ICAR-NBSS&LUP Sujala MWS Publ.435

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

NIRLIGI-1 (4D4A2Q4g) MICROWATERSHED

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 Nirligi-1 (4D4A2Q4g) Microwatershed, Koppal Taluk and District, Karnataka”, ICAR-NBSS&LUP Sujala MWS Publ.435, ICAR – NBSS & LUP, RC, Bangalore. p.145 & 43.

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

NIRLIGI-1 (4D4A2Q4g) MICROWATERSHED

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

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 Nirligi-1 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:21-10-2019

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	Sh. Venkata Giriyappa
	Dr. Gopali Bardhan
	Smt. Chaitra, S.P.
	Mr. Somashekar T.N
	Ms. Arpitha, G.M.
Field Work	
Sh. C. Bache Gowda	Sh. Mayur Patil
Sh. Somashekar	Sh. Arun Kumar, S.
Sh. M. Jayaramaiah	Sh. Sunil Raj
	Sh. Yogesh Kumar, B.
	Sh. Vikas, N.K.
	Sh. Arun Kumar, S.G.
	Sh. Umesh Jadiyappa Madolli
	Sh. Praveen Kumar P. Achalkar
	Sh. Veerabhadraswamy
	Sh. Vinay
	Sh. Shankarappa, K.
	Sh. Lankesh, R.S.
	Sh. Appanna B. Hattigoudar
	Sh. Maharudra
GIS Work	
Dr. S.Srinivas	Sh. A.G. Devendra Prasad
Sh. D. H.Venkatesh	Sh. Abhijith Sastry, N.S.
Smt. K.Sujatha	Sh. Nagendra Babu Kolukondu
Smt. K. V. Archana	Sh. Avinash
Sh. N. Maddileti	Sh. Amar Suputhra, S.
	Sh. Deepak M.J.
	Sh. Madappaswamy
	Smt. K. Karunya Lakshmi
	Ms. Seema, K.V.
	Ms. Ramireddy Lakshmi Silpa
	Ms. Bhanu Rekha, T.
	Ms. Rajata Bhat
	Ms. Shruthi
	Ms. Suman, S.

Laboratory Analysis	
Dr. M. Lalitha	Ms. Thara, V.R.
Smt. Arti Koyal	Ms. Roopa, G.
Smt. Parvathy, S.	Ms. Vindhya, N.G.
	Ms. Shwetha N.K.
	Ms. Pavana Kumari, P.
	Ms. Leelavathy, K.U.
	Ms. Rashmi, N.
	Ms. Padmaja, S.
	Ms. Veena, M.
	Ms. Chaithrashree B
	Ms. Shwetha N
Socio-economic Analysis	
Dr. Ramesh Kumar, S.C.	Sh. Prakashanaik, M.K.
	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 Nirligi-1 microwatershed was conducted using village cadastral maps and IRS satellite imagery on 1:7920 scale. The false colour composites of IRS imagery were interpreted for physiography and these physiographic delineations were used as base for mapping soils. The soils were studied in several transects and a soil map was prepared with phases of soil series as mapping units. Random checks were made all over the area outside the transects to confirm and validate the soil map unit boundaries. The soil map shows the geographic distribution and extent, characteristics, classification, behavior and use potentials of the soils in the microwatershed.

The present study covers an area of 684 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 85 per cent is covered by soils and 15 per cent by habitation and water bodies, settlements and others. The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 12 soil series and 25 soil phases (management units) and 5 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 3 per cent of the soils are very shallow (<25 cm), 10 per cent are moderately shallow (50-75 cm), 4 per cent of the soils are moderately deep (75-100 cm), 49 per cent area has deep (100-150 cm) and 19 per cent area has very deep (>150 cm) soils.*
- *An area of about 12 per cent has loamy soils and 73 per cent has clayey soils at the surface.*
- *About 50 per cent of the area has non-gravelly (<15%) soils, 30 per cent gravelly (15-35% gravel) and 4 per cent very gravelly (35-60%) soils.*
- *About 13 per cent are very low (<50 mm/m), 36 per cent low (51-100 mm/m), 14 per cent medium (101-150 mm/m) and 22 per cent high (151-200 mm/m) in available water capacity.*

- *About 4 per cent area has nearly level (0-1%), and 80 per cent area has very gently sloping (1-3%) lands in the microwatershed.*
- *An area of about 19 per cent has soils that are slightly eroded (e1) and 65 per cent moderately eroded (e2) lands.*
- *About <1 per cent area has slightly acid (pH 6.0-6.5), 5 per cent are neutral (pH 6.5-7.3), 44 per cent are slightly alkaline (pH 7.3-7.8), 28 per cent are moderately alkaline (pH 7.8-8.4) and 8 per cent area are strongly alkaline (pH 8.4-9.0) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils is <2 dS m^{-1} and as such the soils are non-saline.*
- *Organic carbon is low (<0.5%) in 2 per cent, 43 per cent is medium (0.5-0.75%) and 39 per cent is high (>0.75%) in soils.*
- *Available phosphorus is low (<23 kg/ha) in 1 per cent, medium (23-57 kg/ha) in 75 per cent and high (>57 kg/ha) in 9 per cent area of the microwatershed.*
- *About 26 per cent are medium (145-337 kg/ha) and 59 per cent soils are high (>337 kg/ha) in available potassium content.*
- *Available sulphur is low (<10 ppm) in 57 per cent, medium (10-20 ppm) is 27 per cent and high (>20 ppm) in <1 per cent area of the microwatershed.*
- *Available boron is low (0.5 ppm) in about <1 per cent, medium (0.5-1.0 ppm) in 84 per cent and <1 per cent is high (>1.0 ppm) in soils.*
- *Available iron is deficient (<4.5 ppm) in 52 percent and sufficient (>4.5 ppm) in 32 per cent area of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in 48 per cent and sufficient (>0.6 ppm) in about 36 per cent area.*
- *Available manganese and copper are sufficient in all the soils.*
- *The land suitability for 31 major agricultural and horticultural crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	*193 (28)*	*78 (11)*	*Sapota*	*54 (8)*	*41 (6)*
Maize	*54 (8)*	*217 (32)*	*Pomegranate*	*54 (8)*	*216 (32)*
Bajra	*89 (13)*	*206 (30)*	*Musambi*	*168 (25)*	*102 (15)*
Groundnut	*68 (10)*	*248 (36)*	*Lime*	*168 (25)*	*102 (15)*
Sunflower	*168 (25)*	*101 (15)*	*Amla*	*95 (14)*	*465 (68)*
Red gram	*54 (8)*	*217 (32)*	*Cashew*	-	*27 (4)*
Bengalgram	*139 (20)*	*200 (29)*	*Jackfruit*	*54 (8)*	*41 (6)*
Cotton	*160 (23)*	*111 (16)*	*Jamun*	*21 (3)*	*226 (33)*
Chilli	*54 (8)*	*41 (6)*	*Custard apple*	*233 (34)*	*326 (48)*
Tomato	*54 (8)*	*41 (6)*	*Tamarind*	*21 (3)*	*263 (38)*
Brinjal	*6 (1)*	*487 (71)*	*Mulberry*	*89 (13)*	*327 (48)*
Onion	-	*317 (46)*	*Marigold*	*54 (8)*	*216 (32)*
Bhendi	-	*492 (72)*	*Chrysanthemum*	*54 (8)*	*216 (32)*
Drumstick	*54 (8)*	*439 (64)*	*Jasmine*	*54 (8)*	*41 (6)*
Mango	*21 (3)*	*92 (13)*	*Crossandra*	*54 (8)*	*156 (23)*
Guava	*33 (5)*	*62 (9)*			

- *Apart from the individual crop suitability, a proposed crop plan has been prepared for the 5 identified LMUs by considering only the highly and moderately suitable lands for different crops and cropping systems with food, fodder, fibre and other horticulture crops that helps in maintaining productivity and ecological balance in the microwatershed.*
- *Maintaining soil-health is vital for crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested for these problematic soils like saline/alkali, highly eroded, sandy soils etc.*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. 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 Nirligi-1 Microwatershed in Koppal Taluk and 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.

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Nirligi-1 Microwatershed is located in the central part of northern Karnataka in Koppal Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of and Neeralagi village. It lies between $15^0$11' – $15^0$13' North latitudes and $76^0$4' – $76^0$5' East longitudes and covers an area of 684 ha. It is about 23 km from Koppal town. It is surrounded by Neeralagi village on the north, west, south and eastern side.

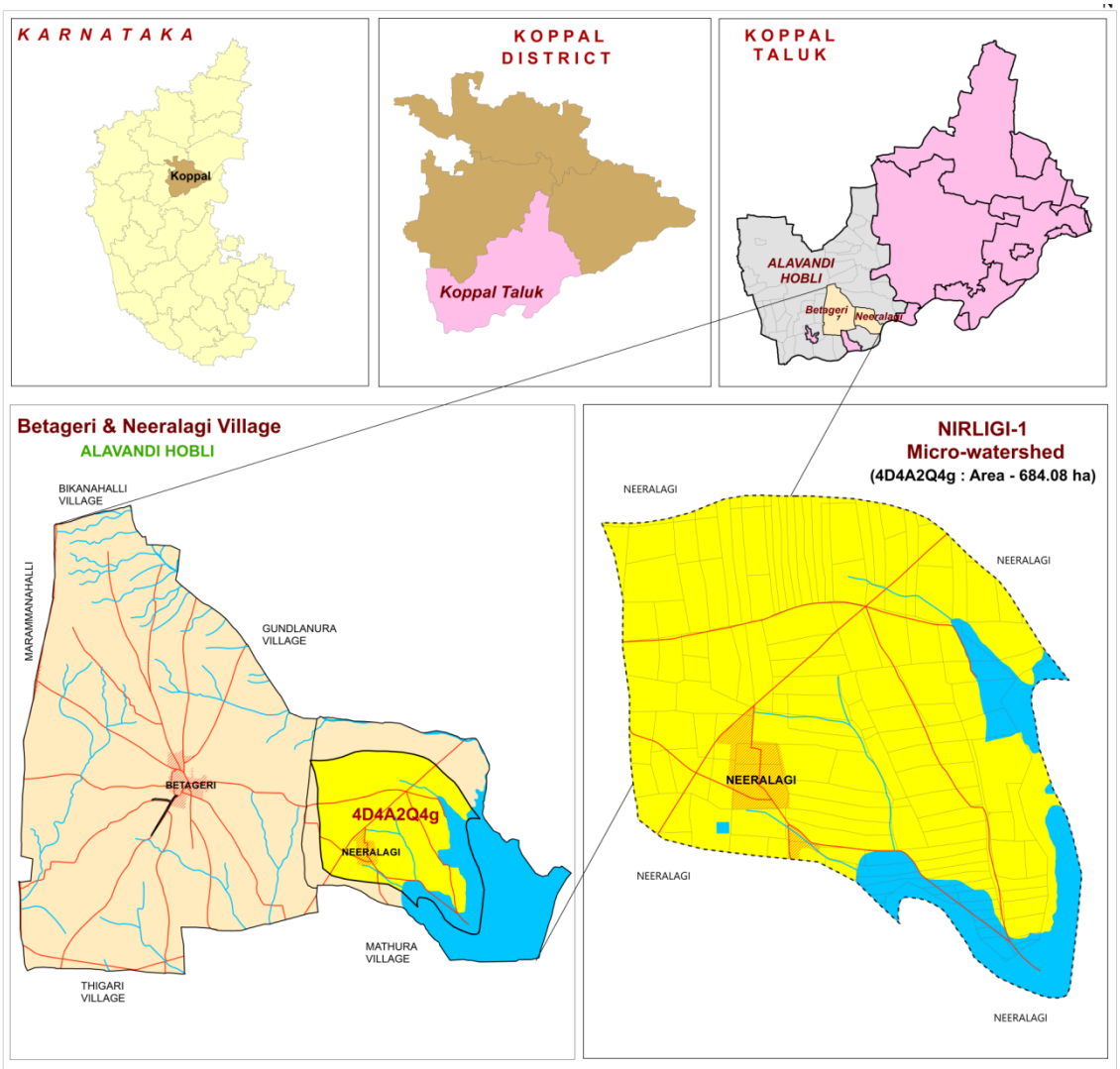


Fig. 2.1 Location map of Nirligi-1 Microwatershed

2.2 Geology

Major rock formations observed in the microwatershed are granite gneiss and alluvium (Figs. 2.2a and b). Granite gneisses are essentially pink to gray and are coarse to medium grained. They consist primarily of quartz, feldspar, biotite and hornblende. The gray granite gneisses are highly weathered, fractured and fissured upto a depth of about 10 m. Dolerite dykes and quartz veins are common with variable width and found to

occur in the village. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soils originally formed at higher elevation, but now occupying river valleys.

Fig. 2.2a Granite and granite gneiss rocks

Fig. 2.2 b Alluvium

2.3 Physiography

Physiographically, the area has been identified as granite gneiss and alluvial landscapes based on geology. The microwatershed area has been further divided into summits, very gently sloping uplands and nearly level plains based on slope and its relief features. The elevation ranges from 498 to 524 m in the gently sloping uplands.

