ICAR-NBSS&LUP Sujala MWS Publ.453

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

KUNIKERI TANDA-2 (4D3A1Z1b) MICRO WATERSHED

Koppal Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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 Kunikeri Tanda-2 (4D3A1Z1b) Microwatershed, Koppal Taluk and District, Karnataka”, ICAR-NBSS&LUP Sujala MWS Publ.453, ICAR – NBSS & LUP, RC, Bangalore. P.137 & 40.

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

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

KUNIKERI TANDA-2 (4D3A1Z1b) MICRO WATERSHED

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

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

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

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

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

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

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

Nagpur
Date: 25-10-2019

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	Smt. Chaitra, S.P.
	Dr. Gopali Bardhan
	Mr. Somashekar T.N
	Ms. Arpitha G.M
	Dr. Mahendra kumar M.B
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	Smt. Shyla, B.
Smt. K.V.Archana	Smt. Swetha ,K.
Sh. N.Maddileti	Ms. Vidya, P.C.
	Sh. Deepak, M.J.
	Smt. K.Karunya Lakshmi
	Ms. Seema, K.V.

Laboratory Analysis	
Dr. M. Lalitha	Sh. Vindhya, N.G.
Smt. Arti Koyal	Ms. P. Pavanakumari, P.
Smt. Parvathy, S.	Ms. Rashmi, N.
	Ms. Leelavathy, K.U.
	Smt. Usha Kiran, G.
Socio-Economic Analysis	
Dr. S.C. Ramesh Kumar	Sh. M.K. Prakashanaik
	Dr. Shridevi. R.Kanabargi
	Ms. Shraddha Hegde
	Sh. Vinod R
	Sh. Basavaraj
	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 Kunikeri Tanda-2 microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the Microwatershed.

The present study covers an area of 407 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 92 per cent is covered by soil, <1 per cent by rockout crops and 8 per cent by water bodies, settlements The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 9 soil series and 23 soil phases (management units) and 4 land management units.*
- *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 31 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 of the soils are shallow (25-50 cm), <1 per cent by moderately shallow (50-75 cm), 10 per cent moderately deep (75- 100 cm), 81 per cent is deep to very deep (100->150cm) soils.*
- *About 72 per cent loamy (sandy loam and sandy clay loam) and 20 per cent has clayey (clay) soils at the surface.*
- *About 16 per cent of the area has non-gravelly (<15%) soils, 60 per cent has gravelly (15-35 % gravel) and 16 per cent has very gravelly (35-60%) soils.*
- *With respect to available water capacity 10 per cent of the area has very low (<50mm/m), 65 per cent of the area has low (51-100 mm/m), 8 per cent medium*

(101-150 mm/m) and 9 per cent area is high (151-200mm/m) in available water capacity.

- *An area of about 4 per cent has nearly level (0-1%) and 89 per cent has very gently sloping (1-3%) lands.*
- *An area of about 39 per cent is slightly eroded (e1) and 53 per cent is moderately eroded (e2).*
- *An area of about 3 per cent is strongly acid (pH 5.0 to 5.5), 7 per cent is moderately acid, (pH 5.5 to 6.0), 44 per cent is slightly acid (pH 6.0 to 6.5), 32 per cent is neutral (pH 6.5 to 7.3), 6 per cent is slightly alkaline (pH 7.3 to 7.8) and < 1 per cent is moderately alkaline (pH 7.8 to 8.4).*
- *The Electrical Conductivity (EC) of the soils are <2 dsm^{-1} indicating that soils are non saline.*
- *Organic carbon is low (<0.5%) in 48 per cent and medium (0.5-0.75%) in 44 per cent area of the microwatershed.*
- *Available phosphorus is medium (<23 kg/ha) in 76 per cent and high (>57 kg/ha) in 16 per cent area of the soils.*
- *Available potassium is low (<145 kg/ha) in 49 per cent, medium (145-337 kg/ha) in 41 per cent and high (>337 kg/ha) in 3 per cent area of the soils.*
- *Available sulphur is low (<10 ppm) in the entire area of the soils.*
- *Available boron is low (<0.5 ppm) in the entire area of the microwatershed.*
- *Available iron is deficient (<4.5ppm) in 37 per cent and sufficient (>4.5 ppm) in 55 per cent of the area.*
- *Available zinc is deficient (<0.6 ppm) in the entire area of the microwatershed.*
- *Available manganese and copper are sufficient in the entire area.*
- *The land suitability for 31 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	*23(6)*	*63(15)*		*Sapota*	*54(13)*	*71(18)*
Maize	*9(2)*	*76 (19)*		*Pomegranate*	*54(13)*	*71(18)*
Bajra	*55(13)*	*72(18)*		*Guava*	*23(6)*	*103(25)*
Redgram	*35(9)*	*49(12)*		*Jackfruit*	*54(13)*	*71(18)*
Bengal gram	-	*85(21)*		*Jamun*	*13(3)*	*112(27)*
Groundnut	*23 (6)*	*336(82)*		*Musambi*	*54(13)*	*71(18)*
Sunflower	*35(9)*	*49 (12)*		*Lime*	*54(13)*	*71(18)*
Cotton	*26(6)*	*59(15)*		*Cashew*	*23(6)*	*103(25)*
Chilli	*35(9)*	*50(12)*		*Custard apple*	*68(17)*	*305(75)*
Tomato	*35(9)*	*50(12)*		*Amla*	*68(17)*	*305(75)*
Brinjal	*58(14)*	*274(67)*		*Tamarind*	*13(3)*	*155 (38)*
Onion	*16(4)*	*316(78)*		*Marigold*	*23(6)*	*63(15)*
Bhendi	*16(4)*	*316(78)*		*Chrysanthemum*	*23(6)*	*63 (15)*
Drumstick	*68(18)*	*263(65)*		*Jasmine*	*23(6)*	*63(15)*
Mulberry	*68(17)*	*304(75)*		*Crossandra*	*23(6)*	*63(15)*
Mango	*13(3)*	*71(17)*		-	-	-

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the 4 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 for crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested to these problematic soils like saline/alkali, highly eroded, sandy soils etc.,*
- *Soil and water conservation and drainage line treatment plans have been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. That would help in supplementing the farm income, provide fodder and fuel, and generate lot of biomass 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 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 Kunikeri Tanda 2 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 Kunikeri Tanda 2 micro-watershed is located in the central part of Karnataka in Koppal taluk and district (Fig 2.1). It lies between $15^0$16' and $15^0$18' North latitudes and $76^0$11' ad$76^0$12' East longitudes, and covers an area of about 407 ha. It comprises parts of Bahaddhurabandi, Hosahalli, Kunakeri, and Mallikeri villages. It is about 11 km from Koppal town and is bounded by Bahaddhurabandi on the north, Kunakeri on the south and northeast, Mallikeri on the south west and Hosahalli on the western side of the microwatershed.

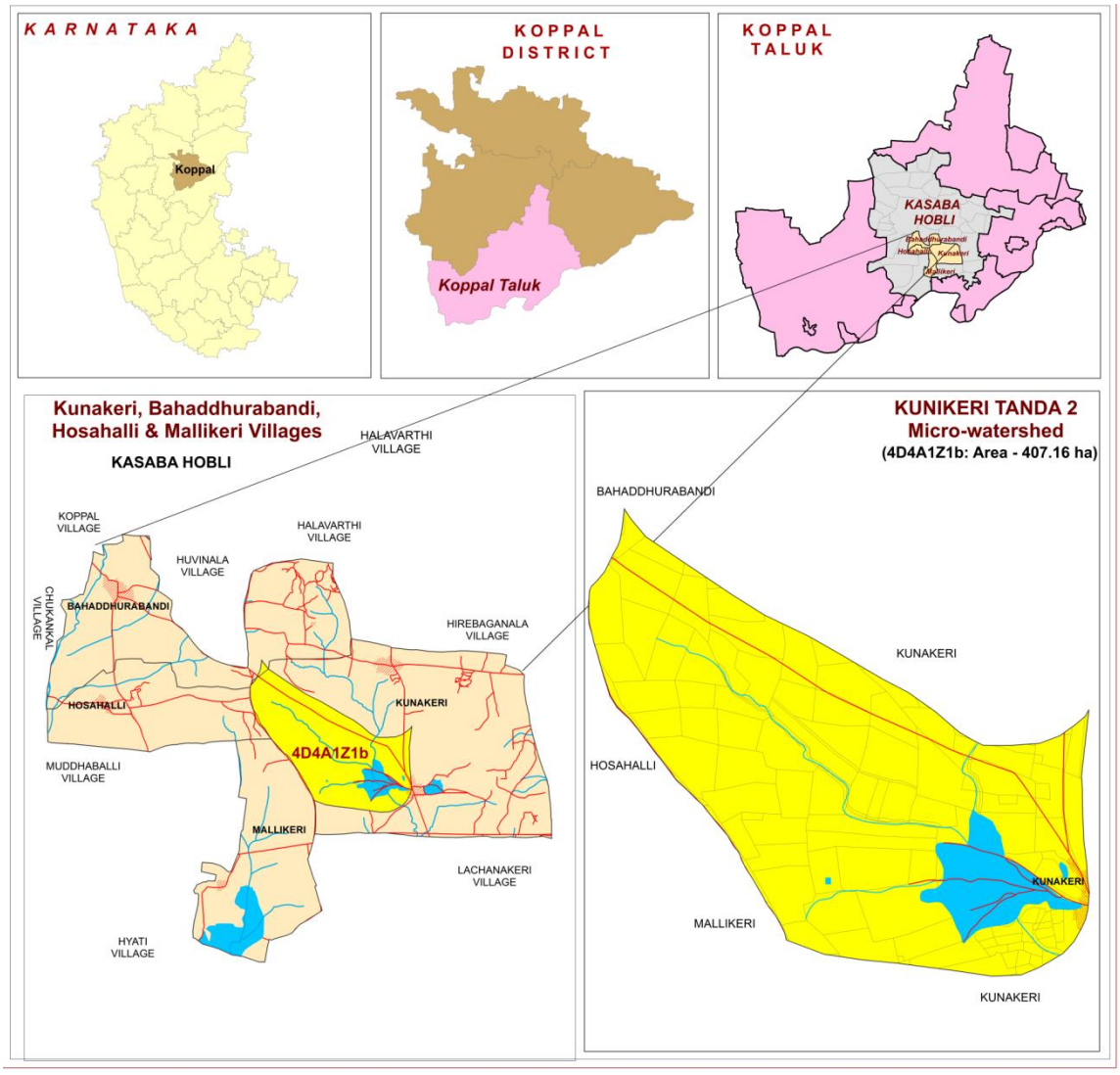


Fig.2.1 Location map of Kunikeri Tanda 2 Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed is granite gneiss (Fig.2.2). Granite gneisses are essentially pink to gray and are coarse to medium grained. They

consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to occur in Kunikeri Tanda 2 village.

Fig.2.2 Granite and granite gneiss rocks

2.3 Physiography

Physiographically, the area has been identified as Granite gneiss landscape based on geology. The microwatershed area has been further divided into mounds/ridges, summits, side slopes and very gently sloping uplands based on slope and its relief features. The elevation ranges from 502 to 530 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 villages. 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**	

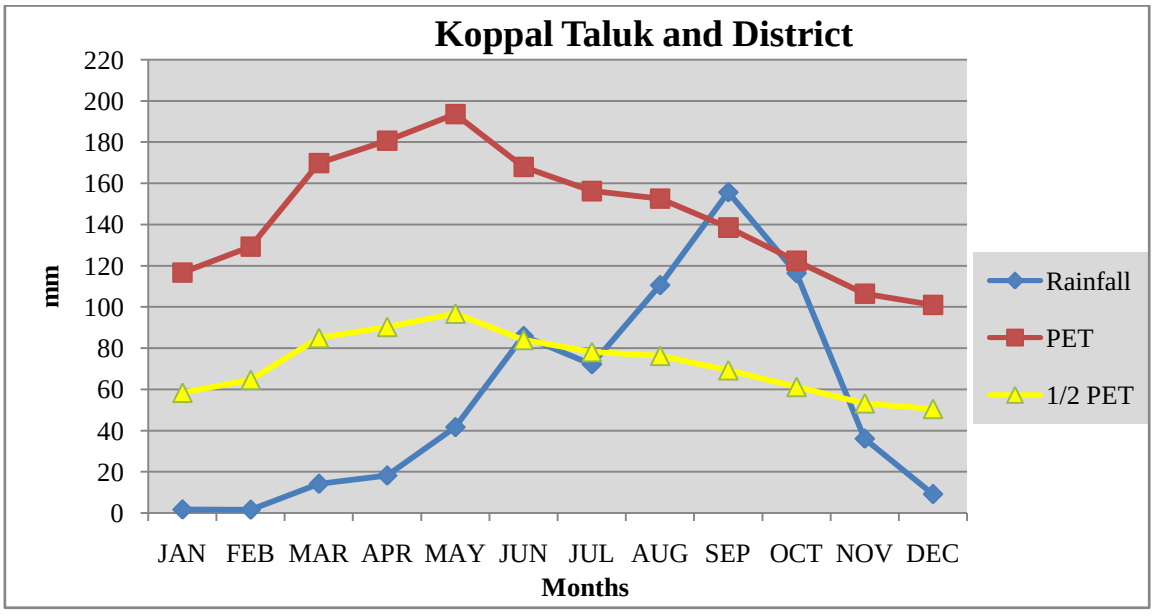


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

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 Kunikeri Tanda 2 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 and 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 Kunikeri Tanda- 2 Microwatershed is presented in Fig.2.6. Simultaneously, enumeration of existing wells (bore wells) is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells in Kunikeri Tanda- 2 Microwatershed is given in Fig 2.7.

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.2.5 (a) Different crops and cropping systems in Kunikeri Tanda 2 Microwatershed

Fig.2.5 (b) Different crops and cropping systems in Kunikeri Tanda 2 Microwatershed

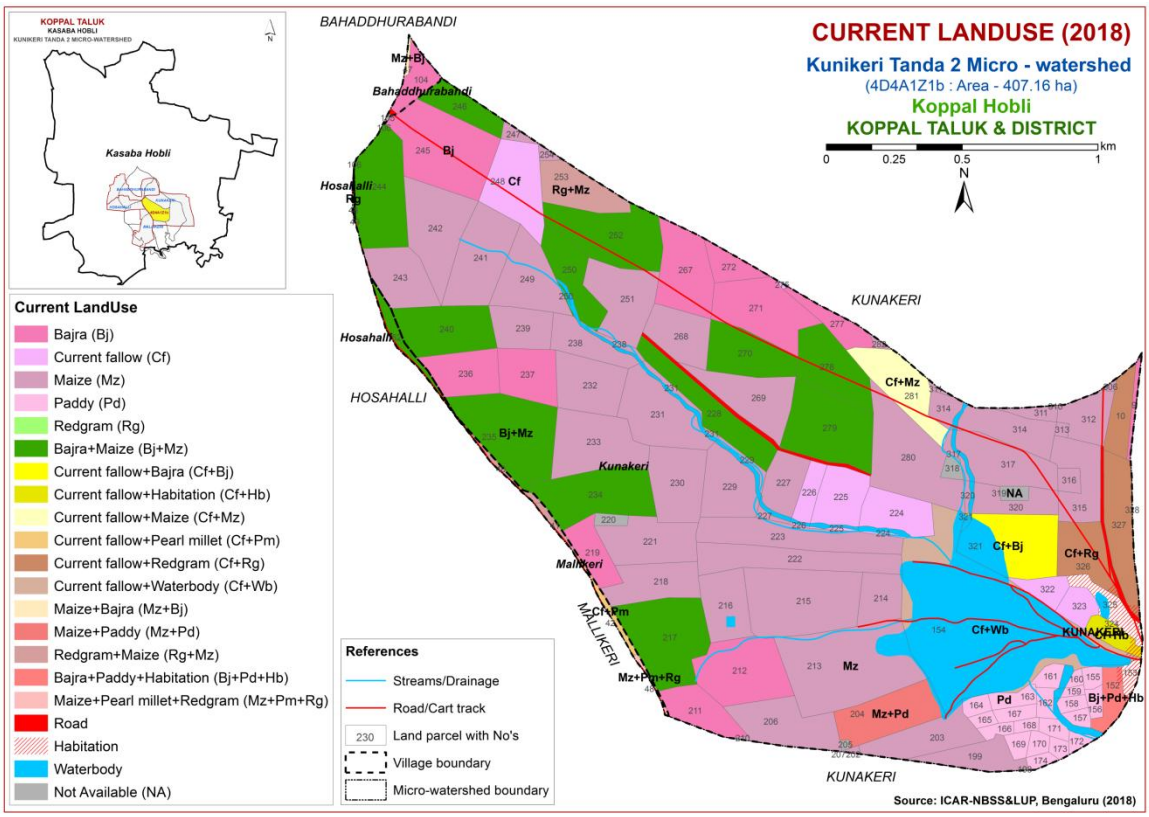


Fig.2.6 Current Land Use – Kunikeri Tanda 2 Microwatershed

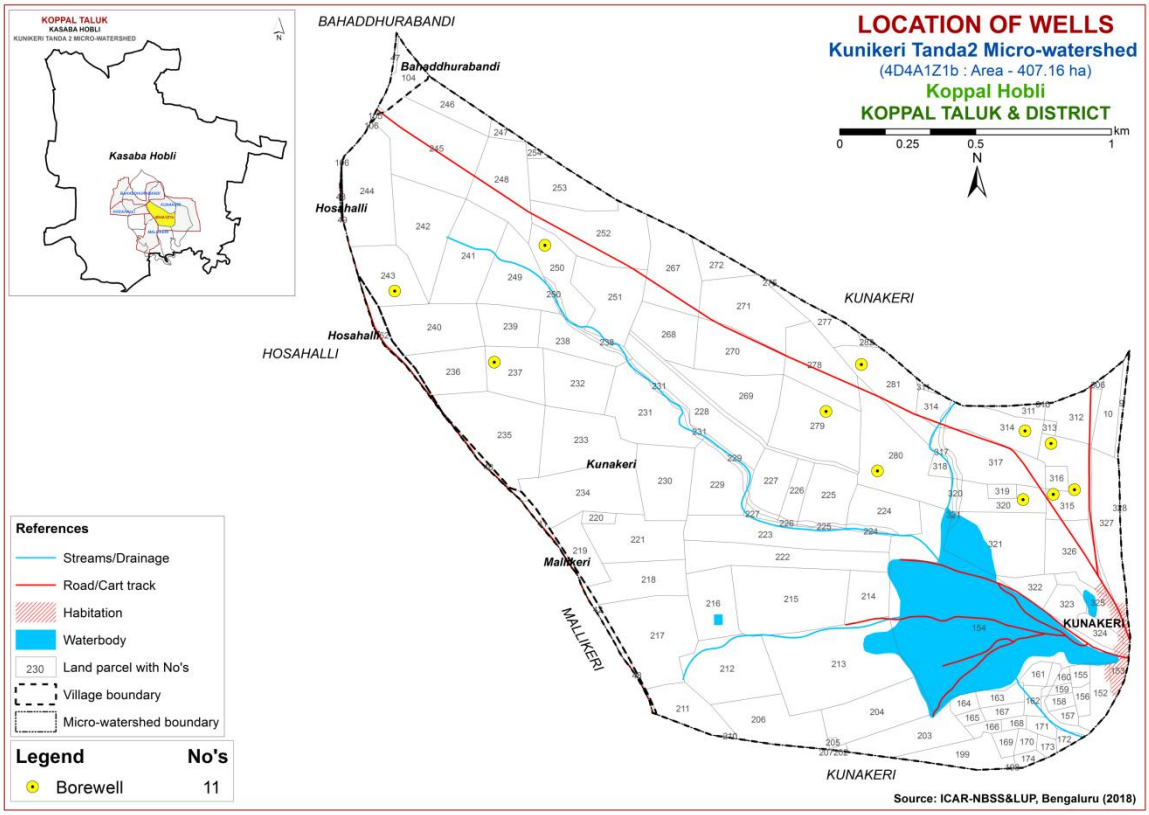


Fig.2.7 Location of wells– Kunikeri Tanda 2 Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Kunikeri Tanda 2 microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics(slope, 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 407 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 landscape 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)

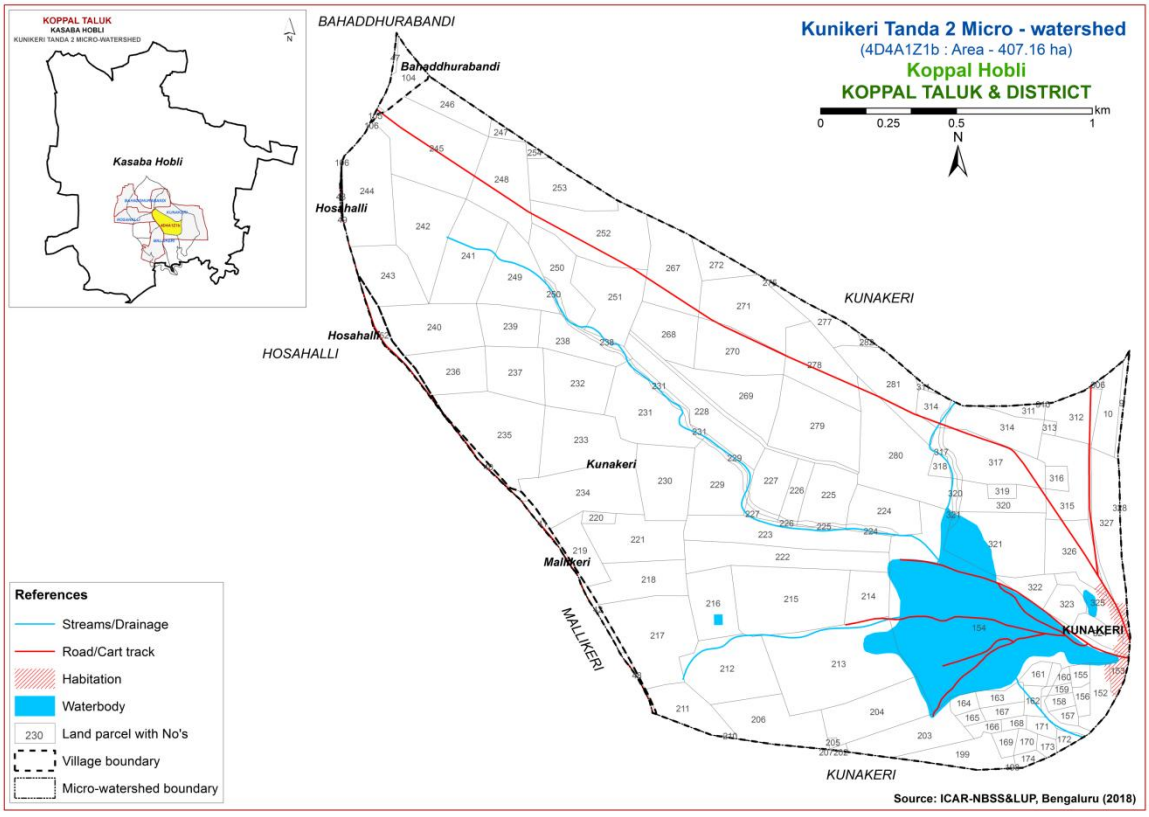


Fig 3.1 Scanned and Digitized Cadastral map of Kunikeri Tanda 2 Microwatershed

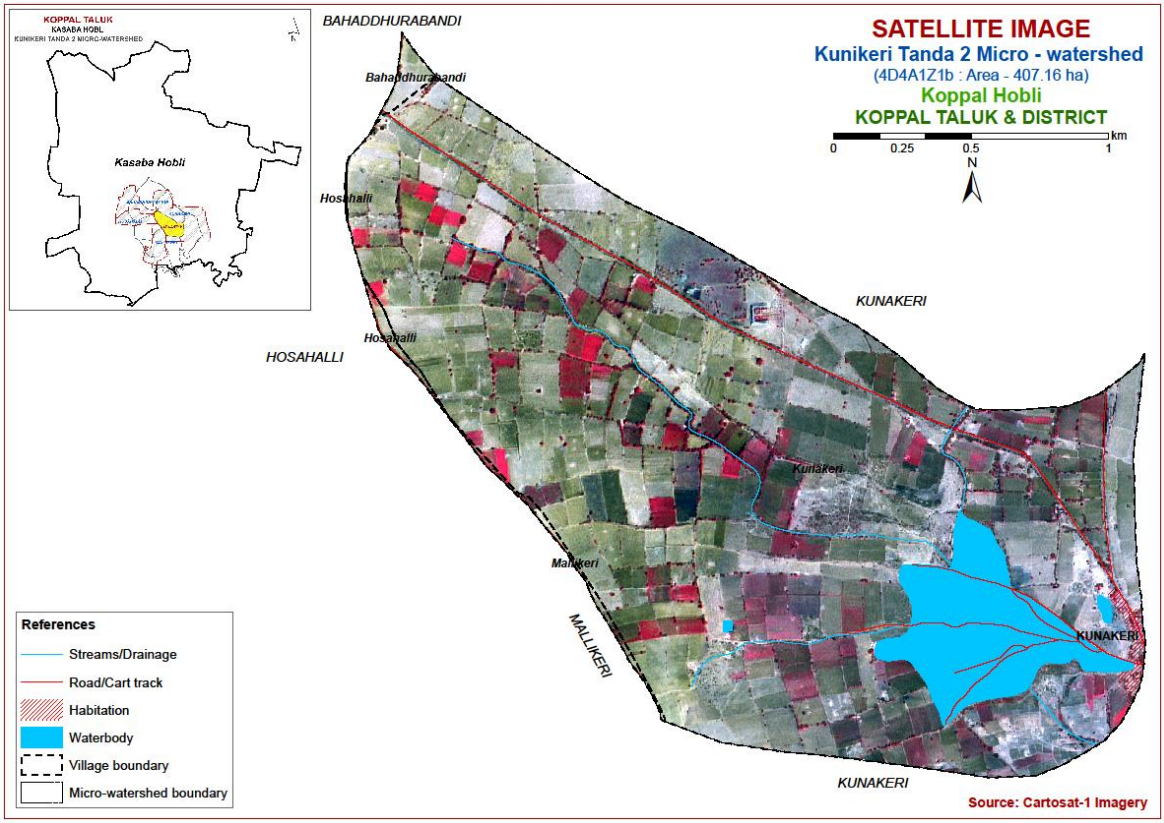


Fig.3.2 Satellite Image of Kunikeri Tanda 2 Microwatershed

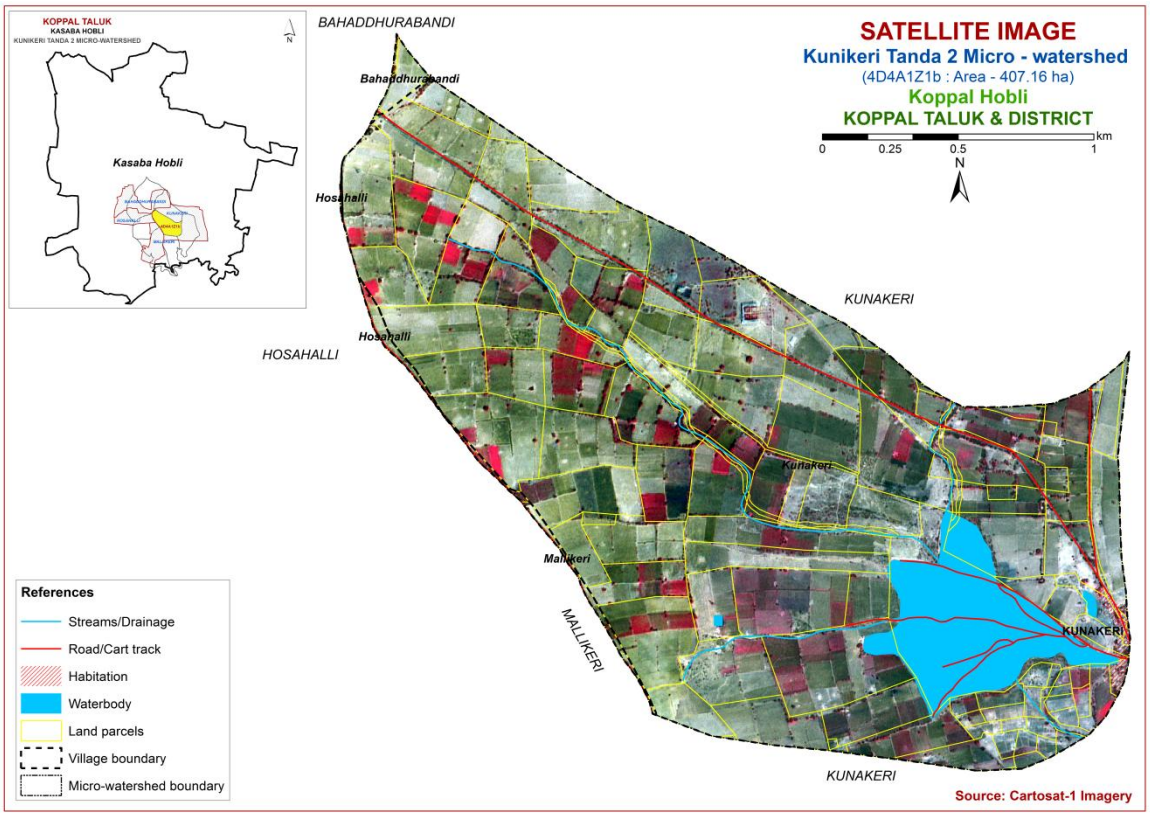


Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Kunikeri Tanda 2 Microwatershed

3.3 Field Investigation

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

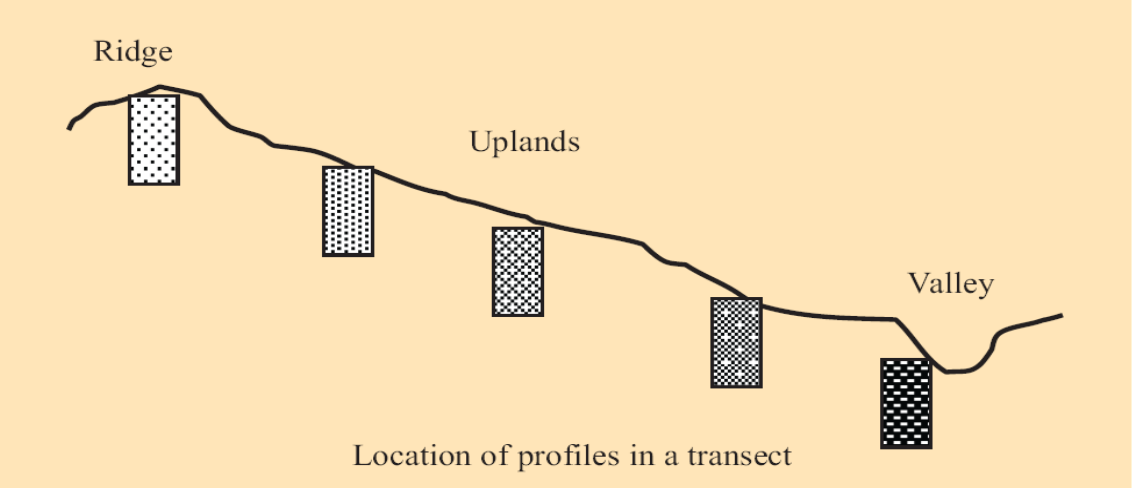


Fig: 3.4. Location of profiles in a transect

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, 9 soil series were identified in Kunikeri Tanda 2 microwatershed.

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

Soils of Granite Gneiss Landscape							
Sl. No	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcareo-usness**
1	**Abbigeri (ABR)**	25-50	2.5YR 3/3, 3/4	gsc	>35	Ap-Bt-Cr	-
2	**Thammadahalli (TDH)**	50-75	2.5YR2.5/4,3/6	sc-c	<15	Ap-Bt-Cr	-
3	**Hooradhahalli (HDH)**	75-100	2.5YR2.5/4,3/4, 3/6	gsc-gc	>35	Ap-Bt-Cr	-
4	**Jedigere (JDG)**	100-150	5YR 4/6, 3/4, 7.5YR 3/4, 4/6	sc-c	<15	Ap-Bt-BC-Cr	-
5	**Vaddarahalli (VDH)**	100-150	7.5YR3/2,3/3,3/4	sc-c	-	Ap-Bt-Cr	-
6	**Balapur (BPR)**	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	
7	**Nagalapur (NGP)**	100-150	5YR2.5/2,3/2, 2.5YR3/6,4/6	gsc	>35	Ap-Bt-Cr	-
8	**Ranatur (RTR)**	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	c	-	Ap-Bt	-
9	**Niduvalalu (NDL)**	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	gsc	>35	Ap-Bt	-

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 23 mapping units representing 9 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 23 phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey

numbers included in one soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units

The 23 soil phases identified and mapped in the microwatershed were regrouped into four 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 Kunikeri Tanda -2 microwatershed, five soil and site characteristics, namely the soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The land management units are expected to behave similarly for a given level of management.

3.6 Laboratory Characterization

Soil samples for each soil series soil 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 2018 from farmer's fields in Kunikeri Tanda- 2 microwatershed (40 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 Kunikeri Tanda- 2 Microwatershed

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite gneiss Landscape				
	ABR	Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown red gravelly sandy clay soils occurring on very gently sloping uplands under cultivation.		**1 (0.27)**
472		ABRiB2g2	Sandy clay surface, slope 1-3%, moderate erosion, very gravelly (35- 60%)	1 (0.27)
	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		**1 (0.26)**
60		TDHiB1	Sandy clay surface, slope 1-3%, slight erosion	1 (0.26)
	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		**41 (10.08)**
111		HDHcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	21 (5.09)

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
121		HDHhB1g2	Sandy clay loam surface, slope 1-3%, slight erosion, very gravelly (35-60%)	9 (2.31)
123		HDHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	11 (2.68)
	JDG	Jedigere soils are deep (100-150 cm), well drained, have dark brown to dark reddish brown red sandy clay to clay soils occurring on nearly level to very gently sloping uplands under cultivation		**32 (7.85)**
211		JDGhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	6 (1.54)
212		JDGiA1g1	Sandy clay surface, slope 0-1%, slight erosion, gravelly (15-35%)	12 (3.01)
458		JDGiB1	Sandy clay surface, slope 1-3%, slight erosion	13 (3.12)
213		JDGiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	1 (0.18)
	VDH	Vaddarahalli soils are deep (100-150 cm), moderately well drained, have dark brown sandy clay to clay soils occurring on nearly level to very gently sloping uplands under cultivation		**23 (5.66)**
243		VDHcB2	Sandy loam surface, slope 1-3%, moderate erosion	9 (2.26)
246		VDHhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	14 (3.4)
	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		**148 (36.48)**
225		BPRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	11 (2.73)
230		BPRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	3 (0.8)
231		BPRhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	84 (20.62)
232		BPRhB2g2	Sandy clay loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	28 (6.97)
239		BPRiB2	Sandy clay surface, slope 1-3%, moderate erosion	22 (5.36)
	NGP	Nagalapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay soils occurring on nearly level to gently sloping uplands under cultivation		**99 (24.3)**
258		NGPhB1g1	Sandy clay loam surface, slope 1-3%, slight erosion, gravelly (15-35%)	69 (16.93)
259		NGPhB1g2	Sandy clay loam surface, slope 1-3%, slight erosion, very gravelly (35-60%)	26 (6.28)

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
262		NGPiB1	Sandy clay surface, slope 1-3%, slight erosion	4 (1.09)
	RTR	Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clayey soils occurring on nearly level to very gently sloping uplands under cultivation		**13 (3.27)**
287		RTRiA1	Sandy clay surface, slope 0-1%, slight erosion	2 (0.53)
288		RTRiB2	Sandy clay surface, slope 1-3%, moderate erosion	11 (2.74)
	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		**16 (3.9)**
299		NDLiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	16 (3.9)
994		Mining/Industrial	Mining/Industrial area	1 (0.12)
999		Rock outcrops	Rock out crops, both massive and bouldery with little or no soil	1 (0.13)
1000		Others	Habitation and water body	31 (7.68)

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

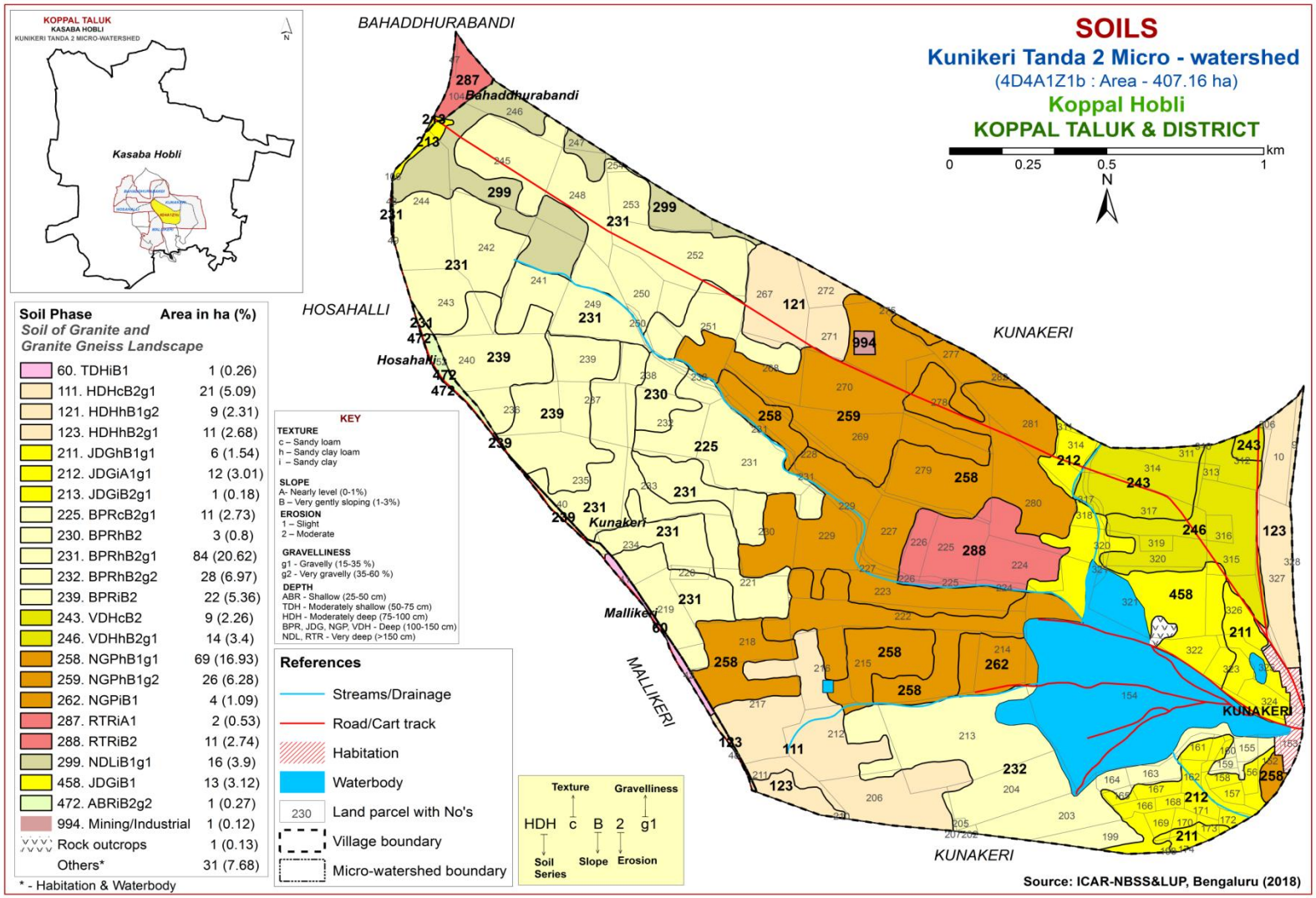


Fig 3.5 Soil Phase or Management Units- Kunikeri Tanda 2 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Kunikeri Tanda 2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss landscape based on geology. In all, 9 soil series 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 9soil series identified followed by 23 soil phases (management units) mapped (Fig. 3.5) are furnished below. The physical and chemical characteristics of soil series identified in Kunikeri Tanda 2 microwatershed are given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of Granite gneiss Landscape

In this landscape, 9 soil series were identified and mapped. Of these series, Balapur (BPR) series occupies maximum area of 148 ha (36 %) followed by Nagalapura (NGP) 99 ha (24 %) and others occupy minor area. The brief description of the soil series along with the soil phases identified and mapped is given below.

4.1.1 Abbigere (ABR) Series: Abbigere soils are shallow (25-50 cm), well drained, have dark reddish brown, to red gravelly sandy clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Abbigere soil series has been classified as a member of the clayey-skeletal, mixed, isohyperthermic family of (Paralithic) Rhodustalfs.

The thickness of the solum ranges from 28 to 48 cm. The thickness of A-horizon ranges from 12 to 17 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 3 to 4. The texture is sandy clay with 20 to 35 per cent gravel. The thickness of B-horizon ranges from 16 to 32 cm. Its colour is in 2.5 YR and 5 YR hue with value 2.5 to 4 and chroma 2 to 3. Its texture is sandy clay with gravel content of more than 35 per cent. The available water capacity is very low (<50 mm/m). One soil phase was identified and mapped.

Landscape Soil Profile Characteristics of Abbigere (ABR) Series

4.1.2 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 weathered 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

4.1.3 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). Three soil phases were identified and mapped.

Landscape and soil profile characteristics of Hooradhahalli (HDH) Series

4.1.4 Jedigere (JDG) Series: Jedigere soils are deep (100-150 cm) well drained, have yellowish red to strong brown sandy clay to clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Jedigere soils have been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 117 to 145 cm. The thickness of A horizon ranges from 13 to 21 cm. Its colour is in hue 5 YR and 7.5 YR with value 2 to 4 and chroma 2 to 6. Its texture is dominantly sandy clay and sand clay loam. The thickness of B horizon ranges from 104 to 124 cm. Its colour is in hue 10 YR and 7.5 YR with value 2 to 4 and chroma 3 to 6. Its texture is dominantly clay. The available water capacity is very high (>200mm/m). Four soil phases were identified and mapped.

Landscape and Soil Profile Characteristics of Jedigere (JDG) Series

4.1.5 Vaddarahalli (VDH) Series: Vaddarahalli soils are deep (100-150 cm), well drained, have dark reddish brown to dark brown, sandy clay to clay soils. They have developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands. The Vaddarahalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustalfs.