]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 an average annual rainfall of 662 mm (Table 2.1). Maximum of 424 mm precipitation takes place during the 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 takes place 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 and 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**	

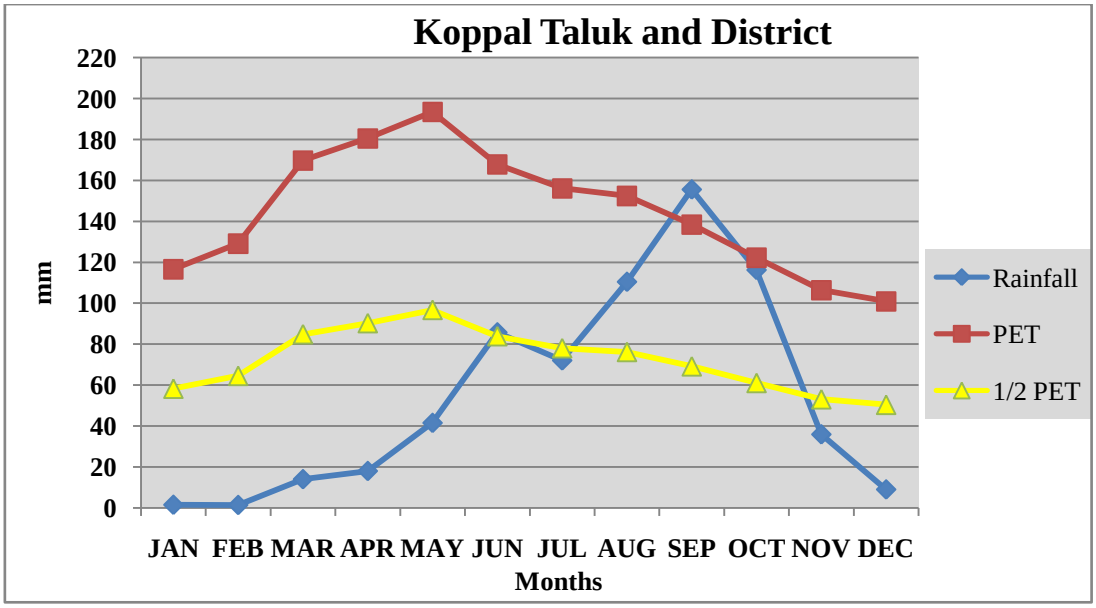


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

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 Nirligi-1 Microwatershed

2.7 Land Utilization

About 91 per cent area (Table 2.2) in Koppal district is cultivated at present and about 16 per cent of the area is sown more than once. The cropping intensity is 118 per cent. 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 bouldery 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). 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 Nirligi-1 Microwatershed is presented in Fig. 2.6. Simultaneously, enumeration of existing wells (bore wells and open wells) and other soil and water conservation structures in the microwatershed is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells and other water bodies in Nirligi-1 Microwatershed is given 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 Nirligi-1 Microwatershed

Fig. 2.5 (b) Different crops and cropping systems in Nirligi-1 Microwatershed

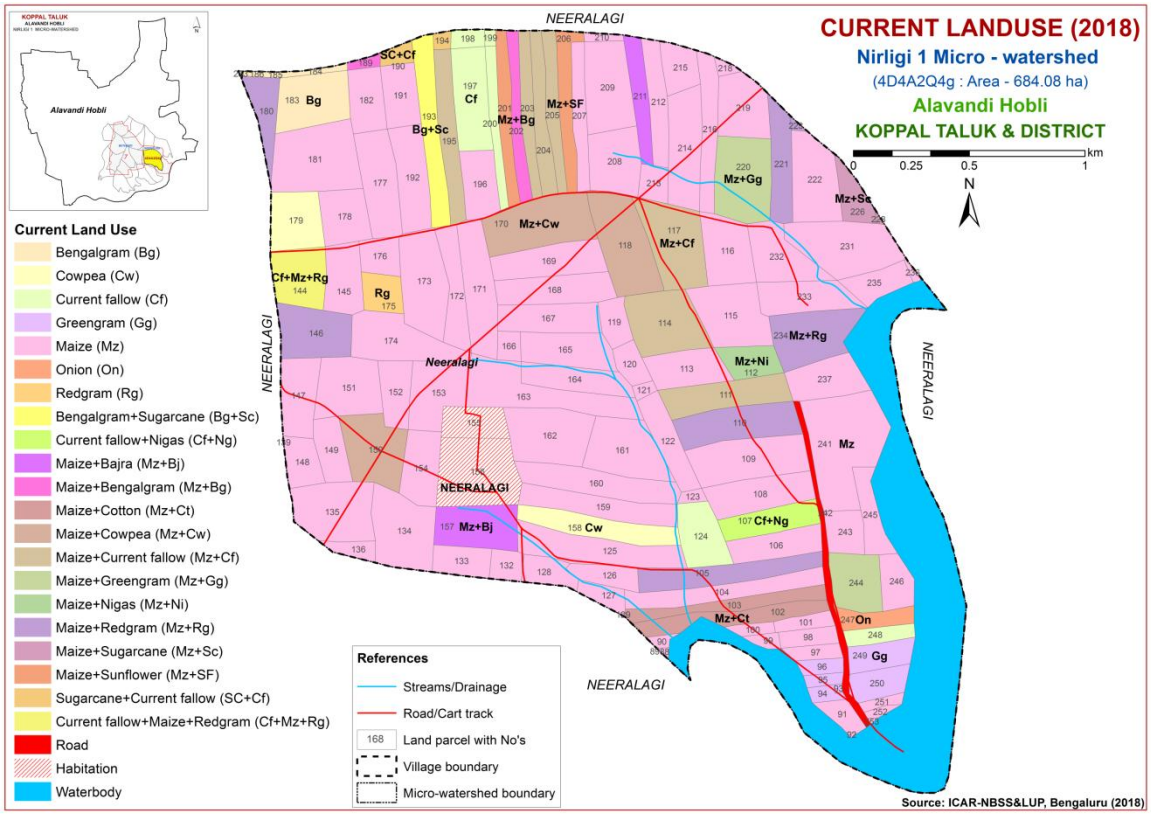


Fig. 2.6 Current Land Use – Nirligi-1 Microwatershed

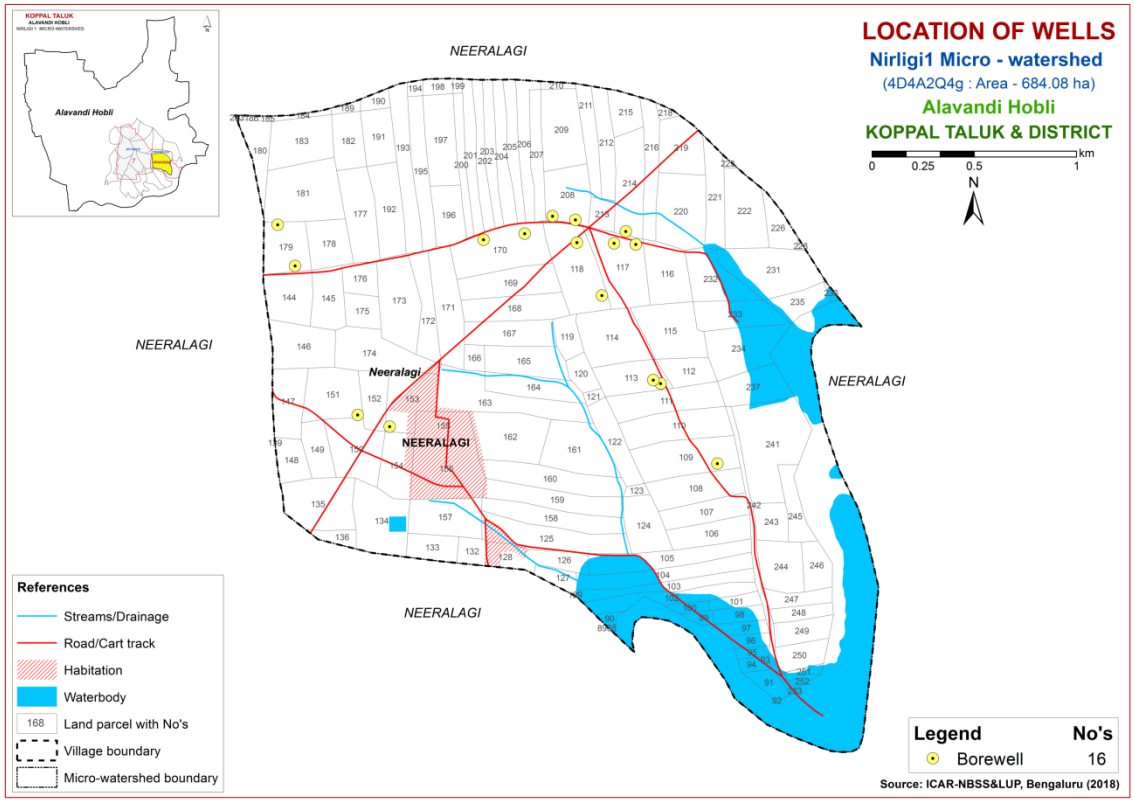


Fig. 2.7 Location of wells -Nirligi-1 Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly for a given level of management. This was achieved in Nirligi-1 Microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units and showing their extent and geographic distribution on the microwatershed cadastral map. The detailed soil survey at 1:7920 scale was carried out in 684 ha area. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.*, 2015) which is briefly described below.

3.1 Base Maps

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

3.2 Image Interpretation for Physiography

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

Image Interpretation Legend for Physiography

G- Granite gneiss landscape

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

DSe Alluvial landscape

Dse 1 Summit

- Dse 11 Nearly level Summit with dark grey tone
- Dse 12 Nearly level Summit with medium grey tone
- Dse 13 Nearly level Summit with whitish grey tone
- Dse 14 Nearly level Summit with whitish tone (Calcareousness)
- Dse 15 Nearly level Summit with pinkish grey tone
- Dse 16 Nearly level Summit with medium pink tone
- Dse 17 Nearly level Summit with bluish white tone
- Dse 18 Nearly level Summit with greenish grey tone

Dse 2 Very genetly sloping

- Dse 21 Very gently sloping, whitish tone
- Dse 22 Very gently sloping, greyish pink tone
- Dse 23 Very gently sloping, whitish grey tone
- Dse 24 Very gently sloping, medium grey tone
- Dse 25 Very gently sloping, medium pink tone
- Dse 26 Very gently sloping, dark grey tone
- Dse 27 Very gently sloping, bluish grey tone
- Dse 28 Very gently sloping, greenish grey tone
- Dse 29 Very gently sloping, Pinkish grey

Dsa 25 – Nearly Level Lands

- Dsa 251- Nearly level, Grayish green tone
- Dsa 252- Nearly level, Bluish grey tone
- Dsa 253- Nearly level, Light green tone
- Dsa 254- Nearly level, Medium green tone
- Dsa 255- Nearly level, Greenish pink tone
- Dsa 256- Nearly level, Whitish green
- Dsa 257- Nearly level, Pink tone
- Dsa 258- Nearly level, Whitish grey tone
- Dsa 259- Nearly level, Grayish Pink