The thickness of the solum ranges from 106 to 148 cm. The thickness of A horizon ranges from 13 to 23 cm. Its colour is in 7.5 YR and 10 YR hue with value 3 and chroma 3 to 4. The texture varies from sandy loam to clay. The thickness of B horizon ranges from 95 to 132 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 to 4 and chroma 2 to 4. Its texture is sandy clay to clay. The available water capacity is high (150-200 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Vaddarahalli (VDH) Series

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

The thickness of the solum ranges from 102 to 147 cm. The thickness of A horizon ranges from 12 to 17cm. Its colour is in 5 YR and 2.5 YR hue with value and chroma 3 to 4. The texture ranges from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay to clay with 35 to 50 per cent gravel. The available water capacity is low (51-100 mm/m). Five soil phases were identified and mapped.

Landscape Soil Profile Characteristics of Balapur (BPR) Series

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

The thickness of the solum ranges from 105 to 145 cm. The thickness of A-horizon ranges from 14 to 20 cm. Its colour is in 7.5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam to sandy clay with 10 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 128 cm. Its colour is in 2.5 YR, 5 YR and 7.5 YR hue with value 3 to 5 and chroma 3 to 6. Texture is sandy clay to clay with 35 to 80 per cent gravel. The available water capacity is low (51-100 mm/m). Three soil phases were identified and mapped.

Landscape Soil Profile Characteristics of Nagalapur (NGP) Series

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

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

Landscape and soil profile characteristics of Ranatur (RTR) Series

4.1.9 Niduvalalu (NDL) Series: Niduvalalu soils are very deep (>150 cm), well drained, have dark red and 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. Niduvalalu series has been classified as a member of the clayey – skeletal, mixed isohyperthermic family of Rhodic Paleustalfs.

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). One soil phase was identified and mapped.

Landscape Soil Profile Characteristics of Niduvalalu (NDL) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Kunikeri Tanda 2 microwatershed

Series Name: Abbigeri (ABR), **Pedon:**R-11
Location: $15^0$26'14.0"N, $76^0$16'39.0"E Abbigeri village, Koppal taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bangalore **Classification:** Clayey- skeletal, mixed, isohyperthermic (Paralithic) 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
0-10	Ap	81.18	8.29	10.53	24.31	11.90	19.33	16.07	9.56	20	ls	7.13	3.91
10-25	Bt1	54.32	7.39	38.29	26.64	11.34	5.83	6.24	4.27	40	sc	14.71	11.30
25-40	Bt2	53.84	7.99	38.17	22.10	14.32	6.43	6.85	4.15	50	sc	16.45	12.00

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	6.13	-	-	0.02	0.81	-	1.56	0.50	0.04	0.01	2.12	3.60	0.34	58.76	0.36
10.-25	6.32	-	-	0.03	0.79	-	5.63	2.41	0.12	0.01	8.17	10.60	0.28	77.07	0.10
25-40	6.27	-	-	0.03	0.64	-	5.41	2.24	0.08	0.01	7.74	12.40	0.32	62.44	0.09

Contd…

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	5.82
25-65	8.00	-	-	0.17	0.35	0.58	-	-	0.15	1.31	1.46	13.87	0.31	100.00	3.78

Contd…

Soil Series: Hooradhahalli (HDH), **Pedon:** RM-69
Location: $13^0$24'31"N, $76^0$33'41"E, (4D3D8G2d), Hesarahalli village, Chikkanayakanahalli taluk, Tumukura 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

Contd…

Series Name: Jedigere (JDG) **Pedon:** R5

Location: $15^0$29'06"N, $76^0$10'38" E Chennahalu village, Yelburga taluk and Koppal district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-14	Ap	70.63	8.33	21.04	16.26	23.58	13.41	11.59	5.79	-	scl	13.46	6.17
14-39	Bt1	49.95	11.56	38.49	10.61	17.40	10.30	7.42	4.22	-	sc	23.07	13.70
39-62	Bt2	45.88	11.44	42.68	10.72	16.70	9.28	6.80	2.37	-	sc	25.24	15.20
62-94	Bt3	42.89	8.51	48.61	9.48	14.54	8.35	6.80	3.71	-	c	25.30	14.07
94-118	Bt4	45.24	11.90	42.86	10.66	15.53	8.59	6.63	3.83	-	sc	23.52	13.58

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-14	6.11			0.078	0.83		5.58	2.49	0.18	0.19	8.45	9.41	0.45	90	2.06
14-39	6.87			0.123	0.67		12.01	5.62	0.32	0.29	18.24	18.22	0.47	100	1.59
39-62	7.65			0.121	0.50				0.42	0.43		21.68	0.51	-	1.99
62-94	8.21			0.188	0.28				0.34	0.41		21.09	0.43	-	1.93
94-118	8.23			0.189	0.24				0.33	0.36		17.62	0.41	-	2.02

Contd…

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

Contd…

Series Name: Nagalapur (NGP) **Pedon :** R-10
Location: $15^0$26'38.0"N, $76^0$10'27.0" E Budashettynala village, Koppal taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bangalore **Classification:** Clayey- skeletal, mixed isohyperthermic Typic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-16	Ap	78.43	6.36	15.21	25.23	18.82	14.04	13.22	7.12	30	sl	9.32	5.56
16-38	Bt1	46.97	8.53	44.51	14.33	12.34	7.43	6.80	6.07	30	sc	18.70	13.79
38-58	Bt2	51.92	7.48	40.60	20.98	10.07	7.37	7.48	6.02	40	sc	17.93	13.75
58-81	Bt3	54.05	7.18	38.77	27.07	10.58	5.91	5.81	4.67	50	sc	17.92	11.87
81-104	Bt4	59.03	8.93	32.04	21.88	13.11	8.88	8.05	7.12	50	scl	16.63	10.55
104-126	BC	62.35	9.26	28.40	21.19	14.51	9.88	8.13	8.64	60	scl	15.03	10.06

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}							%	%
0-16	6.77	-	-	0.09	0.82	-	3.52	2.14	0.18	0.03	5.87	7.10	0.47	82.70	0.46
16-38	6.89	-	-	0.06	0.57	-	9.35	3.85	0.10	0.21	13.50	14.70	0.33	91.87	1.40
38-58	6.80	-	-	0.06	0.52	-	8.76	3.42	0.10	0.26	12.55	14.20	0.35	88.35	1.85
58-81	6.84	-	-	0.06	0.32	-	7.67	2.77	0.10	0.58	11.12	12.90	0.33	86.18	4.48
81-104	6.86	-	-	0.05	0.20	-	6.97	2.07	0.09	0.95	10.07	11.90	0.37	84.59	7.95
104-126	6.70	-	-	0.07	0.10	-	5.53	1.77	0.07	0.73	8.09	9.40	0.33	86.09	7.77

Contd…

Soil Series: Ranatur (RTR), **Pedon:** TR7-3
Location: $15^0$07'58.3"N, $75^0$38'30.6"E, (4D4A3G2d), Devihal-4 microwatershed, 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
0-10	Ap	80.08	8.23	11.69	7.22	16.46	17.68	21.95	16.77	<5	sl	-	-
10-34	Bt1	44.96	12.64	42.39	3.84	11.42	10.07	11.32	8.31	<5	c	-	-
34-71	Bt2	43.35	13.02	43.63	5.20	10.40	9.77	9.77	8.21	<5	c	-	-
71-100	Bt3	47.00	10.23	42.77	10.43	12.71	9.09	7.54	7.23	<5	sc	-	-
100-138	Bt4	45.04	12.78	42.17	8.37	10.33	9.30	9.19	7.85	<5	sc	-	-
138-170	Bt5	44.63	13.79	41.58	9.19	8.99	8.26	9.40	8.78	<5	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}							%	%
0-10	6.47	-	-	0.03	0.49	0.00	5.61	1.33	0.13	0.01	7.07	7.07	0.60	100.00	0.41
10-34	6.46	-	-	0.03	0.57	0.00	11.69	3.19	0.14	0.01	15.03	16.87	0.40	89.00	0.06
34-71	7.23	-	-	0.03	0.53	1.20	-	-	0.16	0.01	-	17.33	0.40	100.00	0.06
71-100	7.60	-	-	0.03	0.3	0.30	-	-	0.17	0.04	-	17.21	0.40	100.00	0.23
100-138	7.88	-	-	0.03	0.6	0.42	-	-	0.17	0.15	-	16.30	0.39	100.00	0.92
138-170	8.12	-	-	0.08	0.64	0.60	-	-	0.14	0.06	-	16.87	0.41	100.00	0.36

Contd…

Series Name: Niduvalalu (NDL) **Pedon:** R-20
Location: $15^0$12'78.8"N, $75^0$57'44.0" E Raghunathanahalli village, Koppal taluk and district
Analysis at: NBSS&LUP, Regional Centre, Bangalore **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
0-16	Ap	79.83	7.02	13.15	9.36	11.02	19.54	28.59	11.33	35-40	sl	14.30	5.17
16-31	Bt1	54.75	10.89	34.36	12.81	7.47	12.17	11.95	10.35	55-60	scl	24.67	14.17
31-44	Bt2	44.64	2.31	53.06	17.06	8.48	7.19	8.05	3.86	65-70	c	30.02	17.19
44-79	Bt3	47.28	2.50	50.21	24.17	8.20	6.07	5.96	2.88	65-70	sc	27.19	14.87
79-107	Bt4	47.79	8.17	44.04	13.38	5.72	11.11	11.87	5.72	60-65	sc	25.96	14.23
107-140	Bt5	46.16	3.57	50.27	21.75	7.57	6.40	6.72	3.73	60-65	sc	27.28	15.13
140-180	Bt6	49.47	3.94	46.59	22.49	8.21	6.29	7.78	4.69	65-70	sc	27.56	14.76

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-16	7.46	-	-	0.08	0.76		6.26	4.05	0.12	0.09	10.52	11.45	0.87	91.88	0.32
16-31	7.84	-	-	0.28	1.05	2.86	-	-	0.18	1.41	-	27.36	0.80	100.00	2.06
31-44	7.69	-	-	0.46	0.81	2.99	-	-	0.24	2.63	-	32.59	0.61	100.00	3.23
44-79	7.92	-	-	0.11	0.35	1.69	16.29	3.51	0.14	2.63	22.57	22.56	0.45	100.03	4.66
79-107	7.86	-	-	0.09	0.23	1.43	12.98	2.83	0.10	1.82	17.73	17.88	0.41	99.19	4.07
107-140	8.20	-	-	0.07	0.23	1.17	16.26	3.41	0.13	1.85	21.65	20.82	0.41	104.01	3.56
140-180	8.11	-	-	0.20	0.15	1.82	-	-	0.11	1.29	-	20.71	0.44	100.00	2.49

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 23 soil map units identified in the Kunikeri Tanda 2 Microwatershed are grouped under two land capability classes and five land capability subclasses (Fig. 5.1).

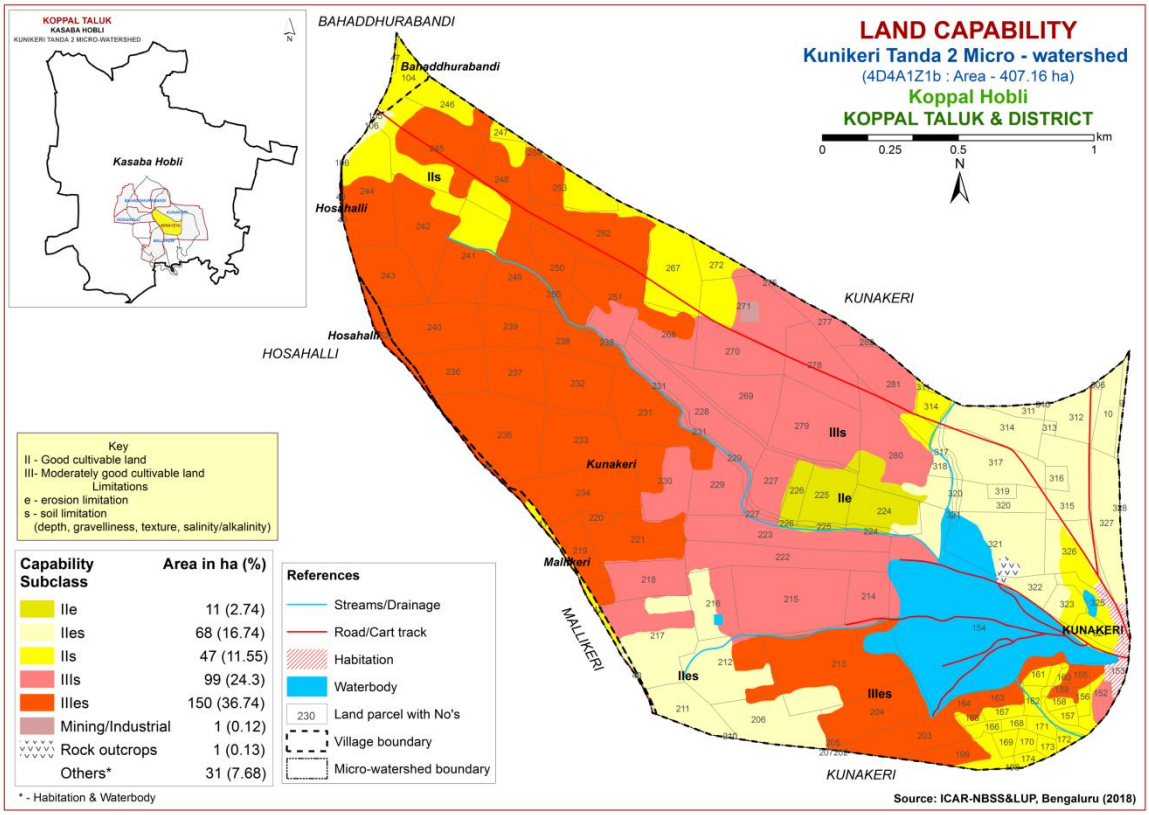


Fig. 5.1 Land Capability map of Kunikeri Tanda 2 Microwatershed

Entire cultivated area in the microwatershed is suitable for agriculture. Good lands (Class II) cover an area of about 126 ha (31%) and distributed in the southern, eastern and northern part of the microwatershed with minor problems of soil and erosion. Moderately good lands (Class III) occupy an area of about 249 ha (61%) and distributed in the major part of the microwatershed with severe limitations of soil and erosion. An area of about 1 ha (<1%) is covered by rock out crops, 1 ha (<1%) under mining/ industrial area and 31 ha (8%) is under habitation and water body.

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.

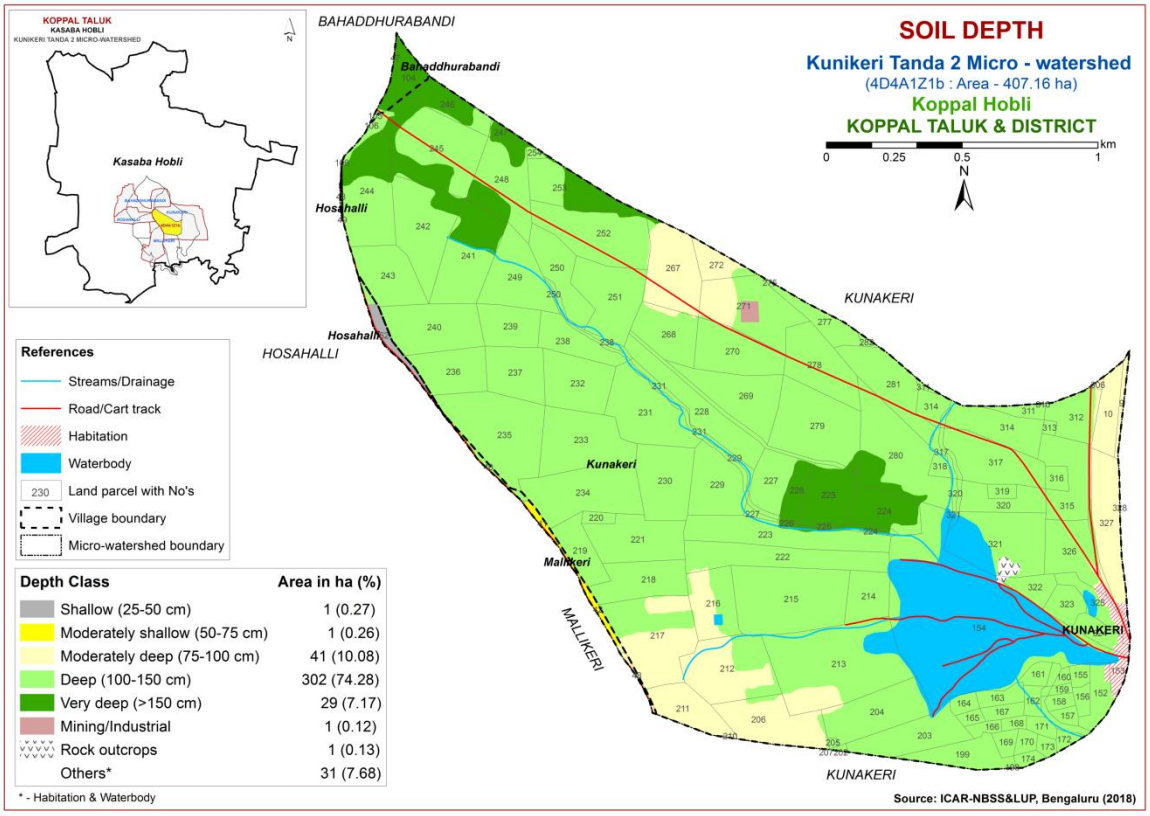


Fig. 5.2 Soil Depth map of Kunikeri Tanda 2 Microwatershed

Shallow soils (25-50 cm) cover an area of about 1 ha (<1%) and distributed in the northwestern part of the microwatershed. Moderately shallow (50-75 cm) soils cover an

area of about 1 ha (<1%) and distributed in the southern, northern and eastern part of the microwatershed. An area of about 41 ha (10%) is moderately deep soils (75-100 cm) and distributed in the southern, eastern and northern part of the microwatershed. Deep to very deep (100- >150 cm) soils occupy an area of about 331 ha (81%) and distributed in the major part of the microwatershed.

The most productive lands cover about 331 ha (81%) where all climatically adopted long duration crops be grown. The problem lands cover about 1 ha (<1%) where only short duration can be grown. The probability of crop failure is very high.

5.3 Surface Soil Texture

Texture is an expression to indicate the coarseness or fineness of the soil as determined by the relative proportion of primary particles of sand, silt and clay. It has a direct bearing on the structure, porosity, adhesion and consistence. The surface layer of a soil to a depth of about 25 cm is the layer that is most used by crops and plants. The surface soil textural class provides a guide to understanding soil-water retention and availability, nutrient holding capacity, infiltration, workability, drainage, physical and chemical 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.

An area of about 292 ha (72%) is loamy (sandy loam and sandy clay loam) at the surface and distributed in the major part of the microwatershed. Clay (sandy clay) soils cover about 83 ha (20%) and are distributed in the eastern, southern and northern part of the microwatershed.

The most productive lands with respect to surface soil texture are clayey soils that (20%) have high potential for soil-water retention and availability and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other productive lands are loamy (72%) soils which also have high potential for soil- water retention and nutrient availability but have no drainage or other physical problems.

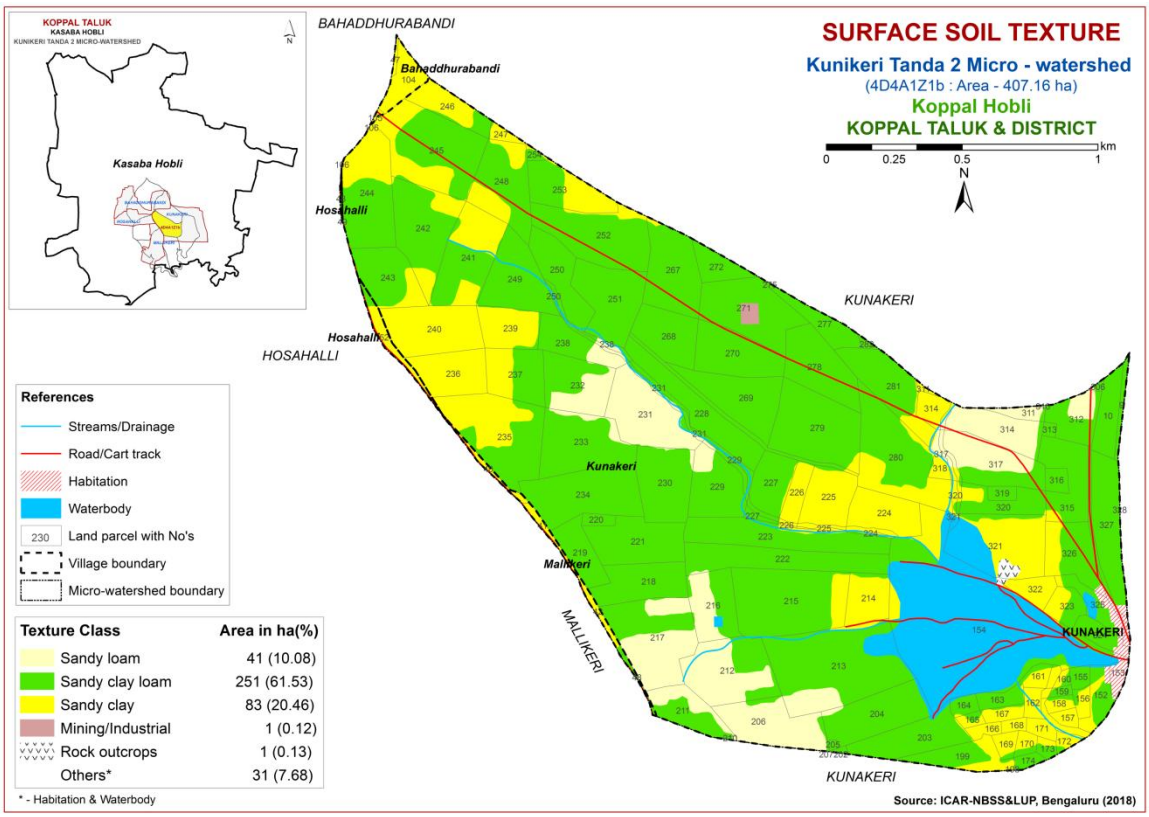


Fig. 5.3 Surface Soil Texture map of Kunikeri Tanda 2 Microwatershed

5.4 Soil Gravelliness

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

The soils that are non-gravelly (<15% gravel) cover an area of about 66 ha (16 %) and distributed in the eastern, southern and northern part of the microwatershed. An area of about 245 ha (60 %) is covered by gravelly (15-35% gravel) soils and are distributed in the major part of the microwatershed. Very gravelly soils (35-60%) cover about 64 ha (16%) and distributed in the northern and southern part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 16 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 16 per cent where only short duration crops can be grown.

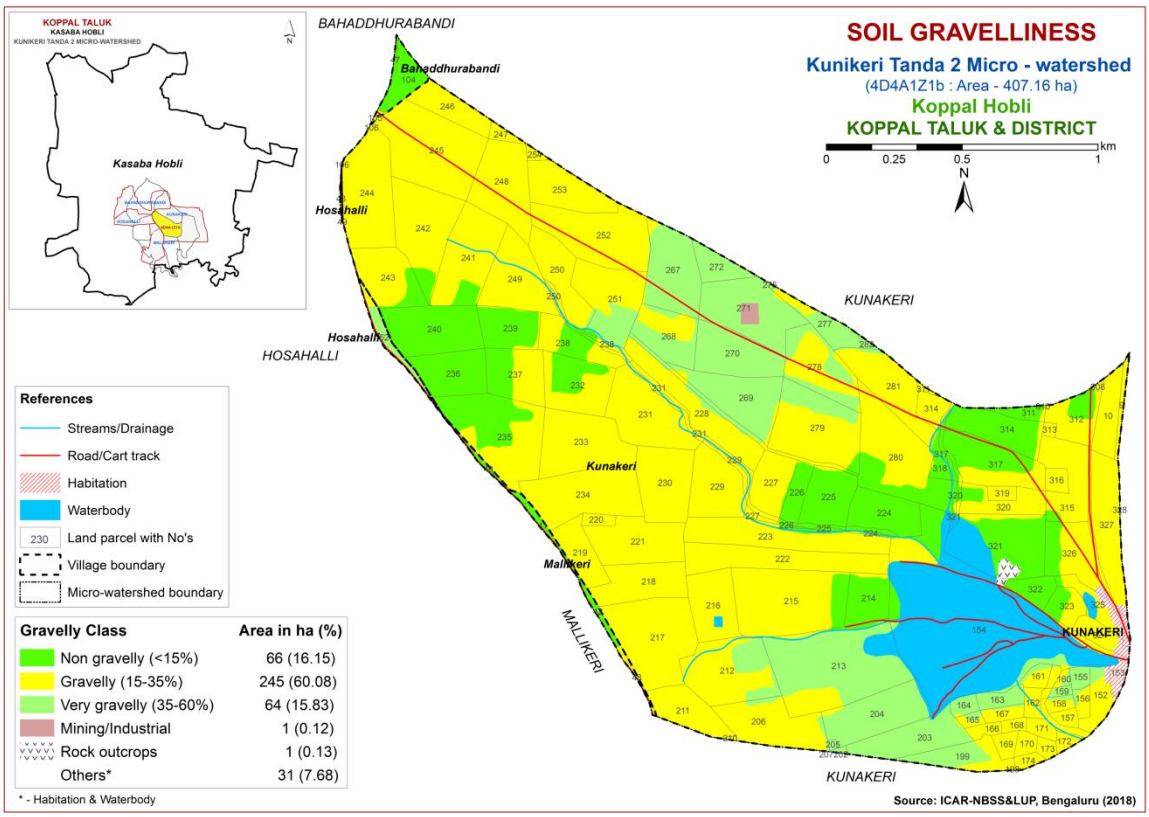


Fig. 5.4 Soil Gravelliness map of Kunikeri Tanda 2 Microwatershed

5.5 Available Water Capacity

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

An area of about 42 ha (10%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the southern, eastern and northern part of the microwatershed. Maximum area of about 264 ha (65%) has soils that are low (51 to 100 mm/m) in available water capacity and are distributed in the major part of the microwatershed. An area of about 32 ha (8%) has soils that are medium (101-150 mm/m) in available water capacity and are distributed in the eastern part of the microwatershed. An area of about 36 ha (9 %) is high (151-200 mm/min) in available water capacity and distributed in the eastern and northern part of the microwatershed.

An area of about 306 ha (75%) 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 36 ha (9%) 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.

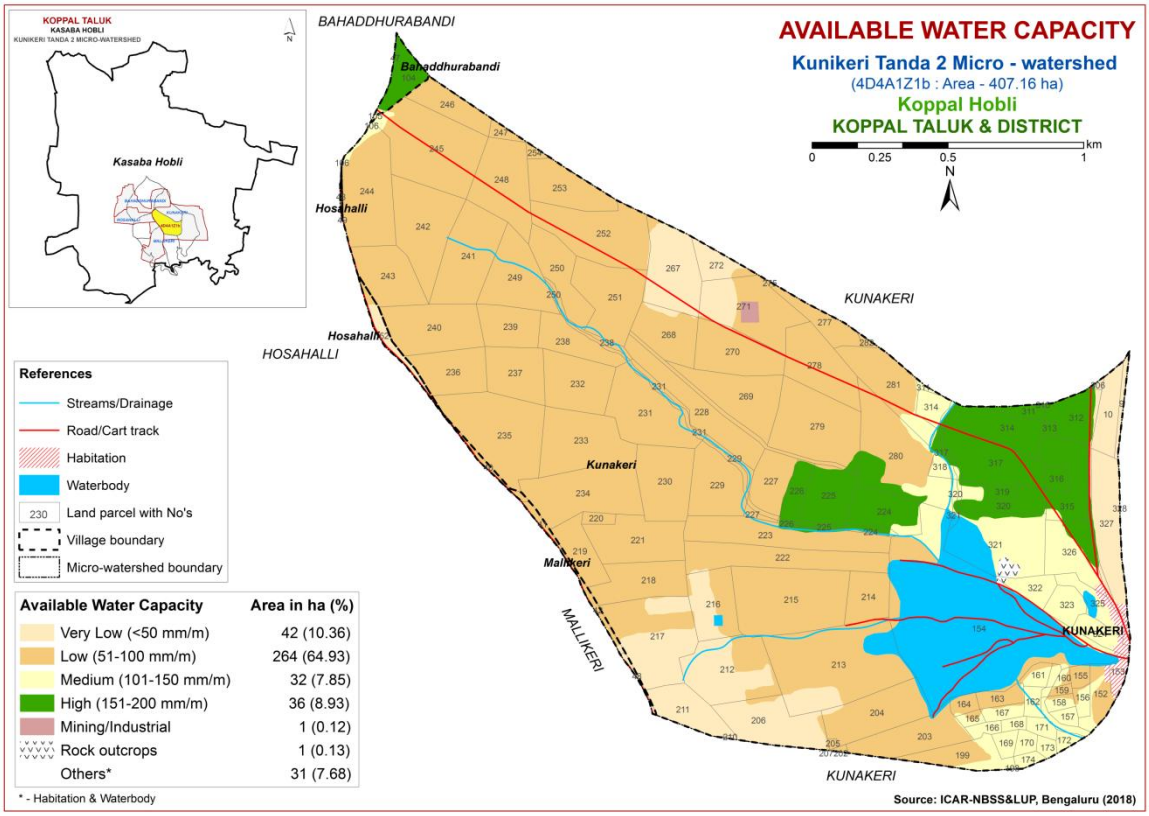


Fig. 5.5 Soil Available Water Capacity map of Kunikeri Tanda 2 Microwatershed

5.6 Soil Slope

Soil slope refers to the inclination of the surface of the land. It is defined by gradient, shape and length, and is an integral feature of any soil as a natural body. Slope is considered important in soil genesis, land use and land development. The length and gradient of slope influences the rate of runoff, infiltration, erosion and deposition. The soil map units were grouped into two 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).

Nearly level (0-1%) lands cover an area of about 14 ha (4%) and distributed in the southern and northern part of the microwatershed. Very gently sloping (1-3%) lands cover a maximum area of about 360 ha (89%) and distributed in the major 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.

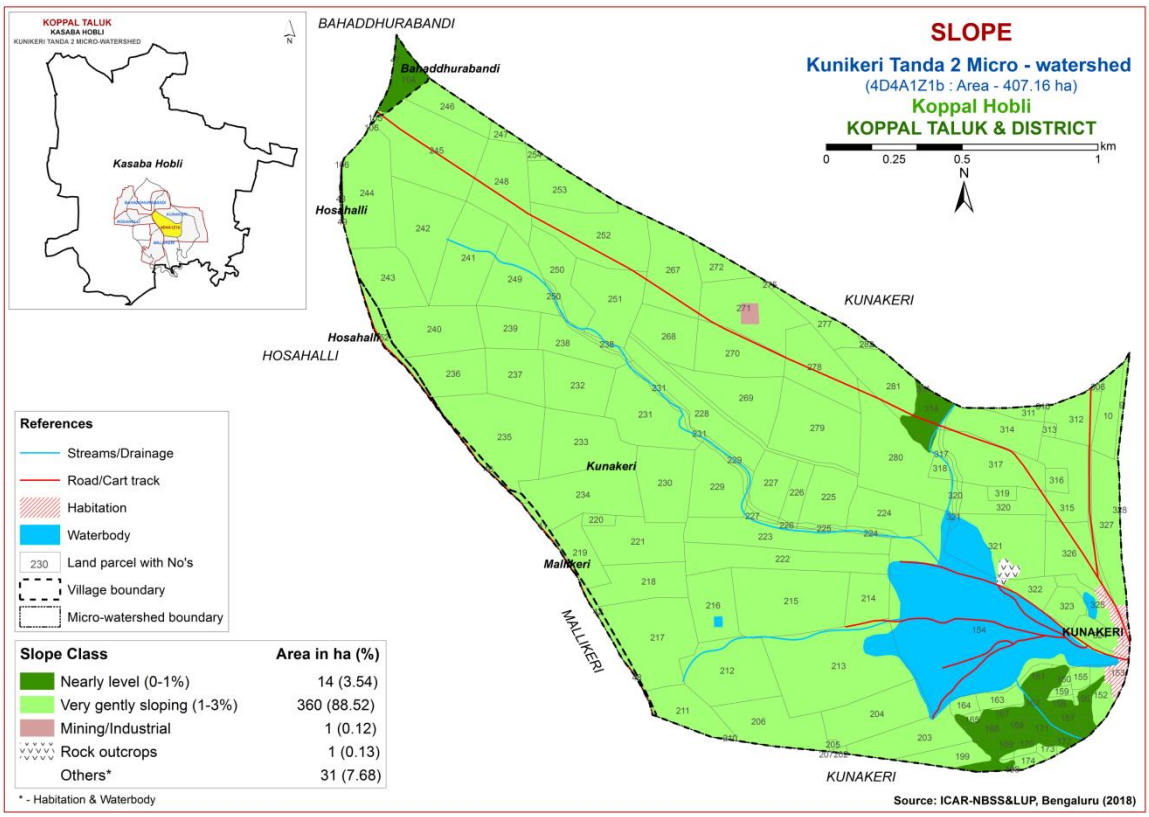


Fig. 5.6 Soil Slope map of Kunikeri Tanda 2 Microwatershed

5.7 Soil Erosion

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

Slightly eroded lands cover an area of about 159 ha (39 %) and distributed in the eastern, northern and central part of the microwatershed. Maximum area of about 216 ha (53 %) is moderately eroded (e2 class) and distributed in the major part of the microwatershed. Moderately eroded lands are problematic and need appropriate soil and water conservation and other land development measures.

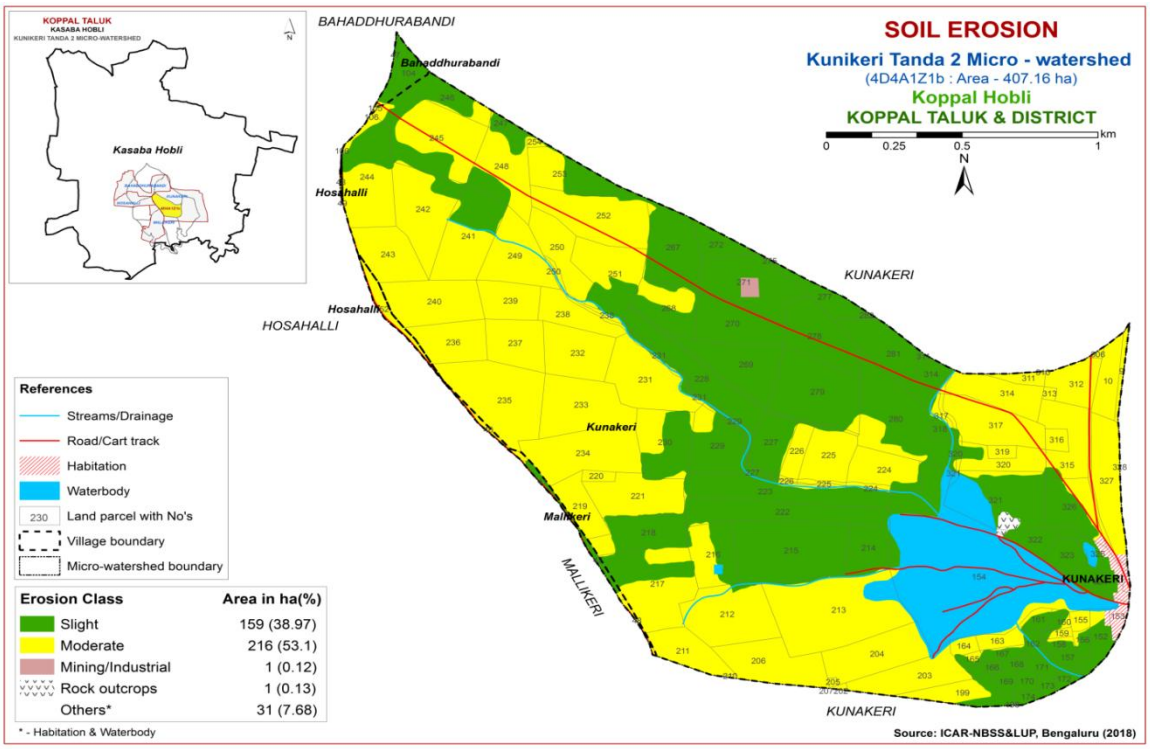


Fig. 5.7 Soil Erosion map of Kunikeri Tanda 2 Microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are 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 2018 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 Kunikeri Tanda 2 microwatershed for soil reaction (pH) showed that strongly to moderately acid (pH 5.0-6.0) soils cover an area of about 41 ha (10%) and distributed in the northern part of the microwatershed. Slightly acid (pH 6.0-6.5) soils cover an area of about 178 ha (44%) and distributed in the major part of the microwatershed. Neutral soils (pH 6.5-7.3) cover about 129 ha (32%) and distributed in the eastern and central part of the microwatershed. Moderately alkaline (pH 7.3-8.4) soils cover an area of about 3 ha (<1%) and distributed in the northeastern part of the microwatershed. (Fig.6.1). Acid soils cover about 219 ha (54%), 129 ha (32%) is neutral and 27 ha (7%) is alkaline in reaction.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

An area of about 197 ha (48%) is low (<0.5%) in OC and distributed in the major part of the microwatershed. An area of about 178 ha (44%) is medium (0.5-0.75%) and distributed in the western and eastern part of the microwatershed (Fig.6.3).

6.4 Available Phosphorus

Maximum area of about 309 ha (76%) is medium (23-57 kg/ha) and distributed in the major part of the microwatershed. An area of about 66 ha (16 %) is high (>57 kg/ha) and distributed in the southern part of the microwatershed. The areas with high

phosphorus content reduce 25 per cent from the recommended dose to avoid the excess application of fertilizer. Apply additional 25% phosphorus in areas where it is medium (Fig 6.4).

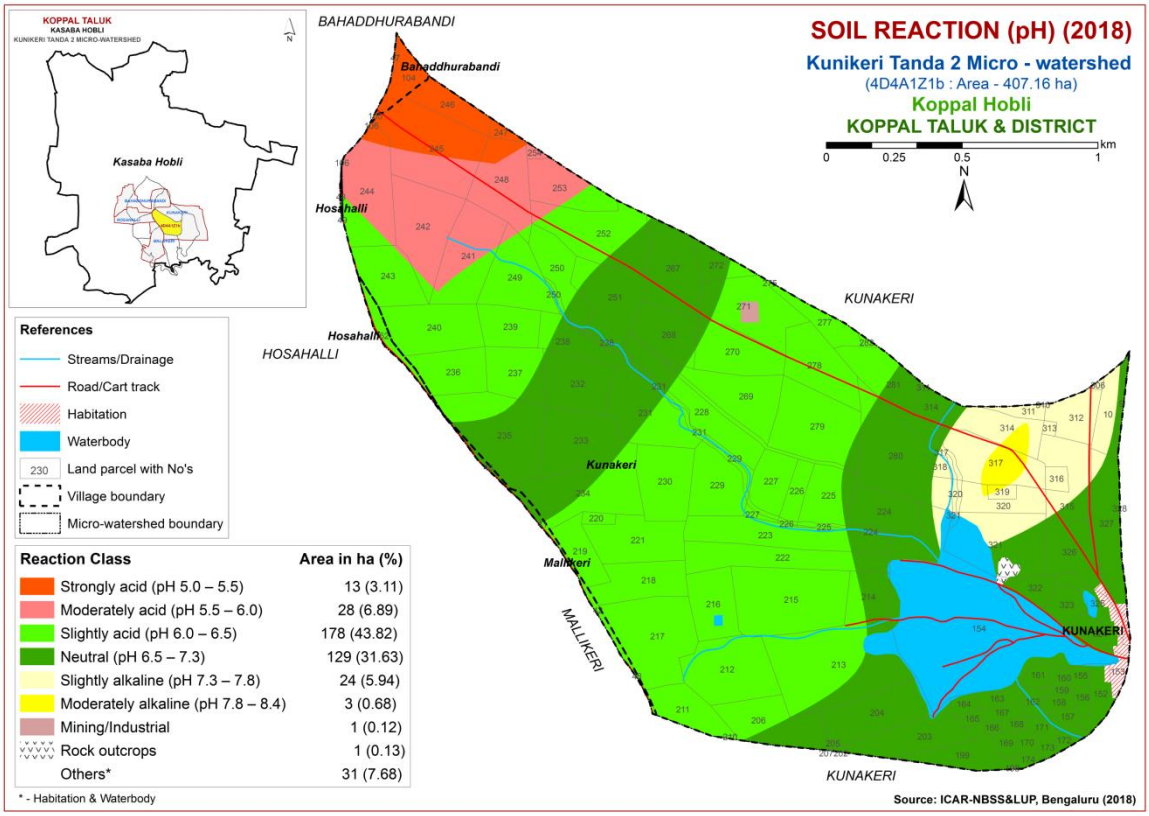


Fig.6.1 Soil Reaction (pH) map of Kunikeri Tanda 2 Microwatershed

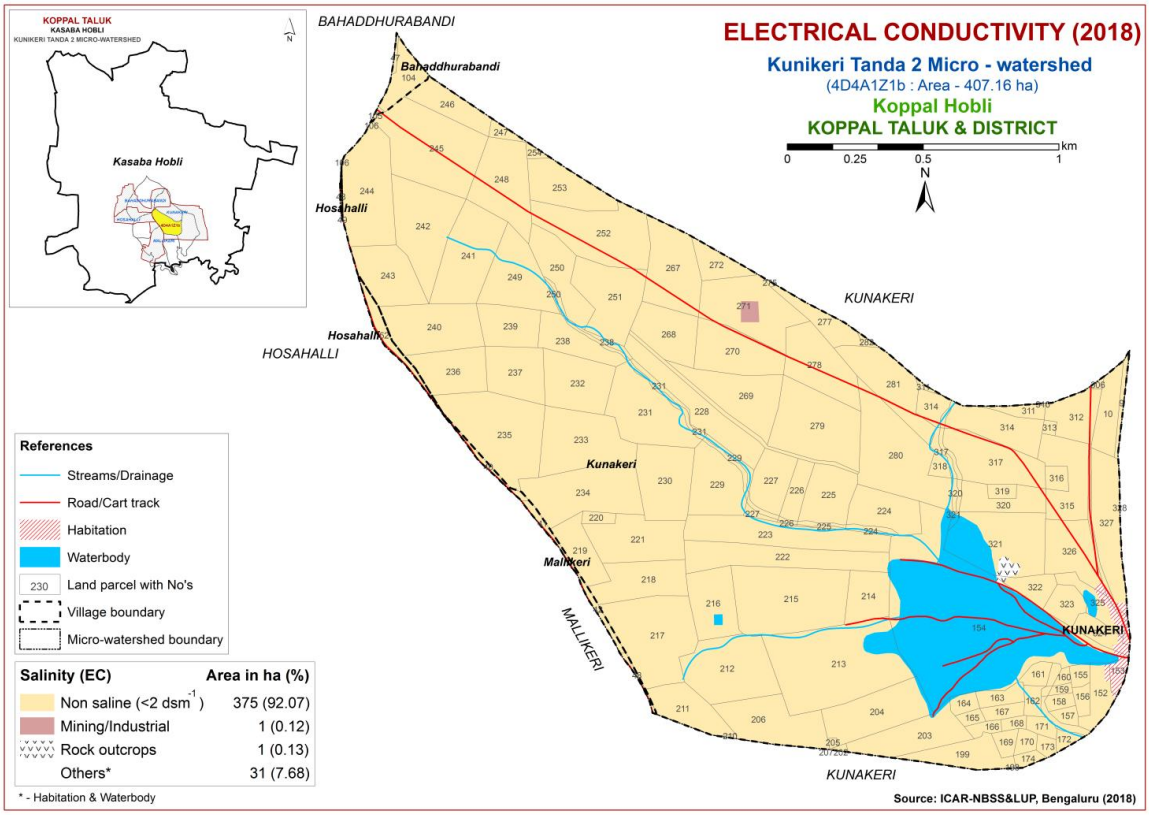


Fig.6.2 Electrical Conductivity (EC) map of Kunikeri Tanda 2 Microwatershed

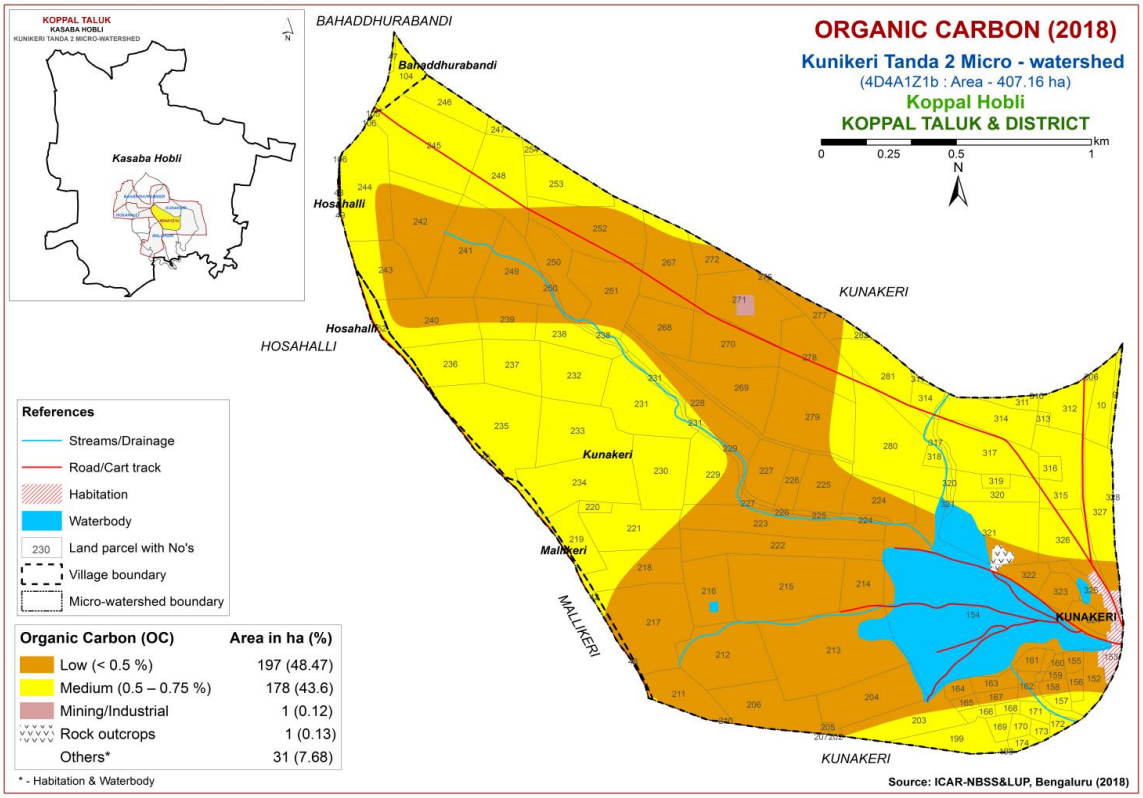


Fig.6.3 Soil Organic Carbon map of Kunikeri Tanda 2 Microwatershed

6.5 Available Potassium

Available potassium is low (<145 kg/ha) in 198 ha (49%) and distributed in the major part of the microwatershed. An area of about 166 ha (41%) is medium (145-337 kg/ha) and distributed in the eastern and northern part of the microwatershed. An area of about 11 ha (3%) is high (>337 kg/ha) and distributed in the northern part of the microwatershed. The areas with high potassium content reduce 25 per cent from the recommended dose to avoid the excess application of fertilizer. Apply additional 25% potassium in areas where it is low and medium (Fig 6.5).

6.6 Available Sulphur

Soil analysis of available sulphur content in Kunikeri Tanda 2 microwatershed showed that available sulphur is low in the entire area of the microwatershed (Fig.6.6). The areas that are low in available sulphur need to be applied with magnesium sulphate or gypsum or factomphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.

6.7 Available Boron

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

6.8 Available Iron

Available iron content in the soils of the Kunikeri Tanda 2 microwatershed is deficient (<4.5 ppm) in 150 ha (37%) and distributed in the northern, central and eastern part of the microwatershed. Maximum area of about 225 ha (55%) is sufficient (>4.5 ppm) and distributed in the major part of the microwatershed (Fig 6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

6.11 Available Zinc

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

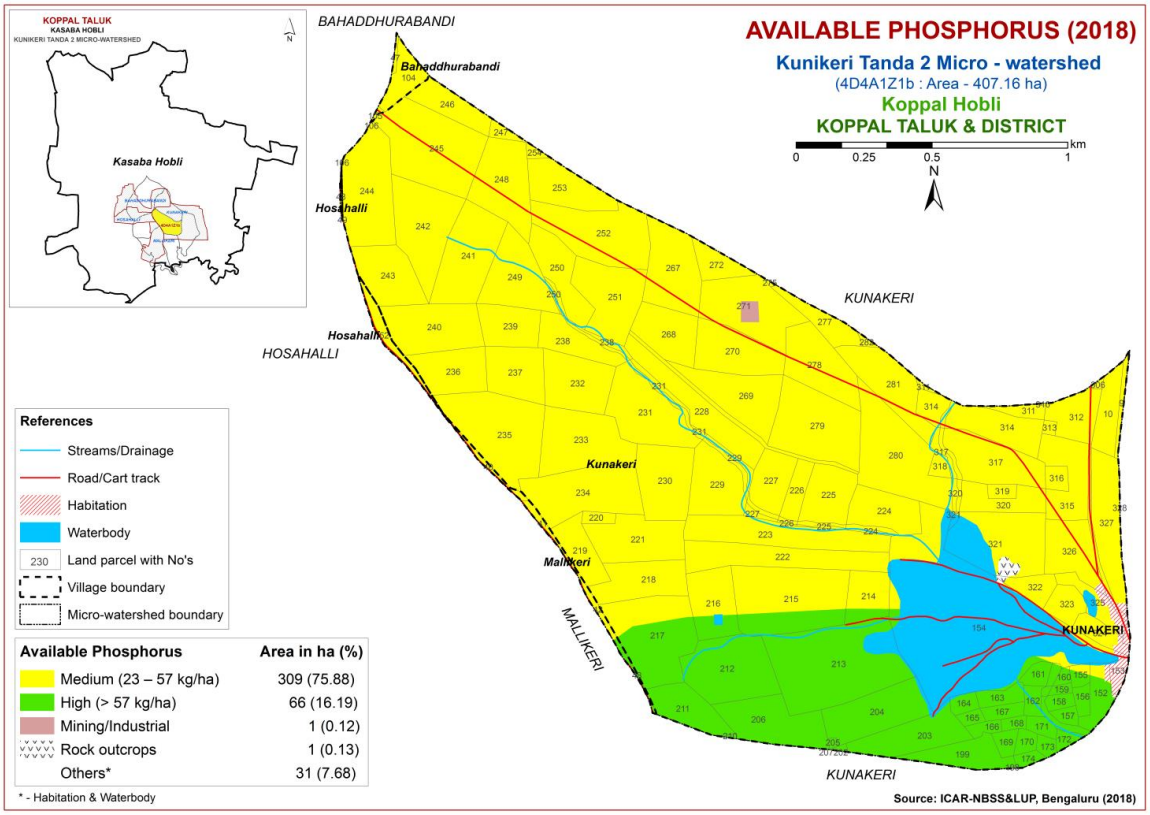


Fig.6.4 Soil Available Phosphorus map of Kunikeri Tanda 2 Microwatershed

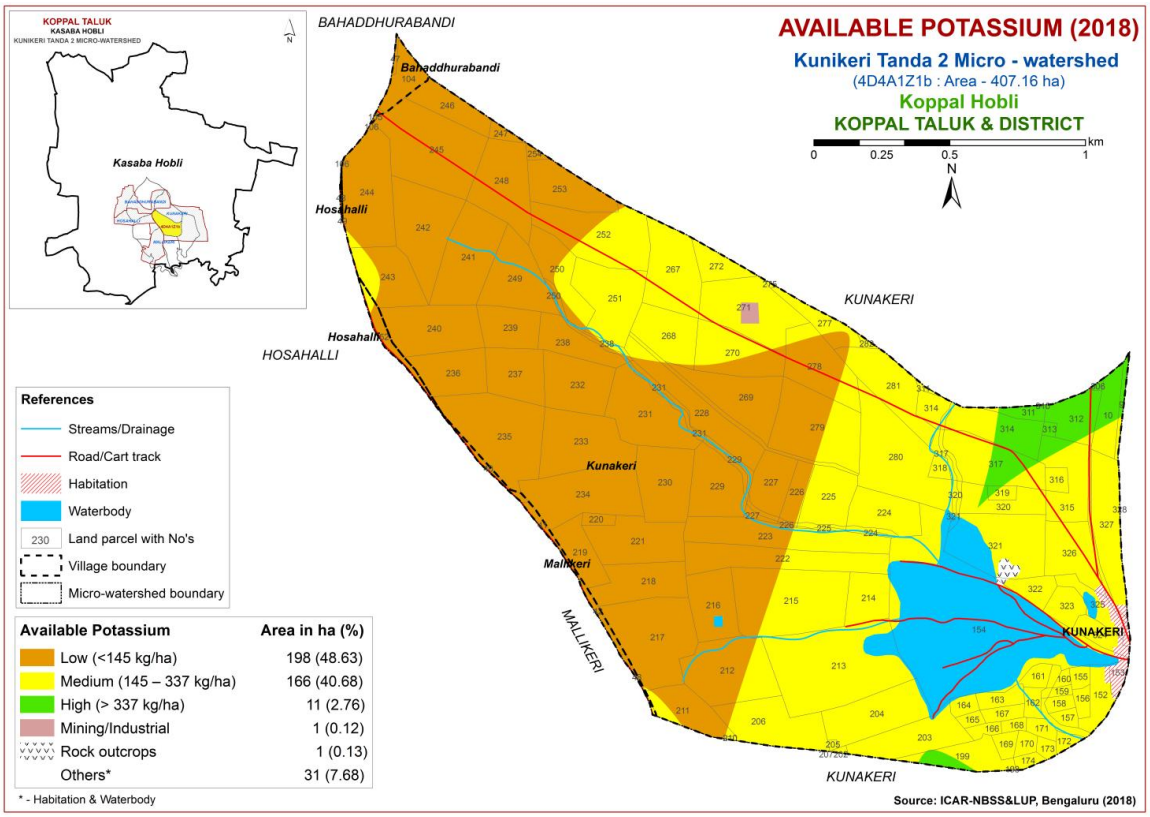


Fig.6.5 Soil Available Potassium map of Kunikeri Tanda 2 Microwatershed

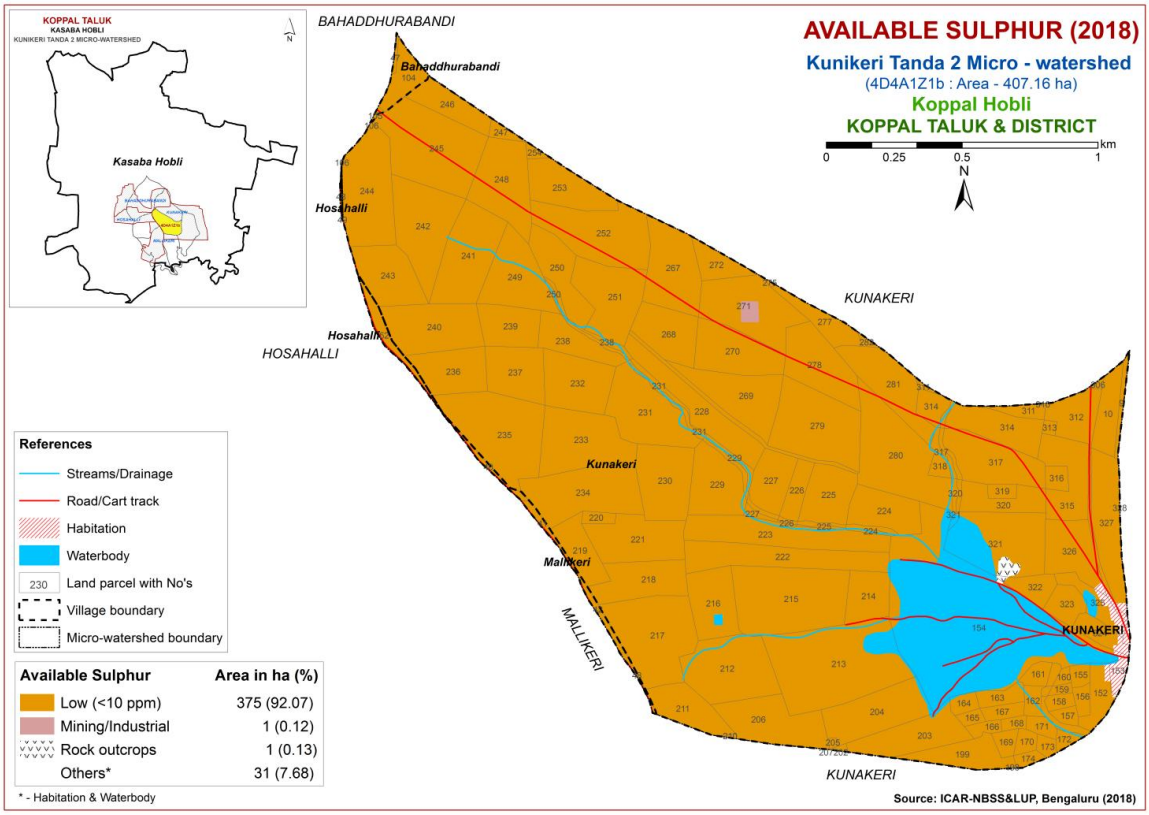


Fig.6.6 Soil Available Sulphur map of Kunikeri Tanda 2 Microwatershed

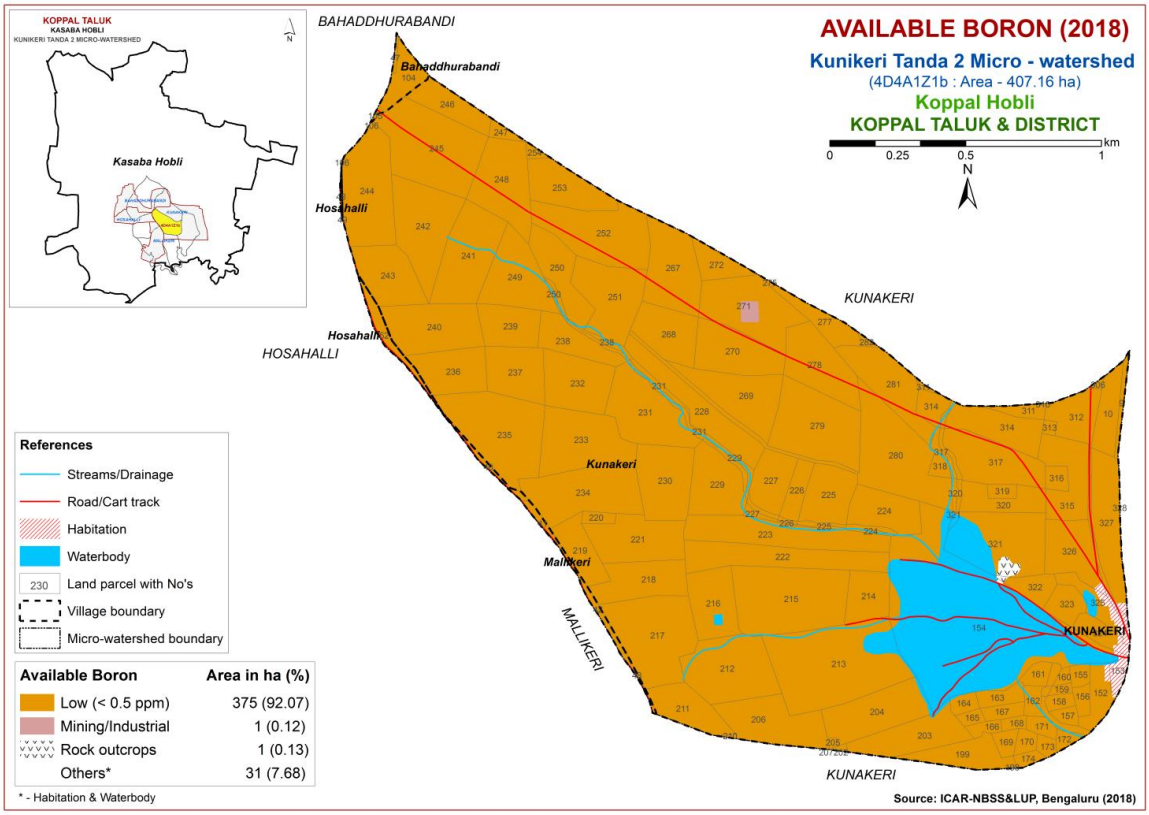


Fig.6.7 Soil Available Boron map of Kunikeri Tanda 2 Microwatershed

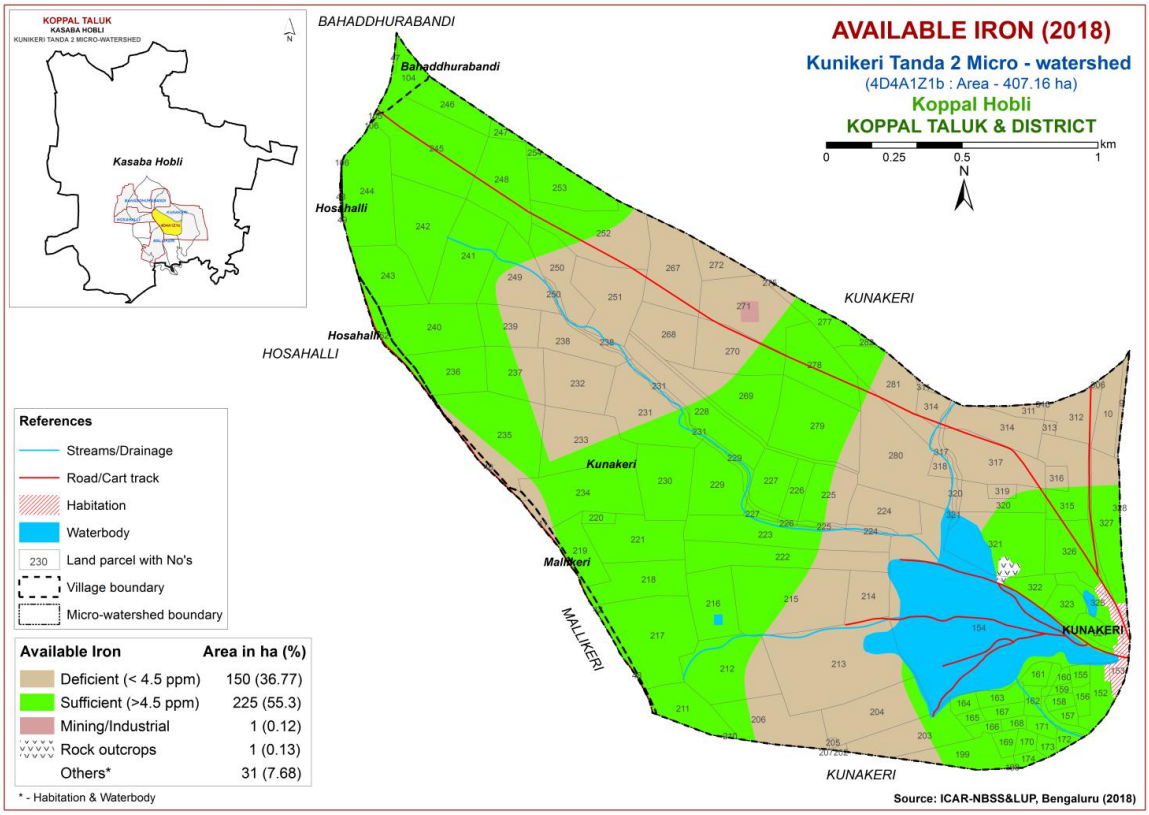


Fig.6.8 Soil Available Iron map of Kunikeri Tanda 2 Microwatershed

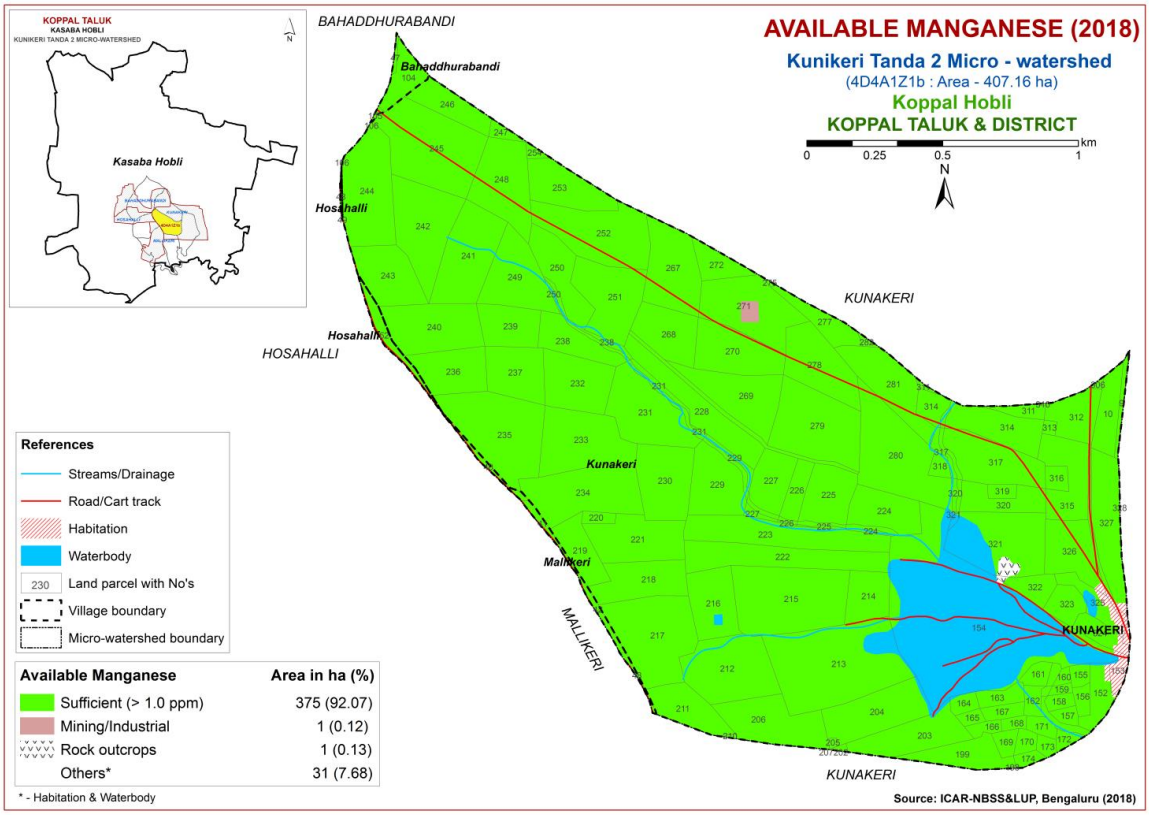


Fig.6.9 Soil Available Manganese map of Kunikeri Tanda 2 Microwatershed

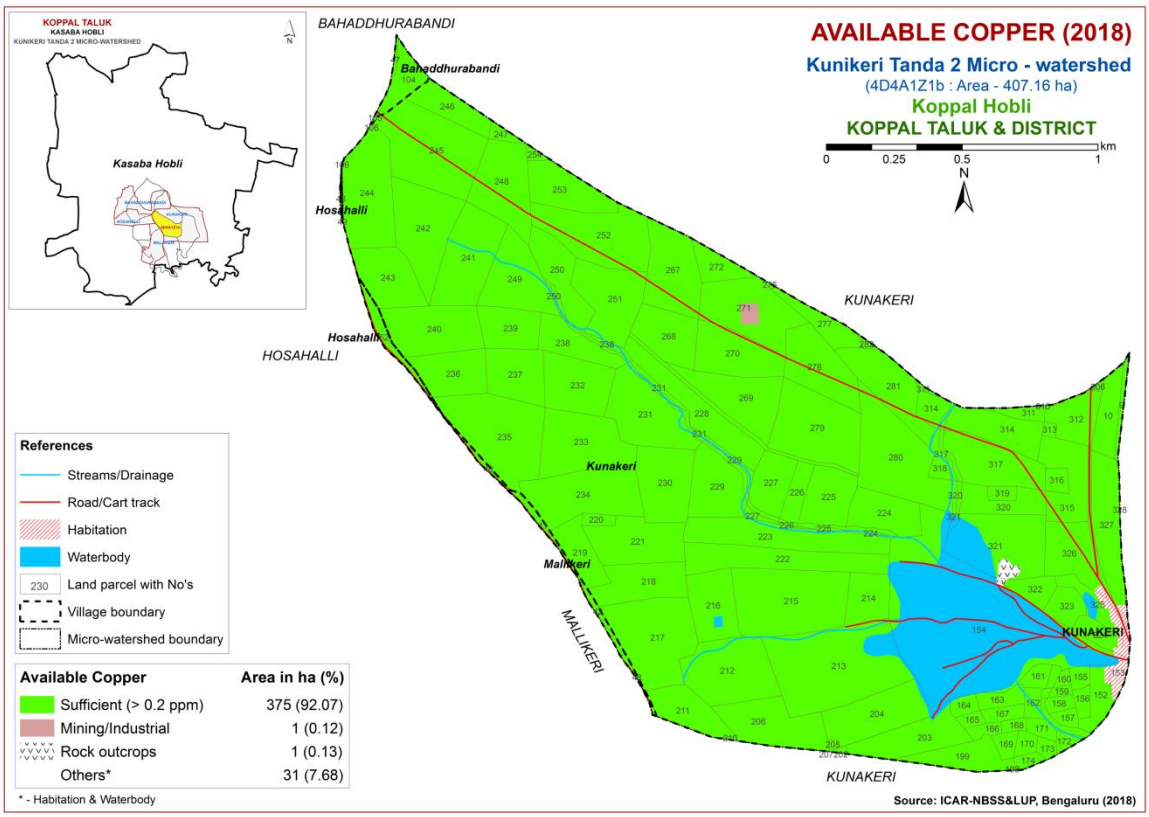


Fig.6.10 Soil Available Copper map of Kunikeri Tanda 2 Microwatershed

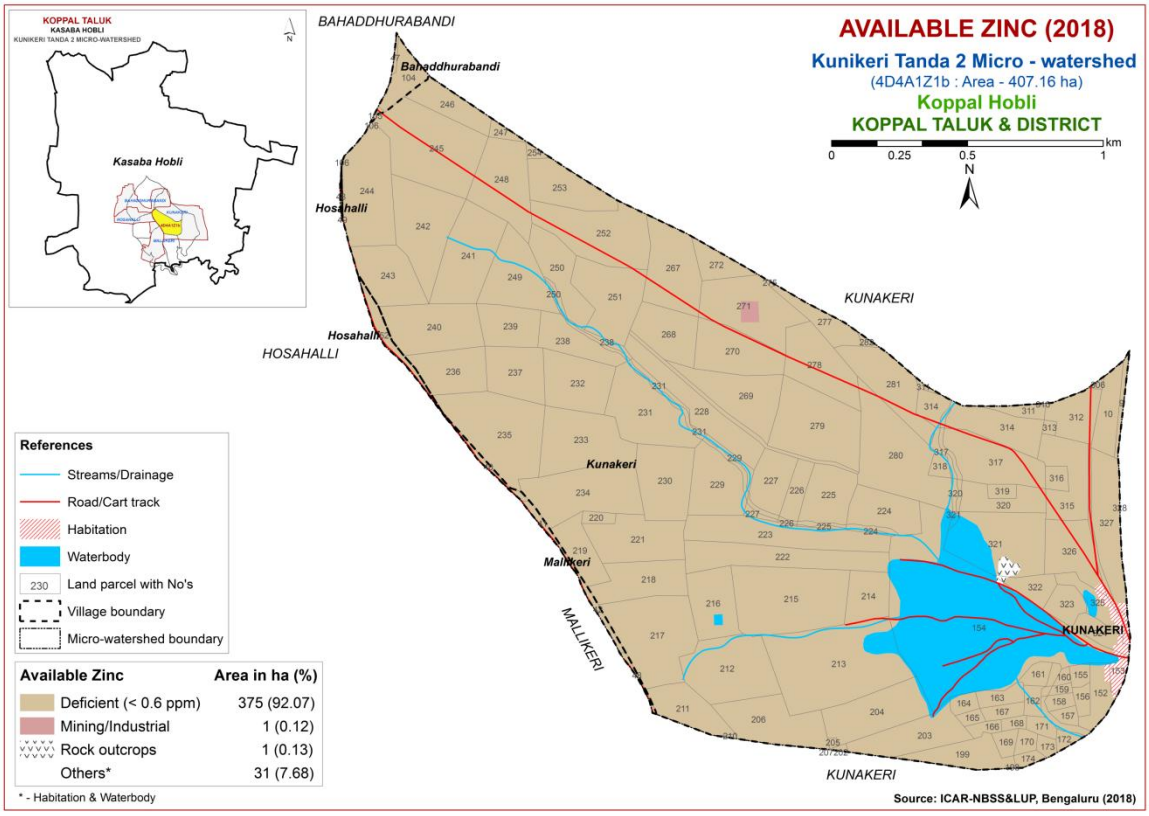


Fig.6.11 Soil Available Zinc map of Kunikeri Tanda 2 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Kunikeri Tanda 2 Microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The soil and land characteristics were matched with the crop requirements to arrive at the crop suitability. The soil and land characteristics table (Table 7.1) were matched with the crop requirements (Tables 7.2-7.32) to arrive at the crop suitability and the crop requirement tables are given at the end of the chapter. 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, 's' for sodium '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 31 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 food crop 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 23 (6%) for growing sorghum and occur in the northern and northeastern part of the microwatershed. An area of about 63 ha (15%) is moderately suitable (Class S2) for growing sorghum and distributed in the northern and eastern part of the microwatershed with minor limitations of gravelliness, rooting depth and texture. Maximum area of about 289 ha (71%) is marginally suitable for growing sorghum and distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting depth.

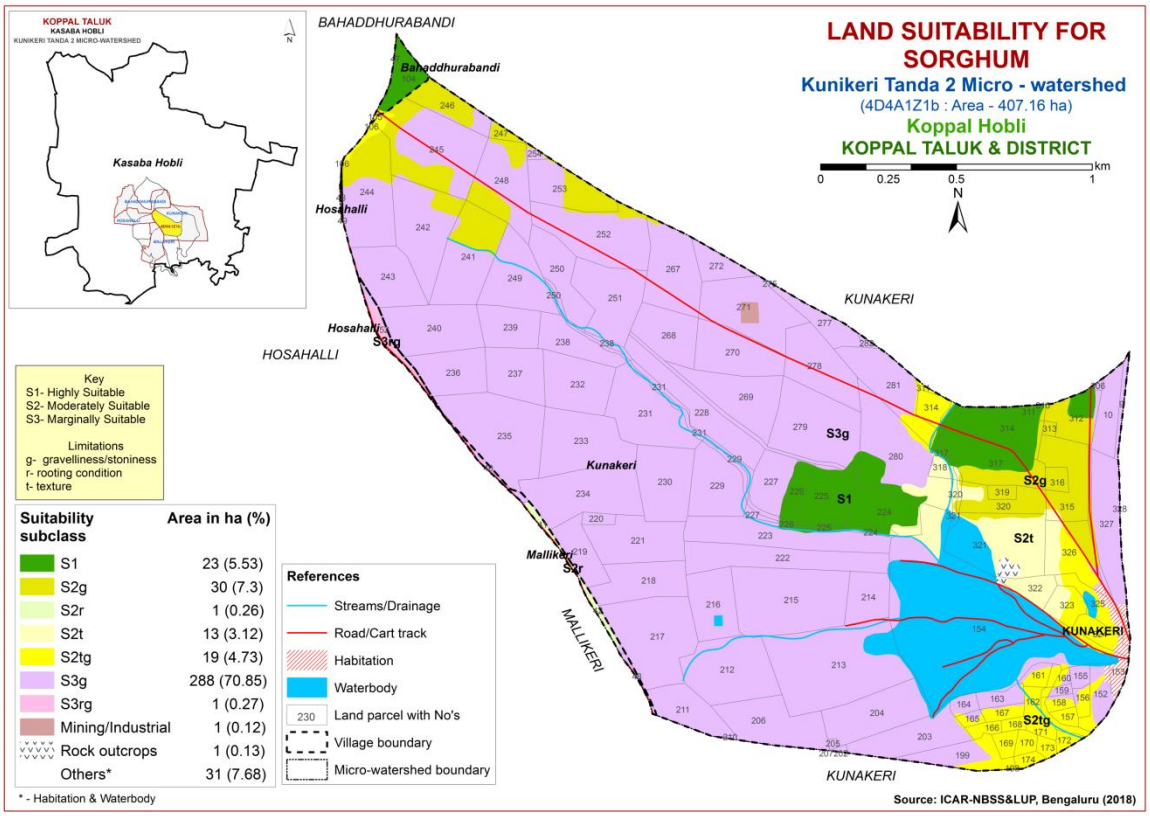


Fig. 7.1 Land Suitability map of Sorghum

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.

An area of about 9 ha (2 %) is highly suitable (Class S1) and distributed in the eastern part of the microwatershed. Moderately suitable (Class S2) lands cover an area of about 76 ha (19%) and distributed in the northern and eastern part of the microwatershed with minor limitations of texture, gravelliness and rooting depth. Marginally suitable (Class S3) lands cover an area of about 289 ha (71%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting depth.

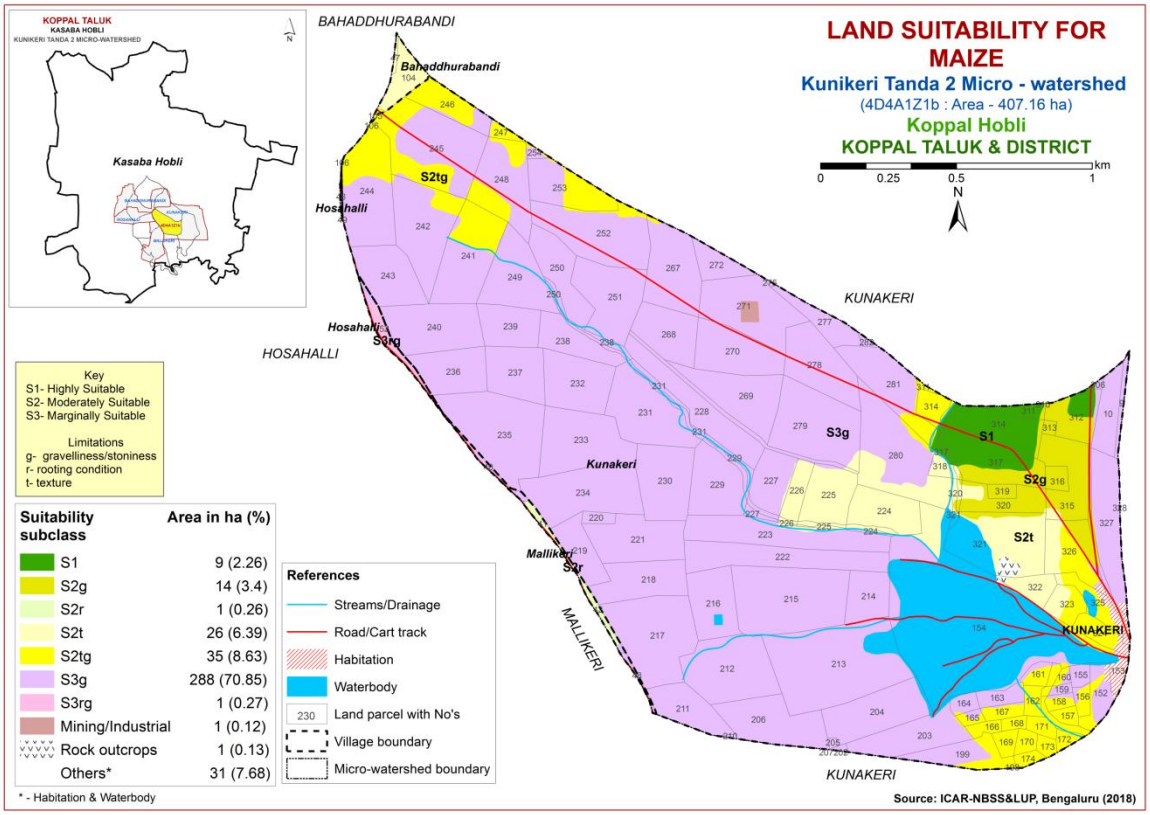


Fig. 7.2 Land Suitability map of Maize

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 (Class S1) lands occupy an area of about 55 ha (13 %) for growing bajra and occur in the northern and eastern part of the microwatershed. An area of about 72 ha (18%) is moderately suitable (Class S2) for growing bajra and distributed in the northern and eastern part of the microwatershed with minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover an area of about 248 ha (61%) and occur in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting depth.

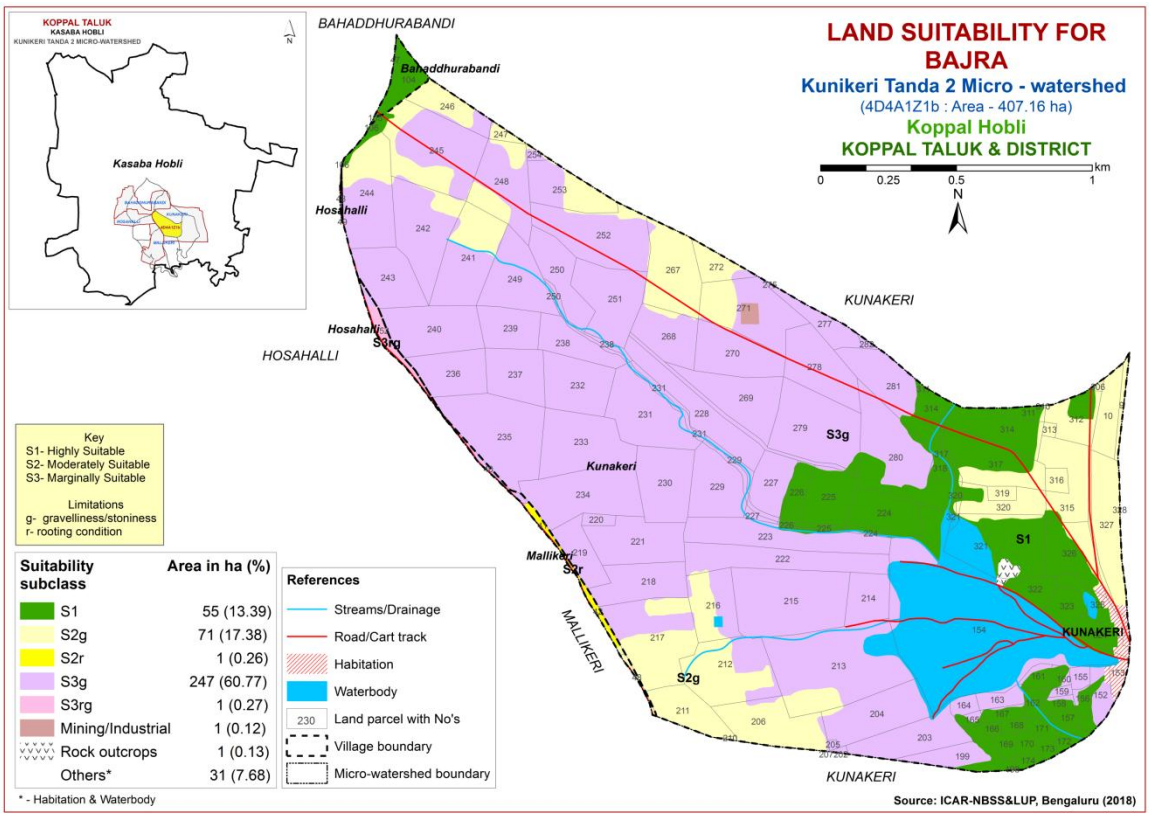


Fig. 7.3 Land Suitability map of Bajra

7.4 Land Suitability for Redgram (*Cajanus cajan*)

Redgram is one of the most important pulse crop grown in an area of 7.28 lakh ha in almost all the districts of the State. The crop requirements for growing 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 (Class S1) lands occupy an area of about 35 ha (9 %) for growing redgram and occur in the northern and eastern part of the microwatershed. An area of about 49 ha (12%) is moderately suitable (Class S2) for growing redgram and distributed in the northern and eastern part of the microwatershed. They have minor limitation of gravelliness. Marginally suitable lands (Class S3) occupy an area of about 289 ha (71%) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth and gravelliness. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth, gravelliness.