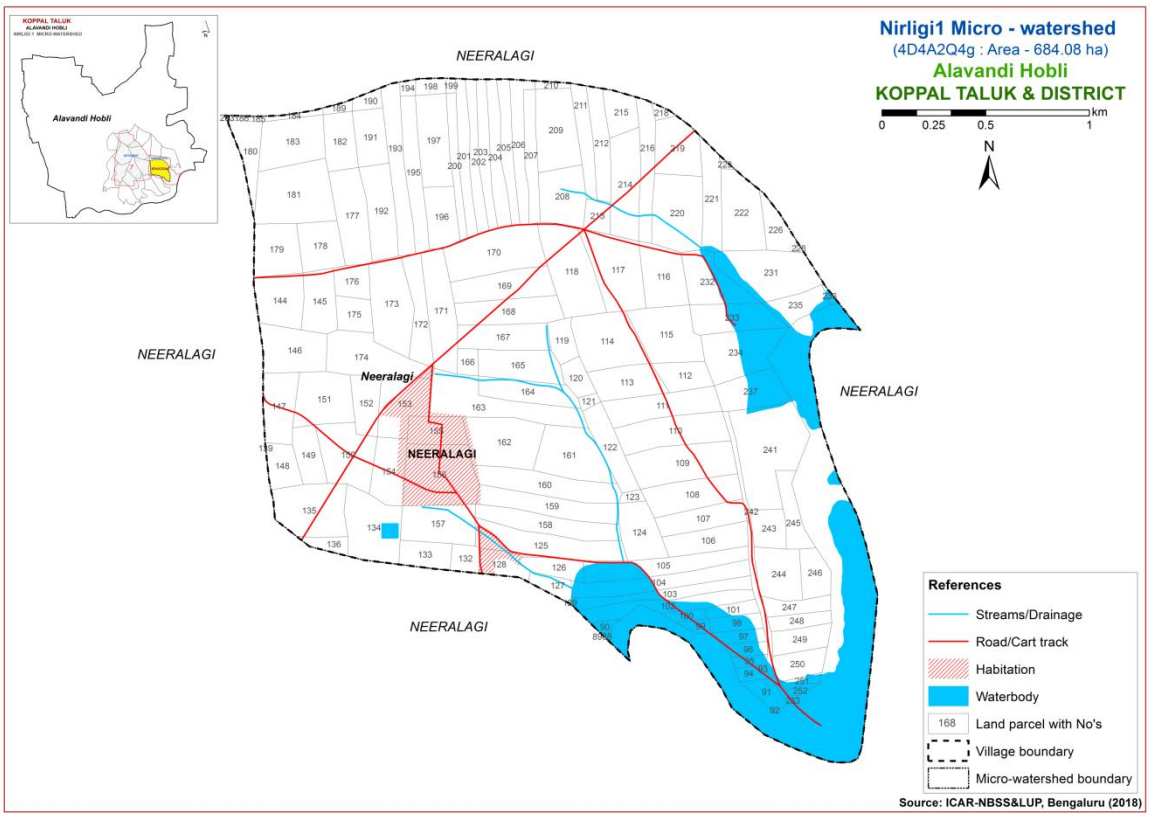


Fig. 3.1 Scanned and Digitized Cadastral map of Nirligi-1 Microwatershed

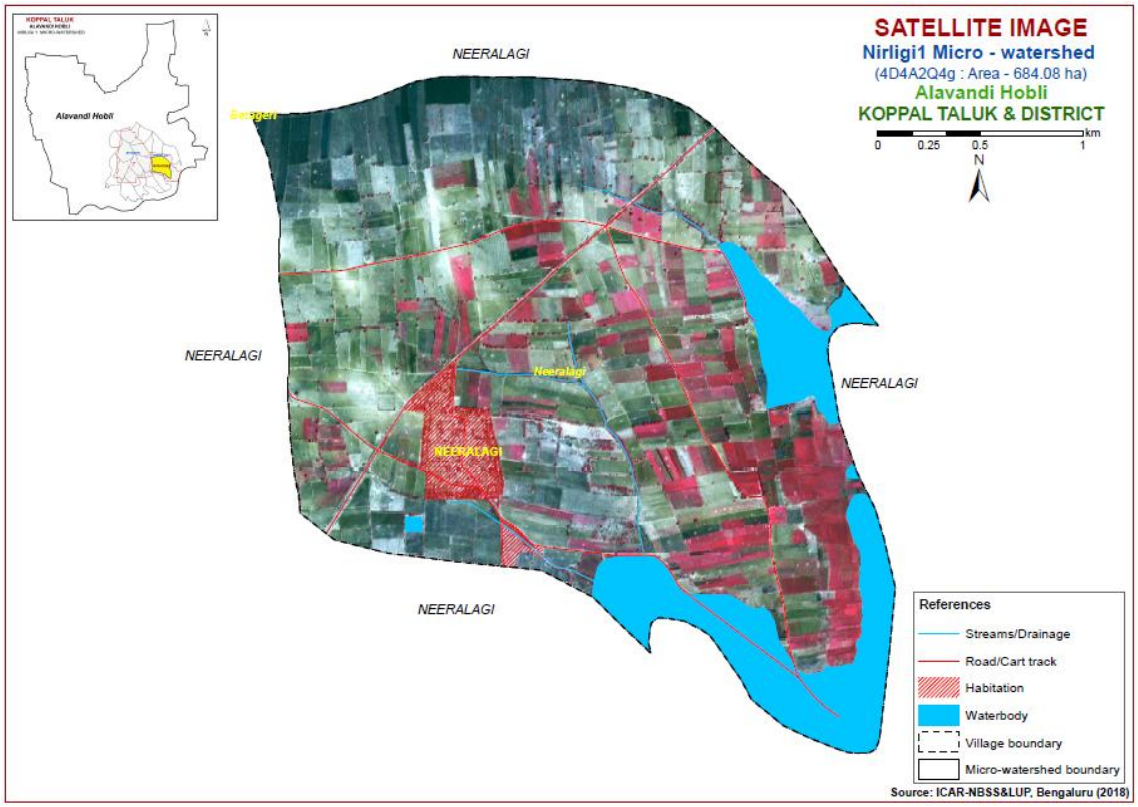


Fig. 3.2 Satellite Image of Nirligi-1 Microwatershed

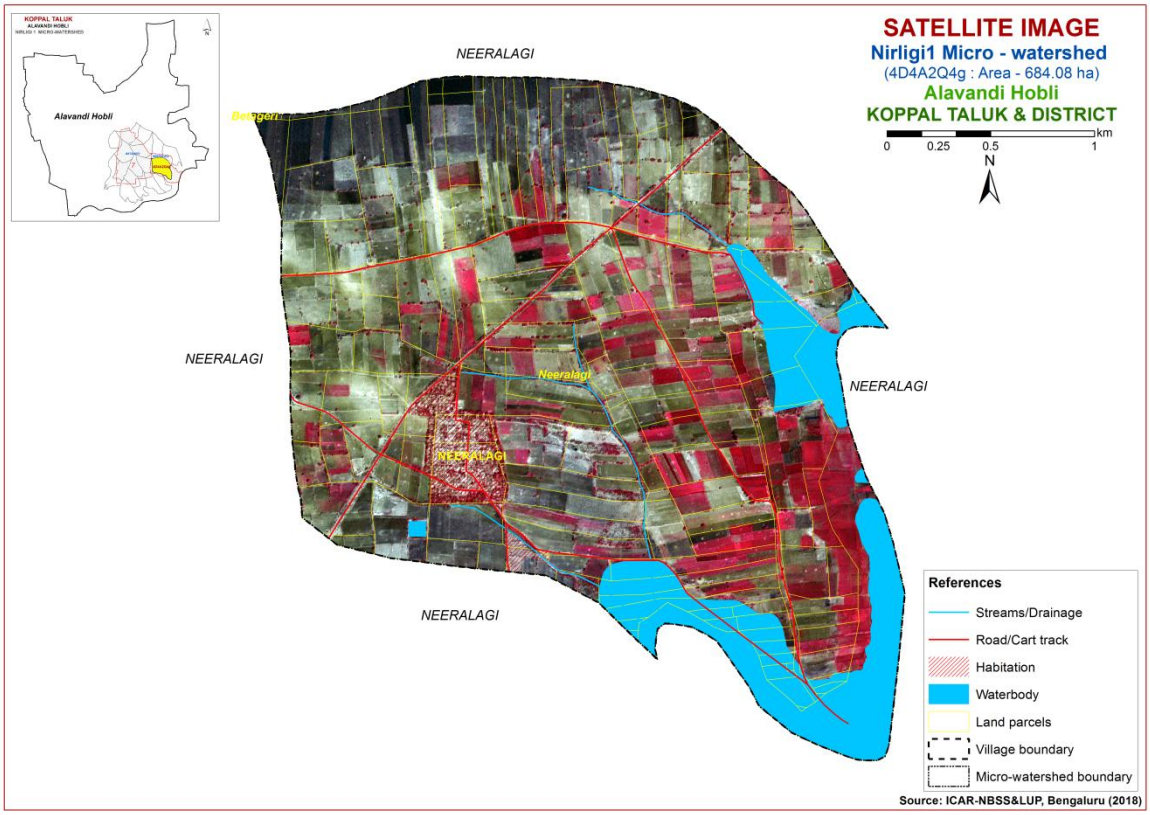


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Nirligi-1 Microwatershed

3.3 Field Investigation

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

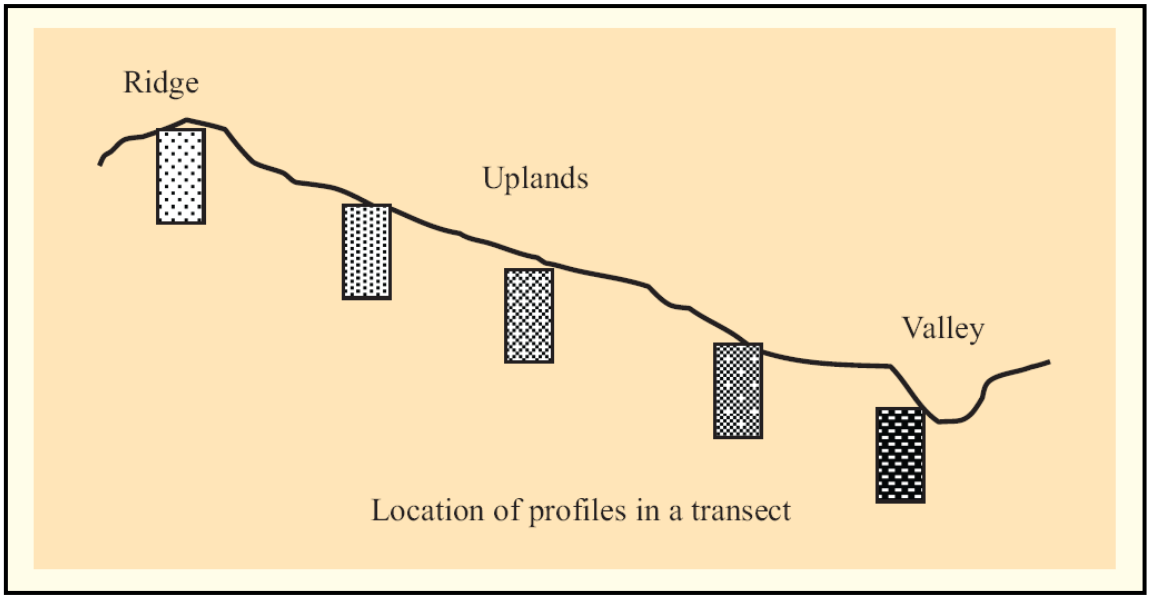


Fig. 3.4 Location of profiles in a transect

In the selected transect, soil profiles (Fig. 3.4) were located at closely spaced intervals to take care of any change in the land features like break in slope, erosion, gravel, stones etc. In the selected sites, soil profiles (vertical cut showing the soil layers from surface to the rock) were opened upto 200 cm or to the depth limited by rock or hard substratum and studied in detail for all their morphological and physical characteristics. The soil and site characteristics were recorded for all profile sites on a standard proforma as per the guidelines given in USDA Soil Survey Manual (Soil Survey Staff, 2012). Apart from the transect study, profiles were also studied at random, almost like in a grid pattern, outside the transect areas 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, 12 soil series were identified in Nirligi-1 Microwatershed.

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

Soils of Granite gneiss Landscape							
Sl. No.	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcareo-usness**
1	Belagatti (BGT)	<25	10 YR3/1, 3/2, 4/2	gc	>35	Ap-Crk	es
2	Lakkur	50-75	2.5YR 2.5/3,	gsc	40-60	Ap-Bt-Bc-Cr	

	(LKR)		2.5/4, 3/4, 3/6				
3	Mukhadahalli (MKH)	50-75	5YR3/3,3/4,4/3, 5/4,6/6 2.5YR3/4	gsc	>35	Ap-Bt-Cr	
4	Bisarahalli (BSR)	75-100	5 YR 3/3, 3/4	gsc	15-35	Ap-Bt-Cr	
5	Mornal (MNL)	100-150	5YR 3/4, 2.5 YR 3/4, 4/6	gsc	15-35	Ap-Bt-Cr	
6	Balapur (BPR)	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	
7	Giddadapalya (GDP)	100-150	2.5YR3/4, 3/6	gsc-gc	35-60	Ap-Bt-Cr	-
Soils of alluvial Landscape							
8	Narasapura (NSP)	75-100	10 YR 3/1, 3/2, 4/2,	c		Ap-Bw-Cr	e-es
9	Kavalu (KVR)	100-150	10 YR 2/2, 3/1, 3/2, 3/3, 4/4	c		Ap-Bss-Bck-Cr	es-ev
10	Kadagathur (KDT)	>150	10 YR 3/1, 3/2, 3/3, 7.5YR 3/3, 3/4	sc-c	-	Ap-Bw	
11	Alawandi (AWD)	>150	10 YR 2/1, 3/2,	c	<15	Ap-Bss	e-es
12	Bardur (BDR)	>150	10YR 2/1, 3/1, 3/2,	c	<15	Ap-Bss	es

3.4 Soil Mapping

The area under each soil series was further separated into 25 soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management.

The soil mapping units are shown on the soil map (Fig. 3.5) in the form of symbols. During the survey many soil profile pits, few minipits and a few auger bores representing different landforms occurring in the microwatershed were studied. In addition to the profile study, spot observations in the form of minipits, road cuts, terrace cuts etc., were studied to validate the soil boundaries on the soil map. The soil map shows the geographic distribution of 25 mapping units representing 12 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 25 soil phases mapped in the microwatershed. Each mapping unit (soil phase) delineated on the map has similar soil and site characteristics. In other words, all the farms or survey numbers included in one phase will have similar management needs and have to be treated accordingly.

3.5 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected in the year 2018 from Nirligi-1farmer's fields 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 Nirligi-1 Microwatershed

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
Soils of Granite and Granite gneiss landscape				
	BGT	Belagatti soils are very shallow (< 25 cm), well drained, have dark gray to dark grayish brown, calcareous, gravelly clay soils occuring on very gently sloping uplands under cultivation		**17 (2.59)**
8		BGTmB1g2	Clay surface, slope 1-3%, slight erosion, very gravelly (35-60%)	16 (2.41)
10		BGTmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	1 (0.18)
	LKR	Lakkur soils are moderately shallow (50-75cm), well drained, have reddish brown to dark red gravelly sandy clay red soils occuring on nearly level to very gently and gently sloping uplands under cultivation		**61 (9.09)**
43		LKRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	15 (2.26)
44		LKRcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	6 (0.94)
45		LKRiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	40 (5.89)
	MKH	Mukhadahalli soils are moderately shallow (50-75 cm), well drained, have dark brown to reddish brown, gravelly sandy clay soils occuring on very gently to gently sloping uplands under cultivation		**6 (0.91)**
78		MKHcB2g2	Sandy loam surface, slope 1-3%, moderate erosion, very gravelly (35-60%)	6 (0.91)
	BSR	Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay red soils occuring on very gently sloping uplands under cultivation		**6 (0.82)**
168		BSRiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	6 (0.82)
	MNL	Mornal soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay soils occuring on very gently sloping uplands under cultivation		**68 (9.97)**
208		MNLiB2	Sandy clay surface, slope 1-3%, moderate	33

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
			erosion,	(4.82)
209		MNLiB2g1	Sandy clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	25 (3.7)
210		MNLmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	10 (1.45)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils and occuring on very gently to gently sloping uplands under cultivation		**222 (32.53)**
221		BPRcA1g1	Sandy loam surface, slope 0-1%, slight erosion, gravelly (15-35%)	12 (1.78)
231		BPRhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly(15-35%)	42 (6.19)
237		BPRiB1	Sandy clay surface, slope 1-3%, slight erosion	42 (6.12)
238		BPRiB1g1	Sandy clay surface, slope 1-3%, slight erosion, gravelly (15-35%)	5 (0.75)
239		BPRiB2	Sandy clay surface, slope 1-3%, moderate erosion,	121 (17.69)
	GDP	Giddadapalya soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occuring on very gently sloping uplands under cultivation		**21 (3.04)**
269		GDPiB2	Sandy clay surface, slope 1-3%, moderate erosion,	21 (3.04)
Soils of Alluvial Landscape				
	NSP	Narasapura soils are moderately deep (75-100 cm), moderately well drained, have dark grayish brown to very dark grayish brown and very dark gray, black calcareous cracking clay sodic soils occuring on very gently sloping uplands under cultivation		**24 (3.55)**
363		NSPmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	24 (3.55)
	KVR	Kavalur soils are deep (100-150 cm), moderately well drained, have dark yellowish brown to very dark brown and very dark gray, calcareous black cracking clay soils occuring on very gently sloping uplands under cultivation		**24.01 (3.48)**
386		KVRmA1	Clay surface, slope 0-1%, slight erosion	0.01 (0.002)
390		KVRmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	24 (3.48)
	KDT	Kadagathur soils are very deep (>150 cm), moderately well drained, have dark brown to very dark grayish brown sandy clay to clay soils occuring on nearly level to very gently sloping plains under cultivation		**51 (7.45)**
401		KDTiB1	Sandy clay surface, slope 1-3%, slight	35

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
			erosion	(5.14)
405		KDTmB2	Clay surface, slope 1-3%, moderate erosion	16 (2.31)
	AWD	Alawandi soils are very deep (>150 cm), moderately well drained, have black to very dark grayish brown, calcareous cracking clay soils occuring on nearly level to very gently sloping plains under cultivation		**13 (1.85)**
424		AWDmB2	Clay surface, slope 1-3%, moderate erosion,	13 (1.85)
	BDR	Bardur soils are very deep (>150 cm), moderately well drained, have very dark grayish brown to very dark gray, black calcareous cracking clay soils occuring on nearly level to very gently sloping plains under cultivation		**64 (9.3)**
428		BDRmA1	Clay surface, slope 0-1%, slight erosion	16 (2.35)
430		BDRmB1	Clay surface, slope 1-3%, slight erosion	5 (0.71)
433		BDRmB2	Clay surface, slope 1-3%, moderate erosion	43 (6.24)
1000		Habitation & waterbody		105 (15.42)

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

3.6 Land Management Units (LMU's)

The 24 soil phases identified and mapped in the microwatershed were regrouped into 5 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 choosen for identification and delineation of LMUs. For Nirligi-1 Microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

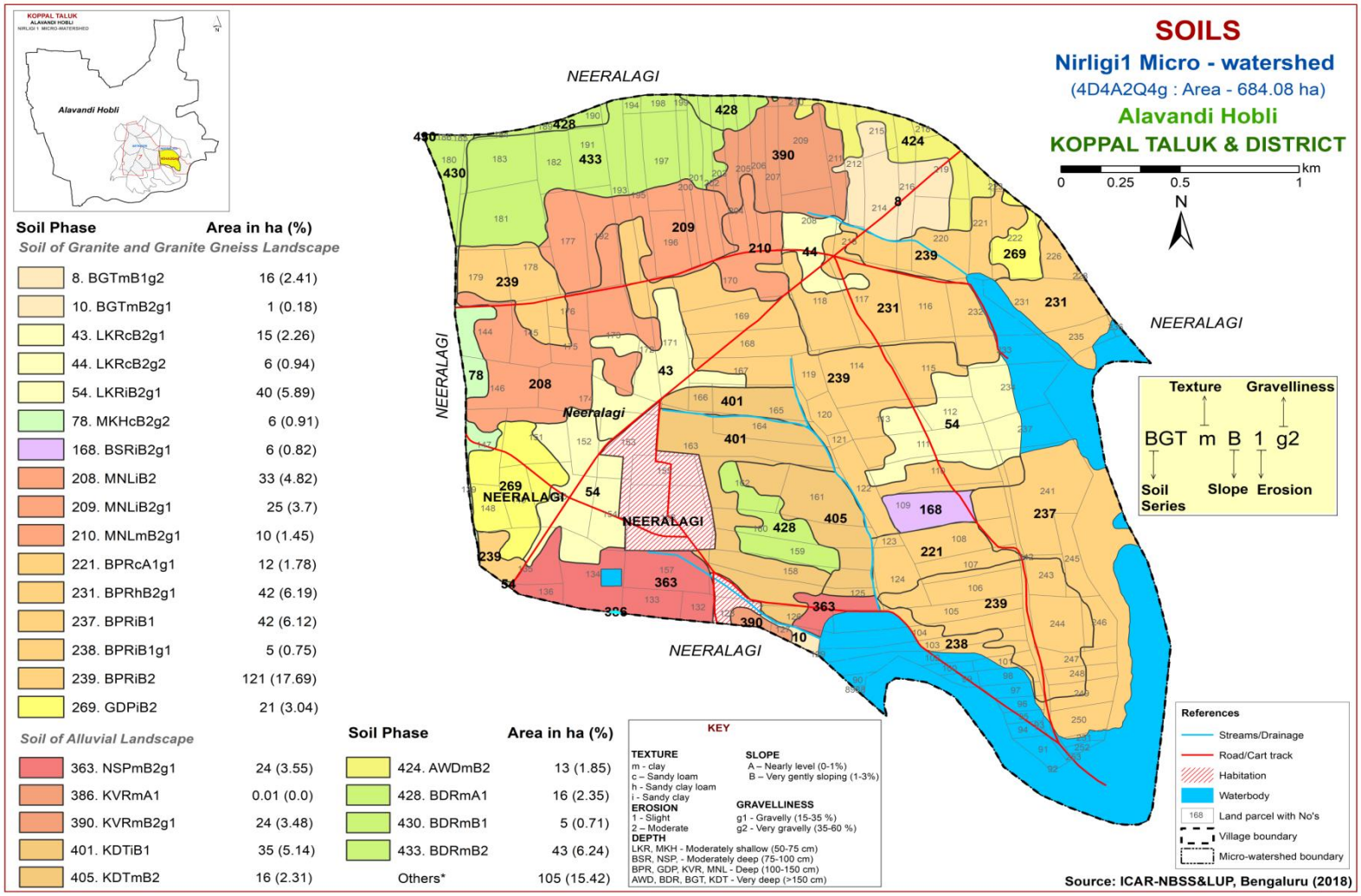


Fig 3.5 Soil Phase or Management Units-Nirligi-1 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Nirligi-1 Microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 12 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 12 soil series identified followed by 25 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Nirligi-1 Microwatershed are given in Table 4.1. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite and granite gneiss landscape

In this landscape, 7 soil series are identified and mapped. Of these, Balapur (BPR) series occupies maximum area of 222 ha (32.53%), Mornal (MNL) 68 ha (10%), Lakkur (LKR) 61 ha (9%), Giddadapalya (GDP) 21 ha (3%), Belagatti (BGT) 17 ha (3%), Mukhadahalli (MKH) 6 ha (1%) and Bisarahalli (BSR) occupy an area of about 6 ha (1%) in the microwatershed. The brief description of each soil series along with the soil phases identified and mapped is given below.

4.1.1 Belagatti (BGT) Series: Belagatti soils are very shallow (< 25 cm), well drained, have dark gray to dark grayish brown, calcareous, gravelly clay soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands. The Belagatti series has been classified as a member of the clayey-skeletal, mixed, (calc), isohyperthermic family of Lithic Ustorthents.

The thickness of the soil is less than 25 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture is clay with more than 35 per cent gravel and the available water capacity is very low (<50 mm/m). Two phases were identified and mapped.

Landscape and soil profile characteristics of Belagatti (BGT) Series

4.1.2 Lakkur (LKR) Series: Lakkur soils are moderately shallow (50-75cm), well drained, have reddish brown to dark red gravelly sandy clay red soils. They have developed from weathered granite gneiss and occur on nearly level to very gently and gently sloping uplands. The Lakkur series has been classified as a member of the clayey-skeletal, mixed, isohyperthermic family of Typic Rhodustalfs.

The thickness of the solum ranges from 51 to 74 cm. The thickness of A horizon ranges from 12 to 18 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from loamy sand to sandy clay loam with 15 to 50 per cent gravel. The thickness of B horizon ranges from 39 to 58 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 4 to 6. Texture is sandy clay with 40 to 60 per cent gravel. The available water capacity is low (50-100 mm/m). Three phases were identified and mapped.

Landscape and soil profile characteristics of Lakkur (LKR) Series

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

The thickness of the solum ranges from 51 to 72 cm. The thickness of A horizon ranges from 12 to 17 cm. Its colour is in 5 YR and 7.5 YR hue with value 3 to 4 and chroma 2 to 4. The texture varies from loamy sand to sandy loam with 20 to 45 per cent gravel. The thickness of B horizon ranges from 40 to 68 cm. Its colour is in 2.5 YR and 5 YR hue with value and chroma 3 to 6. Texture is sandy clay loam to sandy clay with 35 to 50 per cent gravel. The available water capacity is low (50-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Mukhadahalli (MKH) Series

4.1.4 Bisarahalli (BSR) Series: Bisarahalli soils are moderately deep (75-100 cm), well drained, have dark reddish brown gravelly sandy clay red soils. They have developed from weathered granite gneiss and occur on very gently sloping uplands under cultivation. The Bisarahalli series has been classified as a member of the fine, mixed isohyperthermic family of Typic Paleustalfs.

The thickness of the solum ranges from 75 to 98 cm. The thickness of A horizon ranges from 17 to 25 cm. Its colour is in 5 YR hue with value 3 to 4 and chroma 3 to 6. The texture ranges from sandy clay loam to sandy clay with 15 to 35 per cent gravel. The thickness of B horizon ranges from 61 to 79 cm. Its colour is in 5 YR hue with value 3 and chroma 3 to 4. Its texture is gravelly sandy clay with gravel content of 15-35 per cent. The available water capacity is low (50-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Bisarahalli (BSR) Series

4.1.5 Mornal (MNL) Series: Mornal 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 sloping uplands under cultivation. The Mornal series has been classified as a member of the fine, mixed, isohyperthermic family of Rhodic Paleustalfs.

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

Landscape and soil profile characteristics of Mornal (MNL) 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. These soils are developed from weathered granite gneiss and occur on very gently to gently sloping uplands. The Balapur 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 17 cm. Its colour is in 5 YR and 2.5 YR hue with value and chroma 3 to 4. The texture ranges from loamy sand to sandy clay with 15 to 50 per cent gravel. The thickness of B horizon ranges from 90 to 132 cm. Its colour is in 2.5 YR hue with value 2.5 to 3 and chroma 4 to 6. Texture is sandy clay to clay with 35 to 50 per cent gravel. The available water capacity is medium (100-150 mm/m). Five phases were identified and mapped.

Landscape and soil profile characteristics of Balapur (BPR) Series

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

The thickness of the solum ranges from 106 to 145 cm. The thickness of A-horizon ranges from 12 to 13 cm. Its colour is in 5 YR hue with value and chroma 3 to 4. The texture ranges from sandy loam with 10 to 15 per cent gravel. The thickness of B-horizon ranges from 106 to 123 cm. Its colour is in 2.5 YR hue with value 3 to 4 and chroma 3 to 6. Texture is sandy clay to clay with 35 to 75 per cent gravel after 60 cm depth. The available water capacity is low (51-100 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Giddadapalya (GDP) Series

4.2 Soils of Alluvial landscape

In this landscape, five soil series have been identified and mapped. Of these, Bardur (BDR) series occupies maximum area of 64 ha (9%), Kadagathur (KDT) 51 ha (7%), Narasapura (NSP) 24 ha (6%), Kavalur (KVR) 24 ha (3%) and Alawandi (AWD) occupy minor area of about 13 ha (2%) in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

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

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

Landscape and soil profile characteristics of Narsapura (NSP) series

4.2.2 Kavalur (KVR) series: Kavalur soils are deep (100-150 cm), moderately well drained, have dark yellowish brown to very dark brown and very dark gray, calcareous black cracking clay soils. They have developed from alluvium and occur on very gently sloping uplands. The Kavalur series has been classified as a member of the fine smectitic, (calc) isohyperthermic family of Typic Haplusterts.

The thickness of the solum is 113 to 143 cm. The thickness of A horizon ranges from 9 to 24 cm. Its colour is in 10 YR hue with value 3 and chroma 1. The texture is clay with no gravel. The thickness of B horizon ranges from 89 to 134 cm. Its colour is in 10 YR hue with value 3 and chroma 1. Its texture is clay. The available water capacity is very high (>200 mm/m). Three phases were identified and mapped. Two phases were identified and mapped.