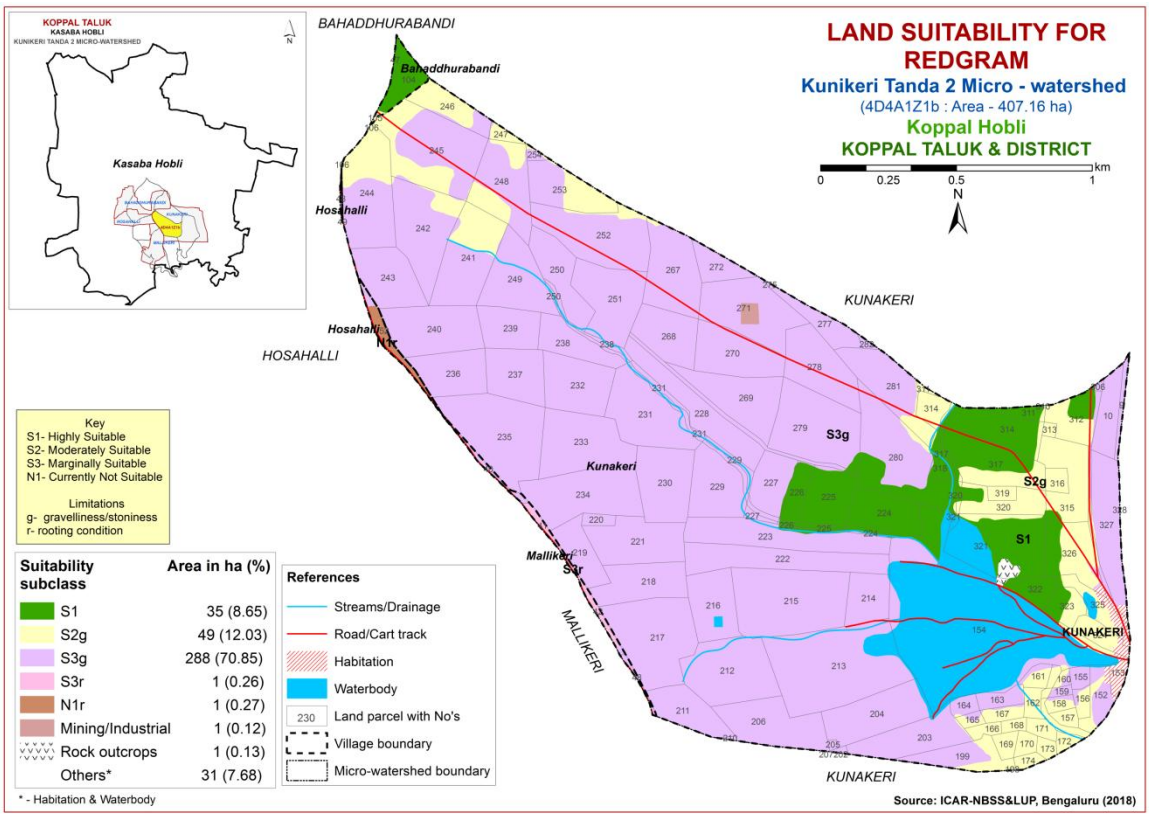


Fig. 7.4 Land Suitability map of Redgram

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 Bell ary 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 85 ha (21%) is moderately suitable (Class S2) for growing bengalgram and are distributed in the northern and eastern part of the microwatershed. They have minor limitations of texture, rooting depth and gravelliness. Marginally suitable (Class S3) lands cover an area of about 289 ha (71%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and texture.

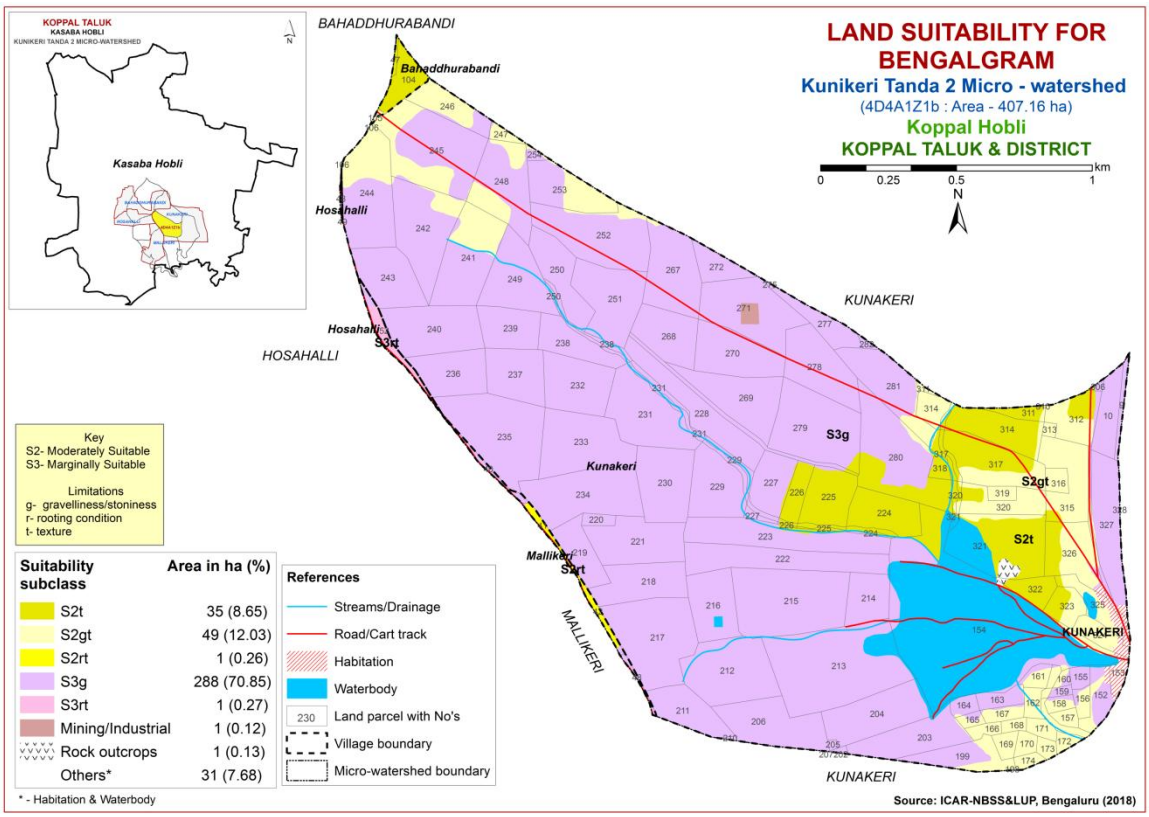


Fig. 7.5 Land Suitability map of Bengal gram

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.

Highly suitable (Class S1) lands occupy an area of about 23 ha (6 %) for growing ground nut and occur in the northern part of the microwatershed. Maximum area of about 336 ha (82%) is moderately suitable (Class S2) for growing groundnut and distributed in the major part of the microwatershed. They have minor limitations of gravelliness, rooting depth and texture. An area of about 17 ha (4%) is marginally suitable (Class S3) for growing groundnut and are distributed in the northern part of the microwatershed with moderate limitations of texture, gravelliness, and rooting depth.

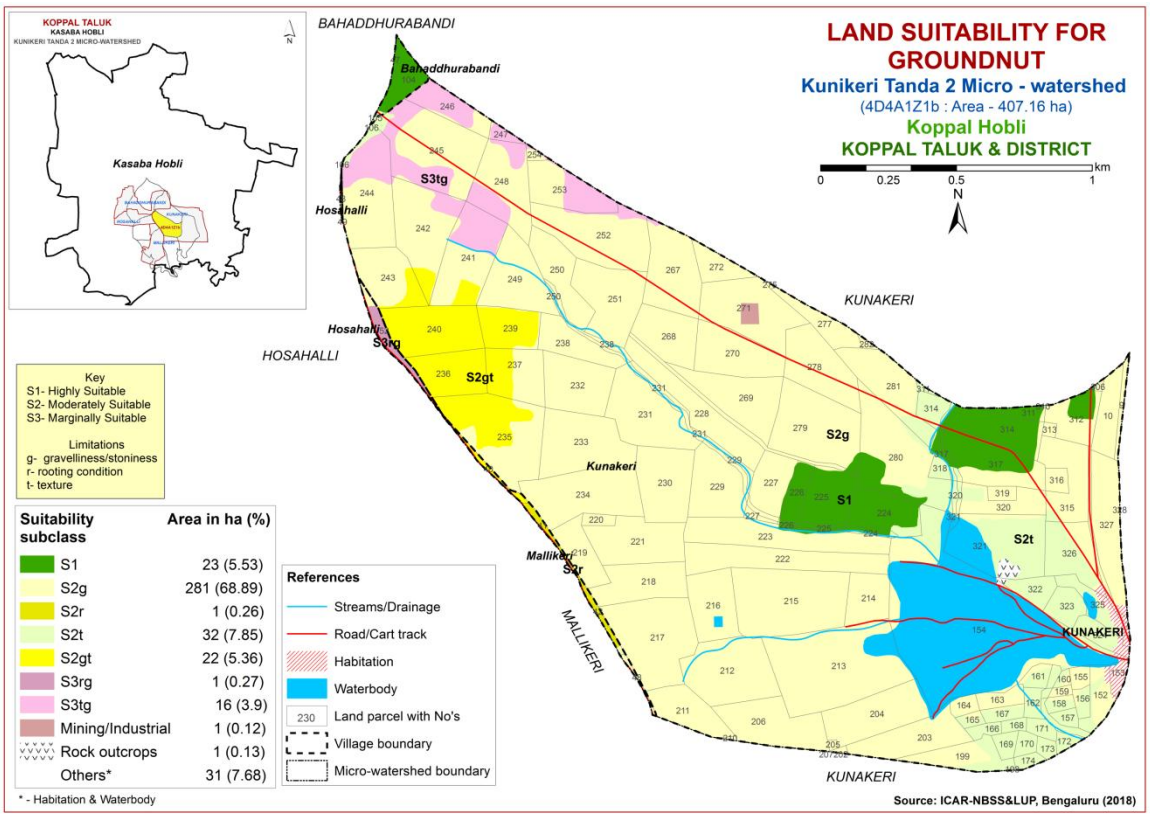


Fig. 7.6 Land Suitability map of Groundnut

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.

An area of about 35 ha (9%) is highly suitable (Class S1) for growing sunflower and are distributed in the northern and northeastern part of the microwatershed. An area of about 49 ha (12%) is moderately suitable (Class S2) and are distributed in the northern and eastern part of the microwatershed. They have minor limitation of gravelliness. Marginally suitable (Class S3) lands occupy a maximum area of about 289 ha (71%) and are distributed in the major part of the microwatershed with moderate limitations of rooting depth and gravelliness. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

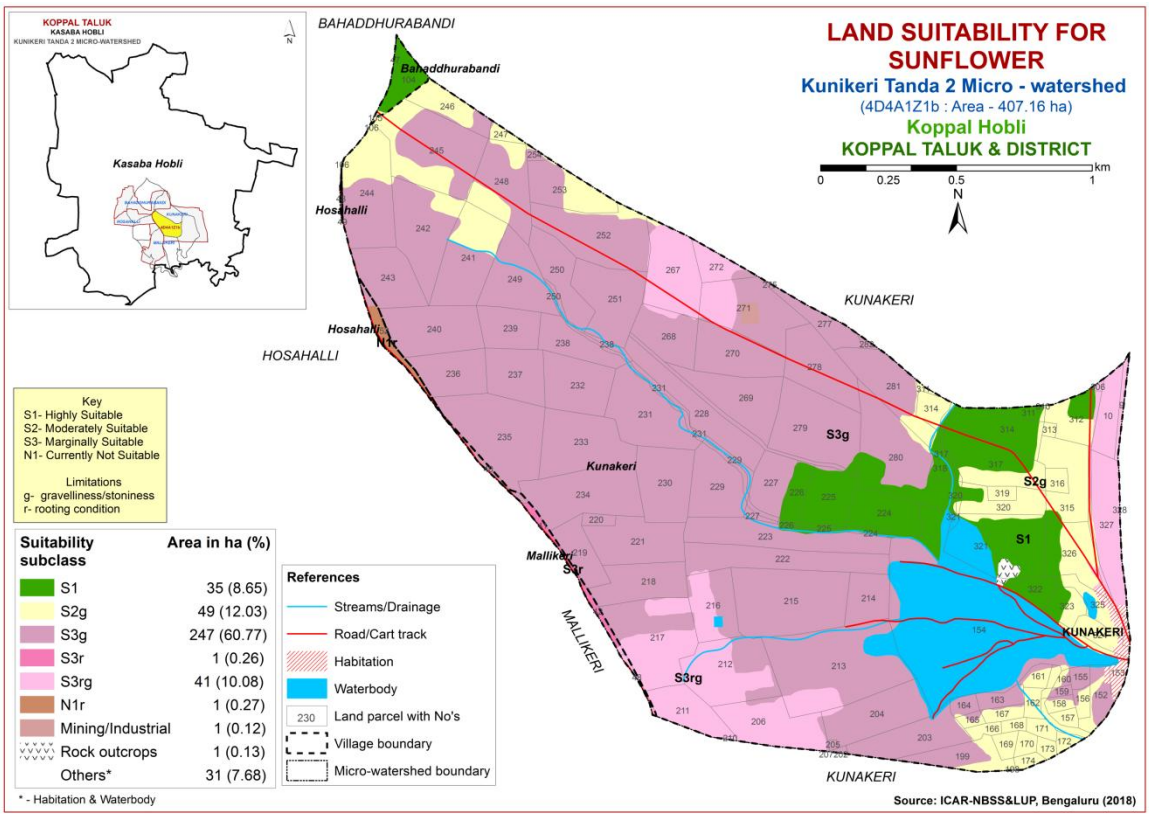


Fig. 7.7 Land Suitability map of Sunflower

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 26 ha (6%) is highly suitable (Class S1) for growing cotton and are distributed in the northern and northeastern part of the microwatershed. Maximum area of about 59 ha (15%) is moderately suitable (Class S2) and are distributed in the eastern and northern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Marginally suitable (Class S3) lands occupy a maximum area of about 289 ha (71%) and are distributed in the major part of the microwatershed with moderate limitations of rooting depth, texture and gravelliness.

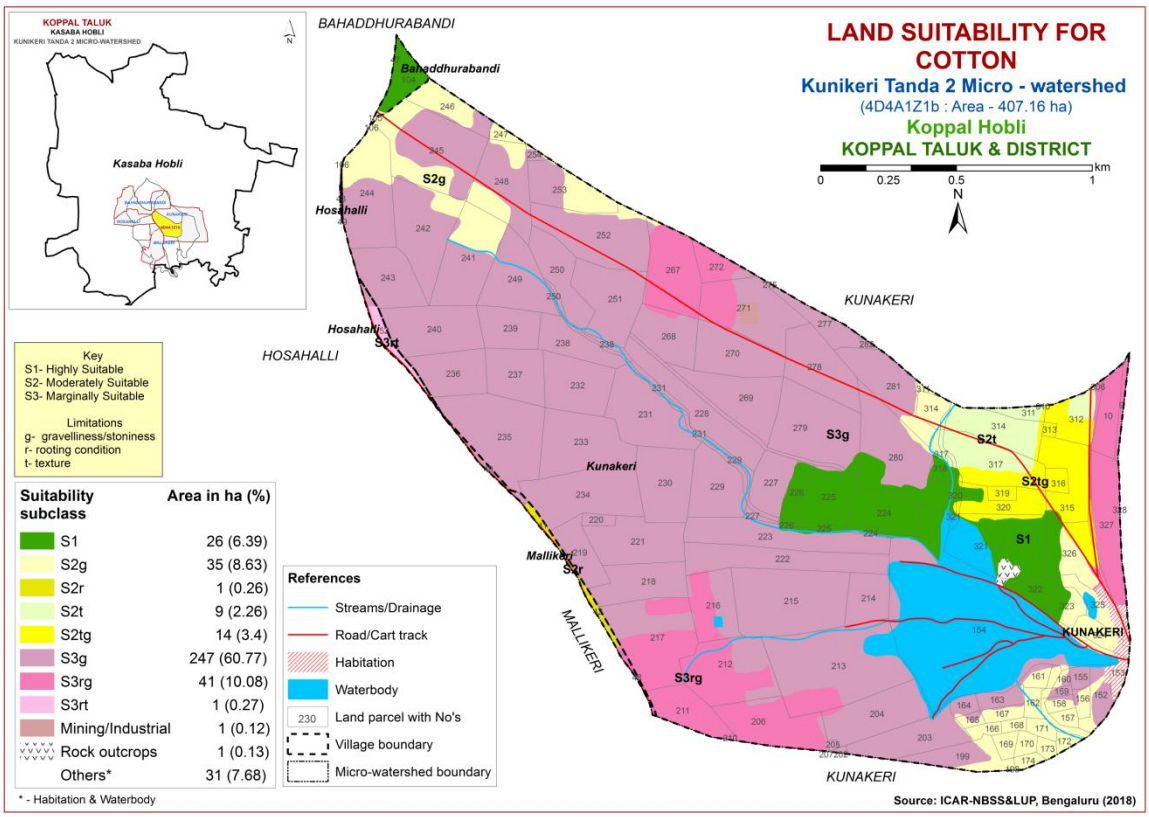


Fig. 7.8 Land Suitability map of Cotton

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

Chilli is one of the most important 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.

An area of about 35 ha (9%) is highly suitable (Class S1) for growing chilli and are distributed in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands cover an area of about 50 ha (12%) and distributed in the northern and eastern part of the microwatershed. They have moderate limitations of gravelliness, texture and rooting depth. Marginally suitable (Class S3) lands occupy a maximum area of about 289 ha (71%) and are distributed in the major part of the microwatershed with moderate limitations of rooting depth and gravelliness.

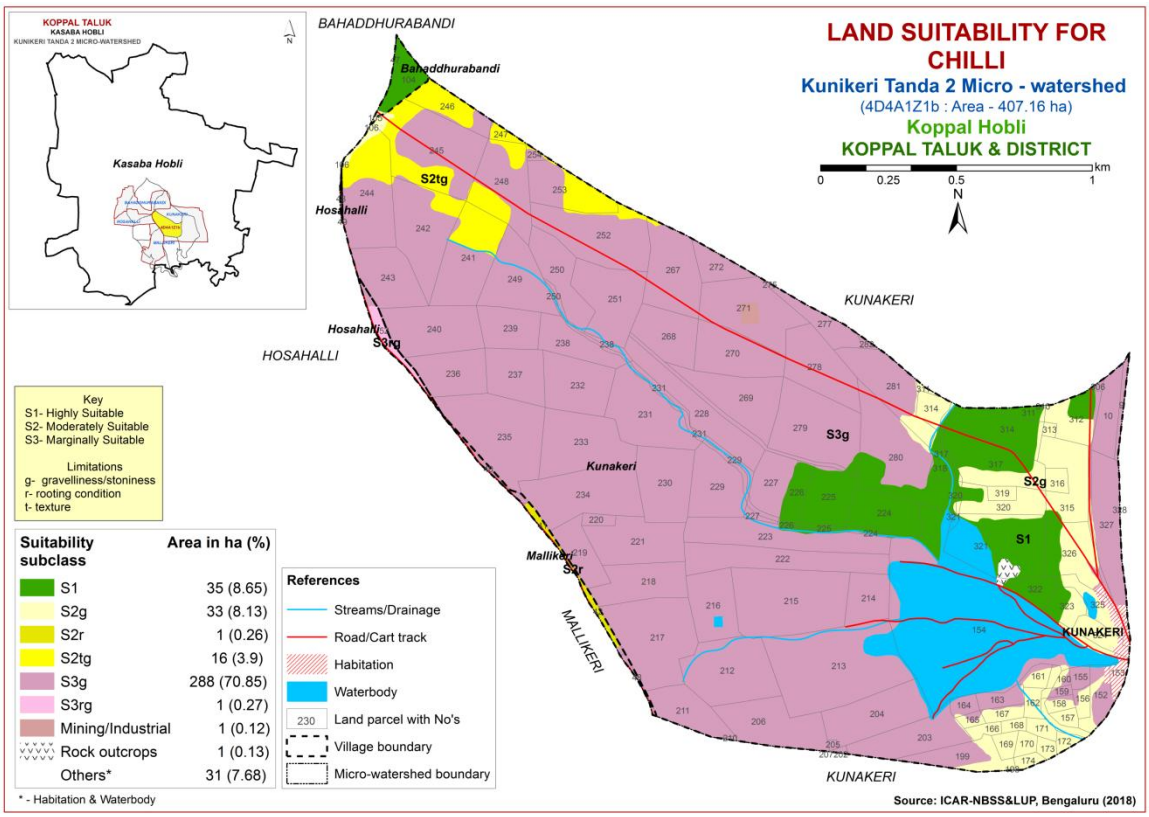


Fig. 7.9 Land Suitability map of Chilli

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.

An area of about 35 ha (9%) is highly suitable (Class S1) for growing tomato and are distributed in the northern and northeastern part of the microwatershed. Moderately suitable (Class S2) lands cover an area of about 50 ha (12%) and distributed in the northern and eastern part of the microwatershed. They have moderate limitations of gravelliness, rooting depth and texture. Marginally suitable (Class S3) lands cover a maximum area of about 289 ha (71%) and distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting depth.

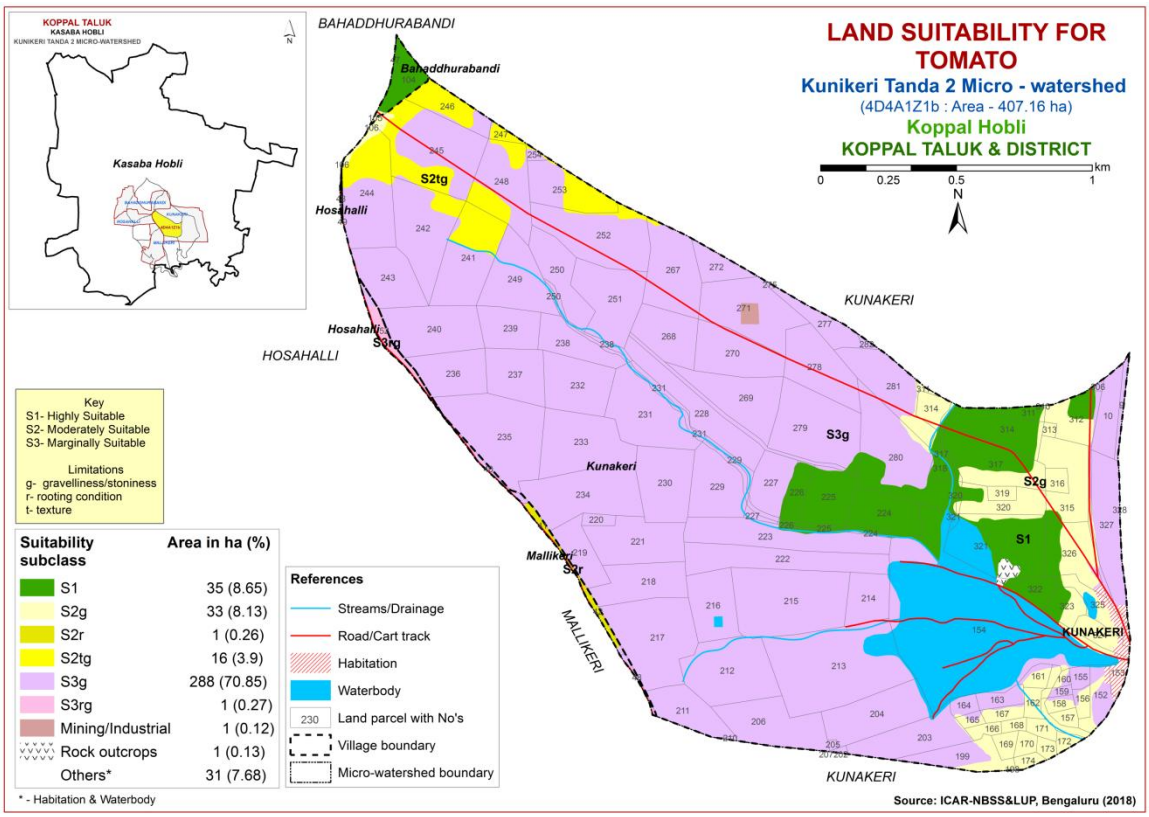


Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

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

An area of about 58 ha (14%) is highly suitable (Class S1) for growing brinjal and are distributed in the northern and eastern part of the microwatershed. Maximum area of about 274 ha (67%) is moderately suitable (Class S2) for growing Brinjal and distributed in the major part of the microwatershed with minor limitations of texture, rooting depth and gravelliness. Marginally suitable (Class S3) lands cover an area of about 42 ha (10%) and occur in the southern and northern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

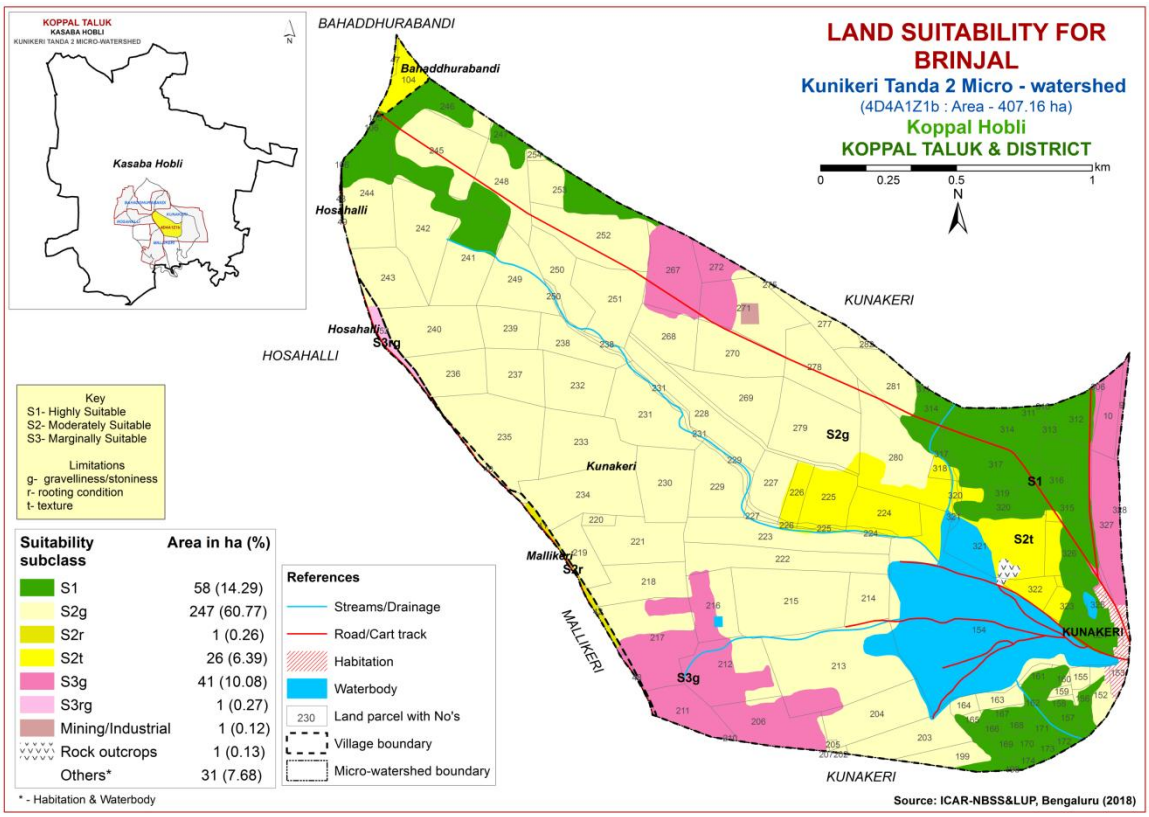


Fig 7.11 Land Suitability map of Brinjal

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

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

An area of about 16 ha (4%) is highly suitable (Class S1) for growing onion and are distributed in the northern part of the microwatershed. Maximum area of about 316 ha (78%) is moderately suitable (Class S2) for growing Onion and distributed in the major part of the microwatershed with minor limitations of texture, rooting depth and gravelliness. Marginally suitable (Class S3) lands cover an area of about 42 ha (10%) and occur in the northern and southern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

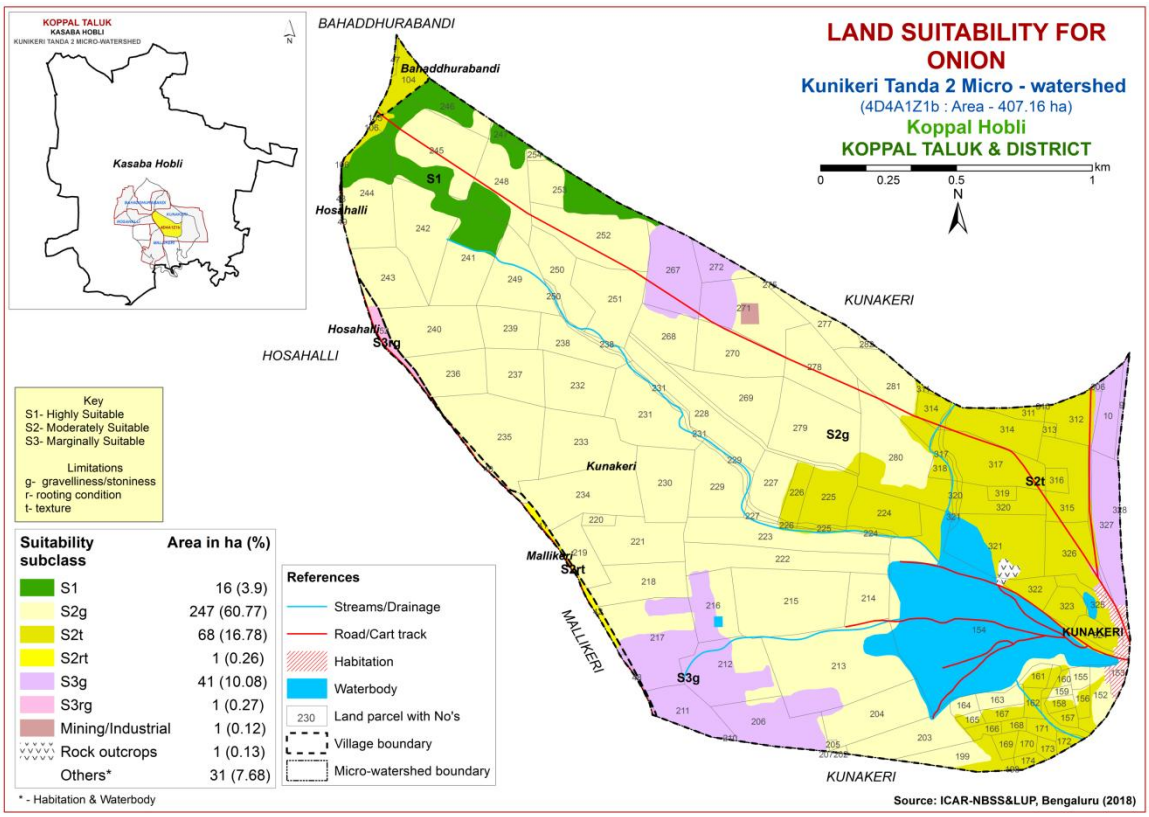


Fig 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

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

An area of about 16 ha (4%) is highly suitable (Class S1) for growing bhendi and are distributed in the northern part of the microwatershed. Moderately suitable (Class S1) lands occupy a maximum area of about 316 ha (78%) for growing Bhendi and occur in the major part of the microwatershed with minor limitations of rooting depth, texture, and gravelliness. An area of about 42 ha (10%) is marginally suitable (Class S3) for growing Bhendi and distributed in the southern and northern part of the microwatershed with moderate limitations of gravelliness and rooting depth.

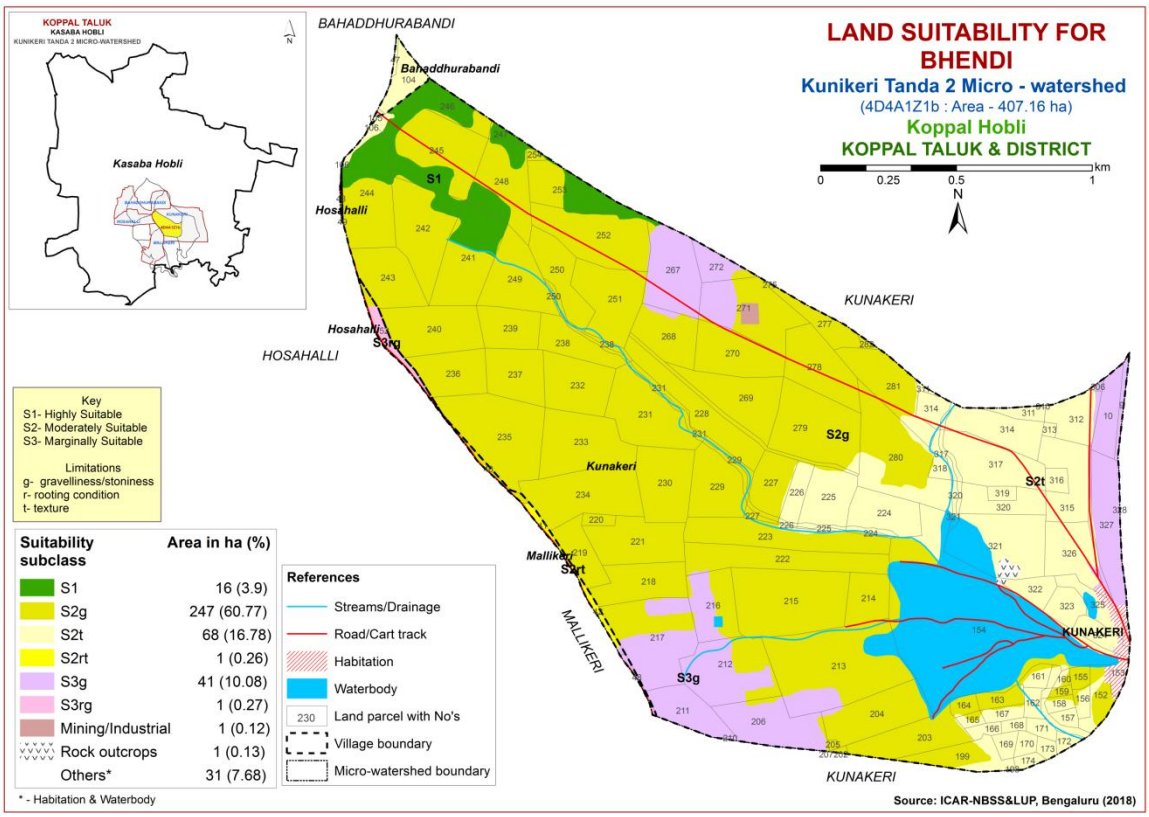


Fig 7.13 Land Suitability map of Bhendi

7.14 Land Suitability for Drumstick (*Moringa oleifera)*

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

An area of about 68 ha (18%) is highly suitable (Class S1) for growing drumstick and are distributed in the northern and northeastern part of the microwatershed. Moderately suitable (Class S2) lands cover an area of about 263 ha (65%) and are distributed in the major part of the microwatershed. They have minor limitation of gravelliness. Marginally suitable (Class S3) lands cover an area of about 42 ha (10%) and occur in the northern and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitations of rooting depth.

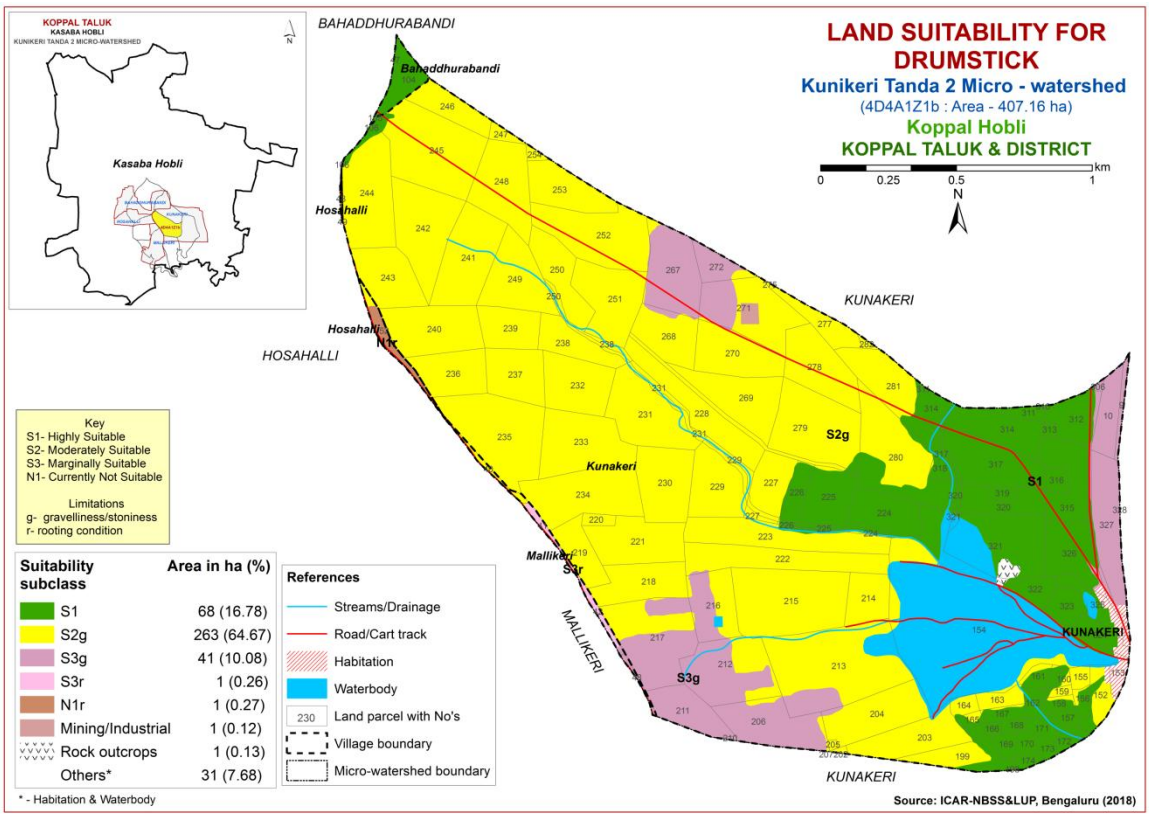


Fig. 7.14 Land Suitability map of Drumstick

7.15 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 7.16) 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 7.15.

An area of about 68 ha (17%) is highly suitable (Class S1) for growing mulberry and are distributed in the northern and northeastern part of the microwatershed. A maximum area of about 304 ha (75%) is moderately suitable (Class S2) for growing mulberry and distributed in the major part of the microwatershed. They have minor limitation of gravelliness. Marginally suitable (Class S3) lands cover an area of about 1 ha (<1%) and occur in the eastern part of the microwatershed. They have moderate limitation of rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

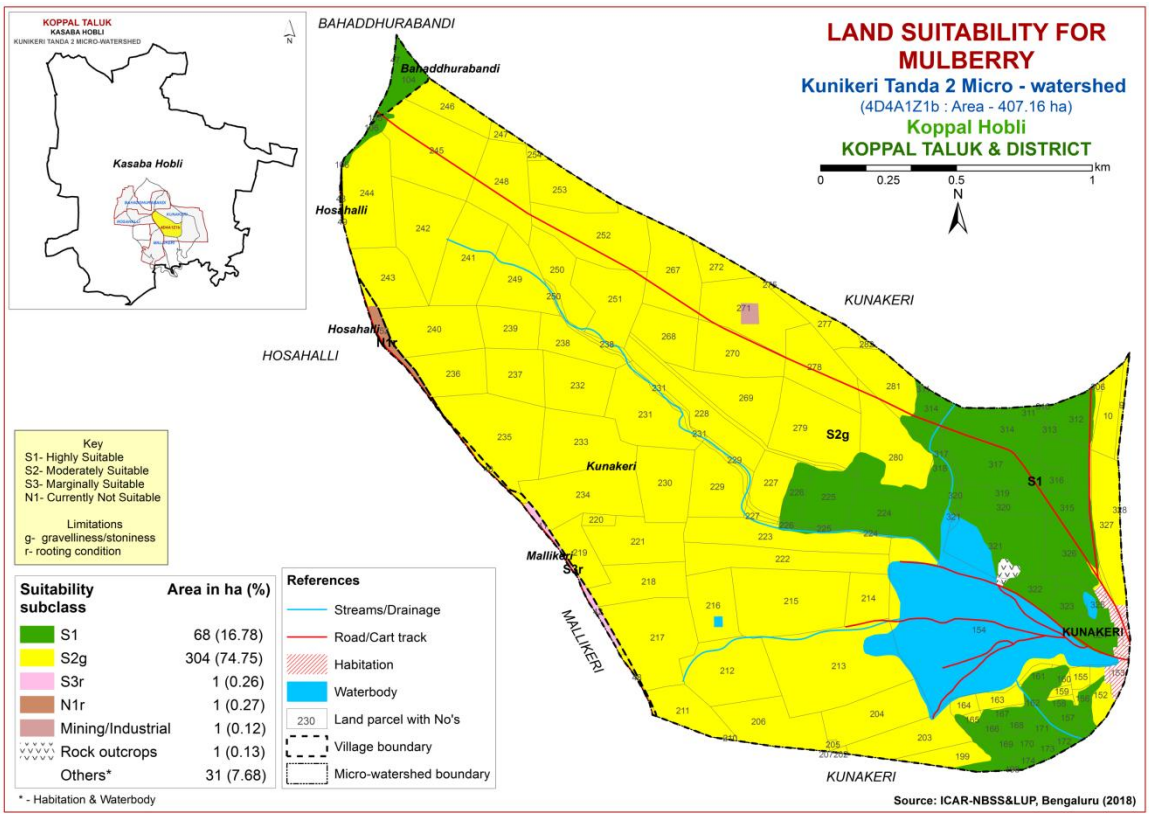


Fig. 7.15 Land Suitability map of Mulberry

7.16 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 7.17) 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 7.16.