Landscape and soil profile characteristics of Kavalur (KVR) series

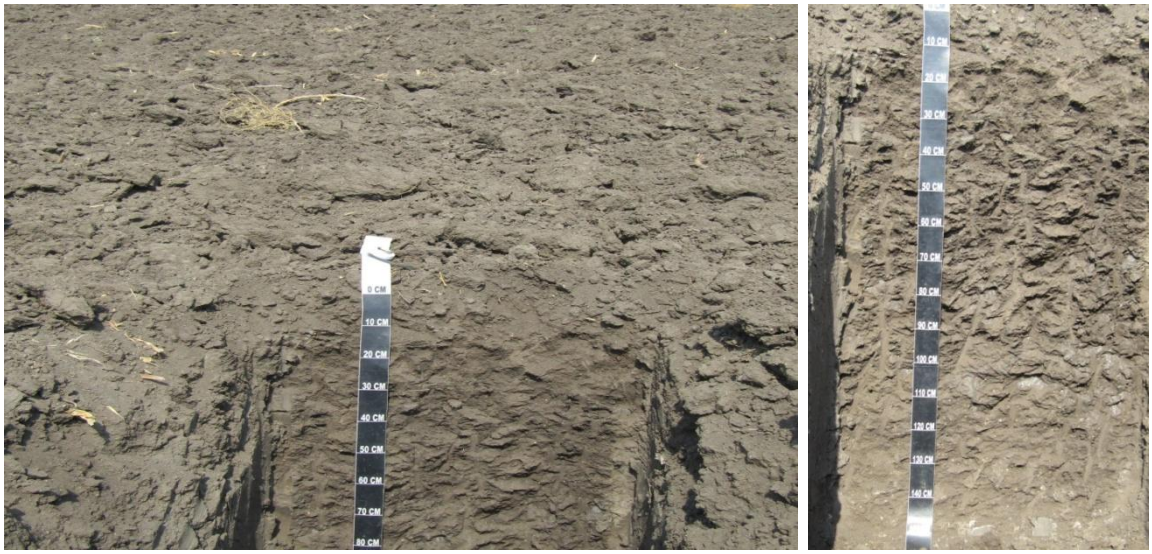
4.2.3 Kadagathur (KDT) Series: Kadagathur soils are very deep (>150 cm), moderately well drained, have dark brown to very dark grayish brown sandy clay to clay soils. They have developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Kadagathur series has been classified as a member of the fine, mixed, isohyperthermic family of Fluventic Haplustepts.

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 10 YR hue with value 3 and chroma 4. The texture varies is sandy loam. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 and chroma 1 to 4. Its texture is sandy clay to clay. The available water capacity is very high (>200 mm/m). Two phases were identified and mapped.

Landscape and soil profile characteristics of Kadagathur (KDT) Series

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

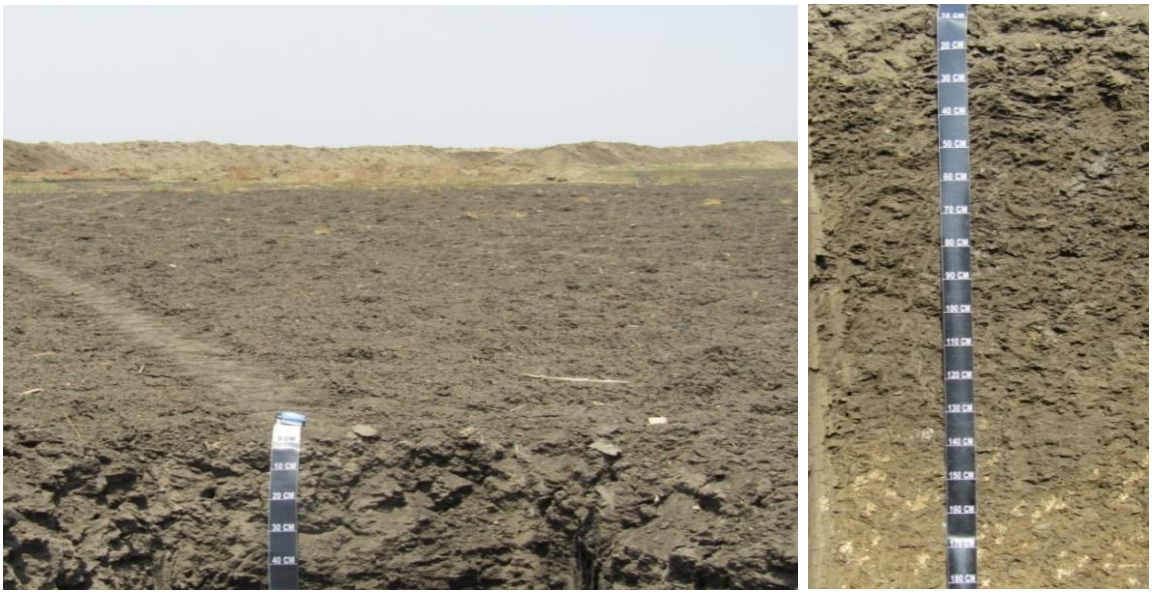
The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 16 to 26 cm. Its colour is in 10 YR hue with value 2 to 3 and chroma 1 to 2. The texture varies from sandy clay to clay. The thickness of B horizon is more than 150 cm. Its colour is in 10 YR hue with value 2 to 3 and chroma 1 to 3. Its texture is clay and is calcareous. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.



Landscape and soil Profile Characteristics of Alawandi (AWD) Series

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

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 15 to 19 cm. Its colour is in 10 YR hue with value 2 and chroma 1 with clay texture. The thickness of B horizon ranges from 146 to 180 cm. Its colour is in 10 YR hue with value 2 to 3 and chroma 1 to 2. Its texture is clay and is calcareous with less than 15 per cent gravel. The available water capacity is very high (>200 mm/m). Three phases were identified and mapped.



Landscape and soil profile characteristics of Bardur (BDR) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Nirligi-1 Microwatershed

Series Name: Belagatti (BGT), **Pedon:** A2/RM-5
Location: $15^0$19'10.8"N, $75^0$57'48.1"E, Kavalura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey-skeletal, mixed, isohyperthermic Lithic Ustorthents

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-23	Ap	36.14	20.34	43.52	10.87	6.93	5.97	8.42	3.94	40	c	29.53	17.97

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}							%	%
0-23	8.4			0.157	0.12	18.24			0.73	0.50		44.84	1.03		1.11

Contd…

Soil Series: Lakkur (LKR), **Pedon:** RM-8.
Location: $15^0$04'26.3"N, $75^0$37'84.1"E, (4D4A3I1f), Belhatti village, Shirahatti taluk, Gadag distrtict
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
0-21	Ap	74.00	8.34	17.66	9.62	11.57	15.76	23.13	13.92	20	sl	-	-
21-35	Bt	54.37	10.48	35.14	16.33	8.64	9.69	11.59	8.11	40	sc	-	-
35-56	Bc	48.37	13.46	38.17	10.96	7.69	9.17	11.28	9.27	60	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}							%	%
0-21	8.18	-	-	0.30	0.56	0.94	-	-	0.31	0.55	0.86	12.19	0.69	100.00	4.51
21-35	8.17	-	-	0.30	0.52	1.29	-	-	0.19	0.84	1.03	22.18	0.63	100.00	3.79
35-56	7.95	-	-	0.46	0.48	1.99	-	-	0.24	0.58	0.82	22.94	0.60	100.00	2.53

Contd…

Series Name: Mukahadahalli (MKH), **Pedon:** R-11
Location: $15^0$22'05.4"N, $76^0$04'10.3"E, Halageri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Clayey-skeletal, 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
0-19	Ap	65.71	8.83	25.46	9.27	9.06	14.42	21.52	11.43	70	scl	16.54	8.60
19-32	Bt	55.89	11.13	32.98	6.47	9.18	11.89	19.19	9.18	50	scl	19.24	12.78
32-58	Bt	47.95	10.41	41.63	17.52	3.78	9.13	9.55	7.97	50	sc	24.03	16.02

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}							%	%
0-19	7.38	-	-	0.09	0.2	0.00	8.97	4.32	0.26	0.22	13.77	14.84	0.58	93	1.49
19-32	7.5	-	-	0.106	0.41	0.00	15.98	3.27	0.16	0.50	19.91	20.88	0.63	95	2.38
32-58	7.46	-	-	0.173	0.49	0.00	19.71	4.53	0.23	1.32	25.79	25.76	0.62	100	5.11

Contd…

Series Name: Bisarahalli (BSR) **Pedon:** R-9
Location: $15^0$25'21.0"N, $76^0$11'42.0"E Hatti village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore**.** **Classification:** Fine, mixed, isohyperthermic Typic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-14	Ap	70.11	9.29	20.60	22.31	15.97	11.98	9.83	10.03	20	scl	13.22	7.81
14-57	Bt1	47.27	7.52	45.20	27.04	8.28	4.61	2.10	5.24	25	sc	16.39	13.31
57-80	Bt2	41.93	8.67	49.40	21.95	6.83	4.76	4.66	3.73	30	c	21.41	15.41
80-99	Bt3	49.02	9.87	41.11	19.90	10.78	6.84	6.42	5.08	40	sc	21.82	14.24

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	6.59	-	-	0.12	0.73	-	4.47	1.77	0.06	0.53	6.82	8.80	0.43	77.55	6.00
14-57	7.02	-	-	0.04	0.48	-	5.85	2.31	0.06	0.20	8.43	14.70	0.33	57.32	1.36
57-80	7.00	-	-	0.05	0.28	-	11.74	2.26	0.08	0.22	14.31	15.60	0.32	91.73	1.44
80-99	6.90	-	-	0.06	0.18	-	13.70	2.16	0.08	0.14	16.08	16.50	0.40	97.44	0.83

Contd…

Series Name: Mornal (MNL), **Pedon:** R-12
Location: $15^0$22'75"N, $76^0$05'16.1" Halageri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic 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
0-17	Ap	81.48	5.14	13.39	14.07	12.15	17.00	27.53	10.73	70	sl	9.64	4.93
17-31	Bt1	51.43	10.24	38.33	6.67	7.72	9.52	19.26	8.25	30	sc	23.97	11.70
31-56	Bt2	45.62	8.77	45.62	17.85	7.31	8.14	8.87	3.44	30	sc	25.94	12.45
56-104	Bt3	53.10	10.62	36.28	21.87	10.30	8.10	7.99	4.84	<30	sc	20.95	10.16
104-126	Bc	54.21	12.88	32.91	12.28	8.84	15.92	10.20	6.97	<30	scl	19.96	10.21

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	7.89	-	-	0.137	0.33	0.00	4.92	3.35	0.35	0.45	9.07	9.01	0.67	100	5.04
17-31	8.19	-	-	0.31	0.45	0.00	7.24	5.16	0.16	0.15	12.70	13.57	0.35	94	1.12
31-56	8.2	-	-	0.414	0.53	0.00	6.49	5.32	0.11	0.13	12.05	18.55	0.41	65	0.71
56-104	8.64	-	-	0.422	0.37	0.00	6.21	4.64	0.16	0.14	11.15	15.16	0.42	74	0.95
104-126	8.71	-	-	0.436	0.2	0.00	7.06	6.31	0.09	0.33	13.79	14.52	0.44	95	2.31

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: Giddadapalya (GDP), **Pedon:** R-8
Location: $15^0$25'26"N, $76^0$10'59"E, Kalakeri village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. Classification: Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-16	Ap	74.95	9.24	15.81	18.43	18.94	13.85	14.97	8.76	-	sl	11.88	5.09
16-43	Bt1	41.69	13.89	44.42	9.84	10.90	7.41	7.62	5.93	-	c	23.13	14.53
43-61	Bt2	47.67	6.13	46.19	21.14	10.15	5.29	6.45	4.65	-	sc	21.60	11.87
61-83	Bt3	52.52	7.10	40.38	24.42	10.59	5.66	7.55	4.30	40	sc	19.51	11.35
83-119	Bt4	43.76	11.59	44.65	20.15	7.56	5.77	5.46	4.83	60	c	20.80	12.06
119-139	Bt5	54.93	9.84	35.23	29.70	10.49	5.50	5.92	3.32	50	sc	15.24	11.97

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	7.88	-	-	0.103	0.79	-	5.98	1.35	0.05	0.22	7.60	7.8	0.49	97	2.87
16-43	7.81	-	-	0.117	0.66	-	13.99	1.97	0.08	0.46	16.50	16.9	0.38	98	2.74
43-61	7.74	-	-	0.132	0.51	-	12.70	2.18	0.08	0.69	15.64	15.9	0.34	98	4.36
61-83	7.72	-	-	0.142	0.39	-	11.46	2.22	0.08	0.66	14.41	14.6	0.36	99	4.53
83-119	7.58	-	-	0.115	0.22	-	11.30	2.70	0.09	0.73	14.82	15.3	0.34	97	4.79
119-139	7.50	-	-	0.113	0.22	-	10.03	2.19	0.07	0.65	12.95	13.2	0.37	98	4.89

Contd…

Series Name: Narsapura (NSP), **Pedon:** A2/RM-2
Location: $15^0$19'86.9"N, $75^0$57'86.1"E, Kavalura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic Vertic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-29	Ap	31.32	16.52	52.16	5.51	5.40	5.51	9.83	5.08	10	c	38.86	27.64
29-52	Bw1	13.30	22.08	64.62	2.52	2.41	2.41	3.67	2.29	05	c	49.88	40.05
52-77	BW2	13.22	17.39	69.40	3.56	2.41	1.95	2.76	2.53	05	c	51.33	41.55

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-29	9.16	-	-	0.615	0.23	9.36	-	-	0.72	10.98	-	51.09	0.98	-	8.60
29-52	8.69	-	-	2.01	0.5	8.64	-	-	0.55	24.42	-	60.63	0.94	-	16.11
52-77	8.52	-	-	2.68	0.46	7.68	-	-	0.50	25.65	-	60.74	0.88	-	16.90

Contd…

Series Name: Kavalura (KVR), **Pedon:** A2/RM-9
Location: $15^0$18'86.8"N, $75^0$56'56.3"E, Kavalura village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, smectitic, (calc) isohyperthermic Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-24	Ap	36.18	17.80	46.02	7.04	7.47	6.62	9.28	5.76	10	c	28.20	18.75
24-50	Bss1	38.79	15.36	45.85	6.25	6.25	9.70	10.67	5.93	05	c	27.16	18.81
50-85	Bss2	36.80	14.66	48.54	9.63	8.23	7.03	7.58	4.33	<5	c	30.16	22.17
85-124	Bss3	22.66	17.24	60.09	4.18	3.85	5.28	5.06	4.29	<5	c	40.34	31.42

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}							%	%
0-24	8.4	-	-	0.265	0.2	8.04	-	-	0.97	0.65		43.25	0.94		0.60
24-50	9.27	-	-	0.23	0.37	8.04	-	-	0.31	3.21		41.66	0.91		3.08
50-85	9.44	-	-	0.297	0.41	8.64	-	-	0.35	6.43		43.99	0.91		5.85
85-124	9.37	-	-	0.46	0.41	11.40	-	-	0.42	7.99		51.09	0.85		6.26

Contd…

Series Name: Kadagathur (KDT**)** **Pedon :** R-7
Location: $15^0$26'48"N, $76^0$09'51" E Budashettynala village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, mixed, isohyperthermic Fluventic Haplustepts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-12	Ap	75.90	8.77	15.33	17.33	18.36	14.36	15.90	9.95	-	sl	10.66	5.33
12-37	A2	62.54	11.35	26.11	8.46	20.54	13.31	12.07	8.15	-	scl	15.61	8.22
37-71	Bw1	52.73	10.51	36.77	6.08	18.24	12.47	9.01	6.92	-	sc	19.66	11.21
71-93	Bw2	33.26	22.65	44.09	3.13	12.53	7.78	5.18	4.64	-	c	30.08	17.34
93-118	Bw3	31.01	24.57	44.42	2.04	10.41	8.26	6.01	4.29	-	c	34.92	18.16
118-170	Bw4	38.31	18.73	42.96	2.99	14.62	10.35	6.30	4.06	-	c	46.06	19.59

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	6.95	-	-	0.17	1.28	0.39	9.17	2.76	0.10	0.08	12.11	12.10	0.79	100.09	0.65
12-37	7.55	-	-	0.17	0.40	0.40	8.36	4.51	0.08	0.40	13.35	13.30	0.51	100.37	3.02
37-71	7.60	-	-	0.21	0.44	0.39	10.67	8.19	0.10	0.74	19.70	19.10	0.52	103.12	3.88
71-93	8.26	-	-	0.28	0.72	1.56	14.97	12.13	0.12	3.07	30.29	29.40	0.67	103.01	10.45
93-118	8.44	-	-	0.58	0.68	1.17	13.32	10.77	0.13	4.76	28.98	28.50	0.64	101.68	12.40
118-170	9.06	-	-	0.64	0.44	1.17	8.92	8.14	0.23	12.32	29.61	28.60	0.67	103.53	37.27

Contd…

Series Name: Alawandi (AWD) **Pedon:** R-16
Location: : $15^0$13'08.2"N, $76^0$15'27.3" E Neeralagi village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Fine, smectitic, (calc) isohyperthermic Typic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	20.88	25.75	53.37	3.31	4.31	4.31	5.19	3.76	-	c	33.11	25.58
17-39	Bss1	25.99	19.79	54.22	5.04	5.48	5.04	5.92	4.50	-	c	33.11	26.23
39-70	Bss2	26.76	17.80	55.44	2.93	5.31	5.53	7.37	5.63	-	c	36.15	28.67
70-111	Bss3	23.83	20.25	55.93	4.15	4.81	4.92	6.01	3.93	-	c	43.60	33.71
111-139	Bss4	21.21	20.40	58.40	2.79	4.80	4.91	5.25	3.46	-	c	46.92	36.28
139-162	Bss5	13.15	20.96	65.90	1.69	2.47	2.36	3.37	3.26	-	c	54.96	41.81

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	8.10	-	-	0.37	0.52	9.48	-	-	0.40	1.56	-	51.30	0.96	100.00	1.22
17-39	8.60	-	-	0.24	0.52	9.60	-	-	0.14	4.60	-	52.60	0.97	100.00	3.50
39-70	8.89	-	-	0.27	0.52	9.48	-	-	0.16	2.41	-	53.90	0.97	100.00	1.78
70-111	9.10	-	-	0.35	0.54	11.28	-	-	0.15	8.95	-	54.10	0.97	100.00	6.61
111-139	9.15	-	-	0.41	0.58	10.80	-	-	0.15	7.36	-	56.10	0.96	100.00	5.24
139-162	9.16	-	-	0.50	0.50	15.48	-	-	0.19	10.19	-	61.66	0.94	100.00	6.61

Contd…

Series Name: Bardur (BDR), **Pedon:** R-4

Location: $15^0$14'31.7"N, $76^0$01'19.1"E, Moranali village, Koppal Taluk and District

Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, (calc) isohyperthermic Typic Haplusterts.

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-25	Ap	21.78	22.78	55.44	2.17	3.68	4.44	6.61	4.88	-	c	36.78	26.95
25-53	BA	18.62	18.56	62.82	2.23	4.24	3.46	5.24	3.46	-	c	41.25	29.87
53-90	Bss1	15.87	18.60	65.53	2.23	1.34	4.25	3.91	4.13	-	c	44.73	33.64
90-126	Bss2	13.66	20.02	66.32	1.68	2.80	2.35	3.70	3.14	-	c	49.24	38.37
126-152	Bss3	11.64	20.79	67.57	1.69	1.81	1.81	3.50	2.82	-	c	53.50	41.90
152-210	Bss4	11.38	22.78	65.42	2.16	2.16	1.93	3.07	2.05	-	c	51.53	39.64

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	8.73	-	22.78	0.203	0.24	5.76	-	-	0.65	4.43	-	40.56	0.73	-	4.37
25-53	9.17	-	18.56	0.295	0.45	4.92	-	-	0.32	10.47	-	74.70	1.19	-	5.61
53-90	9.27	-	18.60	0.388	0.66	6.00	-	-	0.24	10.49	-	76.20	1.16	-	5.51
90-126	9.22	-	20.02	0.608	0.57	5.88	-	-	0.21	15.93	-	77.20	1.16	-	8.25
126-152	9.21	-	20.79	0.936	0.33	6.60	-	-	0.37	20.88	-	80.90	1.20	-	10.32
152-210	9.03	-	23.21	1.47	0.33	8.16	-	-	0.24	15.34	-	73.10	1.12	-	8.39

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

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

The 24 soil map units identified in the Nirligi-1 Microwatershed are grouped under three land capability classes and seven land capability subclasses (Fig. 5.1).

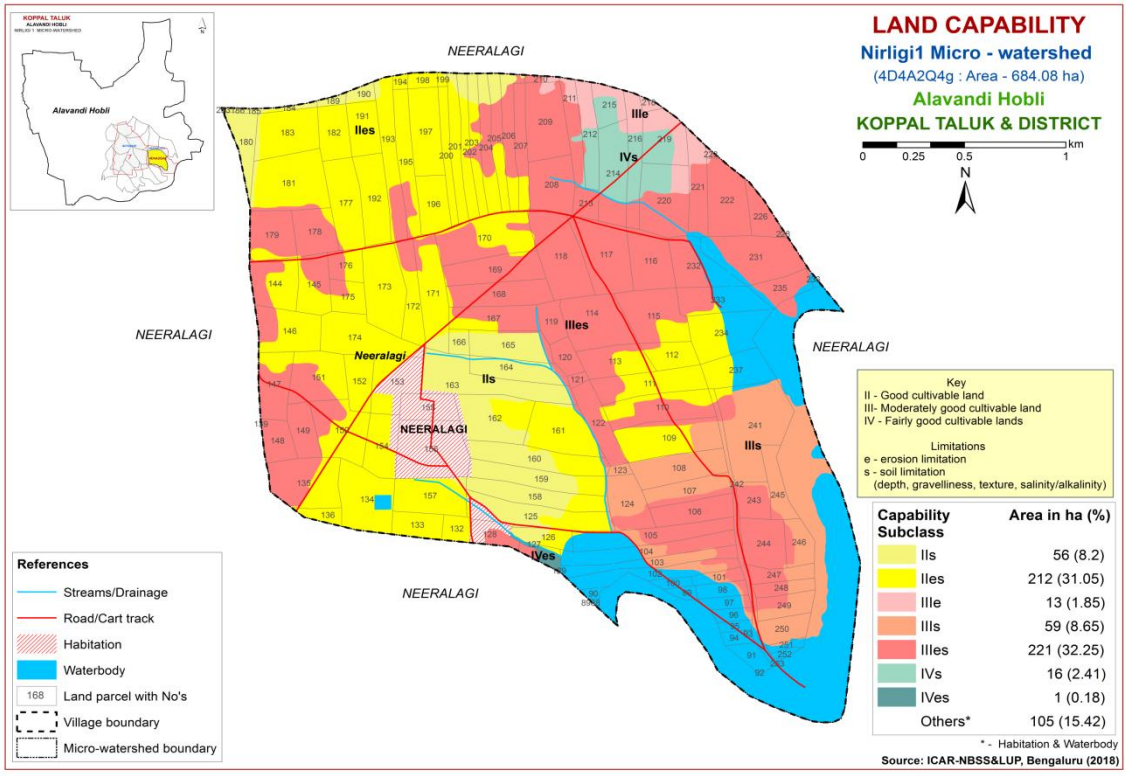


Fig. 5.1 Land Capability map of Nirligi-1 Microwatershed

Entire cultivated area of the microwatershed is suitable for agriculture. An area of 268 ha (39%) are good lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the western and central part of the microwatershed. Moderately good lands (Class III) cover a maximum area of 293 ha (43%) and are distributed in the major part of the microwatershed with moderate problems of soil that require special conservation practices. Fairly good lands occur in an area of 17 ha (3%) and are distributed in the northern and southern part of the microwatershed that have very severe limitations that reduce the choice of crops or that require very careful management. The other miscellaneous areas (habitations and water bodies) cover about 15 per cent.

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).

An area of 18 ha (3%) is very shallow (<25 cm) and are distributed in the northern and southern part of the microwatershed. Moderately shallow (50-75 cm) soils occur in an area of 68 ha (10%) and are distributed in the western, central and northern part of the microwatershed. An area of about 30 ha (4%) is moderately deep (75-100 cm) and are distributed in the southern part of the microwatershed. Maximum area of 462 ha (68%) is deep (100-150 cm) and very deep (>150 cm) and are distributed in the major part of the microwatershed.

The most problem lands with an area of about 18 ha (3%) having very shallow (<25 cm) rooting depth. They are suitable for growing short duration agricultural crops but well suited for pasture, forestry or other recreational purposes. The most productive lands cover a maximum area about 462 ha (68%) where all climatically adapted long duration crops be grown.

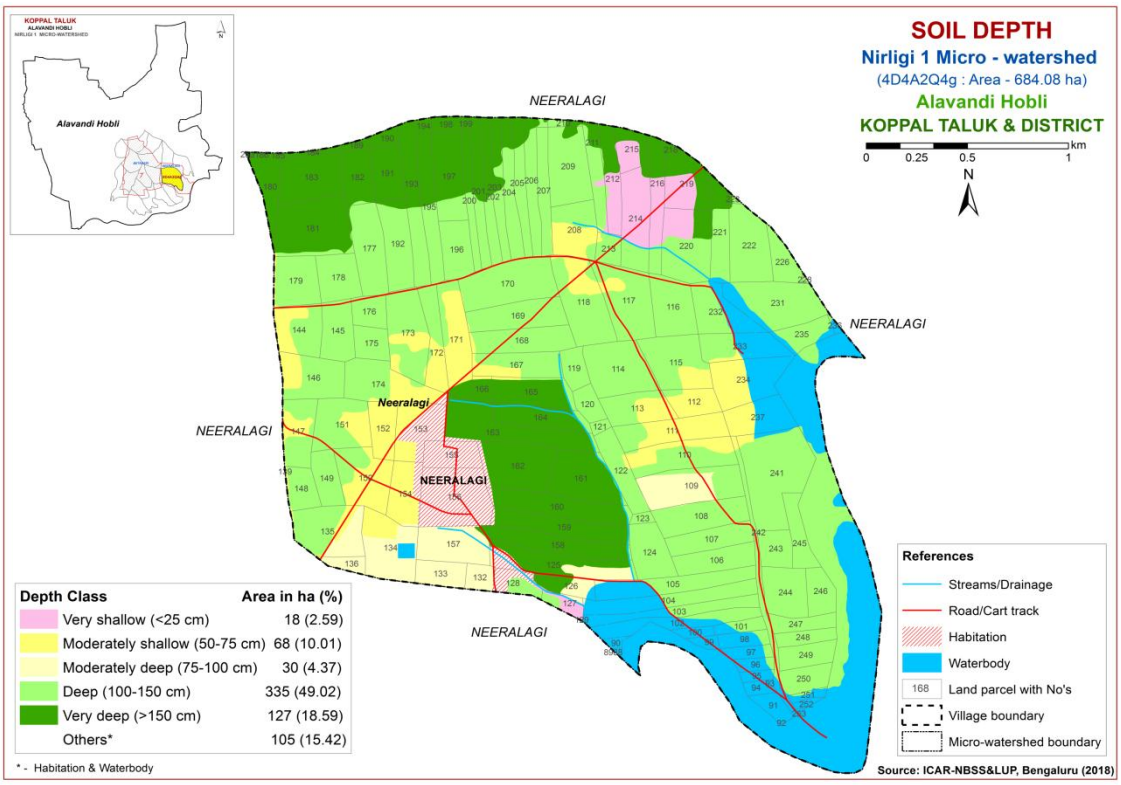


Fig. 5.2 Soil Depth map of Nirligi-1 Microwatershed

5.3 Surface Soil Texture

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

An area of 82 ha (12%) has loamy soils at the surface and are distributed in the western, central, southern and northern part of the microwatershed. Maximum area of 496 ha (73%) has clayey soils at the surface and are distributed in all parts of the microwatershed (Fig. 5.3).