An area of about 13 ha (3%) is highly suitable (Class S1) for growing mango and are distributed in the northern and central part of the microwatershed. An area of about 71 ha (17%) is moderately suitable (Class S2) for growing mango and distributed in the northern and eastern part of the microwatershed. They have minor limitations of gravelliness, rooting depth. Marginally suitable (Class S3) lands cover a maximum area of about 288 ha (71%) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth and gravelliness. Area currently not suitable (Class N1) for growing mango cover about 2 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

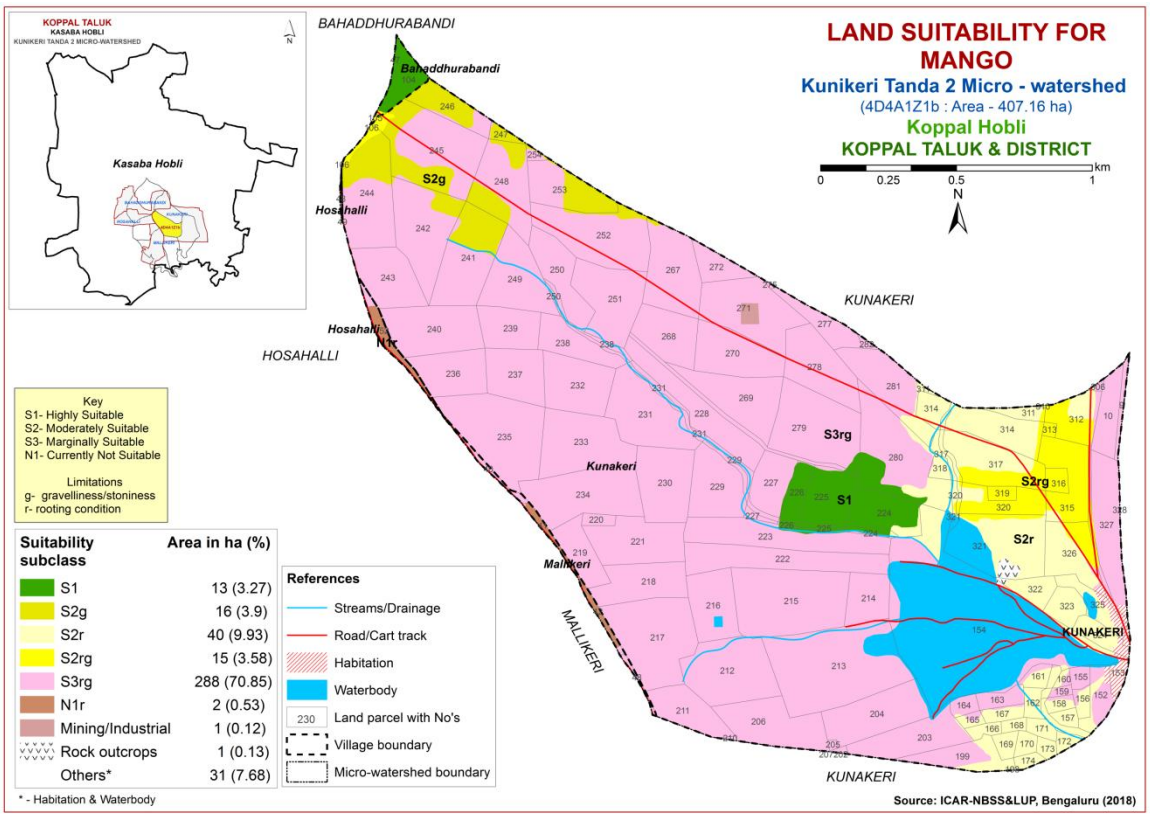


Fig. 7.16 Land Suitability map of Mango

7.17 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 7.18) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.17.

An area of about 54 ha (13%) is highly suitable (Class S1) for growing sapota and are distributed in the northern and eastern part of the microwatershed. Moderately suitable (S2) lands cover an area of about 71 ha (18%) and are distributed in the northern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of about 248 ha (61%) and occur in the major part of the microwatershed. They have moderate limitations of rooting depth, gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

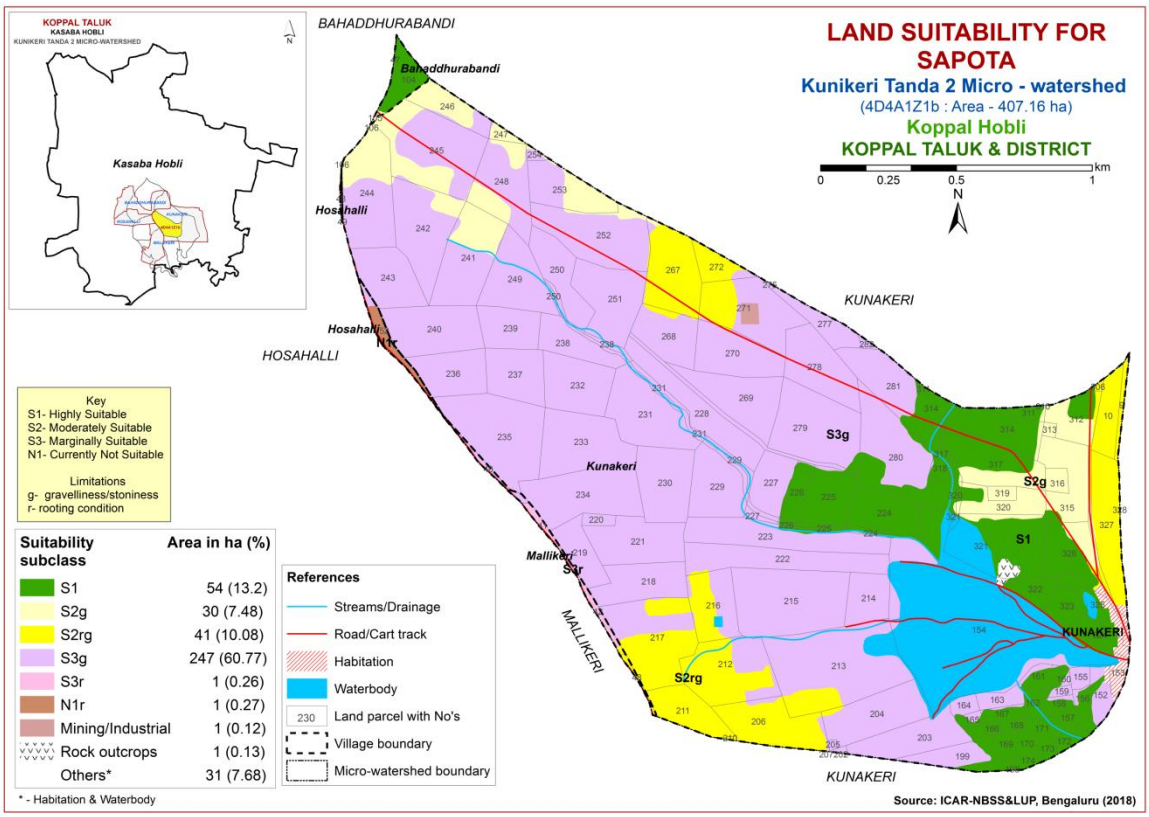


Fig. 7.17 Land Suitability map of Sapota

7.18 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the 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 7.19) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing pomegranate was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.18.

An area of about 54 ha (13%) is highly suitable (Class S1) for growing pomegranate and are distributed in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 71 ha (18%) and are distributed in the southern, eastern and northern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands for growing pomegranate occupy an area of about 248 ha (61%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

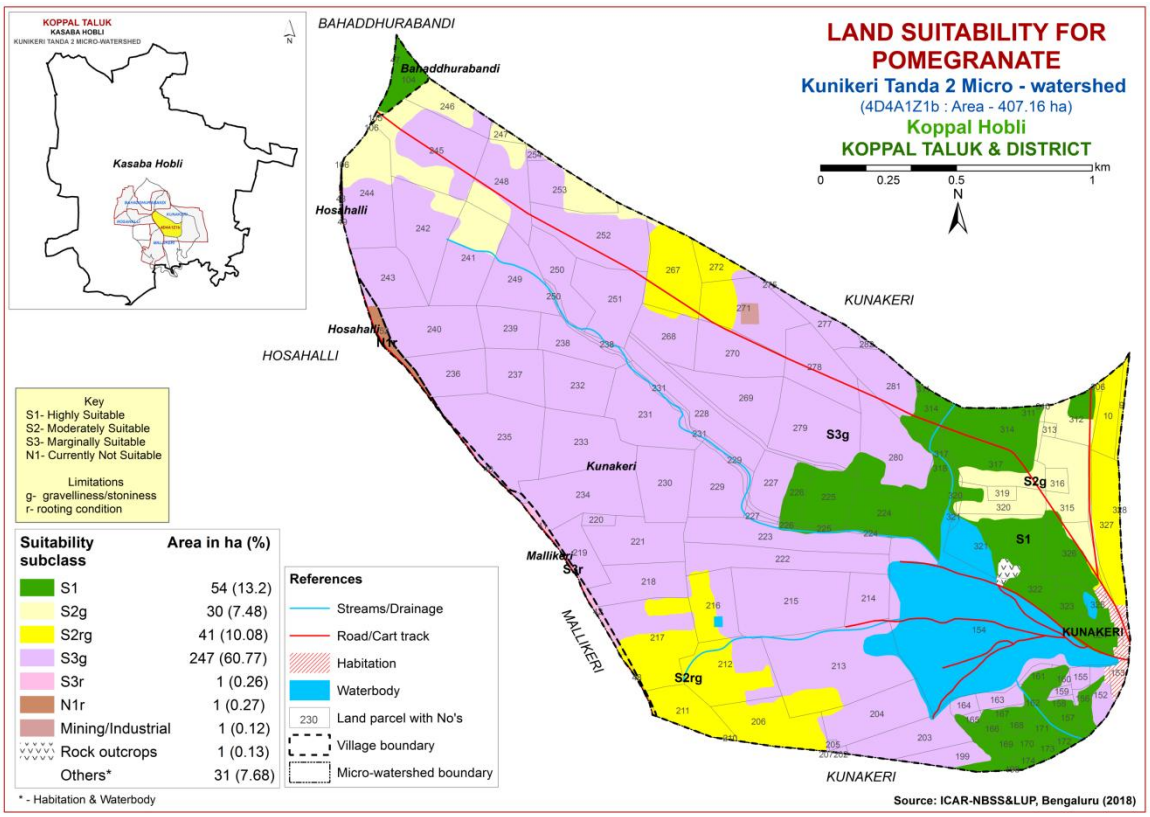


Fig. 7.18 Land Suitability map of Pomegranate

7.19 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 7.20) 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 7.19.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing guava and are distributed in the northern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 103 ha (25%) and are distributed in the northern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Marginally suitable (Class S3) lands for growing guava occupy a maximum area of about 248 ha (61%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

.

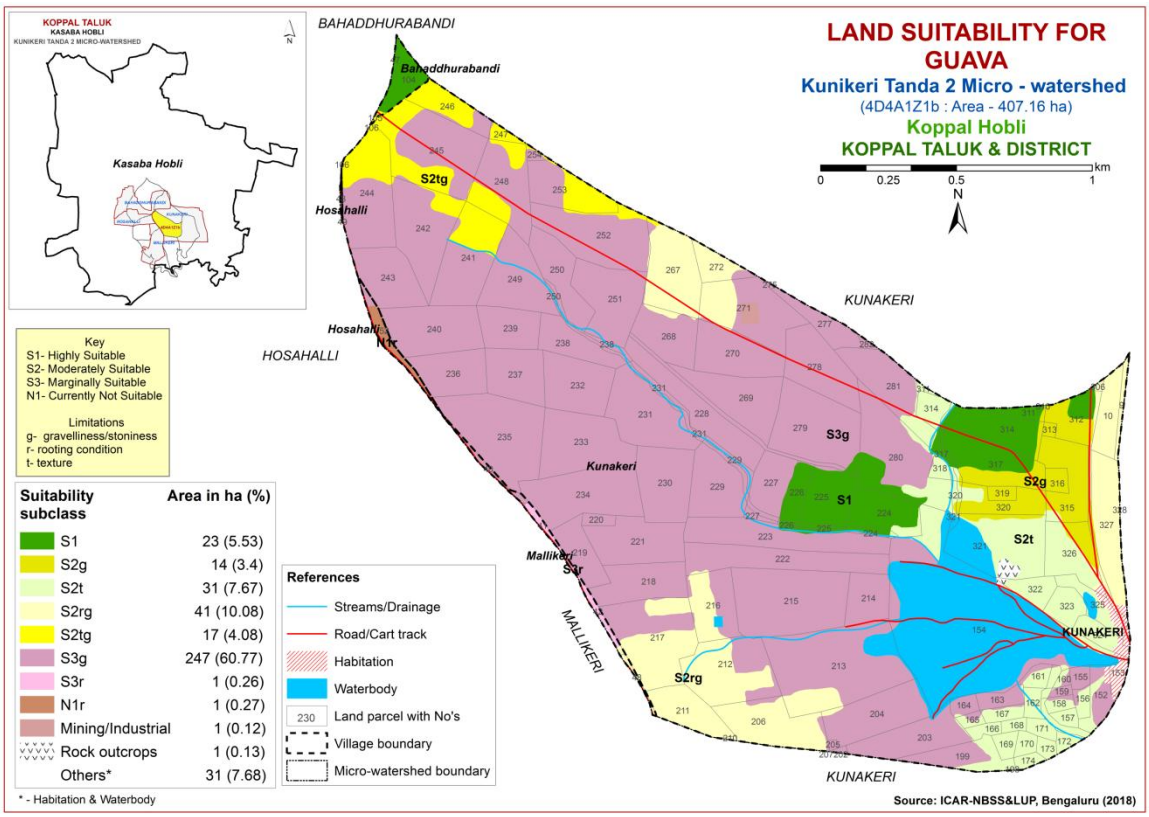


Fig. 7.19 Land Suitability map of Guava

7.20 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.7.21) 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 7.20.

An area of about 54 ha (13%) is highly suitable (Class S1) for growing jackfruit and are distributed in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 71 ha (18%) and are distributed in the northern, eastern and southern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands for growing jackfruit occupy a maximum area of about 248 ha (61%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

.

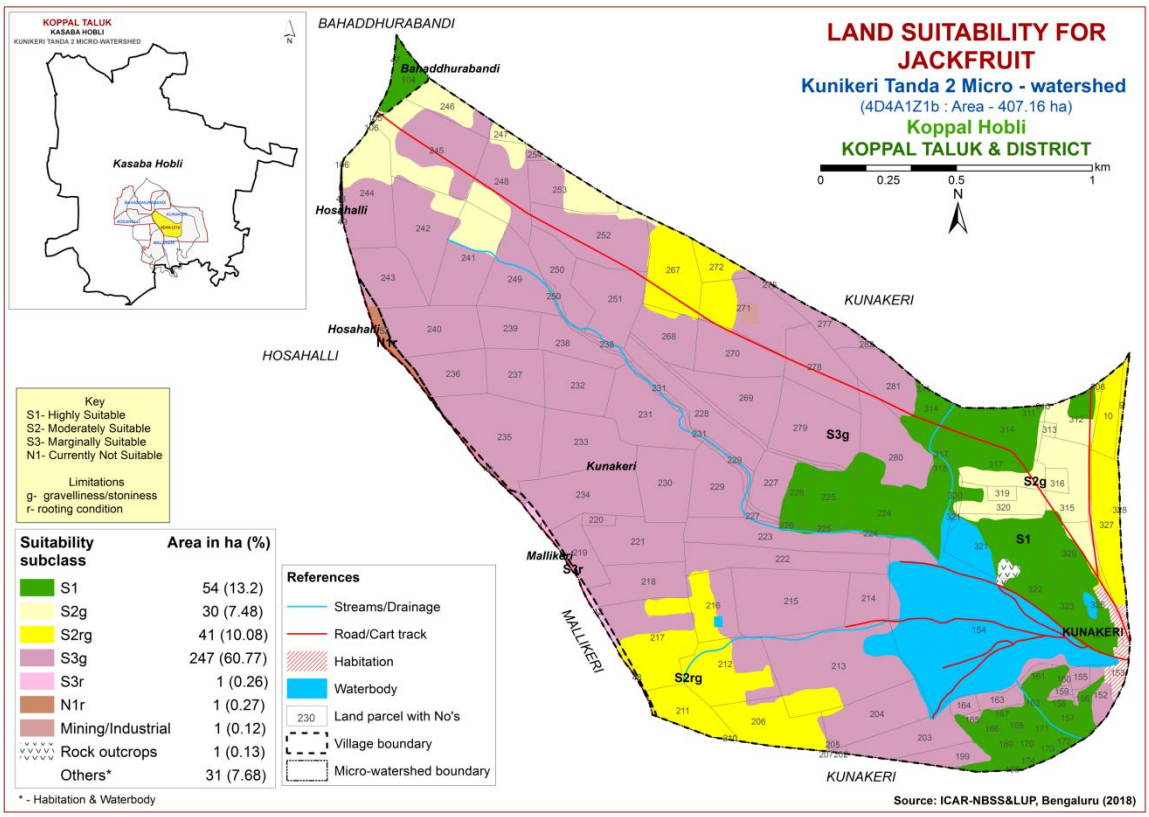


Fig. 7.20 Land Suitability map of Jackfruit

7.21 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the state. The crop requirements (Table 7.22) 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 7.21.

An area of about 13 ha (3%) is highly suitable (Class S1) for growing jamun and are distributed in the central and northern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of about 112 ha (27%) and are distributed in the northern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth and gravelliness. Marginally suitable (Class S3) lands for growing jamun occupy a maximum area of about 248 ha (61%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

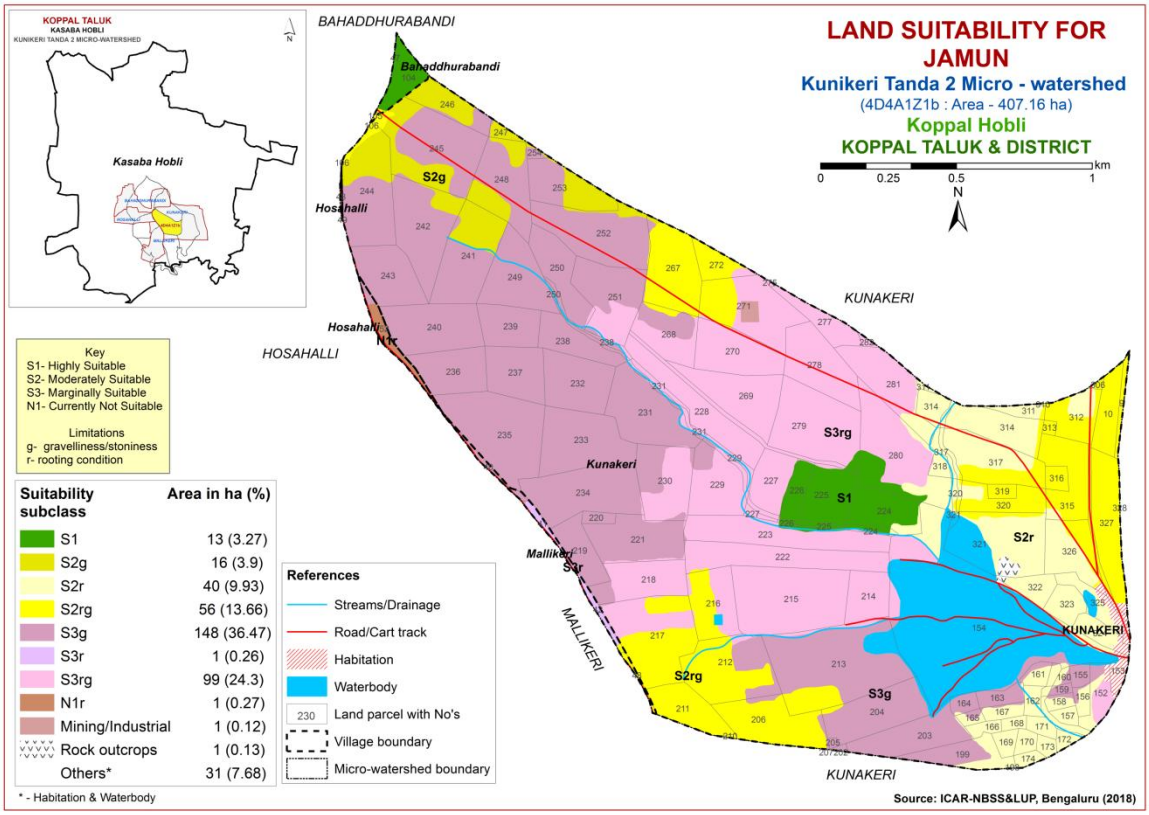


Fig. 7.21 Land Suitability map of Jamun

7.22 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 7.23) for growing musambi were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

An area of about 54 ha (13%) is highly suitable (Class S1) for growing musambi and are distributed in the northern and eastern part of the microwatershed. An area of about 71 ha (18%) is moderately suitable (Class S2) and occur in the southern, eastern and northern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Maximum area of about 248 ha (61%) is marginally suitable (Class S3) for growing musambi and are distributed in the major part of the microwatershed with moderate limitations of gravellines and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

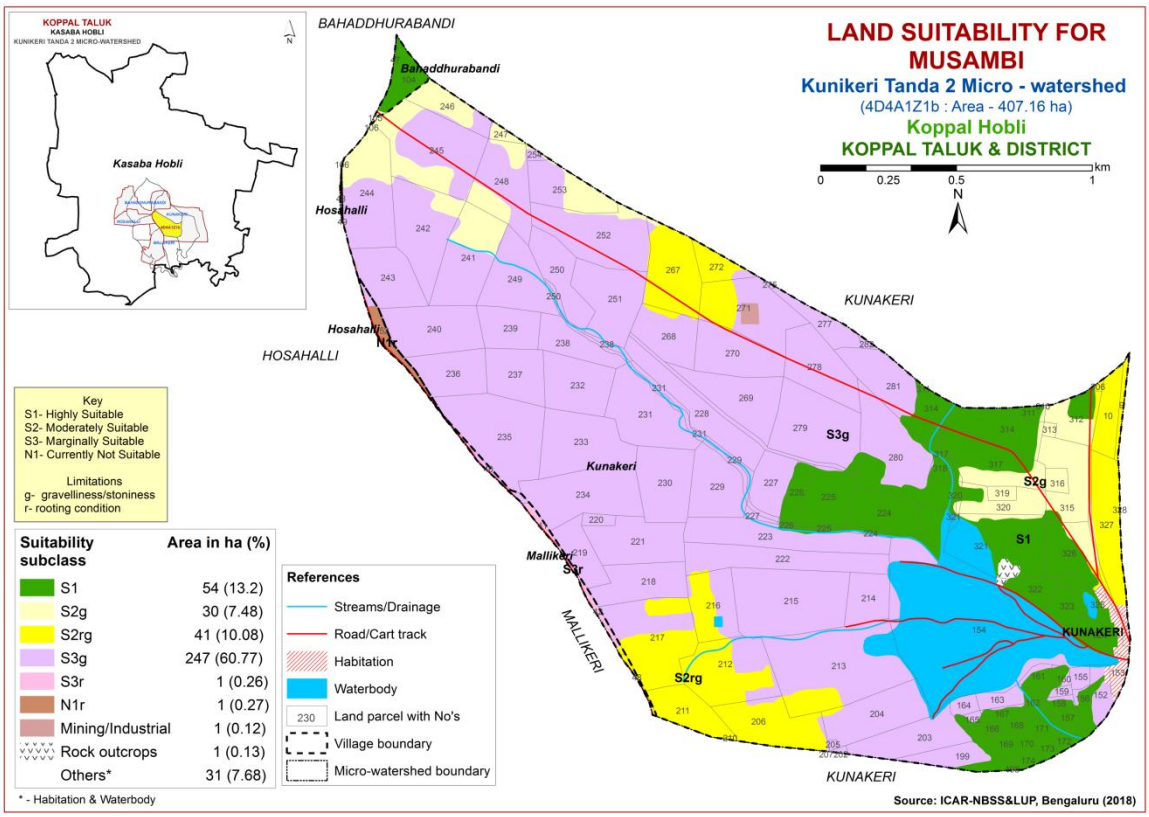


Fig. 7.22 Land Suitability map of Musambi

7.23 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 11752 ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.24) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.23.

An area of about 54 ha (13%) is highly suitable (Class S1) for growing lime and are distributed in the eastern and northern part of the microwatershed. An area of about 71 ha (18%) is moderately suitable (Class S2) and occur in the eastern, southern and northern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. A maximum area of about 248 ha (61%) is marginally suitable (Class S3) for growing lime and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

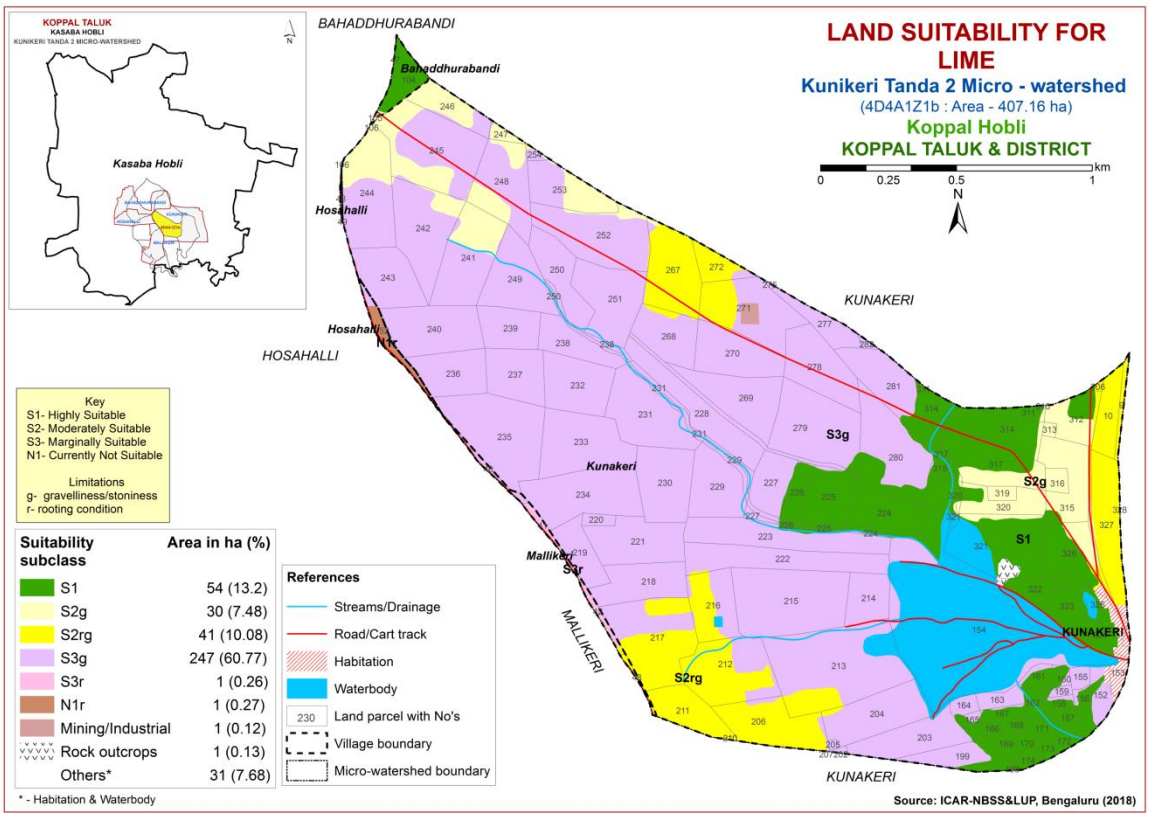


Fig. 7.23 Land Suitability map of Lime

7.24 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 7.25) 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 7.24.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing cashew and are distributed in the northern and eastern part of the microwatershed. An area of about 103 ha (25%) is moderately suitable (Class S2) and occur in the southern, eastern and northern part of the microwatershed. They have minor limitations of gravelliness, texture and rooting depth. Maximum area of about 248 ha (61%) is marginally suitable (Class S3) for growing cashew and distributed in the major part of the microwatershed with moderate limitations of rooting depth and gravelliness. Area currently not suitable (Class N1) cover about 1 ha (<1%) and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

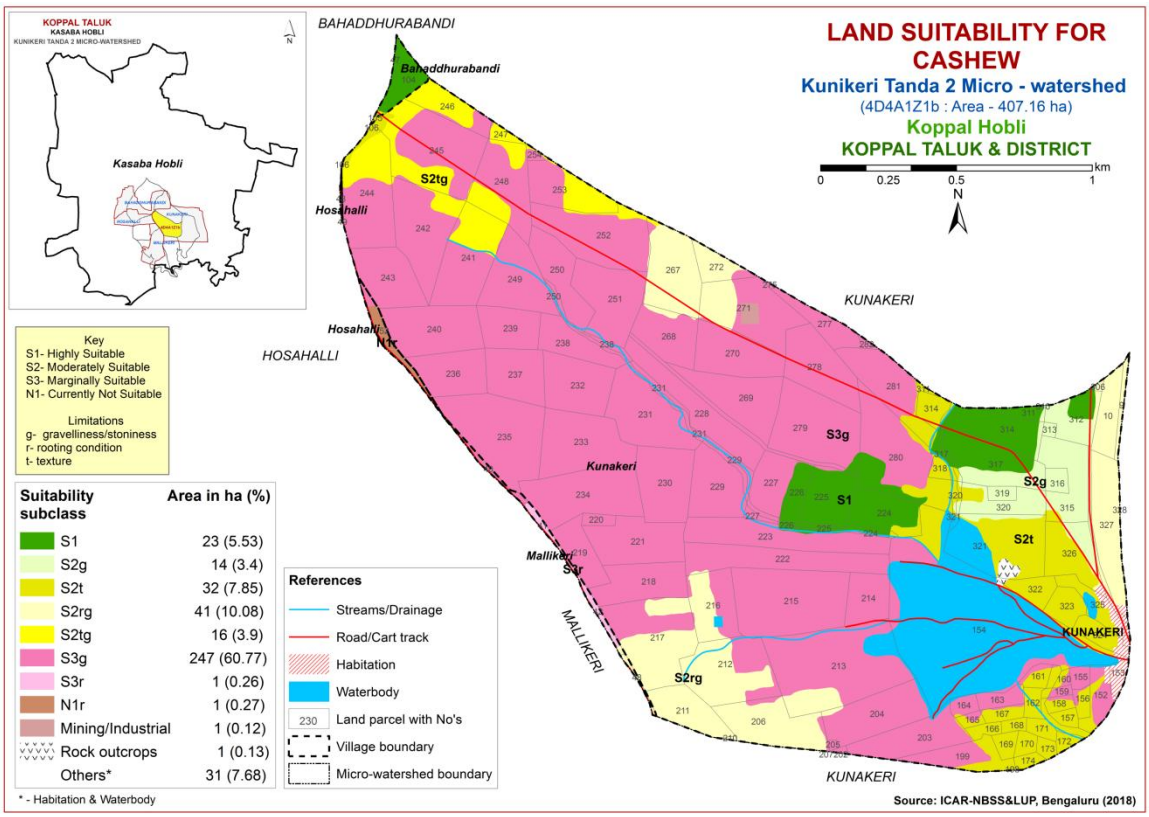


Fig. 7.24 Land Suitability map of Cashew

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

An area of about 68 ha (17%) is highly suitable (Class S1) for growing custard apple and are distributed in the eastern and northern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 305 ha (75%) and occur in the major part of the microwatershed. They have minor limitations of rooting depth and gravelliness. An area of about 1 ha (<1%) is marginally suitable (Class S3) for growing custard apple and distributed in the northwestern part of the microwatershed with moderate limitations of rooting depth and gravelliness.

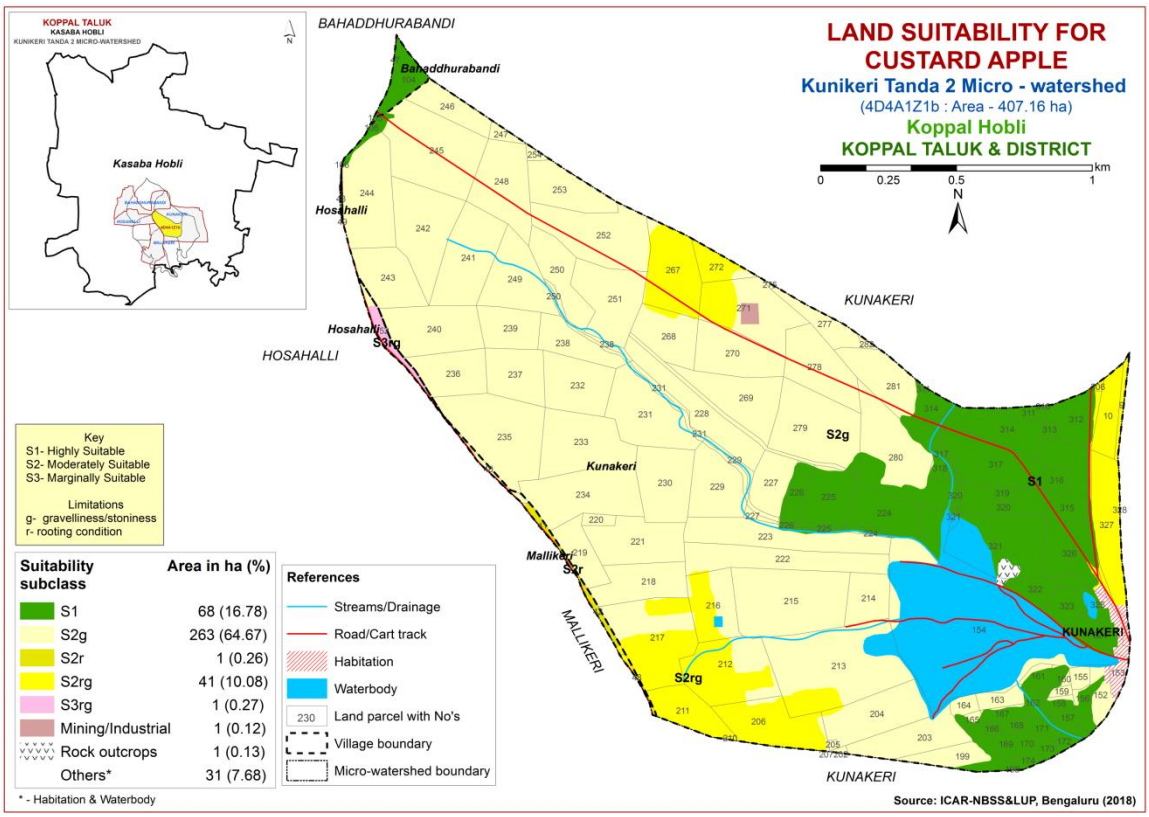


Fig. 7.25 Land Suitability map of Custard Apple

7.26 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 7.27) 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 7.26.

An area of about 68 ha (17%) is highly suitable (Class S1) for growing amla and are distributed in the northern and eastern part of the microwatershed. Moderately suitable (Class S2) lands cover a maximum area of about 305 ha (75%) and occur in the major part of the microwatershed. They have minor limitations of rooting depth, and gravelliness. An area of about 1 ha (<1%) is marginally suitable (Class S3) for growing amla and distributed in the northwestern part of the microwatershed with moderate limitations of rooting depth and gravelliness.

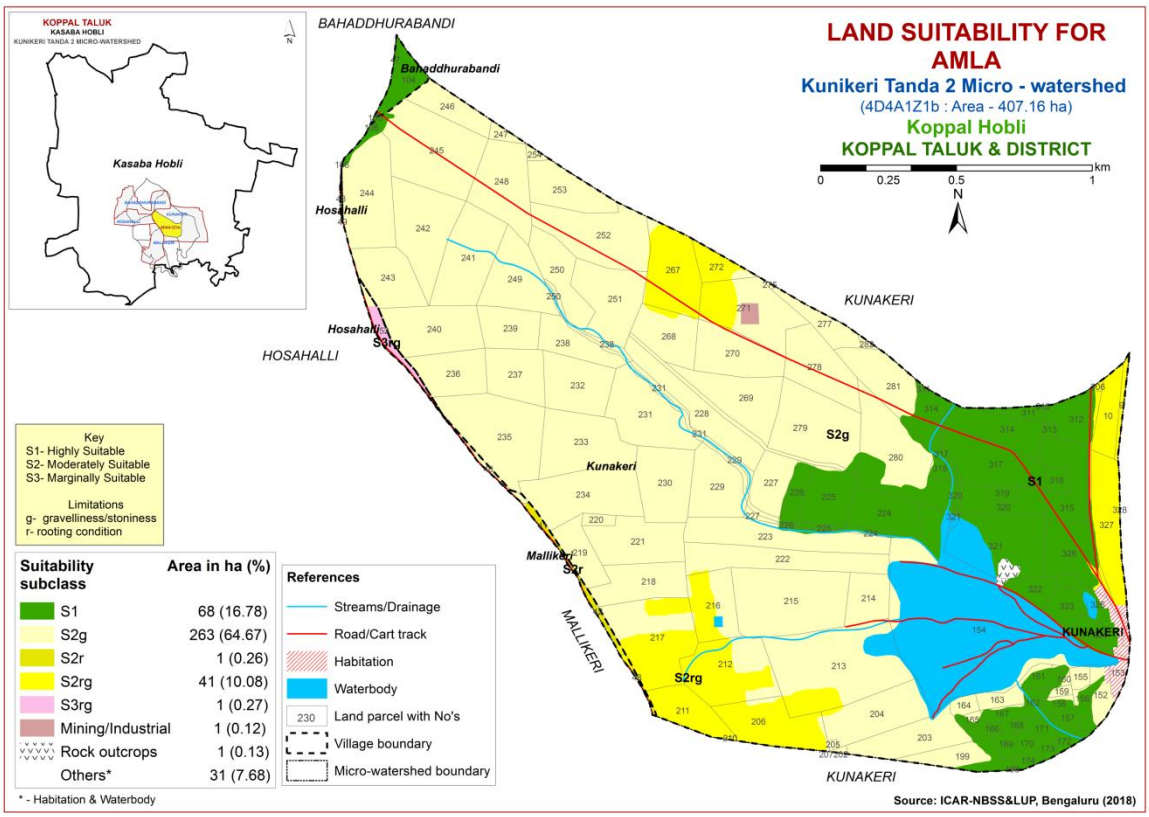


Fig. 7.26 Land Suitability map of Amla

7.27 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 7.28) for growing tamarind were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.27.

An area of about 13 ha (3%) is highly suitable (Class S1) for growing tamarind and are distributed in the central and northern part of the microwatershed. An area of about 155 ha (38%) is moderately suitable (Class S2) and occur in the western, eastern and northern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Maximum area of about 205 ha (50%) is marginally suitable (Class S3) for growing tamarind and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth. An area of about 2 ha (<1%) is currently not suitable (Class N1) for growing tamarind and distributed in the northwestern part of the microwatershed with severe limitation of rooting depth.

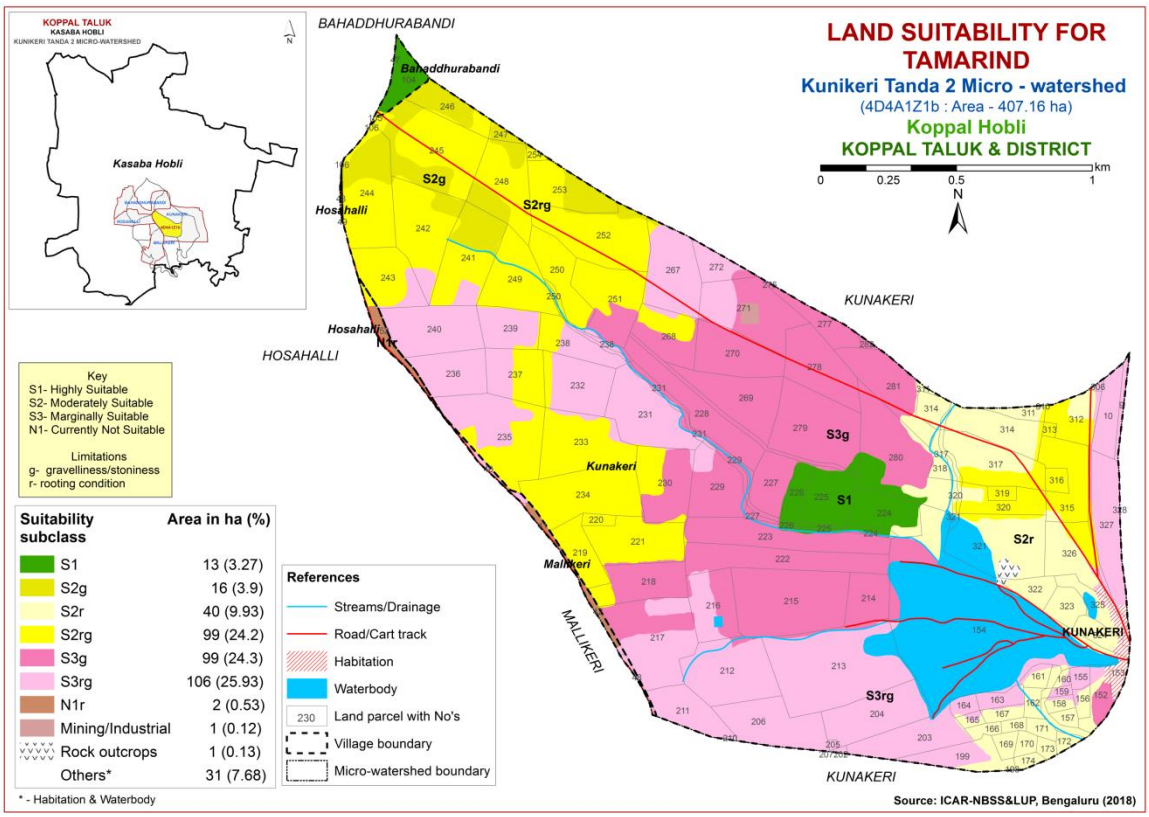


Fig. 7.27 Land Suitability map of Tamarind

7.28 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 7.29) 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 7.28.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing marigold and are distributed in the northern part of the microwatershed. An area of about 63 ha (15%) is moderately suitable (Class S2) and occur in the eastern and northern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 289 ha (71%) is marginally suitable (Class S3) for growing marigold and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth.

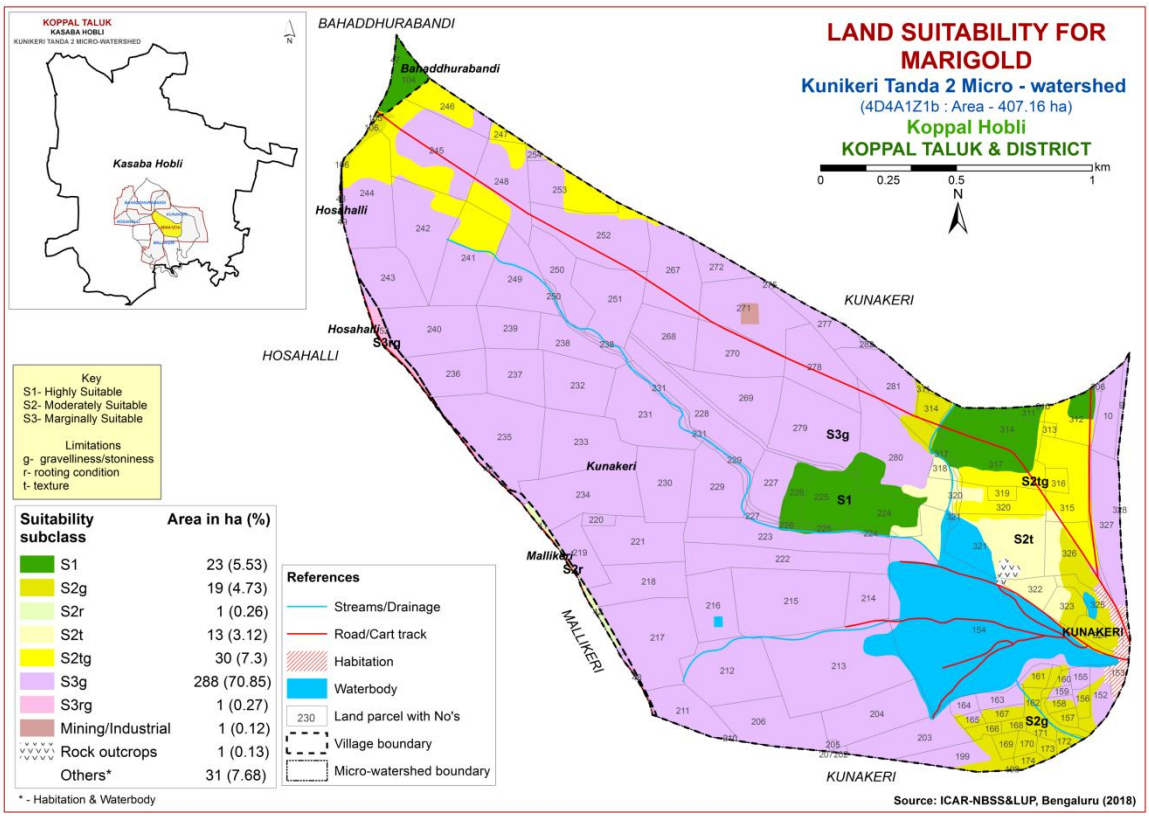


Fig. 7.28 Land Suitability map of Marigold

7.29 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 7.30) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed is given in Figure 7.29.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing chrysanthemum and are distributed in the northern part of the microwatershed. An area of about 63 ha (15%) is moderately suitable (Class S2) and occur in the eastern and northern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 289 ha (71%) is marginally suitable (Class S3) for growing chrysanthemum and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth.

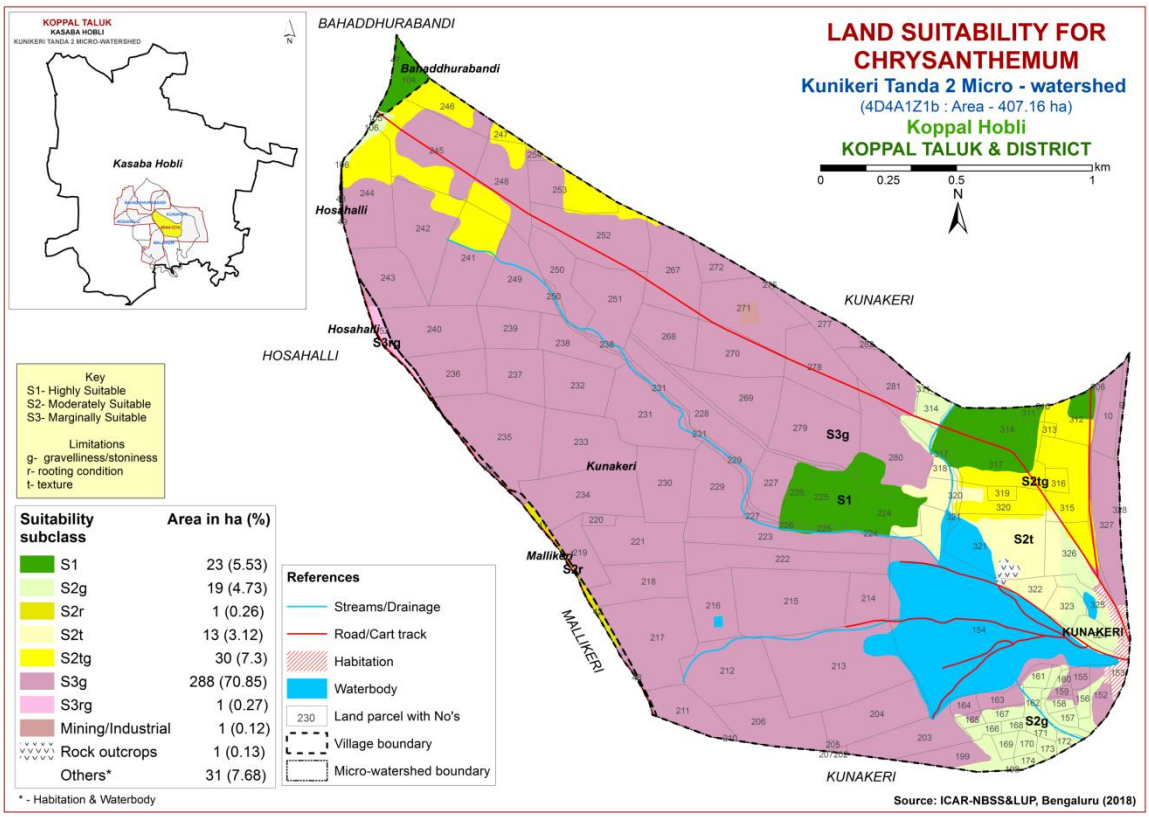


Fig. 7.29 Land Suitability map of Chrysanthemum

7. 30 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 7.31) for growing jasmine were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jasmine was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.30.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing jasmine and are distributed in the northern part of the microwatershed. An area of about 63 ha (15%) is moderately suitable (Class S2) and occur in the eastern and northern part of the microwatershed. They have minor limitations of texture, gravelliness and rooting depth. Maximum area of about 289 ha (71%) is marginally suitable (Class S3) for growing jasmine and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth.

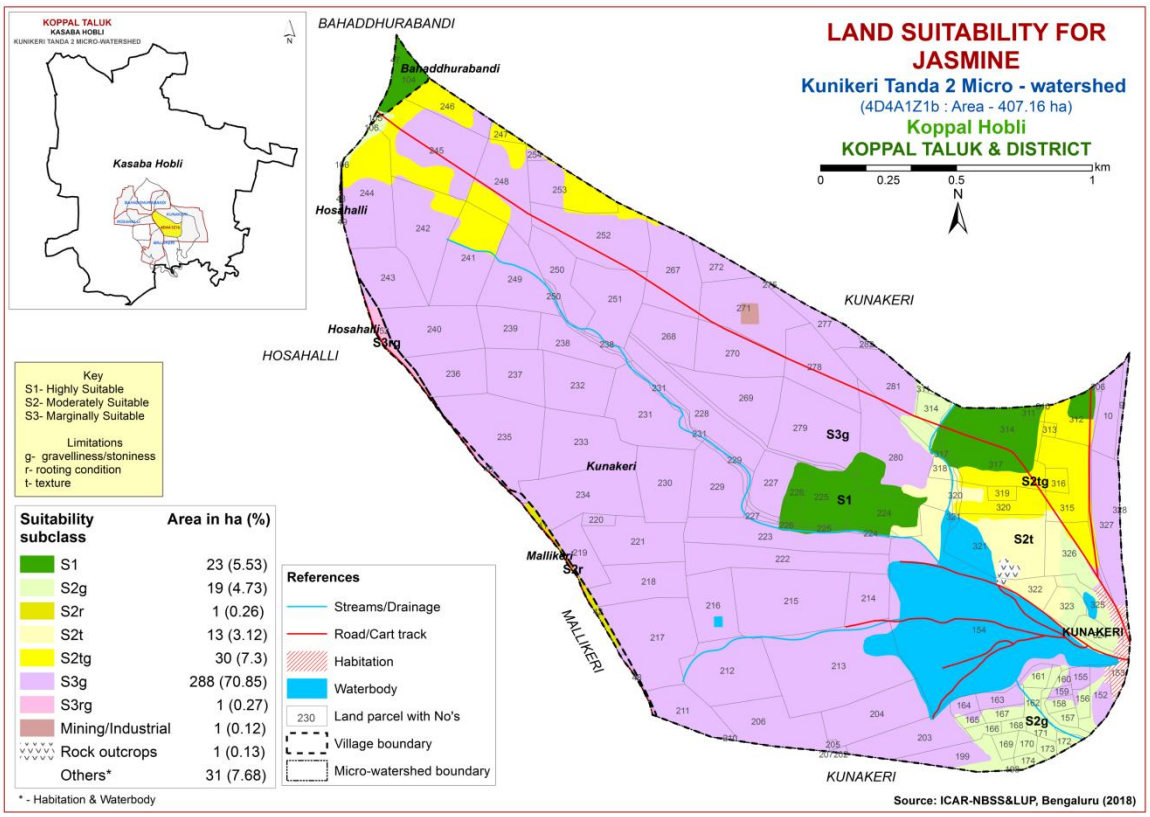


Fig. 7.30 Land Suitability map of Jasmine

7. 31 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 7.32) for growing crossandra were matched with the soil-site characteristics (Table 7.1) and a 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 7.31.

An area of about 23 ha (6%) is highly suitable (Class S1) for growing crossandra and are distributed in the northern and northeastern part of the microwatershed. An area of about 63 ha (15%) is moderately suitable (Class S2) and occur in the northern and eastern part of the microwatershed. They have minor limitations of rooting depth, texture and gravelliness. Maximum area of about 289 ha (71%) is marginally suitable (Class S3) for growing crossandra and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting depth.

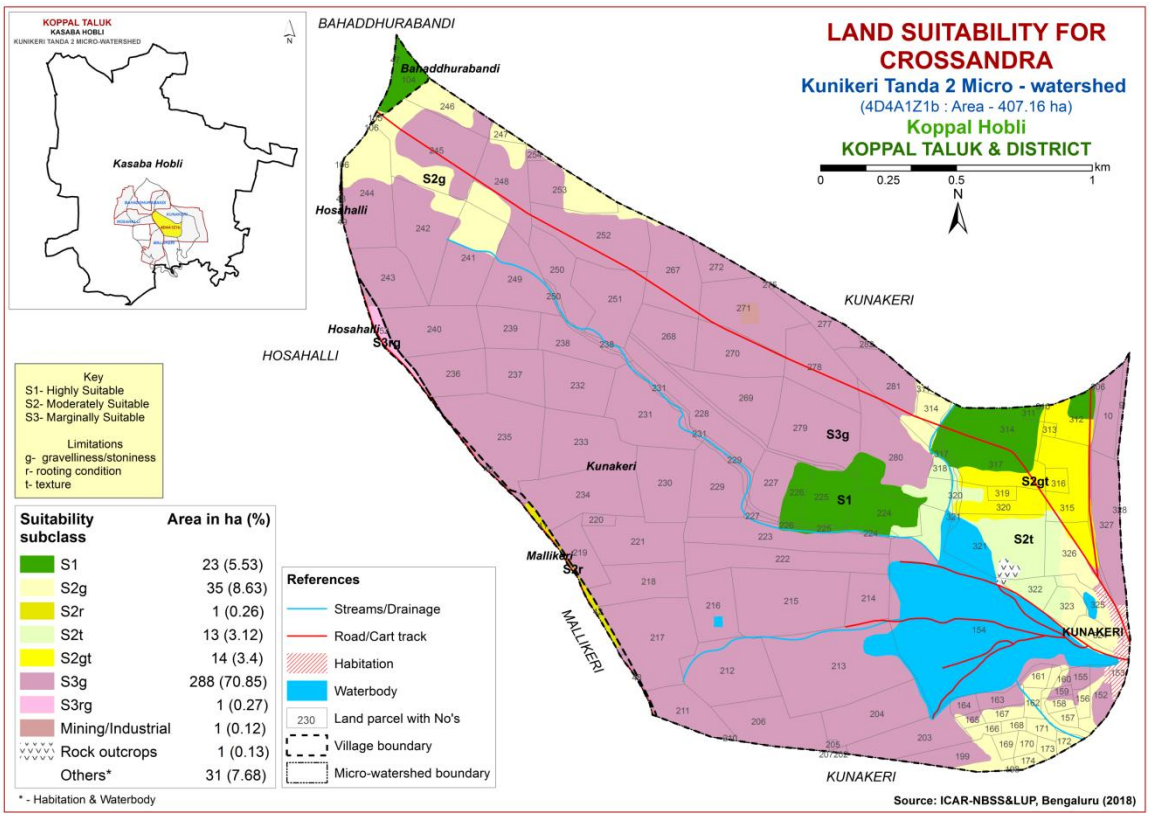


Fig. 7.31 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Kunikeri Tanda 2 Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP	CEC [Cmol $(p^+)kg^{-1}$]	BS (%)
					Surf-ace	Sub-surface	Sur-face	Sub-surface								
ABRiB2g2	662	<90	WD	25-50	sc	gsc	35-60	>35	<50	1-3	moderate					
TDHiB1	662	<90	WD	50-75	sc	sc-c	-	<15	100-150	1-3	moderate	9.19	0.18	5.82	3.57	100
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	84.7
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	84.7
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	84.7
JDGhB1g1	662	<90	WD	100-150	scl	sc-c	15-35	<15	>200	1-3	slight	6.11	0.07	2.06	9.41	90
JDGiA1g1	662	<90	WD	100-150	sc	sc-c	15-35	<15	>200	0-1	slight	6.11	0.07	2.06	9.41	90
JDGiB1	662	<90	WD	100-150	sc	sc-c	-	<15	>200	1-3	slight	6.11	0.07	2.06	9.41	90
JDGiB2g1	662	<90	WD	100-150	sc	sc-c	15-35	<15	>200	1-3	moderate	6.11	0.07	2.06	9.41	90
VDHcB2	662	<90	MWD	100-150	sl	sc-c	-	-	151-200	1-3	moderate	-	-	-	-	-
VDHhB2g1	662	<90	MWD	100-150	scl	sc-c	15-35	-	151-200	1-3	moderate	-	-	-	-	-
BPRcB2g1	662	<90	WD	100-150	sl	gsc-gc	15-35	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRhB2	662	<90	WD	100-150	scl	gsc-gc	-	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRhB2g1	662	<90	WD	100-150	scl	gsc-gc	15-35	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRhB2g2	662	<90	WD	100-150	scl	gsc-gc	35-60	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
BPRiB2	662	<90	WD	100-150	sc	gsc-gc	-	>35	51-100	1-3	moderate	6.64	0.03	0.51	5.45	63.48
NGPhB1g1	662	<90	WD	100-150	scl	gsc	15-35	>35	51-100	1-3	slight	6.67	0.09	0.46	7.10	82.70
NGPhB1g2	662	<90	WD	100-150	scl	gsc	35-60	>35	51-100	1-3	slight	6.67	0.09	0.46	7.10	82.70
NGPiB1	662	<90	WD	100-150	sc	gsc	-	>35	51-100	1-3	slight	6.67	0.09	0.46	7.10	82.70
RTRiA1	662	<90	WD	>150	sc	c	-	-	151-200	0-1	slight	5.08	0.03	2.06	9.21	50.50
RTRiB2	662	<90	WD	>150	sc	c	-	-	151-200	1-3	moderate	5.08	0.03	2.06	9.21	50.50
NDLiB1g1	662	<90	WD	>150	sc	gsc	15-35	>35	51-100	1-3	slight	7.46	0.08	0.32	11.45	91.88

Table 7.2 Land suitability criteria for Sorghum

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic regime1	Mean temperature in growing season	°C	26–30	30–34; 24–26	34–40; 20–24	>40; <20
	Mean max. temp. in growing season	°C				
	Mean min. tempt. in growing season	°C				
	Mean RH in growing season	%				
	Total rainfall	mm				
	Rainfall in growing season	mm				
Land quality	Soil-site characteristics					
Moisture availability	Length of growing period for short duration	Days				
	Length of growing period for long duration					
	AWC	mm/m				
Oxygen availability to roots	Soil drainage	Class	Well drained	Moderately well drained	Poorly drained	V.poorly drained
	Water logging in growing season	Days				
Nutrient availability	Texture	Class	sc, c (red), c (black)	scl, cl	ls, sl	-
	pH	1:2.5	5.5-7.8	5.0-5.5 7.8-9.0	>9.0	-
	CEC	C mol (p+)/Kg				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	10-15
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.3 Land suitability criteria for Maize

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

Table 7.4 Land suitability criteria for Bajra

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

Table 7.5 Land suitability criteria for Red gram

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

Table 7.6 Land suitability criteria for Bengal gram

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

Table 7.7 Land suitability criteria for Groundnut

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

Table 7.8 Land suitability criteria for Sunflower

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

Table 7.9 Land suitability criteria for Cotton

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

Table 7.10 Land suitability criteria for Chilli

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

Table 7.11 Land suitability criteria for Tomato

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

Table 7.12 Land suitability criteria for Brinjal

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

Table 7.13 Land suitability criteria for Onion

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

Table 7.14 Land suitability criteria for Bhendi

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

Table 7.15 Land suitability criteria for Drumstick

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

Table 7.16 Land suitability criteria for Mulberry

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

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

Table 7.17 Land suitability criteria for Mango

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

Table 7.18 Land suitability criteria for Sapota

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

Table 7.19 Land suitability criteria for Pomegranate

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

Table 7.20 Land suitability criteria for Guava

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

Table 7.21 Land suitability criteria for Jackfruit

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

Table 7.22 Land suitability criteria for Jamun

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

Table 7.23 Land suitability criteria for Musambi

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

Table 7.24 Land suitability criteria for Lime

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

Table 7.25 Land suitability criteria for Cashew

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

Table 7.26 Land suitability criteria for Custard apple

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

Table 7.27 Land suitability criteria for Amla

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

Table 7.28 Land suitability criteria for Tamarind

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

Table 7.29 Land suitability criteria for Marigold

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

Table 7.30 Land suitability criteria for Chrysanthemum

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

Table 7.31 Land suitability criteria for Jasmine (irrigated)

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

7.32 Land suitability criteria for Crossandra

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

7.32 Land Management Units (LMUs)

The 23 soil map units identified in Kunikeri Tanda 2 Microwatershed have been grouped into four 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.7.32) 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 four Land Management Units along with brief description of soil and site characteristics are given below.

LMU	Mapping unit	Soil and site characteristics
1	NDLiB1g1, BPRcB2g1, BPRhB2, BPRhB2g1, BPRhB2g2, BPRiB2, NGPhB1g1, NGPhB1g2, NGPiB1, HDHcB2g1, HDHhB1g2 ,HDHhB2g1	Moderately deep to very deep, red gravelly sandy clay to clay soils with slopes of 1-3%, slight to moderate erosion, gravelly (15-60%)
2	RTRiA1 RTRiB2 JDGhB1g1 JDGiA1g1 JDGiB1 JDGiB2g1 VDHcB2 VDHhB2g1	Deep to very deep, red sandy clay to clay soils with slopes of 0-3%, slight to moderate erosion, gravelly (15-35%)
3	TDHiB1	Moderately shallow, red sandy clay to clay soils with slopes of 1-3%, slight erosion
4	ABRiB2g2	Shallow, red gravelly sandy clay soils with slopes of 1-3%, moderate erosion, very gravelly (35-60%)

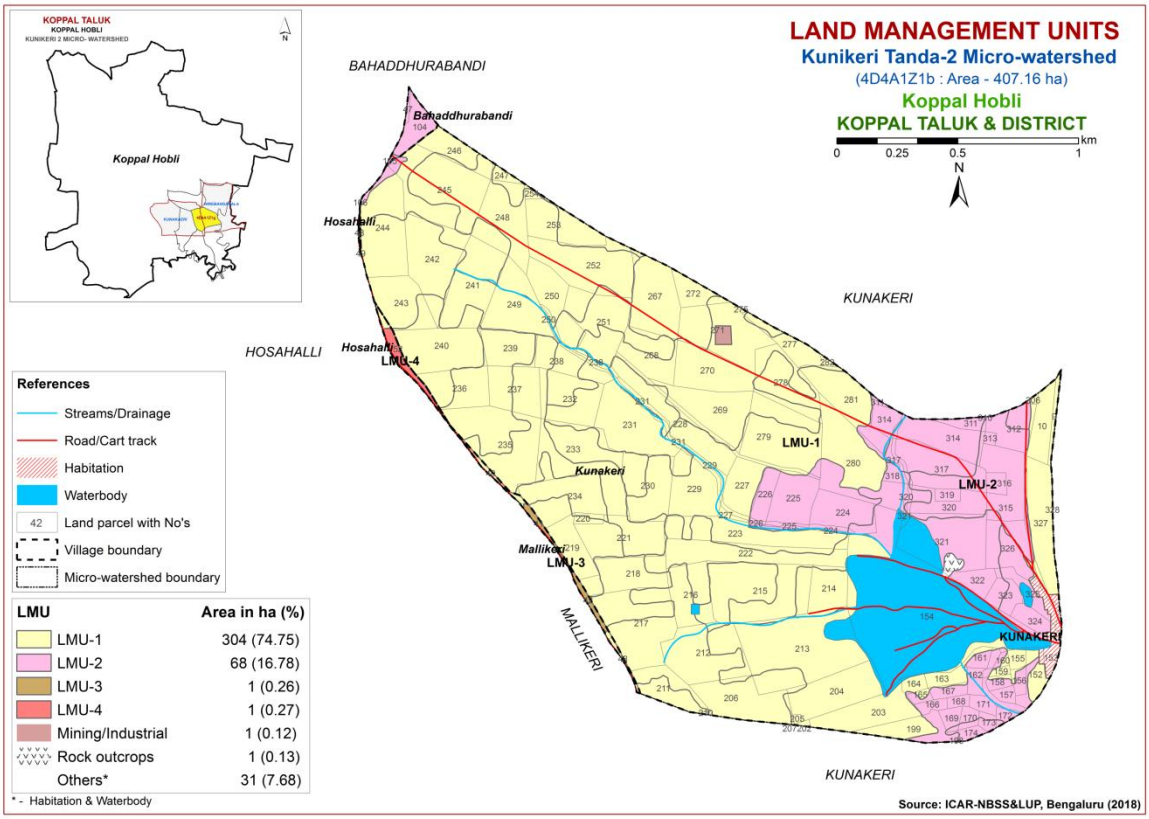


Fig 7.32 Land Management Units map of Kunikeri Tanda 2 microwatershed

7.33 Proposed Crop Plan for Kunikeri Tanda 2 Microwatershed

After assessing the land suitability for the 31 crops, the proposed crop plan has been prepared for the four identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 31 crops. The resultant proposed crop plan is presented in Table 7.33.

Table 7.33 Proposed Crop Plan for Kunikeri Tanda 2 Microwatershed

LMU	Soil Map Units	Survey Number	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
1	299.NDLiB1g1 225.BPRcB2g1 230.BPRhB2 231.BPRhB2g1 232.BPRhB2g2 239.BPRiB2 258.NGPhB1g1 259.NGPhB1g2 262.NGPiB1 111.HDHcB2g1 121.HDHhB1g2 123.HDHhB2g1 (Moderately deep to very deep, red gravelly sandy clay to clay soils)	**Hosahalli:**48,49 **Kunakeri:**9,10,152,155,159,163,164,199,202,203,204,205,206,207,210,211,212,213,214,215,216,217,218,219,220,221,222,223,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,267,268,269,270,271,272,275,277,278,279,280,281,282,306,327, 328 **Mallikeri :** 40,48	Groundnut, Bajra, Horse gram, Castor, Mulberry	**Fruit crops:** Musambi, Lime, Jamun, Jackfruit Amla, Custard apple, Tamarind **Vegetable crops:** Drumstick, Curry leaves	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
2	287.RTRiA1 288.RTRiB2 211.JDGhB1g1 212.JDGiA1g1 458.JDGiB1 213.JDGiB2g1 243.VDHcB2 246.VDHhB2g1 (Deep to very deep, red sandy clay to clay soils)	**Bahddhurabandi :** 104,105,106,47 **Kunakeri:**156,157,158,160,161,162,165,166,167,168,169,170,171,172,173,174,198,224,225,226,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry	**Fruit crops:** Mango, Pomegranate, Guava, Sapota, Jackfruit, Jamun, Tamarind, Lime, Musambi, Amla, Custard apple, Cashew **Vegetable crops:** Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold,	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)

LMU	Soil Map Units	Survey Number	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
				Chrysanthemum, Jasmine, Crossandra	
3	60.TDHiB1 (Moderately shallow, red sandy clay to clay soils)	**Mallikeri :**41,42	Sorghum, Groundnut, Bajra, Green gram, Black gram, Cowpea, Horse gram, Castor,	**Fruit crops:** Lime, Musambi, Amla, Custard apple, Cashew **Flower crops:** Marigold, Chrysanthemum, Crossandra, Jasmine	Drip irrigation, Mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
4	472.ABRiB2g2 (Shallow, red gravelly sandy clay soils)	**Hosahalli :** 52	Green gram, Black gram, Horse gram	**Agri-Silvi-Pasture:** Custard apple, Hybrid Napier**,** *Styloxanthes hamata,* Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

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

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

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

The most important characteristics of a healthy soil are

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

Characteristics of Kunikeri Tanda 2 Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of BPR (148 ha), NGP(99 ha), HDH(41 ha), JDG(32 ha), VDH(23 ha), ABR(1 ha), NDL(16 ha), RTR(13 ha) and TDH(1 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 and erosion.
- On the basis of soil reaction, an area of about 13 ha (3%) is strongly acid (pH 5.0-5.5), 28 ha(7%) is moderately acid (pH 5.5-6.0), 178 ha (44%) is slightly acid (pH 6.0-6.5), 129

ha (32 %) is neutral (pH 6.5-7.3), 24 ha (6%) is slightly alkaline (pH 7.3-7.8) and 3 ha (<1%) is moderately alkaline (pH 7.8-8.4)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.

Acid soils

Acid soils occupy an area of about 219 ha (54%) in the microwatershed. The following measures are recommended for reclaiming acid soils.

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

Liming materials:

1. $CaCO_3$ (Calcium Carbonate). More than 90% use in India.
2. Dolomite [Ca Mg $(Co_3)_2$]
3. Quick lime (Cao)
4. Slaked lime [Ca $(OH)_2$]

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

Alkaline soils

An area of about 27 ha (7%) is under alkaline soils. 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, Azatobacter, Rhizobium).
3. Application of 25% extra N and P (125 % RDN&P).
4. Application of $ZnSO_4$ – 12.5 kg/ha (once in three years).
5. Application of Boron – 5 kg/ha (once in three years).

Neutral soils

Neutral soils cover about 129 ha (32%) 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 factor affecting the soil health in the microwatershed. An area of about 216 ha (53%) is under moderate erosion. The areas with moderate erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

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

Inputs for Net Planning (Saturation Plan) and Interventions needed

Net planning 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, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.

- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Kunikeri Tanda 2 Microwatershed.
- **Organic Carbon:** An area of about 197 ha (48%) is low (<0.5%) and 178 ha (44%) is medium (0.5-0.75%). 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 375 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 medium in (23-57 kg/ha) 309 ha (76%) and high (>57 kg/ha) in 66 ha (16%) of the area. The areas with high phosphorus content reduce 25% from the RDF to avoid the excess application of fertilizer and apply additional 25% phosphorus in areas where it is medium.
- **Available Potassium:** Available potassium is low (<145 kg/ha) in 198 ha (49%) medium (145-337 kg/ha) in 166 ha (41%) and high (>337 kg/ha) in 11 ha (3%) area of the microwatershed. The areas with high potassium content reduce 25% from the RDF to avoid the excess application of fertilizer and apply additional 25% potassium in areas where it is medium and low.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in the entire area of the microwatershed. Areas with low in available sulphur need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertitilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Iron:** It is deficient (<4.5 ppm) in 150 ha (37 %) and sufficient (>4.5 ppm) in 225 ha (55 %) area of the microwatershed. To manage iron deficiency iron sulphate @ 25 kg/ha needs to be applied for 2-3 years.
- **Available Zinc:** It is deficient (<0.6 ppm) in the entire area of the microwatershed. Application of zinc sulphate @ 25kg/ha is to be followed in areas that are deficient in available zinc.

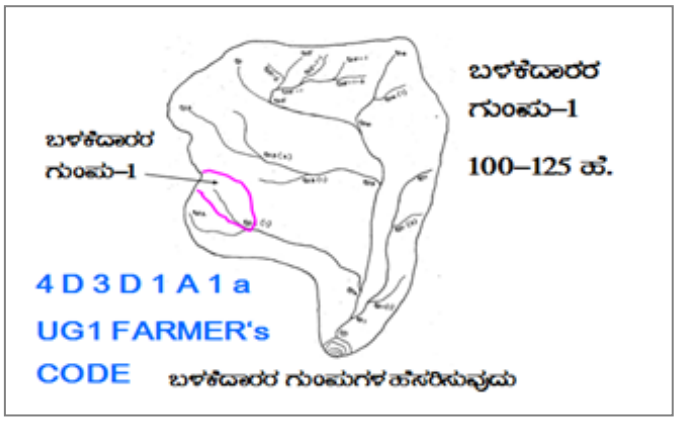
- **Available Boron:** Available boron is low in (<0.5ppm) the entire area of the microwatershed. The areas with low in boron content need to be applied with sodium borate @ 10kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency.
- **Available Manganese**: It is sufficient in the entire area of the microwatershed**.**
- **Available Copper:** It is sufficient in the entire area of the microwatershed**.**
- **Soil Acidity:** The microwatershed has 219 ha (54 %) area with soils that are slightly acid. These areas need application of lime (Calcium Carbonate).
- **Soil Alkalinity:** An area of about 27 ha (7%) in the microwatershed has soils that are slightly to very strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase 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 Kunikeri Tanda 2 Microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

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



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

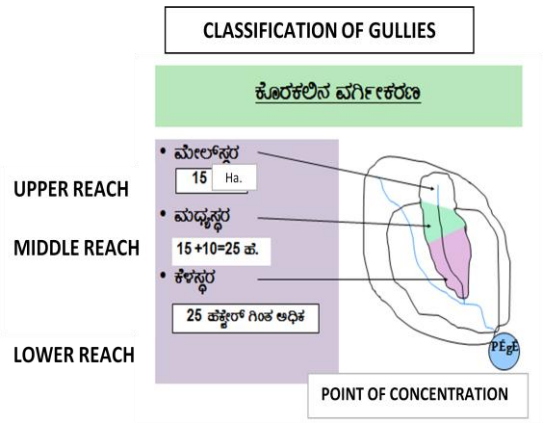
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

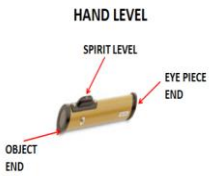
9.1.1 Arable Land Treatment

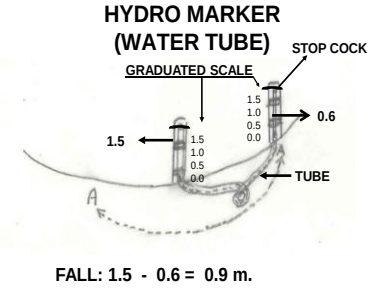
A. BUNDING

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.

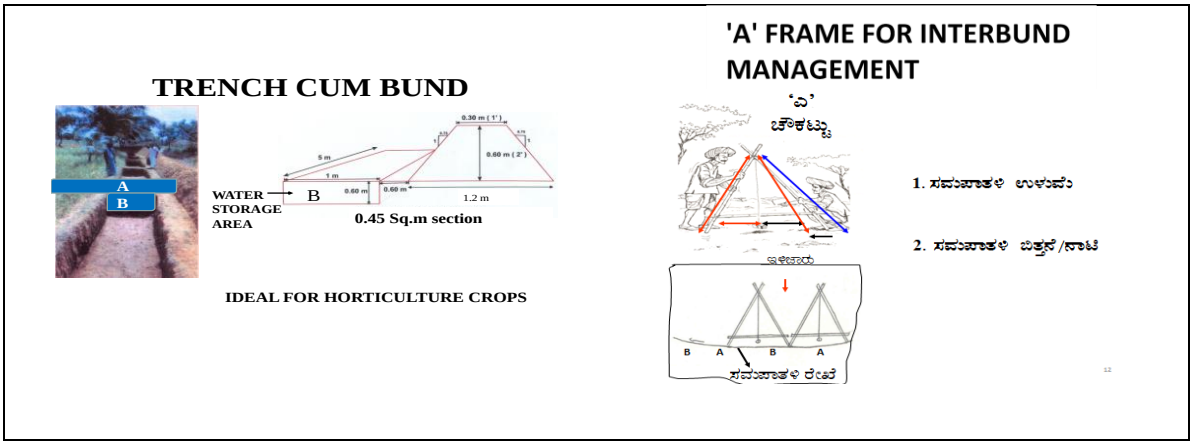
Recommended Bund Section

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 drainge 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 Levelling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.
f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.
g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.
h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthern checks in the natural water course. Location and design details are given in the Manual.

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. A maximum area of about 360 ha (89%) needs trench cum bunding, an area of about 14 ha (4 %) needs strengthening of existing bunds/ bunding. The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalized in a participatory approach.

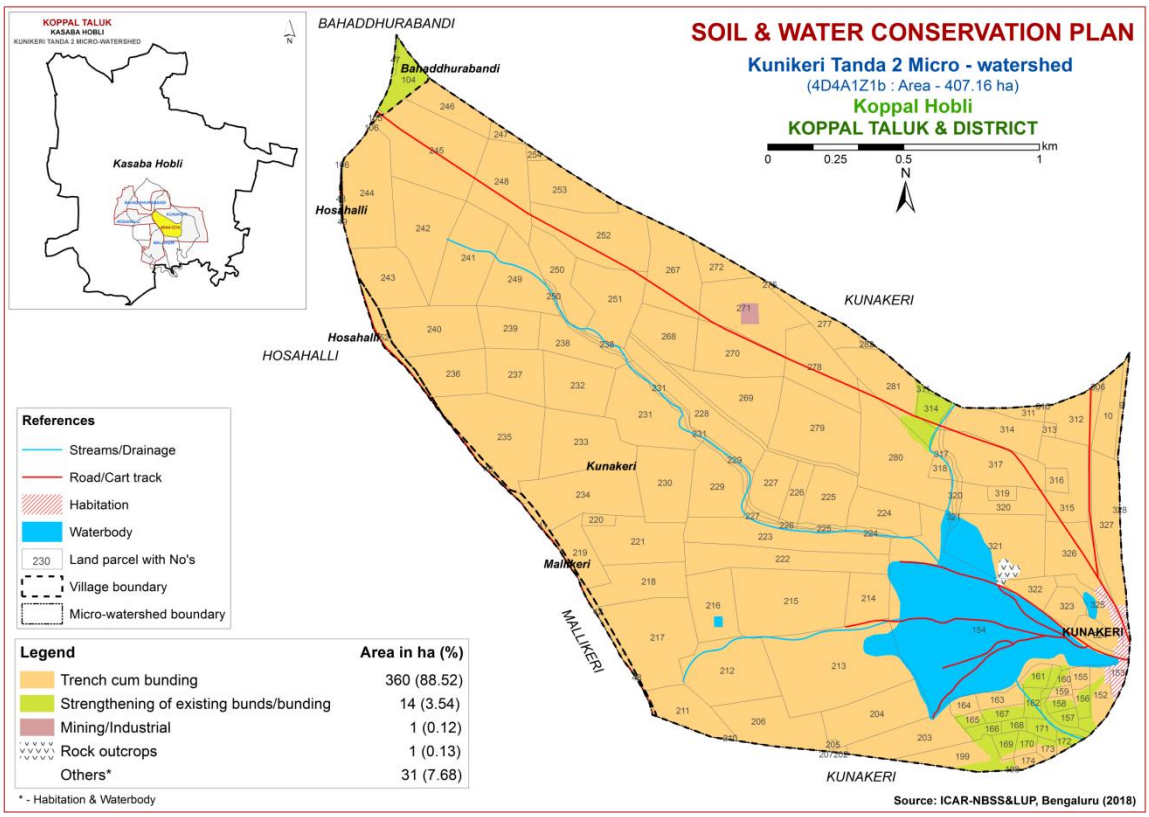


Fig. 9.1 Soil and Water Conservation Plan map of Kunikeri Tanda 2 Microwatershed

9.3 Greening of Microwatershed

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

Kunikeri Tanda-2 (1Z1b) Microwatershed

Soil Phase Information

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Mallikeri	40	0.53	BPRiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIIes	Trench cum bunding
Mallikeri	41	0.47	TDHiB1	LMU-3	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Redgram+Maize (Rg+Mz)	Not Available	IIs	Trench cum bunding
Mallikeri	42	0.66	TDHiB1	LMU-3	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow+Pearl millet (Cf+Pm)	Not Available	IIs	Trench cum bunding
Mallikeri	48	0.24	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Pearl millet+Redgram (Mz+Pm+Rg)	Not Available	IIes	Trench cum bunding
Bahaddhurabandi	47	0.16	RTRiA1	LMU-2	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	High (151-200 mm/m)	Nearly level (0-1%)	Slight	Maize+Bajra (Mz+Bj)	Not Available	IIs	Graded bunding
Bahaddhurabandi	104	1.99	RTRiA1	LMU-2	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	High (151-200 mm/m)	Nearly level (0-1%)	Slight	Bajra (Bj)	Not Available	IIs	Graded bunding
Bahaddhurabandi	105	0.04	JDGiB2g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Trench cum bunding
Bahaddhurabandi	106	0.001	JDGiB2g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Hosahalli	48	0.09	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Hosahalli	49	0.001	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Hosahalli	52	1.37	ABRiB2g2	LMU-4	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	9	0.58	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Kunakeri	10	2.38	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow+Redgram (Cf+Rg)	Not Available	IIes	Trench cum bunding
Kunakeri	152	1.87	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Paddy+Habitation (Bj+Pd+Hb)	Not Available	IIIs	Trench cum bunding
Kunakeri	153	0.67	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Kunakeri	154	29.46	Waterbody	Others	Others	Others	Others	Others	Others	Others	Current fallow+Waterbody (Cf+Wb)	Not Available	Others	Others
Kunakeri	155	0.57	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Trench cum bunding
Kunakeri	156	0.62	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	157	0.52	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	158	0.57	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	159	0.28	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Kunakeri	160	0.29	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	161	0.77	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	162	0.73	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	163	1.06	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Trench cum bunding
Kunakeri	164	0.69	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIIes	Trench cum bunding
Kunakeri	165	0.44	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	166	0.57	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	167	0.79	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	168	0.42	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	169	0.71	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	170	0.62	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	171	0.68	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	172	0.49	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Paddy (Pd)	Not Available	IIs	Graded bunding
Kunakeri	173	0.48	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Paddy (Pd)	Not Available	IIs	Trench cum bunding
Kunakeri	174	0.48	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Paddy (Pd)	Not Available	IIs	Trench cum bunding
Kunakeri	198	0.03	JDGiA1g1	LMU-2	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Kunakeri	199	3.01	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	202	0.11	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	203	4.49	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	204	5.52	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Paddy (Mz+Pd)	Not Available	IIIes	Trench cum bunding
Kunakeri	205	0.11	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Kunakeri	206	5.5	HDHcB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	207	0	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	210	0.06	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Kunakeri	211	3.36	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Kunakeri	212	7.07	HDHcB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding
Kunakeri	213	13.15	BPRhB2g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	214	2.79	NGPiB1	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	215	9.7	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	216	4.16	HDHcB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	217	8.28	HDHcB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	218	4.36	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	219	2.67	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Kunakeri	220	0.52	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIIes	Trench cum bunding
Kunakeri	221	5.32	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	222	6.11	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	223	6.49	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	224	3.7	RTRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIe	Trench cum bunding
Kunakeri	225	3.72	RTRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIe	Trench cum bunding
Kunakeri	226	1.52	RTRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIe	Trench cum bunding
Kunakeri	227	3.17	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	228	5.05	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	229	4.87	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	230	5.24	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	231	6.69	BPRcB2g1	LMU-1	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	232	4.84	BPRcB2g1	LMU-1	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	233	6.64	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	234	7.06	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Kunakeri	235	8.86	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	236	4	BPRiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Kunakeri	237	4	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	1 Borewell	IIIes	Trench cum bunding
Kunakeri	238	3.29	BPRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	239	3.23	BPRiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	240	5.91	BPRiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	241	6.48	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	242	6.79	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	243	4.42	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIIes	Trench cum bunding
Kunakeri	244	7.33	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	245	9.35	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIIes	Trench cum bunding
Kunakeri	246	2.7	NDLiB1g1	LMU-1	Very deep (>150 cm)	Sandy clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIs	Trench cum bunding
Kunakeri	247	0.5	NDLiB1g1	LMU-1	Very deep (>150 cm)	Sandy clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Kunakeri	248	5.84	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIIes	Trench cum bunding
Kunakeri	249	5.26	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	250	3.88	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	1 Borewell	IIIes	Trench cum bunding
Kunakeri	251	5.71	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	252	7.4	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Maize (Bj+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	253	4	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Maize (Rg+Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	254	0.29	BPRhB2g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Kunakeri	267	5.73	HDHhB1g2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Trench cum bunding
Kunakeri	268	3.96	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	269	5.34	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	270	4.84	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Kunakeri	271	6.65	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIIs	Trench cum bunding
Kunakeri	272	1.76	HDHhB1g2	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIs	Trench cum bunding
Kunakeri	275	0.05	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow (Cf)	Not Available	IIIs	Trench cum bunding
Kunakeri	277	2.06	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra (Bj)	Not Available	IIIs	Trench cum bunding
Kunakeri	278	5.22	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	279	7.76	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Bajra+Maize (Bj+Mz)	1 Borewell	IIIs	Trench cum bunding
Kunakeri	280	8.85	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	1 Borewell	IIIs	Trench cum bunding
Kunakeri	281	4.91	NGPhB1g1	LMU-1	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow+Maize (Cf+Mz)	1 Borewell	IIIs	Trench cum bunding
Kunakeri	282	0.17	NGPhB1g2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Very gravelly (35-60%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Kunakeri	306	0.13	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	310	0.03	VDHcB2	LMU-2	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	311	0.92	VDHcB2	LMU-2	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	312	2.86	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	313	0.25	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	314	5.06	VDHcB2	LMU-2	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIes	Trench cum bunding
Kunakeri	315	4.18	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	3 Borewell	IIes	Trench cum bunding
Kunakeri	316	0.73	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	317	5.54	VDHcB2	LMU-2	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Kunakeri	318	0.56	JDGiB1	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIes	Trench cum bunding
Kunakeri	319	0.55	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Trench cum bunding
Kunakeri	320	2.89	VDHhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIes	Trench cum bunding
Kunakeri	321	7.54	JDGiB1	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow+Bajra (Cf+Bj)	Not Available	IIes	Trench cum bunding
Kunakeri	322	1.52	JDGiB1	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow (Cf)	Not Available	IIes	Trench cum bunding
Kunakeri	323	1.59	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Current fallow (Cf)	Not Available	IIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	WELLS	Land Capability	Conservation Plan
Kunakeri	324	1.43	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Currentfallow+Habitation (Cf+Hb)	Not Available	IIs	Trench cum bunding
Kunakeri	325	1.91	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Kunakeri	326	3.98	JDGhB1g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Currentfallow+Redgram (Cf+Rg)	Not Available	IIs	Trench cum bunding
Kunakeri	327	5.07	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Currentfallow+Redgram (Cf+Rg)	Not Available	IIes	Trench cum bunding
Kunakeri	328	0.001	HDHhB2g1	LMU-1	Moderately deep (75-100 cm)	Sandy clay loam	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Trench cum bunding