The most productive lands 496 ha (73%) with respect to surface soil texture are the clayey soils that have high potential for soil-water retention and availability, and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other most productive lands 82 ha (12%) are loamy soils which also have high potential for AWC, nutrient availability but have no drainage or other physical problems compared to loamy soils.

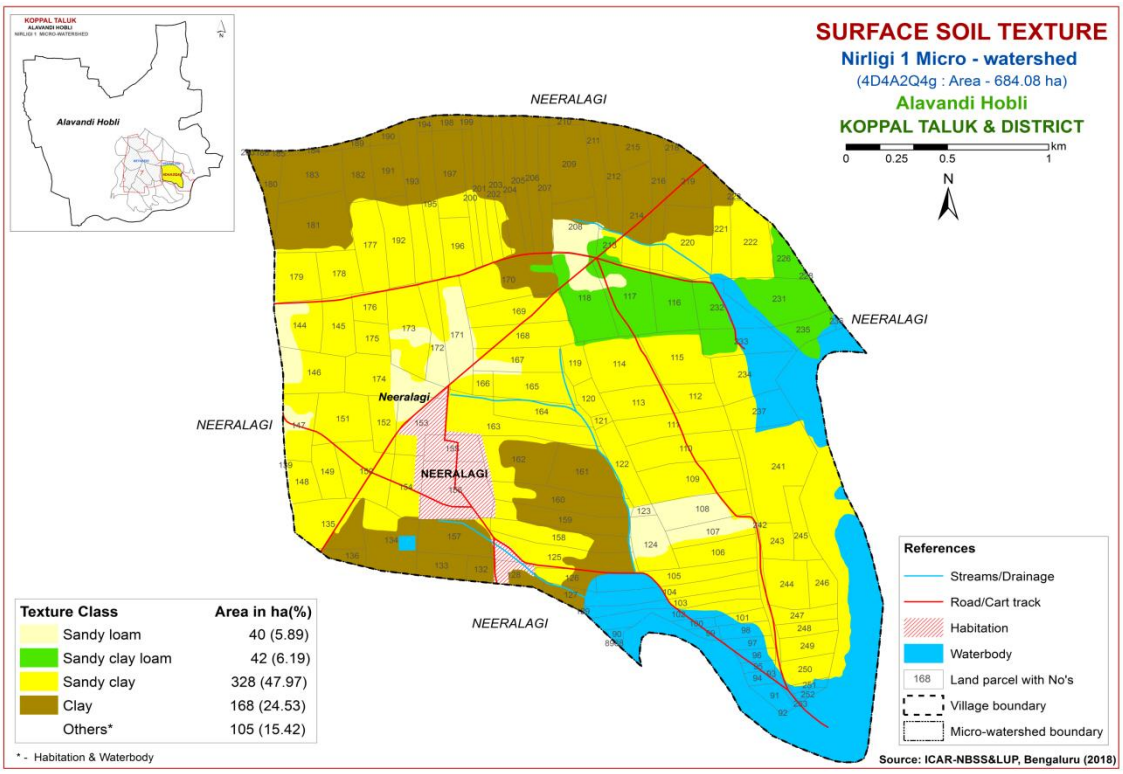


Fig. 5.3 Surface Soil Texture map of Nirligi-1 Microwatershed

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 spatial distribution in the microwatershed is given in figure 5.4.

The soils that are non-gravelly (<15% gravel) cover a maximum area of 344 ha (50%) and are distributed in the major part of the microwatershed. An area of 206 ha (30%) is covered by gravelly (15-35% gravel) soils and are distributed in the northern, central and southern part of the microwatershed. An area of 29 ha (4%) is very gravelly (35-60%) and are distributed in the northern and western part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 50%. 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 gravelly (15-35%) to very gravelly (35-60%) cover 235 ha (34%) where only short or medium duration crops can be grown.

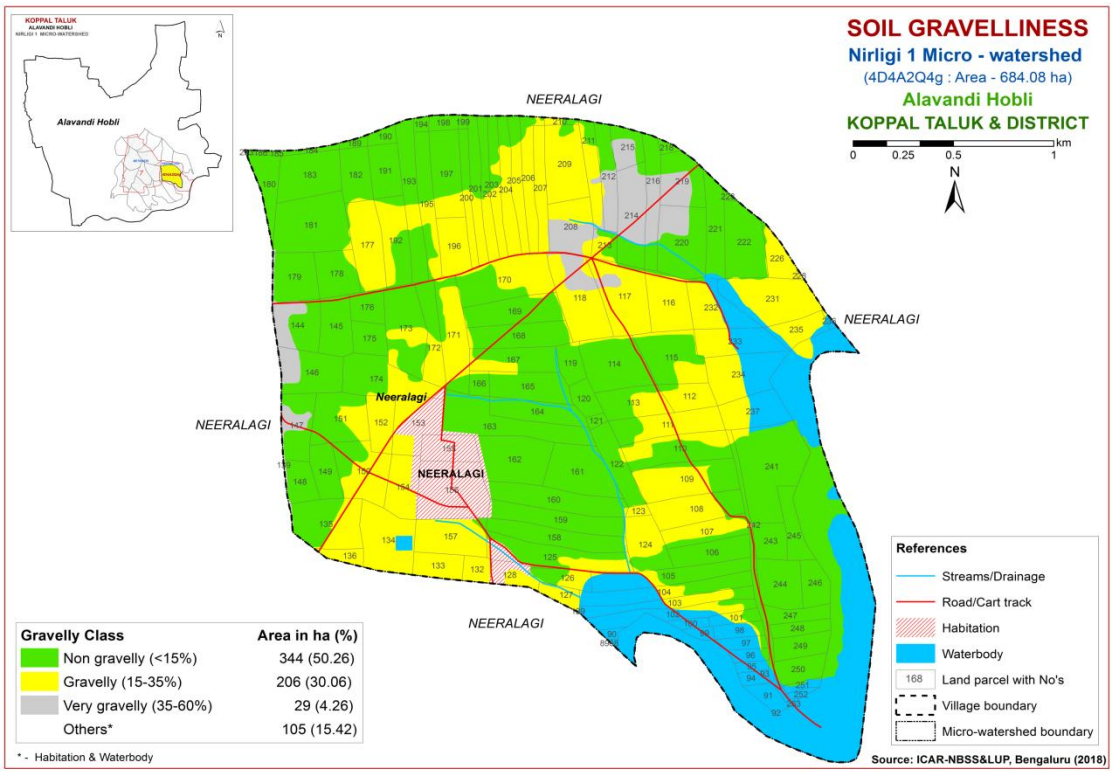


Fig. 5.4 Soil Gravelliness map of Nirligi-1 Microwatershed

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 (Fig. 5.5), showing the area extent and their spatial distribution in the microwatershed.

An area of about 86 ha (13%) are very low (<50 mm/m) in available water capacity and are distributed in the western, central and northern part of the microwatershed. Maximum area of about 249 ha (36%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the major part of the microwatershed. Soils with medium (101-150 mm/m) available water capacity occupy an area of 93 ha (14%) and are distributed in the western, southern and northern part of the microwatershed. An area of about 151 ha (22%) is very high (>200 mm/m) in available water capacity and are distributed in the northern and southern part of the microwatershed.

An area of about 86 ha (13%) 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. The potential soils with respect to AWC cover about 151 ha (22%) that have high AWC, where all climatically adapted long duration crops can be grown.

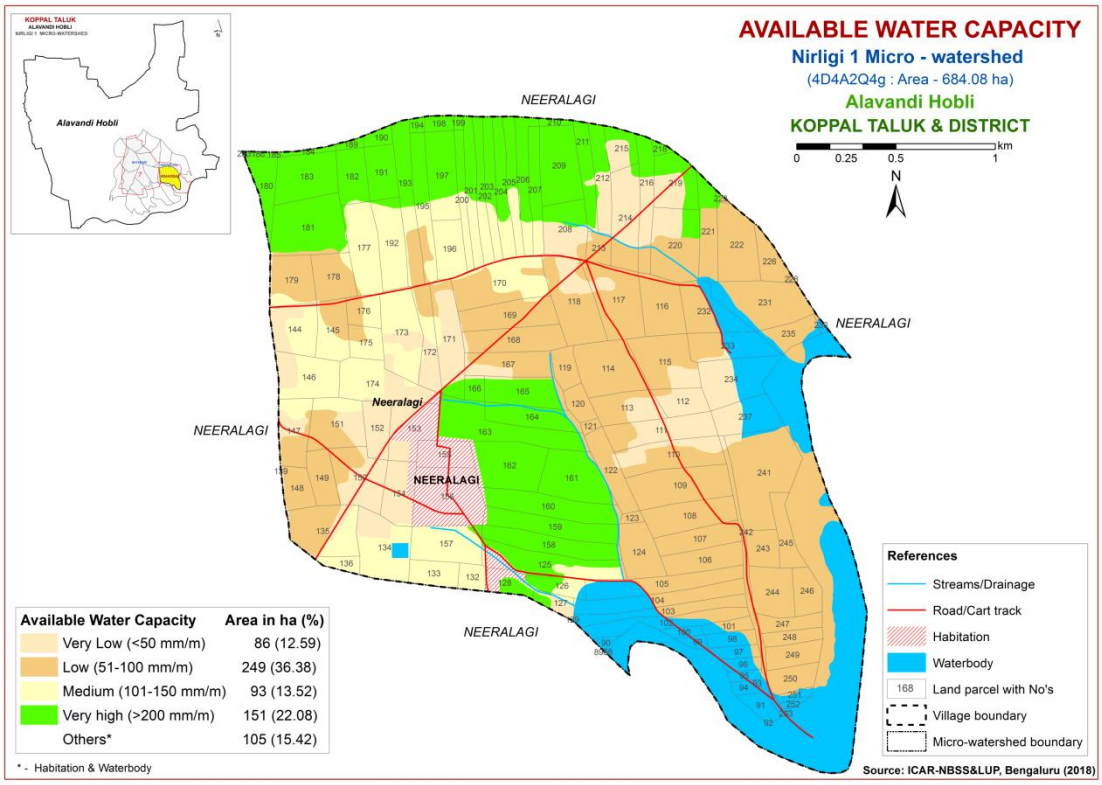


Fig. 5.5 Soil Available Water Capacity map of Nirligi-1 Microwatershed

5.6 Soil Slope

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

An area of 28 ha (4%) falls under nearly sloping (0-1%) and is distributed in the northern and southern part of the microwatershed. Very gently sloping (1-3% slope) lands occur in a maximum area of 550 ha (80%) and are distributed in all parts of the microwatershed. In all these lands, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures.