Appendix II

Kunikeri Tanda-2 (1Z1b) Microwatershed

Soil Fertility Information

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Mallikeri	40	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mallikeri	41	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mallikeri	42	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Mallikeri	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bahaddhur abandi	47	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bahaddhur abandi	104	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bahaddhur abandi	105	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Bahaddhur abandi	106	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hosahalli	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hosahalli	49	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hosahalli	52	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	9	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	10	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	152	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	153	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kunakeri	154	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kunakeri	155	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	156	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	157	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	158	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	159	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	160	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	161	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kunakeri	162	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	163	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	164	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	165	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	166	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	167	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	168	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	169	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	170	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	171	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	172	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	173	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	174	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	198	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	199	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 0.6 ppm)
Kunakeri	202	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	203	Neutral (pH 6.5 – 7.3)	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)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	204	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	205	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	206	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	207	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	210	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	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)	Deficient (< 0.6 ppm)
Kunakeri	211	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	212	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kunakeri	213	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	214	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	215	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	216	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	217	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	218	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	219	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	220	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	221	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	222	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	223	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	224	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	225	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	226	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	227	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	228	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	229	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	230	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	231	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	232	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	233	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	234	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	235	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	236	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kunakeri	237	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	238	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	239	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	240	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	241	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	242	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	243	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	244	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	245	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	246	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	247	Strongly acid (pH 5.0 – 5.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	248	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	249	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	250	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	251	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	252	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	253	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	254	Moderately acid (pH 5.5 – 6.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	267	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	268	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	269	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	270	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	271	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	272	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kunakeri	275	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	277	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	278	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	279	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	280	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	281	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	282	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	306	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	310	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	311	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	312	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	313	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	314	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	315	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	316	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	317	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	318	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	319	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	320	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	321	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	322	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	323	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	324	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	325	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Kunakeri	326	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	327	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Kunakeri	328	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Kunikeri Tanda-2 (1Z1b) Microwatershed

Soil Suitability Information

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Mallikeri	40	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Mallikeri	41	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	S2rt	S2r	S2r	S3r	S3r	S2rt
Mallikeri	42	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	S2rt	S2r	S2r	S3r	S3r	S2rt
Mallikeri	48	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	S3g	S3g	S2g	S3g
Bahaddhurabandi	47	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Bahaddhurabandi	104	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Bahaddhurabandi	105	S2rg	S2tg	S2g	S2tg	S2tg	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2t	S2rg	S2g	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Bahaddhurabandi	106	S2rg	S2tg	S2g	S2tg	S2tg	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2t	S2rg	S2g	S2t	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Hosahalli	48	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Hosahalli	49	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Hosahalli	52	N1r	S3rg	N1r	S3rg	N1r	S3rt	N1r	N1r	S3rt	N1r	N1r	S3rg	N1r	S3rg	N1r	N1r	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	S3rg	S3rg	S3rg	S3rg	S3rg	N1r	N1r	S3rg
Kunakeri	9	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	S3g	S3g	S2g	S3g
Kunakeri	10	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	S3g	S3g	S2g	S3g
Kunakeri	152	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	153	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kunakeri	154	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Kunakeri	155	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	156	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	157	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	158	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	159	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	160	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	161	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Kunakeri	162	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	163	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	164	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	165	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	166	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	167	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	168	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	169	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	170	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	171	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	172	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	173	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	174	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	198	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	199	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	202	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	203	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	204	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	205	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	206	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	S3g	S3g	S2g	S3g
Kunakeri	207	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	210	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	S3g	S3g	S2g	S3g
Kunakeri	211	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	S3g	S3g	S2g	S3g
Kunakeri	212	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	S3g	S3g	S2g	S3g
Kunakeri	213	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	214	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	215	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Kunakeri	216	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	S3g	S3g	S2g	S3g
Kunakeri	217	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	S3g	S3g	S2g	S3g
Kunakeri	218	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	219	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	220	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	221	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	222	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	223	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	224	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Kunakeri	225	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Kunakeri	226	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Kunakeri	227	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	228	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	229	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	230	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	231	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	232	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	233	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	234	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	235	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	236	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	237	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	238	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	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	239	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	240	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2gt	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	241	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	242	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Kunakeri	243	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	244	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	245	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	246	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2gt	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S1	S1	S2g	S2g	S2g	S1
Kunakeri	247	S2g	S2tg	S2g	S2g	S2tg	S2g	S2g	S2g	S2gt	S2g	S2g	S2g	S2g	S2g	S2tg	S2g	S2g	S3tg	S2tg	S2tg	S2tg	S2tg	S2g	S2g	S2tg	S1	S1	S2g	S2g	S2g	S1
Kunakeri	248	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	249	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	250	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	251	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	252	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	253	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	254	S3rg	S3g	S3g	S3g	S3g	S3g	S2rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	267	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	S3g	S3g	S2g	S3g
Kunakeri	268	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	269	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	270	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	271	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	272	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	S3g	S3g	S2g	S3g
Kunakeri	275	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	277	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	278	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	279	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	280	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	281	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	282	S3rg	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3rg	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g
Kunakeri	306	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	S3g	S3g	S2g	S3g
Kunakeri	310	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Kunakeri	311	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Kunakeri	312	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	313	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	314	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Kunakeri	315	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	316	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	317	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S2t
Kunakeri	318	S2r	S2t	S1	S2t	S2t	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S2t	S2t	S1	S1	S2t	S2t	S2t	S2t	S1	S1	S2t
Kunakeri	319	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	320	S2rg	S2g	S2g	S2g	S2g	S2tg	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	S2g	S2rg	S2g	S2g	S2g	S2g	S2tg	S2tg	S2g	S2g	S2tg	S2t	S1	S2gt	S1	S1	S2t
Kunakeri	321	S2r	S2t	S1	S2t	S2t	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S2t	S2t	S1	S1	S2t	S2t	S2t	S2t	S1	S1	S2t
Kunakeri	322	S2r	S2t	S1	S2t	S2t	S1	S2r	S1	S2t	S1	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S2t	S2t	S1	S1	S2t	S2t	S2t	S2t	S1	S1	S2t
Kunakeri	323	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	324	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	325	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	326	S2r	S2tg	S1	S2tg	S2t	S2g	S2r	S1	S2gt	S2g	S2g	S1	S1	S1	S2t	S2r	S1	S2t	S2g	S2g	S2g	S2g	S1	S1	S2g	S2t	S1	S2g	S1	S1	S2t
Kunakeri	327	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	S3g	S3g	S2g	S3g
Kunakeri	328	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	S3g	S3g	S2g	S3g

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Salient findings of the survey

- *The data indicated that there were 88 (58.67%) men and 62 (41.33%) were women among the sampled households.*
- *The average family size of landless farmers was 4.5, marginal farmers' was 4.13, small farmers' was 4.67, semi medium farmers' was 4.70 and medium farmers' was 4.17.*
- *The data indicated that, 18 (12%) people were in 0-15 years of age, 72 (48%) were in 16-35 years of age, 50 (33.33%) were in 36-60 years of age and 10 (6.67%) were above 61 years of age.*
- *The results indicated that Kunikeri tanda-2 had 37.33 per cent illiterates, 0.67 per cent functional literates, 22 per cent of them had primary school education, 6 per cent of them had middle school education, 19.33 per cent of them had high school education, 6.67 per cent of them had PUC education, 2 per cent of them did diploma, 2.67 per cent of them had degree education and 1 person was doing masters.*
- *The results indicate that, 90.91 per cent of households practicing agriculture and 3.03 per cent were general laborers.*
- *The results indicate that agriculture was the major occupation for 76.67 per cent of the household members, 1.33 per cent were agricultural labourers, 1.33 per cent were general laborers, 0.67 per cent had household industry, 0.67 per cent were in government service, 0.67 per cent were retired, 14.67 per cent were students and 3.33 per cent were children.*
- *The results show that 0.67 per cent of the households participated in user group, 0.67 per cent participated in raitha sangha and 98.67 per cent of them have not participated in any local institutions.*
- *The results indicate that 66.67 per cent of the households possess katcha house and 33.33 per cent of the households possess semi pucca house.*
- *The results shows that 96.97 per cent of the households possess TV, 81.82 per cent of the households possess Mixer grinder, 6.06 per cent of the households possess bicycle, 63.64 per cent of the households possess motor cycle and 90.91 per cent of the households possess mobile phones.*
- *The results shows that the average value of television was Rs.8531, mixer grinder was Rs.1865, motor cycle was Rs.33130, mobile phone was Rs.2081 and bicycle was Rs.2500.*
- *About 24.24 per cent of the households possess bullock cart, 39.39 per cent of them possess plough, 18.18 per cent of them possess tractor, 69.70 per cent of them posses sprayer, 6.06 per cent possess irrigation pump, 6.06 per cent possess power tiller, 9.09 per cent possess sprinkler, 3.03 per cent possess JCB/Hitachi and 72.73 per cent of them possess weeder.*

- *The results show that the average value of bullock cart was Rs.17125, the average value of plough was Rs.1576, the average value of irrigation pump was Rs.60000, the average value of power tiller was Rs.22500, the average value of tractor was Rs.471428, the average value of sprayer was Rs.4256, the average value of sprinkler was Rs.13000, the average value of weeder was Rs.96 and the average value of JCB/Hitachi was Rs.800000.*
- *The results indicate that, 15.15 per cent of the households possess bullocks, 24.24 per cent of the households possess local cow, 18.18 per cent of the households possess crossbred cow, 15.15 per cent of the households possess buffalo and 9.09 per cent of the households possess goat.*
- *The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.55, average hired labour (men) available was 8.38 and average hired labour (women) available was 8.12.*
- *The results indicate that, 100 per cent of the households in the micro watershed opined that the hired labour was adequate.*
- *The results indicate that, households of the Kunikeri tanda-2 micro watershed possess 27.78 ha (48.17%) of dry land and 29.89 ha (51.83%) of irrigated land. Marginal farmers possess 3.48 ha (86.62%) of dry land and 0.54 ha (13.38%) of irrigated land. Small farmers possess 5.17 ha (67.03%) of dry land and 2.54 ha (32.97%) of irrigated land. Semi medium possess 19.13 ha (74.47%) of dry land and 6.56 ha (25.53%) of irrigated land and medium farmers possess 20.25 ha (100%) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 273,484.85 and average value of irrigated was Rs. 394,664.86. In case of marginal famers, the average land value was Rs. 659,814.17 for dry land and Rs. 2,042,857.12. In case of small famers, the average land value was Rs. 348,159.75 for dry land and Rs. 786,624.21. In case of semi medium famers, the average land value was Rs. 182,924.25 for dry land and Rs. 426,913.59 for irrigated land. In case of medium famers, the average land value Rs. 291,227.02 for irrigated land.*
- *The results indicate that, there were 17 functioning and 4 de-functioning bore wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 48.57 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 47.46 meters.*
- *The results indicate that, marginal farmers had irrigated area of 0.99 hectares, small farmers had 2.49 hectares, semi medium farmers had 5.03 hectares and medium farmers had 24.19 hectares.*
- *The results indicate that, farmers have grown Bajra (10.83 ha), Banana (0.81 ha), Chilly (0.4 ha), Greengram (0.87 ha), Groundnut (4.15 ha), Maize (14.83 ha), Paddy (2.69 ha), Redgram (5.26 ha), Sugarcane (13.21), and Cowpea (0.4 ha).*

- *Marginal farmers have grown bajra, groundnut, maize and paddy. Small farmers have grown bajra, greengram, maize, sugarcane and cowpea. Semi medium farmers have grown bajra, chilly, groundnut, maize, paddy, redgram and sugarcane. Medium farmers have grown banana, groundnut, maize, redgram and sugarcane.*
- *The results indicate that, the cropping intensity in Kunikeri tanda-2 micro watershed was found to be 83.68 per cent. In case of marginal farmers it was 92.21 per cent, for small farmers it was 89.90 per cent, in case of semi medium farmers it was 87.96 per cent and medium farmers had cropping intensity of 74.84 per cent.*
- *The results indicate that, the total cost of cultivation for maize was Rs. 47267.81. The gross income realized by the farmers was Rs. 31175.46. The net income from Maize cultivation was Rs. -16092.35, thus the benefit cost ratio was found to be 1:0.66.*
- *The total cost of cultivation for bajra was Rs. 40976.20. The gross income realized by the farmers was Rs. 35863.76. The net income from bajra cultivation was Rs. -5112.44. Thus the benefit cost ratio was found to be 1:0.88.*
- *The total cost of cultivation for paddy was Rs. 41034.52. The gross income realized by the farmers was Rs. 48946.42. The net income from paddy cultivation was Rs. 7911.89. Thus the benefit cost ratio was found to be 1:1.19.*
- *The total cost of cultivation for green gram was Rs. 33799.68. The gross income realized by the farmers was Rs. 46198.15. The net income from green gram cultivation was Rs. 12398.47. Thus the benefit cost ratio was found to be 1:1.37.*
- *The total cost of cultivation for groundnut was Rs. 50787.55. The gross income realized by the farmers was Rs. 93527.14. The net income from groundnut cultivation was Rs. 42739.59. Thus the benefit cost ratio was found to be 1:1.84.*
- *The total cost of cultivation for red gram was Rs. 18383.80. The gross income realized by the farmers was Rs. 33592. The net income from red gram cultivation was Rs. 15208.20. Thus the benefit cost ratio was found to be 1:1.83.*
- *The total cost of cultivation for chilly was Rs. 48908.01. The gross income realized by the farmers was Rs. 74100. The net income from chilly cultivation was Rs. 25191.99. Thus the benefit cost ratio was found to be 1:1.52.*
- *The total cost of cultivation for sugarcane was Rs. 61303.84. The gross income realized by the farmers was Rs. 234604.72. The net income from sugarcane cultivation was Rs. 173300.88. Thus the benefit cost ratio was found to be 1:3.83.*
- *The total cost of cultivation for cowpea was Rs. 45586.65. The gross income realized by the farmers was Rs. 39026. The net income from cowpea cultivation was Rs. -6560.65. Thus the benefit cost ratio was found to be 1:0.86.*
- *The total cost of cultivation for banana was Rs. 74552.13. The gross income realized by the farmers was Rs. 111150. The net income from banana cultivation was Rs. 36597.87. Thus the benefit cost ratio was found to be 1:1.49.*
- *The results indicate that, 6.06 per cent of the households opined that green fodder was adequate.*

- *The results indicate that the average annual gross income was Rs.134000 for landless farmers, for marginal farmers it was Rs.46700, for small farmers it was Rs.76933, for semi medium farmers it was Rs.91900 and for medium farmers it was Rs.285182.*
- *The results indicate that the average annual expenditure is Rs. 9819.95. For landless households it was Rs.40000, for marginal farmers it was Rs 3043.75, for small farmers it was Rs. 7750, for semi medium farmers it was Rs. 7483.33 and for medium farmers it was Rs. 14053.57.*
- *The results indicate that, sampled households have grown 24 coconut and 3 mango trees in their field. Farmers have also grown 1 coconut tree in their backyard.*
- *The results indicate that, households have planted 37 neem trees, 7 tamarind trees and 34 banyan trees.*
- *The results indicated that, bajra, banana, chilly, cowpea, greengram, maize and paddy were marketed to the extent of 100 per cent. Groundnut was marketed to the extent of 86.84 per cent, redgram was marketed to the extent of 85.71 per cent and sugarcane was marketed to the extent of 91.27 per cent.*
- *The results indicated that, about 60.61 per cent of the households have sold their produce to agents/traders, 21.21 per cent of the households sold their produce to local/village, another 9.09 per cent have sold their produce in cooperative marketing society, and 39.39 per cent have sold in regulated markets.*
- *The results indicated that 51.52 per cent have used cart, 72.73 per cent have used tractor and 6.06 per cent of the farmers have used truck as a mode of transport.*
- *The results indicated that, piped supply was the major source of drinking water for 81.82 per cent of the households, bore well was the source of drinking water for 6.06 per cent of the households, lake/tank was the source of drinking water for 3.03 per cent of the households and canal/nala was the source of drinking water for 6.06 per cent of the households.*
- *The results indicated that, 93.94 percent used fire wood and 3.03 percent of the households used LPG as a source of domestic fuel.*
- *Electricity was the major source of light for 93.94 per cent of the households and kerosene lamp was the source of light for 3.03per cent of the households in the micro watershed.*
- *The results indicated that, 51.52 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 12.50 per cent of marginal, 16.67 per cent of small, 100 per cent of semi medium and 57.14 per cent of medium farmers had sanitary toilet facility.*
- *The results indicated that, 93.94 per cent of the sampled households possessed BPL card and 3.03 per cent did not possess PDS card.*
- *The results indicated that, 42.42 per cent of the households participated in NREGA programme.*

- *The results indicated that, cereals were adequate for 90.91 per cent of the households, pulses were adequate for 42.42 per cent, oilseeds were adequate for 27.27 per cent, vegetables were adequate for 63.64 per cent, fruits were adequate for 54.55 per cent, milk was adequate for 81.82 per cent, eggs were adequate for 51.52 per cent and meat was adequate for 51.52 per cent of the households.*
- *The results indicated that, cereals were inadequate for 3.03 per cent of the households, pulses were inadequate for 51.52 per cent, oilseeds were inadequate for 66.67 per cent, vegetables were inadequate for 30.30 per cent, fruits were inadequate for 33.33 per cent, milk was inadequate for 12.12 per cent, eggs were inadequate for 36.36 per cent and meat was inadequate for 36.36 per cent of the households.*
- *The results indicated that, lower fertility status of the soil was the constraint experienced by 30.30 per cent of the households, wild animal menace on farm field (12.12%), frequent incidence of pest and diseases (57.58%), inadequacy of irrigation water (9.09%), high cost of fertilizers and plant protection chemicals (93.94%), high rate of interest on credit (81.82%), low price for the agricultural commodities (33.33%), lack of marketing facilities in the area (66.67%), lack of transport for safe transport of the agricultural produce to the market (84.85%), less rainfall (96.97%), inadequate extension services (3.03%) and source of agri-technology information (75.76%).*

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

Description of the study area

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.3 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%.

Description of the micro watershed

Kunikeri tanda-2 micro-watershed (Karkihalli sub-watershed, Koppal Taluk and District) is located at North latitude 15^0 18' 15.828'' to 15^0 16' 50.808'' and East longitude 76^0 12' 49.588'' to 76^0 11' 17.765'' covering an area of 407.31 ha and spread across Kunikeri, Bahaddhurabandi, Hosahalli and Mallikeri villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 33 households located in the micro watershed were interviewed for the survey.

Chapter 3

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey

The data on households sampled for socio economic survey in Kunikeri tanda-2 micro watershed is presented in Table 1 and it indicated that 33 farmers were sampled in Kunikeri tanda-2 micro watershed among them 2 (6.06%) were landless, 8 (24.24%) were marginal farmers, 6 (18.18%) were small farmers, 10 (30.30%) were semi medium farmers and 7 (21.21%) were medium farmers.

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

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	2	6.06	8	24.24	6	18.18	10	30.30	7	21.21	33	100.00

Population characteristics

The population characteristics of households sampled for socio-economic survey in Kunikeri tanda-2 micro watershed is presented in Table 2. The data indicated that there were 88 (58.67%) men and 62 (41.33%) were women among the sampled households. The average family size of landless farmers was 4.5, marginal farmers' was 4.13, small farmers' was 4.67, semi medium farmers' was 4.70 and medium farmers' was 4.17.

Table 2: Population characteristics of Kunikeri tanda-2 micro-watershed

Sl. No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Male	5	55.56	23	69.70	14	50.00	27	57.45	19	57.58	88	58.67
2	Female	4	44.44	10	30.30	14	50.00	20	42.55	14	42.42	62	41.33
Total		9	100.00	33	100.00	28	100.00	47	100.00	33	100.00	150	100.00
Average		4.50		4.13		4.67		4.70		4.71		4.55	

Age wise classification of population: The age wise classification of household members in Kunikeri tanda-2 micro watershed is presented in Table 3. The data indicated that, 18 (12%) people were in 0-15 years of age, 72 (48%) were in 16-35 years of age, 50 (33.33%) were in 36-60 years of age and 10 (6.67%) were above 61 years of age.

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

Sl. No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	1	11.11	4	12.12	5	17.86	3	6.38	5	15.15	18	12.00
2	16-35 years of age	3	33.33	15	45.45	17	60.71	25	53.19	12	36.36	72	48.00
3	36-60 years of age	2	22.22	11	33.33	4	14.29	19	40.43	14	42.42	50	33.33
4	> 61 years	3	33.33	3	9.09	2	7.14	0	0.00	2	6.06	10	6.67
Total		9	100.00	33	100.00	28	100.00	47	100.00	33	100.00	150	100.00

Education level of household members

Education level of household members in Kunikeri tanda-2 micro watershed is presented in Table 4. The results indicated that Kunikeri tanda-2 had 37.33 per cent illiterates, 0.67 per cent functional literates, 22 per cent of them had primary school education, 6 per cent of them had middle school education, 19.33 per cent of them had high school education, 6.67 per cent of them had PUC education, 2 per cent of them did diploma, 2.67 per cent of them had degree education and 1 person was doing masters.

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

Sl. No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	4	44.44	14	42.42	8	28.57	19	40.43	11	33.33	56	37.33
2	Functional Literate	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	0.67
3	Primary School	3	33.33	8	24.24	7	25.00	7	14.89	8	24.24	33	22.00
4	Middle School	1	11.11	3	9.09	2	7.14	2	4.26	1	3.03	9	6.00
5	High School	0	0.00	4	12.12	6	21.43	12	25.53	7	21.21	29	19.33
6	PUC	0	0.00	0	0.00	4	14.29	5	10.64	1	3.03	10	6.67
7	Diploma	0	0.00	1	3.03	0	0.00	1	2.13	1	3.03	3	2.00
8	ITI	0	0.00	0	0.00	0	0.00	0	0.00	1	3.03	1	0.67
9	Degree	0	0.00	3	9.09	0	0.00	1	2.13	0	0.00	4	2.67
10	Masters	0	0.00	0	0.00	0	0.00	0	0.00	1	3.03	1	0.67
11	Others	0	0.00	0	0.00	1	3.57	0	0.00	2	6.06	3	2.00
Total		9	100.00	33	100.00	28	100.00	47	100.00	33	100.00	150	100.00

Occupation of household heads

The data regarding the occupation of the household heads in Kunikeri tanda-2 micro watershed is presented in Table 5. The results indicate that, 90.91 per cent of households practicing agriculture and 3.03 per cent were general laborers.

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

Sl.No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	50.00	7	87.50	6	100.00	9	90.00	7	100.00	30	90.91
2	General Labour	1	50.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.03
Total		2	100.00	7	100.00	6	100.00	9	100.00	7	100.00	31	100.00

Occupation of the household members

The data regarding the occupation of the household members in Kunikeri tanda-2 micro watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 76.67 per cent of the household members, 1.33 per cent were agricultural labourers, 1.33 per cent were general laborers, 0.67 per cent had household industry, 0.67 per cent were in government service, 0.67 per cent were retired, 14.67 per cent were students and 3.33 per cent were children. In case of landless households 44.44

per cent were doing agriculture, 11.11 per cent of them were agricultural labour, 22.22 per cent were general labour, 11.11 per cent have household industry and 11.11 per cent of them are retired. In case of marginal farm households 75.76 per cent were agriculturists and 24.24 per cent were students. In case of small farm households 82.14 per cent were agriculturists, 14.29 per cent were students and 3.57 per cent were children. In case of semi medium farm households 80.85 per cent were agriculturists, 2.13 per cent were agricultural labourers, 12.77 per cent were students and 2.13 per cent were children. In case of medium farm households 75.76 per cent were agriculturists, 12.12 per cent were students and 9.09 per cent were children.

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

Sl. No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	4	44.44	25	75.76	23	82.14	38	80.85	25	75.76	115	76.67
2	Agricultural Labour	1	11.11	0	0.00	0	0.00	1	2.13	0	0.00	2	1.33
3	General Labour	2	22.22	0	0.00	0	0.00	0	0.00	0	0.00	2	1.33
4	Household industry	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	0.67
5	Government Service	0	0.00	0	0.00	0	0.00	1	2.13	0	0.00	1	0.67
6	Retired	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	0.67
7	Student	0	0.00	8	24.24	4	14.29	6	12.77	4	12.12	22	14.67
8	Others	0	0.00	0	0.00	0	0.00	0	0.00	1	3.03	1	0.67
9	Children	0	0.00	0	0.00	1	3.57	1	2.13	3	9.09	5	3.33
Total		9	100.00	33	100.00	28	100.00	47	100.00	33	100.00	150	100.00

Institutional participation of the household members

The data regarding the institutional participation of the household members in Kunikeri tanda-2 micro watershed is presented in Table 7. The results show that 0.67 per cent of the households participated in user group, 0.67 per cent participated in raitha sangha and 98.67 per cent of them have not participated in any local institutions.

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

Sl.No.	Particulars	LL (9)		MF (33)		SF (28)		SMF (47)		MDF (33)		All (150)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	User Group	0	0.00	0	0.00	1	3.57	0	0.00	0	0.00	1	0.67
2	Raitha Sangha	1	11.11	0	0.00	0	0.00	0	0.00	0	0.00	1	0.67
3	No Participation	8	88.89	33	100.00	27	96.43	47	100.00	33	100.00	148	98.67
Total		9	100.00	33	100.00	28	100.00	47	100.00	33	100.00	150	100.00

Type of house owned: The data regarding the type of house owned by the households in Kunikeri tanda-2 micro watershed is presented in Table 8. The results indicate that 66.67 per cent of the households possess katcha house and 33.33 per cent of the households possess semi pucca house.

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

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Katcha	2	100.00	7	87.50	3	50.00	6	60.00	4	57.14	22	66.67
2	Semi pacca	0	0.00	1	12.50	3	50.00	4	40.00	3	42.86	11	33.33
Total		2	100.00	8	100.00	6	100.00	10	100.00	7	100.00	33	100.00

Durable Assets owned by the households

The data regarding the Durable Assets owned by the households in Kunikeri tanda-2 micro watershed is presented in Table 9. The results shows that 96.97 per cent of the households possess TV, 81.82 per cent of the households possess Mixer grinder, 6.06 per cent of the households possess bicycle, 63.64 per cent of the households possess motor cycle and 90.91 per cent of the households possess mobile phones.

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

Sl. No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Television	2	100.00	8	100.00	6	100.00	10	100.00	6	85.71	32	96.97
2	Mixer/Grinder	1	50.00	8	100.00	5	83.33	9	90.00	4	57.14	27	81.82
3	Bicycle	0	0.00	1	12.50	0	0.00	1	10.00	0	0.00	2	6.06
4	Motor Cycle	2	100.00	4	50.00	4	66.67	6	60.00	5	71.43	21	63.64
5	Mobile Phone	1	50.00	8	100.00	5	83.33	10	100.00	6	85.71	30	90.91

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Kunikeri tanda-2 micro watershed is presented in Table 10. The results shows that the average value of television was Rs.8531, mixer grinder was Rs.1865, motor cycle was Rs.33130, mobile phone was Rs.2081 and bicycle was Rs.2500.

Table 10. Average value of durable assets owned by households in Kunikeri tanda-2 micro watershed **Average value (Rs.)**

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Television	7,000.00	8,375.00	9,166.00	7,900.00	9,666.00	8,531.00
2	Mixer/Grinder	1,500.00	2,071.00	2,000.00	1,666.00	1,875.00	1,865.00
3	Bicycle	0.00	2,000.00	0.00	3,000.00	0.00	2,500.00
4	Motor Cycle	26,666.00	36,250.00	30,000.00	35,833.00	34,400.00	33,130.00
5	Mobile Phone	333.00	2,291.00	2,142.00	2,382.00	1,800.00	2,081.00

Farm Implements owned

The data regarding the farm implements owned by the households in Kunikeri tanda-2 micro watershed is presented in Table 11. About 24.24 per cent of the households possess bullock cart, 39.39 per cent of them possess plough, 18.18 per cent of them possess tractor, 69.70 per cent of them posses sprayer, 6.06 per cent possess irrigation pump, 6.06 per cent possess power tiller, 9.09 per cent possess sprinkler, 3.03 per cent possess JCB/Hitachi and 72.73 per cent of them possess weeder.

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

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0.00	0	0.00	0	0.00	4	40.00	4	57.14	8	24.24
2	Plough	1	50.00	2	25.00	1	16.67	5	50.00	4	57.14	13	39.39
3	Irrigation Pump	0	0.00	0	0.00	0	0.00	0	0.00	2	28.57	2	6.06
4	Power Tiller	1	50.00	0	0.00	0	0.00	1	10.00	0	0.00	2	6.06
5	Tractor	1	50.00	0	0.00	1	16.67	1	10.00	3	42.86	6	18.18
6	Sprayer	2	100.00	5	62.50	4	66.67	9	90.00	3	42.86	23	69.70
7	Sprinkler	0	0.00	1	12.50	0	0.00	0	0.00	2	28.57	3	9.09
8	Weeder	2	100.00	6	75.00	5	83.33	7	70.00	4	57.14	24	72.73
9	JCB/Hitachi	0	0.00	0	0.00	1	16.67	0	0.00	0	0.00	1	3.03
10	Blank	0	0.00	0	0.00	0	0.00	0	0.00	1	14.29	1	3.03

Average value of farm implements

The data regarding the average value of farm Implements owned by the households in Kunikeri tanda-2 micro watershed is presented in Table 12. The results show that the average value of bullock cart was Rs.17125, the average value of plough was Rs.1576, the average value of irrigation pump was Rs.60000, the average value of power tiller was Rs.22500, the average value of tractor was Rs.471428, the average value of sprayer was Rs.4256, the average value of sprinkler was Rs.13000, the average value of weeder was Rs.96 and the average value of JCB/Hitachi was Rs.800000.

Table 12. Average value of farm implements owned by households in Kunikeri tanda-2 micro watershed **Average Value (Rs.)**

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Bullock Cart	0.00	0.00	0.00	17,250.00	17,000.00	17,125.00
2	Plough	1,500.00	2,000.00	1,500.00	1,300.00	1,750.00	1,576.00
3	Irrigation Pump	0.00	0.00	0.00	0.00	60,000.00	60,000.00
4	Power Tiller	25,000.00	0.00	0.00	20,000.00	0.00	22,500.00
5	Tractor	600,000.00	0.00	300,000.00	500,000.00	533,333.00	471,428.00
6	Sprayer	5,000.00	4,080.00	5,000.00	4,500.00	2,333.00	4,256.00
7	Sprinkler	0.00	12,000.00	0.00	0.00	13,500.00	13,000.00
8	Weeder	50.00	66.00	140.00	107.00	100.00	96.00
9	JCB/Hitachi	0.00	0.00	800,000.00	0.00	0.00	800,000.00

Livestock possession by the households

The data regarding the Livestock possession by the households in Kunikeri tanda-2 micro watershed is presented in Table 13. The results indicate that, 15.15 per cent of the households possess bullocks, 24.24 per cent of the households possess local cow, 18.18 per cent of the households possess crossbred cow, 15.15 per cent of the households possess buffalo and 9.09 per cent of the households possess goat. Landless farmers possess local cow, crossbred cow and goat. Marginal farmers possess bullock, local cow and buffalo. Small farmers possess local cow, crossbred cow, buffalo and goat. Semi

medium farmers possess bullock, local cow, crossbred cow and buffalo. Medium farmers possess bullock, local cow and crossbred cow.

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

Sl. No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0.00	1	12.50	0	0.00	2	20.00	2	28.57	5	15.15
2	Local cow	1	50.00	1	12.50	1	16.67	2	20.00	3	42.86	8	24.24
3	Crossbred cow	1	50.00	0	0.00	1	16.67	1	10.00	3	42.86	6	18.18
4	Buffalo	0	0.00	1	12.50	1	16.67	3	30.00	0	0.00	5	15.15
5	Goat	1	50.00	0	0.00	1	16.67	0	0.00	1	14.29	3	9.09
6	blank	0	0.00	6	75.00	3	50.00	4	40.00	1	14.29	14	42.42

Average Labour availability

The data regarding the average labour availability in Kunikeri tanda-2 micro watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.55, average hired labour (men) available was 8.38 and average hired labour (women) available was 8.12.

Table 14. Average Labour availability in Kunikeri tanda-2 micro watershed

Sl. No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
		N	N	N	N	N	N
1	Own labour Male	2.50	1.89	1.83	1.70	1.57	1.79
2	Own Labour Female	2.50	1.13	1.50	1.60	1.71	1.55
3	Hired labour Male	5.00	8.11	7.00	5.50	15.00	8.38
4	Hired labour Female	4.50	7.56	4.50	4.70	17.86	8.12

Adequacy of Hired Labour

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

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

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	2	100	8	100	6	100	10	100	7	100	34	100
2	Inadequate	0	0	0	0	0	0	0	0	0	0	0	0

Distribution of land (ha): The data regarding the distribution of land (ha) in Kunikeri tanda-2 micro watershed is presented in Table 16. The results indicate that, households of the Kunikeri tanda-2 micro watershed possess 27.78 ha (48.17%) of dry land and 29.89 ha (51.83%) of irrigated land. Marginal farmers possess 3.48 ha (86.62%) of dry land and 0.54 ha (13.38%) of irrigated land. Small farmers possess 5.17 ha (67.03%) of dry land and 2.54 ha (32.97%) of irrigated land. Semi medium possess 19.13 ha (74.47%) of dry

land and 6.56 ha (25.53%) of irrigated land and medium farmers possess 20.25 ha (100%) of irrigated land.

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

Sl. No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	0.00	0.00	3.48	86.62	5.17	67.03	19.13	74.47	0.00	0.00	27.78	48.17
2	Irrigated	0.00	0.00	0.54	13.38	2.54	32.97	6.56	25.53	20.25	100.00	29.89	51.83
Total		0.00	100.00	4.02	100.00	7.71	100.00	25.68	100.00	20.25	100.00	57.67	100.00

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Kunikeri tanda-2 micro watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 273,484.85 and average value of irrigated was Rs. 394,664.86. In case of marginal famers, the average land value was Rs. 659,814.17 for dry land and Rs. 2,042,857.12. In case of small famers, the average land value was Rs. 348,159.75 for dry land and Rs. 786,624.21. In case of semi medium famers, the average land value was Rs. 182,924.25 for dry land and Rs. 426,913.59 for irrigated land. In case of medium famers, the average land value Rs. 291,227.02 for irrigated land.

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
		N	N	N	N	N	N
1	Dry	0.00	659,814.17	348,159.75	182,924.25	0.00	273,484.85
2	Irrigated	0.00	2,042,857.12	786,624.21	426,913.59	291,227.02	394,664.86

Status of bore wells: The data regarding the status of bore wells in Kunikeri tanda-2 micro watershed is presented in Table 18. The results indicate that, there were 17 functioning and 4 de-functioning bore wells in the micro watershed.

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
		N	N	N	N	N	N
1	De-functioning	0	0	0	0	0	0
2	Functioning	0	1	4	3	7	15

Source of irrigation: The data regarding the source of irrigation in Kunikeri tanda-2 micro watershed is presented in Table 19. The results indicate that, bore well was the major irrigation source in the micro water shed for 48.57 per cent of the farmers.

Table 19. Source of irrigation in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0.00	1	12.50	4	66.67	3	30.00	7	100.00	15	45.45

Depth of water (Avg in meters): The data regarding the depth of water in Kunikeri tanda-2 micro watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 47.46 meters.

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
		N	N	N	N	N	N
1	Bore Well	0.00	13.34	35.56	32.00	45.72	29.09

Irrigated Area (ha): The data regarding the irrigated area (ha) in Kunikeri tanda-2 micro watershed is presented in Table 21. The results indicate that, marginal farmers had irrigated area of 0.99 hectares, small farmers had 2.49 hectares, semi medium farmers had 5.03 hectares and medium farmers had 24.19 hectares.

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Kharif	0.00	0.54	2.09	5.03	19.34	27.00
2	Rabi	0.00	0.45	0.40	0.00	4.86	5.71
Total		0.00	0.99	2.49	5.03	24.19	32.71

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Kharif - Bajra	0	2.26	3.32	5.26	0	10.83
2	Kharif - Banana	0	0	0	0	0.81	0.81
3	Kharif - Chilly	0	0	0	0.4	0	0.4
4	Kharif - Greengram	0	0	0.87	0	0	0.87
5	Kharif - Groundnut	0	0.81	0	0.81	2.53	4.15
6	Kharif - Maize	0	0.49	2.59	8.91	2.83	14.83
7	Kharif - Paddy	0	0.45	0	1.79	0	2.24
8	Kharif - Red gram (togari)	0	0	0	4.45	0.81	5.26
9	Kharif - Sugarcane	0	0	0.45	1.21	10.73	12.4
10	Rabi - Cowpea	0	0	0.4	0	0	0.4
11	Rabi - Paddy	0	0.45	0	0	0	0.45
12	Rabi - Sugarcane	0	0	0	0.81	0	0.81
Total		0	4.46	7.64	23.66	17.72	53.47

Cropping pattern: The data regarding the cropping pattern in Kunikeri tanda-2 micro watershed is presented in Table 22. The results indicate that, farmers have grown Bajra (10.83 ha), Banana (0.81 ha), Chilly (0.4 ha), Greengram (0.87 ha), Groundnut (4.15 ha), Maize (14.83 ha), Paddy (2.69 ha), Redgram (5.26 ha), Sugarcane (13.21), and Cowpea (0.4 ha).

Cropping intensity: The data regarding the cropping intensity in Kunikeri tanda-2 micro watershed is presented in Table 23. The results indicate that, the cropping intensity in Kunikeri tanda-2 micro watershed was found to be 83.68 per cent.

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

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Cropping Intensity	0.00	92.21	89.90	87.96	74.84	83.68

Cost of Cultivation of Maize

The data regarding the cost of cultivation of maize in Kunikeri tanda-2 micro watershed is presented in Table 24. The results indicate that, the total cost of cultivation for maize was Rs. 47267.81. The gross income realized by the farmers was Rs. 31175.46. The net income from Maize cultivation was Rs. -16092.35, thus the benefit cost ratio was found to be 1:0.66.

Table 24. Cost of Cultivation of maize in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	47.65	6762.86	14.31
2	Bullock		Pairs/day	0.61	367.44	0.78
3	Tractor		Hours	2.92	2335.00	4.94
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	17.94	2366.50	5.01
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	14.46	2891.02	6.12
8	Fertilizer + micronutrients		Quintal	15.78	13363.40	28.27
9	Pesticides (PPC)		Kgs / ltrs	1.34	1428.67	3.02
10	Irrigation		Number	3.14	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	2987.63	6.32
14	Land revenue and Taxes			0.00	5.54	0.01
II	**Cost B1**					
16	Interest on working capital				2406.02	5.09
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				34914.08	73.86
III	**Cost B2**					
18	Rental Value of Land				272.73	0.58
19	**Cost B2 = (Cost B1 + Rental value)**				35186.81	74.44
IV	**Cost C1**					
20	Family Human Labour			37.39	7783.39	16.47
21	**Cost C1 = (Cost B2 + Family Labour)**				42970.19	90.91
V	**Cost C2**					
22	Risk Premium				0.55	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				42970.74	90.91
VI	**Cost C3**					
24	Managerial Cost				4297.07	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				47267.81	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		27.18	29645.57	
		b) Main Crop Sales Price (Rs.)			1090.91	
	By Product	e) Main Product (q)		2.95	1529.90	
		f) Main Crop Sales Price (Rs.)			518.18	
b.	Gross Income (Rs.)				31175.46	
c.	Net Income (Rs.)				-16092.35	
d.	Cost per Quintal (Rs./q.)				1739.38	
e.	Benefit Cost Ratio (BC Ratio)				1:0.66	

Cost of cultivation of Bajra

The data regarding the cost of cultivation of bajra in Kunikeri tanda-2 micro watershed is presented in Table 25. The results indicate that, the total cost of cultivation for bajra was Rs. 40976.20. The gross income realized by the farmers was Rs. 35863.76. The net income from bajra cultivation was Rs. -5112.44. Thus the benefit cost ratio was found to be 1:0.88.

Table 25. Cost of Cultivation of bajra in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	51.90	8263.97	20.17
2	Bullock		Pairs/day	3.21	1927.03	4.70
3	Tractor		Hours	4.29	3377.91	8.24
4	Machinery		Hours	1.67	1335.14	3.26
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	13.10	1526.24	3.72
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	8.78	1755.42	4.28
8	Fertilizer + micronutrients		Quintal	8.31	8046.08	19.64
9	Pesticides (PPC)		Kgs /liters	0.99	994.86	2.43
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	160.65	0.39
14	Land revenue and Taxes			0.00	4.53	0.01
II	**Cost B1**					
16	Interest on working capital				1478.80	3.61
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				28870.63	70.46
III	**Cost B2**					
18	Rental Value of Land				291.67	0.71
19	**Cost B2 = (Cost B1 + Rental value)**				29162.30	71.17
IV	**Cost C1**					
20	Family Human Labour			36.56	8088.04	19.74
21	**Cost C1 = (Cost B2 + Family Labour)**				37250.34	90.91
V	**Cost C2**					
22	Risk Premium				0.75	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				37251.09	90.91
VI	**Cost C3**					
24	Managerial Cost				3725.11	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				40976.20	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.53	34519.77	
		b) Main Crop Sales Price (Rs.)			1862.50	
	By Product	e) Main Product (q)		4.14	1343.99	
		f) Main Crop Sales Price (Rs.)			325.00	
b.	Gross Income (Rs.)				35863.76	
c.	Net Income (Rs.)				-5112.44	
d.	Cost per Quintal (Rs./q.)				2210.85	
e.	Benefit Cost Ratio (BC Ratio)				1:0.88	

Cost of cultivation of paddy

The data regarding the cost of cultivation of paddy in Kunikeri tanda-2 micro watershed is presented in Table 26. The results indicate that, the total cost of cultivation for paddy was Rs. 41034.52. The gross income realized by the farmers was Rs. 48946.42. The net income from paddy cultivation was Rs. 7911.89. Thus the benefit cost ratio was found to be 1:1.19.

Table 26. Cost of Cultivation of paddy in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	42.30	6889.68	16.79
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	2.23	1780.18	4.34
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	122.51	15046.64	36.67
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	0.00	0.00	0.00
8	Fertilizer + micronutrients		Quintal	6.68	5753.97	14.02
9	Pesticides (PPC)		Kgs / liters	1.39	1391.39	3.39
10	Irrigation		Number	10.02	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	21.17	0.05
14	Land revenue and Taxes			0.00	5.76	0.01
II	**Cost B1**					
16	Interest on working capital				2663.10	6.49
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				33551.90	81.77
III	**Cost B2**					
18	Rental Value of Land				166.67	0.41
19	**Cost B2 = (Cost B1 + Rental value)**				33718.56	82.17
IV	**Cost C1**					
20	Family Human Labour			18.65	3585.05	8.74
21	**Cost C1 = (Cost B2 + Family Labour)**				37303.61	90.91
V	**Cost C2**					
22	Risk Premium				0.50	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				37304.11	90.91
VI	**Cost C3**					
24	Managerial Cost				3730.41	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				41034.52	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		31.74	47611.28	
		b) Main Crop Sales Price (Rs.)			1500.00	
	By Product	e) Main Product (q)		3.34	1335.14	
		f) Main Crop Sales Price (Rs.)			400.00	
b.	Gross Income (Rs.)				48946.42	
c.	Net Income (Rs.)				7911.89	
d.	Cost per Quintal (Rs./q.)				1292.80	
e.	Benefit Cost Ratio (BC Ratio)				1:1.19	

Cost of Cultivation of green gram

The data regarding the cost of cultivation of green gram in Kunikeri tanda-2 micro watershed is presented in Table 27. The results indicate that, the total cost of cultivation for green gram was Rs. 33799.68. The gross income realized by the farmers was Rs. 46198.15. The net income from green gram cultivation was Rs. 12398.47. Thus the benefit cost ratio was found to be 1:1.37.

Table 27. Cost of Cultivation of green gram in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	56.03	6815.37	20.16
2	Bullock		Pairs/day	1.14	686.11	2.03
3	Tractor		Hours	3.43	2744.44	8.12
4	Machinery		Hours	3.43	2744.44	8.12
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	22.87	2744.44	8.12
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	5.72	1143.52	3.38
8	Fertilizer + micronutrients		Quintal	8.00	7501.48	22.19
9	Pesticides (PPC)		Kgs / liters	1.14	1143.52	3.38
10	Irrigation		Number	3.43	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	114.35	0.34
14	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
16	Interest on working capital				1504.08	4.45
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				27145.05	80.31
III	**Cost B2**					
18	Rental Value of Land				333.33	0.99
19	**Cost B2 = (Cost B1 + Rental value)**				27478.39	81.30
IV	**Cost C1**					
20	Family Human Labour			19.44	3247.59	9.61
21	**Cost C1 = (Cost B2 + Family Labour)**				30725.98	90.91
V	**Cost C2**					
22	Risk Premium				1.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				30726.98	90.91
VI	**Cost C3**					
24	Managerial Cost				3072.70	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				33799.68	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		9.15	45740.74	
		b) Main Crop Sales Price (Rs.)			5000.00	
	By Product	e) Main Product (q)		2.29	457.41	
		f) Main Crop Sales Price (Rs.)			200.00	
b.	Gross Income (Rs.)				46198.15	
c.	Net Income (Rs.)				12398.47	
d.	Cost per Quintal (Rs./q.)				3694.70	
e.	Benefit Cost Ratio (BC Ratio)				1:1.37	

Cost of Cultivation of groundnut

The data regarding the cost of cultivation of groundnut in Kunikeri tanda-2 micro watershed is presented in Table 28. The results indicate that, the total cost of cultivation for groundnut was Rs. 50787.55. The gross income realized by the farmers was Rs. 93527.14. The net income from groundnut cultivation was Rs. 42739.59. Thus the benefit cost ratio was found to be 1:1.84.

Table 28. Cost of Cultivation of groundnut in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	38.03	7321.66	14.42
2	Bullock		Pairs/day	0.86	437.17	0.86
3	Tractor		Hours	3.96	2983.67	5.87
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	154.76	15958.00	31.42
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	18.29	2340.31	4.61
8	Fertilizer + micronutrients		Quintal	5.04	4831.94	9.51
9	Pesticides (PPC)		Kgs / liters	1.39	907.71	1.79
10	Irrigation		Number	3.47	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	3818.64	7.52
14	Land revenue and Taxes			0.00	5.15	0.01
II	**Cost B1**					
16	Interest on working capital				2884.58	5.68
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				41488.83	81.69
III	**Cost B2**					
18	Rental Value of Land				366.67	0.72
19	**Cost B2 = (Cost B1 + Rental value)**				41855.49	82.41
IV	**Cost C1**					
20	Family Human Labour			21.63	4314.76	8.50
21	**Cost C1 = (Cost B2 + Family Labour)**				46170.25	90.91
V	**Cost C2**					
22	Risk Premium				0.25	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				46170.50	90.91
VI	**Cost C3**					
24	Managerial Cost				4617.05	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				50787.55	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		18.57	92870.91	
		b) Main Crop Sales Price (Rs.)			5000.00	
	By Product	e) Main Product (q)		2.02	656.23	
		f) Main Crop Sales Price (Rs.)			325.00	
b.	Gross Income (Rs.)				93527.14	
c.	Net Income (Rs.)				42739.59	
d.	Cost per Quintal (Rs./q.)				2734.31	
e.	Benefit Cost Ratio (BC Ratio)				1:1.84	

Cost of Cultivation of red gram

The data regarding the cost of cultivation of red gram in Kunikeri tanda-2 micro watershed is presented in Table 29. The results indicate that, the total cost of cultivation for red gram was Rs. 18383.80. The gross income realized by the farmers was Rs. 33592. The net income from red gram cultivation was Rs. 15208.20. Thus the benefit cost ratio was found to be 1:1.83.

Table 29. Cost of Cultivation of red gram in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	30.88	5517.98	30.02
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	1.48	1185.60	6.45
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	8.60	688.31	3.74
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	0.00	0.00	0.00
8	Fertilizer + micronutrients		Quintal	4.08	3143.08	17.10
9	Pesticides (PPC)		Kgs / liters	0.62	494.00	2.69
10	Irrigation		Number	1.24	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	1834.63	9.98
14	Land revenue and Taxes			0.00	8.23	0.04
II	**Cost B1**					
16	Interest on working capital				519.05	2.82
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				13390.87	72.84
III	**Cost B2**					
18	Rental Value of Land				200.00	1.09
19	**Cost B2 = (Cost B1 + Rental value)**				13590.87	73.93
IV	**Cost C1**					
20	Family Human Labour			14.57	3121.67	16.98
21	**Cost C1 = (Cost B2 + Family Labour)**				16712.54	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				16712.54	90.91
VI	**Cost C3**					
24	Managerial Cost				1671.25	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				18383.80	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		8.40	33592.00	
		b) Main Crop Sales Price (Rs.)			4000.00	
b.	Gross Income (Rs.)				33592.00	
c.	Net Income (Rs.)				15208.20	
d.	Cost per Quintal (Rs./q.)				2189.07	
e.	Benefit Cost Ratio (BC Ratio)				1:1.83	

Cost of cultivation of chilly

The data regarding the cost of cultivation of chilly in Kunikeri tanda-2 micro watershed is presented in Table 30. The results indicate that, the total cost of cultivation for chilly was Rs. 48908.01. The gross income realized by the farmers was Rs. 74100. The net income from chilly cultivation was Rs. 25191.99. Thus the benefit cost ratio was found to be 1:1.52.

Table 30. Cost of Cultivation of chilly in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	29.64	3556.80	7.27
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	2.47	1976.00	4.04
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	1.24	432.25	0.88
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	12.35	2470.00	5.05
8	Fertilizer + micronutrients		Quintal	24.70	19019.00	38.89
9	Pesticides (PPC)		Kgs / liters	2.47	2470.00	5.05
10	Irrigation		Number	0.00	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	256.88	0.53
14	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
16	Interest on working capital				2927.07	5.98
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				33111.29	67.70
III	**Cost B2**					
18	Rental Value of Land				333.33	0.68
19	**Cost B2 = (Cost B1 + Rental value)**				33444.63	68.38
IV	**Cost C1**					
20	Family Human Labour			54.34	11016.20	22.52
21	**Cost C1 = (Cost B2 + Family Labour)**				44460.83	90.91
V	**Cost C2**					
22	Risk Premium				1.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				44461.83	90.91
VI	**Cost C3**					
24	Managerial Cost				4446.18	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				48908.01	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		49.40	74100.00	
		b) Main Crop Sales Price (Rs.)			1500.00	
b.	Gross Income (Rs.)				74100.00	
c.	Net Income (Rs.)				25191.99	
d.	Cost per Quintal (Rs./q.)				990.04	
e.	Benefit Cost Ratio (BC Ratio)				1:1.52	

Cost of cultivation of sugarcane

The data regarding the cost of cultivation of sugarcane in Kunikeri tanda-2 micro watershed is presented in Table 31. The results indicate that, the total cost of cultivation for sugarcane was Rs. 61303.84. The gross income realized by the farmers was Rs. 234604.72. The net income from sugarcane cultivation was Rs. 173300.88. Thus the benefit cost ratio was found to be 1:3.83.

Table 31. Cost of Cultivation of sugarcane in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Mandays	52.88	8786.34	14.33
2	Bullock		Pairs/day	0.31	216.13	0.35
3	Tractor		Hours	3.20	2188.77	3.57
4	Machinery		Hours	2.73	2157.47	3.52
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	8157.42	24065.32	39.26
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	15.15	2517.45	4.11
8	Fertilizer + micronutrients		Quintal	4.98	4305.23	7.02
9	Pesticides (PPC)		Kgs / ltrs	0.89	783.44	1.28
10	Irrigation		Number	5.90	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	2028.01	3.31
14	Land revenue and Taxes			0.00	4.84	0.01
II	**Cost B1**					
16	Interest on working capital				3800.62	6.20
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				50853.61	82.95
III	**Cost B2**					
18	Rental Value of Land				395.83	0.65
19	**Cost B2 = (Cost B1 + Rental value)**				51249.44	83.60
IV	**Cost C1**					
20	Family Human Labour			22.33	4480.95	7.31
21	**Cost C1 = (Cost B2 + Family Labour)**				55730.39	90.91
V	**Cost C2**					
22	Risk Premium				0.38	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				55730.76	90.91
VI	**Cost C3**					
24	Managerial Cost				5573.08	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				61303.84	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		418.94	234604.72	
		b) Main Crop Sales Price (Rs.)			560.00	
b.	Gross Income (Rs.)				234604.72	
c.	Net Income (Rs.)				173300.88	
d.	Cost per Quintal (Rs./q.)				146.33	
e.	Benefit Cost Ratio (BC Ratio)				1:3.83	

Cost of cultivation of Cowpea

The data regarding the cost of cultivation of cowpea in Kunikeri tanda-2 micro watershed is presented in Table 32. The results indicate that, the total cost of cultivation for cowpea was Rs. 45586.65. The gross income realized by the farmers was Rs. 39026. The net income from cowpea cultivation was Rs. -6560.65. Thus the benefit cost ratio was found to be 1:0.86.

Table 32. Cost of Cultivation of cowpea in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	69.16	9484.80	20.81
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	4.94	2964.00	6.50
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.35	1852.50	4.06
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	24.70	3705.00	8.13
8	Fertilizer + micronutrients		Quintal	9.88	9509.50	20.86
9	Pesticides (PPC)		Kgs / liters	0.00	0.00	0.00
10	Irrigation		Number	4.94	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	256.88	0.56
14	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
16	Interest on working capital				1808.04	3.97
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				29584.01	64.90
III	**Cost B2**					
18	Rental Value of Land				200.00	0.44
19	**Cost B2 = (Cost B1 + Rental value)**				29784.01	65.33
IV	**Cost C1**					
20	Family Human Labour			69.16	11658.40	25.57
21	**Cost C1 = (Cost B2 + Family Labour)**				41442.41	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				41442.41	90.91
VI	**Cost C3**					
24	Managerial Cost				4144.24	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				45586.65	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		12.35	37050.00	
		b) Main Crop Sales Price (Rs.)			3000.00	
	By Product	e) Main Product (q)		2.47	1976.00	
		f) Main Crop Sales Price (Rs.)			800.00	
b.	Gross Income (Rs.)				39026.00	
c.	Net Income (Rs.)				-6560.65	
d.	Cost per Quintal (Rs./q.)				3691.23	
e.	Benefit Cost Ratio (BC Ratio)				1:0.86	

Cost of cultivation of Banana

The data regarding the cost of cultivation of banana in Kunikeri tanda-2 micro watershed is presented in Table 33. The results indicate that, the total cost of cultivation for banana was Rs. 74552.13. The gross income realized by the farmers was Rs. 111150. The net income from banana cultivation was Rs. 36597.87. Thus the benefit cost ratio was found to be 1:1.49.

Table 33. Cost of Cultivation of banana in Kunikeri tanda-2 micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	25.94	4754.75	6.38
2	Bullock		Pairs/day	3.71	2593.50	3.48
3	Tractor		Hours	7.41	5187.00	6.96
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	988.00	7904.00	10.60
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	37.05	7410.00	9.94
8	Fertilizer + micronutrients		Quintal	11.12	9818.25	13.17
9	Pesticides (PPC)		Kgs / liters	6.18	6175.00	8.28
10	Irrigation		Number	12.35	0.00	0.00
11	Repairs			0.00	0.00	0.00
12	Msc. Charges (Marketing costs etc)			0.00	0.00	0.00
13	Depreciation charges			0.00	10675.34	14.32
14	Land revenue and Taxes			0.00	4.12	0.01
II	**Cost B1**					
16	Interest on working capital				3756.87	5.04
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				58278.83	78.17
III	**Cost B2**					
18	Rental Value of Land				233.33	0.31
19	**Cost B2 = (Cost B1 + Rental value)**				58512.16	78.48
IV	**Cost C1**					
20	Family Human Labour			41.99	9262.50	12.42
21	**Cost C1 = (Cost B2 + Family Labour)**				67774.66	90.91
V	**Cost C2**					
22	Risk Premium				0.00	0.00
23	**Cost C2 = (Cost C1 + Risk Premium)**				67774.66	90.91
VI	**Cost C3**					
24	Managerial Cost				6777.47	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				74552.13	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		37.05	111150.00	
		b) Main Crop Sales Price (Rs.)			3000.00	
b.	Gross Income (Rs.)				111150.00	
c.	Net Income (Rs.)				36597.87	
d.	Cost per Quintal (Rs./q.)				2012.20	
e.	Benefit Cost Ratio (BC Ratio)				1:1.49	

Adequacy of fodder

The data regarding the adequacy of fodder in Kunikeri tanda-2 micro watershed is presented in Table 34. The results indicate that, 6.06 per cent of the households opined that green fodder was adequate.

Table 34. Adequacy of fodder in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Green Fodder	1	50.00	0	0.00	0	0.00	1	10.00	0	0.00	2	6.06

Average annual gross income

The data regarding the average annual gross income in Kunikeri tanda-2 micro watershed is presented in Table 35. The results indicate that the average annual gross income was Rs.134000 for landless farmers, for marginal farmers it was Rs.46700, for small farmers it was Rs.76933, for semi medium farmers it was Rs.91900 and for medium farmers it was Rs.285182.

Table 35. Average annual gross income in Kunikeri tanda-2 micro watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Service/salary	100,000.00	0.00	13,333.33	10,000.00	8,571.43	13,333.33
2	Wage	4,000.00	17,500.00	17,500.00	14,500.00	6,428.57	13,424.24
3	Agriculture	26,000.00	28,200.00	45,266.67	65,300.00	263,000.00	92,218.18
4	Dairy Farm	4,000.00	1,000.00	833.33	2,100.00	7,182.86	2,796.36
Income(Rs.)		134,000.00	46,700.00	76,933.33	91,900.00	285,182.86	121,772.12

Average annual expenditure

The data regarding the average annual expenditure in Kunikeri tanda-2 micro watershed is presented in Table 36. The results indicate that the average annual expenditure is Rs. 9819.95. For landless households it was Rs.40000, for marginal farmers it was Rs 3043.75, for small farmers it was Rs. 7750, for semi medium farmers it was Rs. 7483.33 and for medium farmers it was Rs. 14053.57.

Table 36. Average annual expenditure in Kunikeri tanda-2 micro watershed

(Avg value in Rs.)

Sl.No.	Particulars	LL (2)	MF (8)	SF (6)	SMF (10)	MDF (7)	All (33)
1	Service/salary	60,000.00	0.00	30,000.00	40,000.00	0.00	3,939.39
2	Wage	0.00	7,750.00	4,166.67	5,333.33	5,000.00	2,818.18
3	Agriculture	20,000.00	16,600.00	12,333.33	28,333.33	90,000.00	24,151.52
4	Dairy Farm	0.00	0.00	0.00	1,166.67	3,375.00	515.15
Total		80,000.00	24,350.00	46,500.00	74,833.33	98,375.00	324,058.33
Average		40,000.00	3,043.75	7,750.00	7,483.33	14,053.57	9,819.95

Horticulture species grown: The data regarding horticulture species grown in Kunikeri tanda-2 micro watershed is presented in Table 37. The results indicate that, sampled households have grown 24 coconut and 3 mango trees in their field. Farmers have also grown 1 coconut tree in their backyard.

Table 37. Horticulture species grown in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	0	0	0	0	3	0	12	1	9	0	24	1
2	Mango	0	0	0	0	0	0	3	0	0	0	3	0

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

Forest species grown

The data regarding forest species grown in Kunikeri tanda-2 micro watershed is presented in Table 38. The results indicate that, households have planted 37 neem trees, 7 tamarind trees and 34 banyan trees.

Table 38: Forest species grown in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Neem	2	0	3	0	8	0	14	0	10	0	37	0
2	Tamarind	0	0	0	0	0	0	4	0	3	0	7	0
3	Banyan	5	0	5	0	21	0	3	0	0	0	34	0

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

Marketing of the agricultural produce

The data regarding marketing of the agricultural produce in Kunikeri tanda-2 micro watershed is presented in Table 39. The results indicated that, bajra, banana, chilly, cowpea, greengram, maize and paddy were marketed to the extent of 100 per cent. Groundnut was marketed to the extent of 86.84 per cent, redgram was marketed to the extent of 85.71 per cent and sugarcane was marketed to the extent of 91.27 per cent.

Table 39. Marketing of the agricultural produce in Kunikeri tanda-2 micro watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	136.0	0.0	136.0	100.0	1877.78
2	Banana	30.0	0.0	30.0	100.0	3000.0
3	Chilly	20.0	0.0	20.0	100.0	1500.0
4	Cow Pea	5.0	0.0	5.0	100.0	3000.0
5	Greengram	8.0	0.0	8.0	100.0	5000.0
6	Groundnut	76.0	10.0	66.0	86.84	5000.0
7	Maize	337.0	0.0	337.0	100.0	1090.91
8	Paddy	66.0	0.0	66.0	100.0	1500.0
9	Redgram	42.0	6.0	36.0	85.71	4000.0

10	Sugarcane	5500.0	480.0	5020.0	91.27	560.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Kunikeri tanda-2 micro watershed is presented in Table 40. The results indicated that, about 60.61 per cent of the households have sold their produce to agents/traders, 21.21 per cent of the households sold their produce to local/village, another 9.09 per cent have sold their produce in cooperative marketing society, and 39.39 per cent have sold in regulated markets.

Table 40. Marketing Channels used for sale of agricultural produce in Kunikeri tanda-2 micro watershed

Sl. No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agent/Traders	0	0.00	5	62.50	5	83.33	6	60.00	4	57.14	20	60.61
2	Local/village Merchant	0	0.00	2	25.00	1	16.67	3	30.00	1	14.29	7	21.21
3	Regulated Market	0	0.00	2	25.00	0	0.00	7	70.00	4	57.14	13	39.39
4	Cooperative marketing Society	0	0.00	0	0.00	1	16.67	0	0.00	2	28.57	3	9.09

Mode of transport of agricultural produce

The data regarding Mode of transport of agricultural produce in Kunikeri tanda-2 micro watershed is presented in Table 41. The results indicated that 51.52 per cent have used cart, 72.73 per cent have used tractor and 6.06 per cent of the farmers have used truck as a mode of transport.

Table 41. Mode of transport of agricultural produce in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cart	0	0.00	8	100.00	2	33.33	5	50.00	2	28.57	17	51.52
2	Tractor	0	0.00	1	12.50	4	66.67	11	110.00	8	114.29	24	72.73
3	Truck	0	0.00	0	0.00	1	16.67	0	0.00	1	14.29	2	6.06

Table 42. Source of drinking water in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	1	50.00	7	87.50	5	83.33	9	90.00	5	71.43	27	81.82
2	Bore Well	0	0.00	0	0.00	1	16.67	0	0.00	1	14.29	2	6.06
3	Lake/ Tank	0	0.00	0	0.00	0	0.00	0	0.00	1	14.29	1	3.03
4	Canal/Nala	0	0.00	1	12.50	0	0.00	1	10.00	0	0.00	2	6.06

Source of drinking water

The data regarding source of drinking water in Kunikeri tanda-2 micro watershed is presented in Table 42. The results indicated that, piped supply was the major source of drinking water for 81.82 per cent of the households, bore well was the source of drinking water for 6.06 per cent of the households, lake/tank was the source of drinking water for

3.03 per cent of the households and canal/nala was the source of drinking water for 6.06 per cent of the households.

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Kunikeri tanda-2 micro watershed is presented in Table 43. The results indicated that, 93.94 percent used fire wood and 3.03 percent of the households used LPG as a source of domestic fuel.

Table 43. Usage pattern of fuel for domestic use in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	1	50.00	8	100.00	6	100.00	10	100.00	6	85.71	31	93.94
2	LPG	0	0.00	0	0.00	0	0.00	0	0.00	1	14.29	1	3.03

Source of light

The data regarding source of light in Kunikeri tanda-2 micro watershed is presented in Table 44. The results indicated that, Electricity was the major source of light for 93.94 per cent of the households and kerosene lamp was the source of light for 3.03per cent of the households in the micro watershed.

Table 44. Source of light in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Kerosene Lamp	0	0.00	1	12.50	0	0.00	0	0.00	0	0.00	1	3.03
2	Electricity	1	50.00	7	87.50	6	100.00	10	100.00	7	100.00	31	93.94

Existence of Sanitary toilet facility

The data regarding existence of sanitary toilet facilit**y** in Kunikeri tanda-2 micro watershed is presented in Table 45. The results indicated that, 51.52 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 12.50 per cent of marginal, 16.67 per cent of small, 100 per cent of semi medium and 57.14 per cent of medium farmers had sanitary toilet facility.

Table 45. Existence of Sanitary toilet facility in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	1	50.00	1	12.50	1	16.67	10	100.00	4	57.14	17	51.52

Possession of PDS card: The data regarding possession of PDS card in Kunikeri tanda-2 micro watershed is presented in Table 46. The results indicated that, 93.94 per cent of the sampled households possessed BPL card and 3.03 per cent did not possess PDS card.

Table 46. Possession of PDS card in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	1	50.00	8	100.00	6	100.00	9	90.00	7	100.00	31	93.94
2	Not Possessed	0	0.00	0	0.00	0	0.00	1	10.00	0	0.00	1	3.03

Participation in NREGA program

The data regarding participation in NREGA programme in Kunikeri tanda-2 micro watershed is presented in Table 47. The results indicated that, 42.42 per cent of the households participated in NREGA programme.

Table 47. Participation in NREGA programme in Kunikeri tanda-2 micro watershed

Sl. No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	1	50.00	4	50.00	2	33.33	5	50.00	2	28.57	14	42.42

Adequacy of food items

The data regarding adequacy of food items in Kunikeri tanda-2 micro watershed is presented in Table 48. The results indicated that, cereals were adequate for 90.91 per cent of the households, pulses were adequate for 42.42 per cent, oilseeds were adequate for 27.27 per cent, vegetables were adequate for 63.64 per cent, fruits were adequate for 54.55 per cent, milk was adequate for 81.82 per cent, eggs were adequate for 51.52 per cent and meat was adequate for 51.52 per cent of the households.

Table 48. Adequacy of food items in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	1	50.00	8	100.00	6	100.00	9	90.00	6	85.71	30	90.91
2	Pulses	1	50.00	4	50.00	1	16.67	4	40.00	4	57.14	14	42.42
3	Oilseed	0	0.00	2	25.00	1	16.67	2	20.00	4	57.14	9	27.27
4	Vegetables	0	0.00	4	50.00	6	100.00	5	50.00	6	85.71	21	63.64
5	Fruits	0	0.00	4	50.00	5	83.33	5	50.00	4	57.14	18	54.55
6	Milk	0	0.00	7	87.50	6	100.00	7	70.00	7	100.00	27	81.82
7	Egg	0	0.00	4	50.00	5	83.33	5	50.00	3	42.86	17	51.52
8	Meat	0	0.00	4	50.00	5	83.33	5	50.00	3	42.86	17	51.52

Response on Inadequacy of food items

The data regarding inadequacy of food items in Kunikeri tanda-2 micro watershed is presented in Table 49. The results indicated that, cereals were inadequate for 3.03 per cent of the households, pulses were inadequate for 51.52 per cent, oilseeds were inadequate for 66.67 per cent, vegetables were inadequate for 30.30 per cent, fruits were inadequate for 33.33 per cent, milk was inadequate for 12.12 per cent, eggs were

inadequate for 36.36 per cent and meat was inadequate for 36.36 per cent of the households.

Table 49. Response on Inadequacy of food items in Kunikeri tanda-2 micro watershed

Sl.No.	Particulars	LL (2)		MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	0	0.00	0	0.00	0	0.00	0	0.00	1	14.29	1	3.03
2	Pulses	0	0.00	4	50.00	5	83.33	5	50.00	3	42.86	17	51.52
3	Oilseed	1	50.00	6	75.00	5	83.33	7	70.00	3	42.86	22	66.67
4	Vegetables	1	50.00	4	50.00	0	0.00	4	40.00	1	14.29	10	30.30
5	Fruits	1	50.00	3	37.50	0	0.00	5	50.00	2	28.57	11	33.33
6	Milk	1	50.00	1	12.50	0	0.00	2	20.00	0	0.00	4	12.12
7	Egg	1	50.00	4	50.00	0	0.00	4	40.00	3	42.86	12	36.36
8	Meat	1	50.00	4	50.00	0	0.00	4	40.00	3	42.86	12	36.36

Table 50. Farming constraints Experienced in Kunikeri tanda-2 micro watershed

Sl. No.	Particulars	MF (8)		SF (6)		SMF (10)		MDF (7)		All (33)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	2	25.00	0	0.00	4	40.00	3	42.86	10	30.30
2	Wild animal menace on farm field	0	0.00	1	16.67	2	20.00	0	0.00	4	12.12
3	Frequent incidence of pest and diseases	4	50.00	6	100.00	6	60.00	3	42.86	19	57.58
4	Inadequacy of irrigation water	1	12.50	0	0.00	2	20.00	0	0.00	3	9.09
5	High cost of Fertilizers and plant protection chemicals	7	87.50	6	100.00	11	110.00	6	85.71	31	93.94
6	High rate of interest on credit	6	75.00	5	83.33	10	100.00	6	85.71	27	81.82
7	Low price for the agricultural commodities	3	37.50	0	0.00	5	50.00	2	28.57	11	33.33
8	Lack of marketing facilities in the area	6	75.00	4	66.67	7	70.00	5	71.43	22	66.67
9	Inadequate extension services	1	12.50	0	0.00	0	0.00	0	0.00	1	3.03
10	Lack of transport for safe transport of the Agril produce to the market.	7	87.50	6	100.00	9	90.00	6	85.71	28	84.85
11	Less rainfall	7	87.50	6	100.00	11	110.00	7	100.00	32	96.97
12	Source of Agri-technology information(Newspaper/TV/Mobile)	7	87.50	3	50.00	8	80.00	7	100.00	25	75.76

Farming constraints

The data regarding farming constraints experienced by households in Kunikeri tanda-2 micro watershed is presented in Table 50. The results indicated that, lower fertility status of the soil was the constraint experienced by 30.30 per cent of the households, wild animal menace on farm field (12.12%), frequent incidence of pest and diseases (57.58%), inadequacy of irrigation water (9.09%), high cost of fertilizers and plant protection chemicals (93.94%), high rate of interest on credit (81.82%), low price for the agricultural commodities (33.33%), lack of marketing facilities in the area (66.67%), lack of transport for safe transport of the agricultural produce to the market

(84.85%), less rainfall (96.97%), inadequate extension services (3.03%) and source of agri-technology information (75.76%).

Chapter 5

SUMMARY

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 33 households located in the micro watershed were interviewed for the survey.

The data indicated that there were 88 (58.67%) men and 62 (41.33%) were women among the sampled households. The average family size of landless farmers was 4.5, marginal farmers' was 4.13, small farmers' was 4.67, semi medium farmers' was 4.70 and medium farmers' was 4.17.

The data indicated that, 18 (12%) people were in 0-15 years of age, 72 (48%) were in 16-35 years of age, 50 (33.33%) were in 36-60 years of age and 10 (6.67%) were above 61 years of age.

The results indicated that Kunikeri tanda-2 had 37.33 per cent illiterates, 0.67 per cent functional literates, 22 per cent of them had primary school education, 6 per cent of them had middle school education, 19.33 per cent of them had high school education, 6.67 per cent of them had PUC education, 2 per cent of them did diploma, 2.67 per cent of them had degree education and 1 person was doing masters.

The results indicate that, 90.91 per cent of households practicing agriculture and 3.03 per cent were general laborers. The results indicate that agriculture was the major occupation for 76.67 per cent of the household members, 1.33 per cent were agricultural labourers, 1.33 per cent were general laborers, 0.67 per cent had household industry, 0.67 per cent were in government service, 0.67 per cent were retired, 14.67 per cent were students and 3.33 per cent were children.

The results show that 0.67 per cent of the households participated in user group, 0.67 per cent participated in raitha sangha and 98.67 per cent of them have not participated in any local institutions. The results indicate that 66.67 per cent of the households possess katcha house and 33.33 per cent of the households possess semi pucca house.

The results shows that 96.97 per cent of the households possess TV, 81.82 per cent of the households possess Mixer grinder, 6.06 per cent of the households possess bicycle, 63.64 per cent of the households possess motor cycle and 90.91 per cent of the households possess mobile phones. The results shows that the average value of television

was Rs.8531, mixer grinder was Rs.1865, motor cycle was Rs.33130, mobile phone was Rs.2081 and bicycle was Rs.2500.

About 24.24 per cent of the households possess bullock cart, 39.39 per cent of them possess plough, 18.18 per cent of them possess tractor, 69.70 per cent of them posses sprayer, 6.06 per cent possess irrigation pump, 6.06 per cent possess power tiller, 9.09 per cent possess sprinkler, 3.03 per cent possess JCB/Hitachi and 72.73 per cent of them possess weeder.

The results show that the average value of bullock cart was Rs.17125, the average value of plough was Rs.1576, the average value of irrigation pump was Rs.60000, the average value of power tiller was Rs.22500, the average value of tractor was Rs.471428, the average value of sprayer was Rs.4256, the average value of sprinkler was Rs.13000, the average value of weeder was Rs.96 and the average value of JCB/Hitachi was Rs.800000.

The results indicate that, 15.15 per cent of the households possess bullocks, 24.24 per cent of the households possess local cow, 18.18 per cent of the households possess crossbred cow, 15.15 per cent of the households possess buffalo and 9.09 per cent of the households possess goat.

The results indicate that, average own labour men available in the micro watershed was 1.79, average own labour (women) available was 1.55, average hired labour (men) available was 8.38 and average hired labour (women) available was 8.12. The results indicate that, 100 per cent of the households in the micro watershed opined that the hired labour was adequate.

The results indicate that, households of the Kunikeri tanda-2 micro watershed possess 27.78 ha (48.17%) of dry land and 29.89 ha (51.83%) of irrigated land. Marginal farmers possess 3.48 ha (86.62%) of dry land and 0.54 ha (13.38%) of irrigated land. Small farmers possess 5.17 ha (67.03%) of dry land and 2.54 ha (32.97%) of irrigated land. Semi medium possess 19.13 ha (74.47%) of dry land and 6.56 ha (25.53%) of irrigated land and medium farmers possess 20.25 ha (100%) of irrigated land.

The results indicate that, the average value of dry land was Rs. 273,484.85 and average value of irrigated was Rs. 394,664.86. In case of marginal famers, the average land value was Rs. 659,814.17 for dry land and Rs. 2,042,857.12. In case of small famers, the average land value was Rs. 348,159.75 for dry land and Rs. 786,624.21. In case of semi medium famers, the average land value was Rs. 182,924.25 for dry land and Rs. 426,913.59 for irrigated land. In case of medium famers, the average land value Rs. 291,227.02 for irrigated land.

The results indicate that, there were 17 functioning and 4 de-functioning bore wells in the micro watershed. The results indicate that, bore well was the major irrigation

source in the micro water shed for 48.57 per cent of the farmers. The results indicate that, the depth of bore well was found to be 47.46 meters.

The results indicate that, marginal farmers had irrigated area of 0.99 hectares, small farmers had 2.49 hectares, semi medium farmers had 5.03 hectares and medium farmers had 24.19 hectares.

The results indicate that, farmers have grown Bajra (10.83 ha), Banana (0.81 ha), Chilly (0.4 ha), Greengram (0.87 ha), Groundnut (4.15 ha), Maize (14.83 ha), Paddy (2.69 ha), Redgram (5.26 ha), Sugarcane (13.21), and Cowpea (0.4 ha). Marginal farmers have grown bajra, groundnut, maize and paddy. Small farmers have grown bajra, greengram, maize, sugarcane and cowpea. Semi medium farmers have grown bajra, chilly, groundnut, maize, paddy, redgram and sugarcane. Medium farmers have grown banana, groundnut, maize, redgram and sugarcane.

The results indicate that, the cropping intensity in Kunikeri tanda-2 micro watershed was found to be 83.68 per cent. In case of marginal farmers it was 92.21 per cent, for small farmers it was 89.90 per cent, in case of semi medium farmers it was 87.96 per cent and medium farmers had cropping intensity of 74.84 per cent.

The results indicate that, the total cost of cultivation for maize was Rs. 47267.81. The gross income realized by the farmers was Rs. 31175.46. The net income from Maize cultivation was Rs. -16092.35, thus the benefit cost ratio was found to be 1:0.66. The total cost of cultivation for bajra was Rs. 40976.20. The gross income realized by the farmers was Rs. 35863.76. The net income from bajra cultivation was Rs. -5112.44. Thus the benefit cost ratio was found to be 1:0.88. The total cost of cultivation for paddy was Rs. 41034.52. The gross income realized by the farmers was Rs. 48946.42. The net income from paddy cultivation was Rs. 7911.89. Thus the benefit cost ratio was found to be 1:1.19. The total cost of cultivation for green gram was Rs. 33799.68. The gross income realized by the farmers was Rs. 46198.15. The net income from green gram cultivation was Rs. 12398.47. Thus the benefit cost ratio was found to be 1:1.37. The total cost of cultivation for groundnut was Rs. 50787.55. The gross income realized by the farmers was Rs. 93527.14. The net income from groundnut cultivation was Rs. 42739.59. Thus the benefit cost ratio was found to be 1:1.84. The total cost of cultivation for red gram was Rs. 18383.80. The gross income realized by the farmers was Rs. 33592. The net income from red gram cultivation was Rs. 15208.20. Thus the benefit cost ratio was found to be 1:1.83. The total cost of cultivation for chilly was Rs. 48908.01. The gross income realized by the farmers was Rs. 74100. The net income from chilly cultivation was Rs. 25191.99. Thus the benefit cost ratio was found to be 1:1.52. The total cost of cultivation for sugarcane was Rs. 61303.84. The gross income realized by the farmers was Rs. 234604.72. The net income from sugarcane cultivation was Rs. 173300.88. Thus the benefit cost ratio was found to be 1:3.83. The total cost of cultivation for cowpea was

Rs. 45586.65. The gross income realized by the farmers was Rs. 39026. The net income from cowpea cultivation was Rs. -6560.65. Thus the benefit cost ratio was found to be 1:0.86. The total cost of cultivation for banana was Rs. 74552.13. The gross income realized by the farmers was Rs. 111150. The net income from banana cultivation was Rs. 36597.87. Thus the benefit cost ratio was found to be 1:1.49.

The results indicate that the average annual gross income was Rs.134000 for landless farmers, for marginal farmers it was Rs.46700, for small farmers it was Rs.76933, for semi medium farmers it was Rs.91900 and for medium farmers it was Rs.285182. The results indicate that the average annual expenditure is Rs. 9819.95. For landless households it was Rs.40000, for marginal farmers it was Rs 3043.75, for small farmers it was Rs. 7750, for semi medium farmers it was Rs. 7483.33 and for medium farmers it was Rs. 14053.57.

The results indicate that, sampled households have grown 24 coconut and 3 mango trees in their field. Farmers have also grown 1 coconut tree in their backyard. The results indicate that, households have planted 37 neem trees, 7 tamarind trees and 34 banyan trees.

The results indicated that, bajra, banana, chilly, cowpea, greengram, maize and paddy were marketed to the extent of 100 per cent. Groundnut was marketed to the extent of 86.84 per cent, redgram was marketed to the extent of 85.71 per cent and sugarcane was marketed to the extent of 91.27 per cent.

The results indicated that, about 60.61 per cent of the households have sold their produce to agents/traders, 21.21 per cent of the households sold their produce to local/village, another 9.09 per cent have sold their produce in cooperative marketing society, and 39.39 per cent have sold in regulated markets. The results indicated that 51.52 per cent have used cart, 72.73 per cent have used tractor and 6.06 per cent of the farmers have used truck as a mode of transport.

The results indicated that, piped supply was the major source of drinking water for 81.82 per cent of the households, bore well was the source of drinking water for 6.06 per cent of the households, lake/tank was the source of drinking water for 3.03 per cent of the households and canal/nala was the source of drinking water for 6.06 per cent of the households.

The results indicated that, 93.94 percent used fire wood and 3.03 percent of the households used LPG as a source of domestic fuel. Electricity was the major source of light for 93.94 per cent of the households and kerosene lamp was the source of light for 3.03per cent of the households in the micro watershed. The results indicated that, 51.52 per cent of the households possess sanitary toilet i.e. 50 per cent of landless, 12.50 per cent of marginal, 16.67 per cent of small, 100 per cent of semi medium and 57.14 per

cent of medium farmers had sanitary toilet facility. The results indicated that, 93.94 per cent of the sampled households possessed BPL card and 3.03 per cent did not possess PDS card. The results indicated that, 42.42 per cent of the households participated in NREGA programme.

The results indicated that, cereals were adequate for 90.91 per cent of the households, pulses were adequate for 42.42 per cent, oilseeds were adequate for 27.27 per cent, vegetables were adequate for 63.64 per cent, fruits were adequate for 54.55 per cent, milk was adequate for 81.82 per cent, eggs were adequate for 51.52 per cent and meat was adequate for 51.52 per cent of the households.

The results indicated that, cereals were inadequate for 3.03 per cent of the households, pulses were inadequate for 51.52 per cent, oilseeds were inadequate for 66.67 per cent, vegetables were inadequate for 30.30 per cent, fruits were inadequate for 33.33 per cent, milk was inadequate for 12.12 per cent, eggs were inadequate for 36.36 per cent and meat was inadequate for 36.36 per cent of the households.

The results indicated that, lower fertility status of the soil was the constraint experienced by 30.30 per cent of the households, wild animal menace on farm field (12.12%), frequent incidence of pest and diseases (57.58%), inadequacy of irrigation water (9.09%), high cost of fertilizers and plant protection chemicals (93.94%), high rate of interest on credit (81.82%), low price for the agricultural commodities (33.33%), lack of marketing facilities in the area (66.67%), lack of transport for safe transport of the agricultural produce to the market (84.85%), less rainfall (96.97%), inadequate extension services (3.03%) and source of agri-technology information (75.76%).