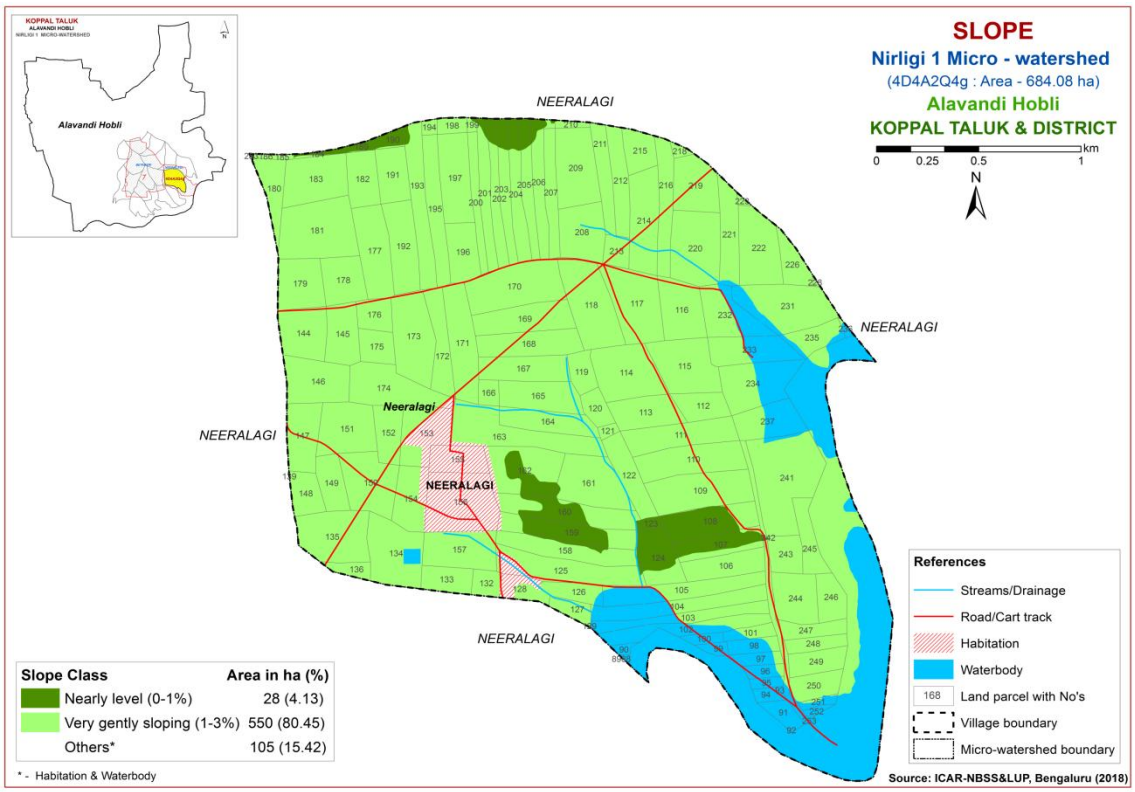


Fig. 5.6 Soil Slope map of Nirligi-1 Microwatershed

5.7 Soil Erosion

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

Soils that are slightly eroded (e1 Class) occupy an area of about 132 ha (19%) and are distributed in the southern, eastern, northern and northwestern part of the microwatershed. Moderately eroded (e2 Class) soils cover an area of 447 ha (65%) and are distributed in the major part of the microwatershed.

An area of about 447 ha (65%) in the microwatershed is problematic because of moderate erosion. These areas need soil and water conservation and other land development measures for restoring the soil health.

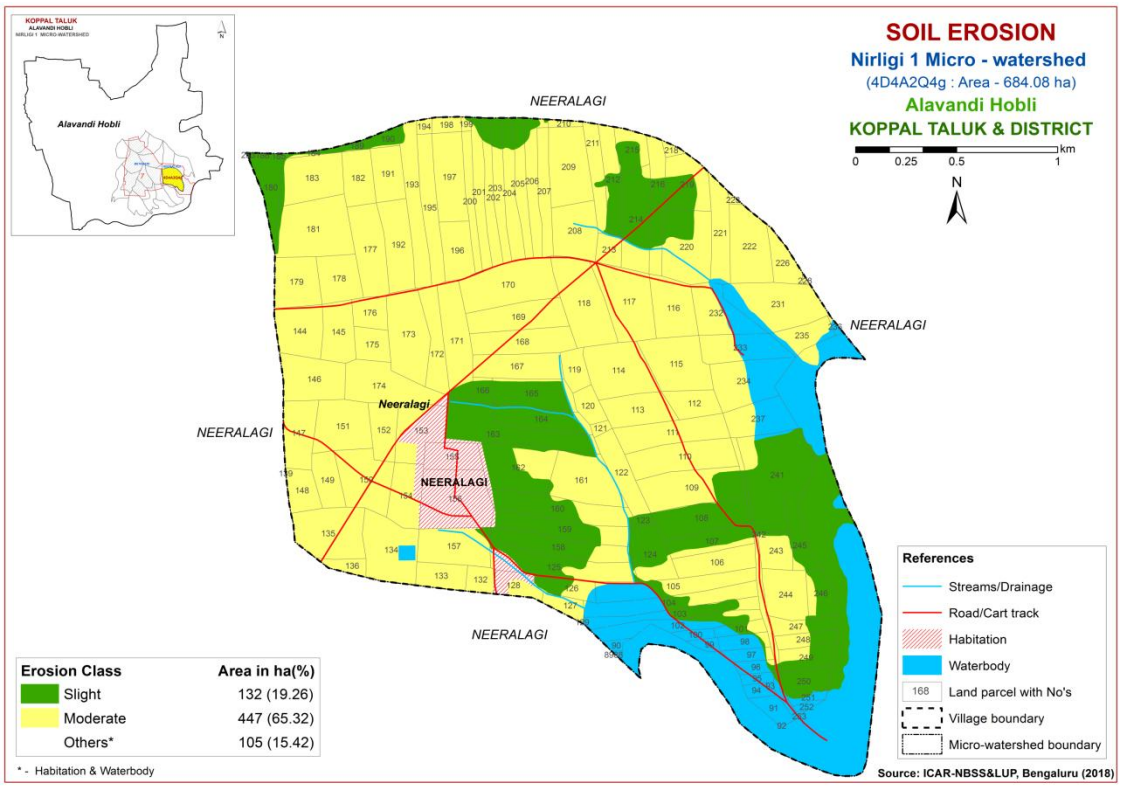


Fig. 5.7 Soil Erosion map of Nirligi-1 Microwatershed

Chapter 6

FERTILITY STATUS

Soil fertility plays an important role in increasing crop yield. The adoption of high yielding varieties that require high amounts of nutrients has resulted in deficiency symptoms in crops and plants due to imbalanced fertilization and poor inherent fertility status, as these areas are characterised by low rainfall and high temperatures. Hence, it is necessary to know the fertility (macro and micro nutrients) status of the soils of the watersheds for assessing the kind and amount of fertilizers required for each of the crop intended to be grown. For this purpose, the surface soil samples collected from the grid points (one soil sample at every 320 m grid interval) all over the microwatershed through land resource inventory in the year 2018 were analysed for pH, EC, organic carbon, available phosphorus and potassium and for micronutrients like zinc, boron, copper, iron and manganese, and secondary nutrient sulphur.

Soil fertility data generated has been assessed and individual maps for all the nutrients for the microwatershed have been generated 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 Nirligi-1 Microwatershed for soil reaction (pH) showed that an area of 0.46 ha (<1%) is slightly acid (pH 6.0-6.5) and are distributed in the northwestern part of the microwatershed. An area of 35 ha (5%) is neutral (pH 6.5-7.3) and are distributed in the central and northwestern part of the microwatershed. Slightly alkaline (pH 7.3-7.8) soils occur in a maximum area of 301 ha (44%) and are distributed in the major part of the microwatershed. An area of 189 ha (28%) is moderately alkaline (pH 7.8-8.4) and are distributed in the southern, southwestern and northern part of the microwaterhsed. An area of 53 ha (8%) is strongly alkaline (pH 8.4-9.5) and are distributed in the northern and southern part of the microwatershed. Thus, soils in the microwatershed are acidic covering 0.46 ha, neutral covering 35 ha and alkaline covering 543 ha.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is low (<0.5%) covering an area 14 ha (2%) and is distributed in the northern part of the microwatershed. Maximum area of 297 ha (43%) is medium (0.5-0.75%) and is distributed in the major part of the microwatershed. An area of 268 ha

(39%) is high (>0.75%) and is distributed in the southern and eastern part of the microwatershed (Fig. 6.3).

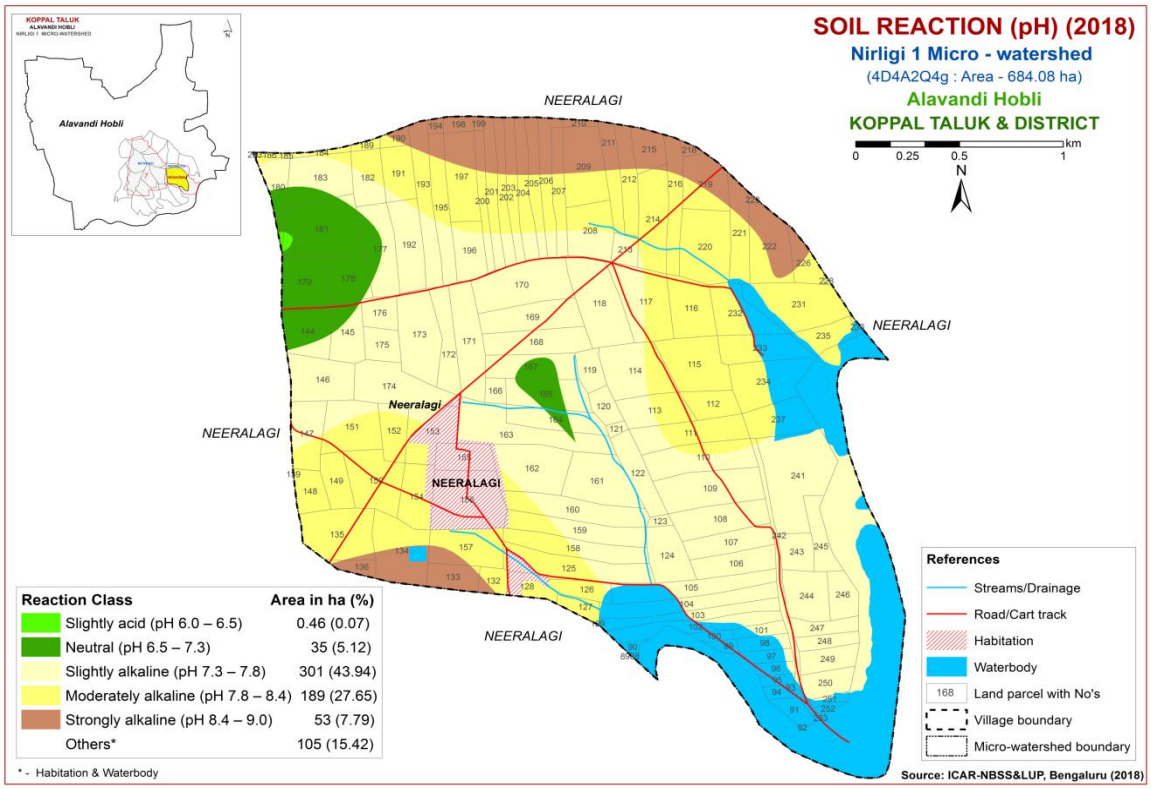


Fig. 6.1 Soil Reaction (pH) map of Nirligi-1 Microwatershed

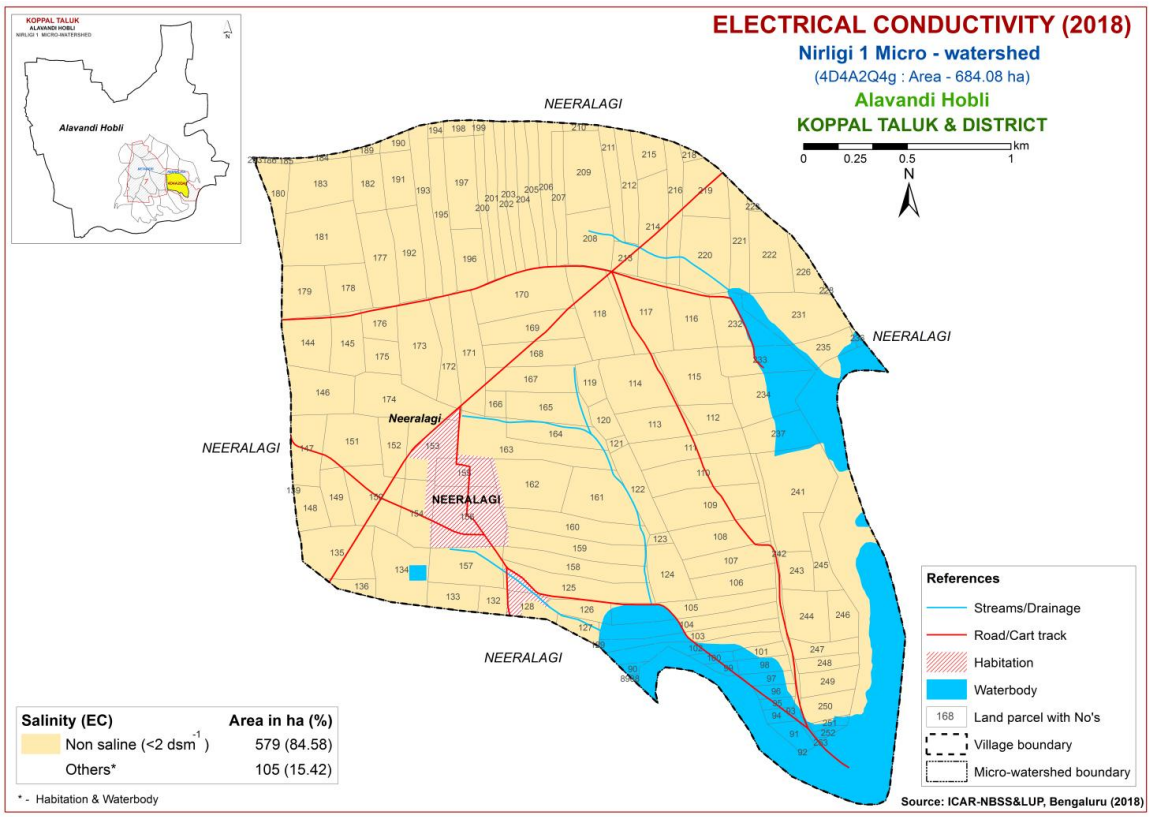


Fig. 6.2 Electrical Conductivity (EC) map of Nirligi-1 Microwatershed

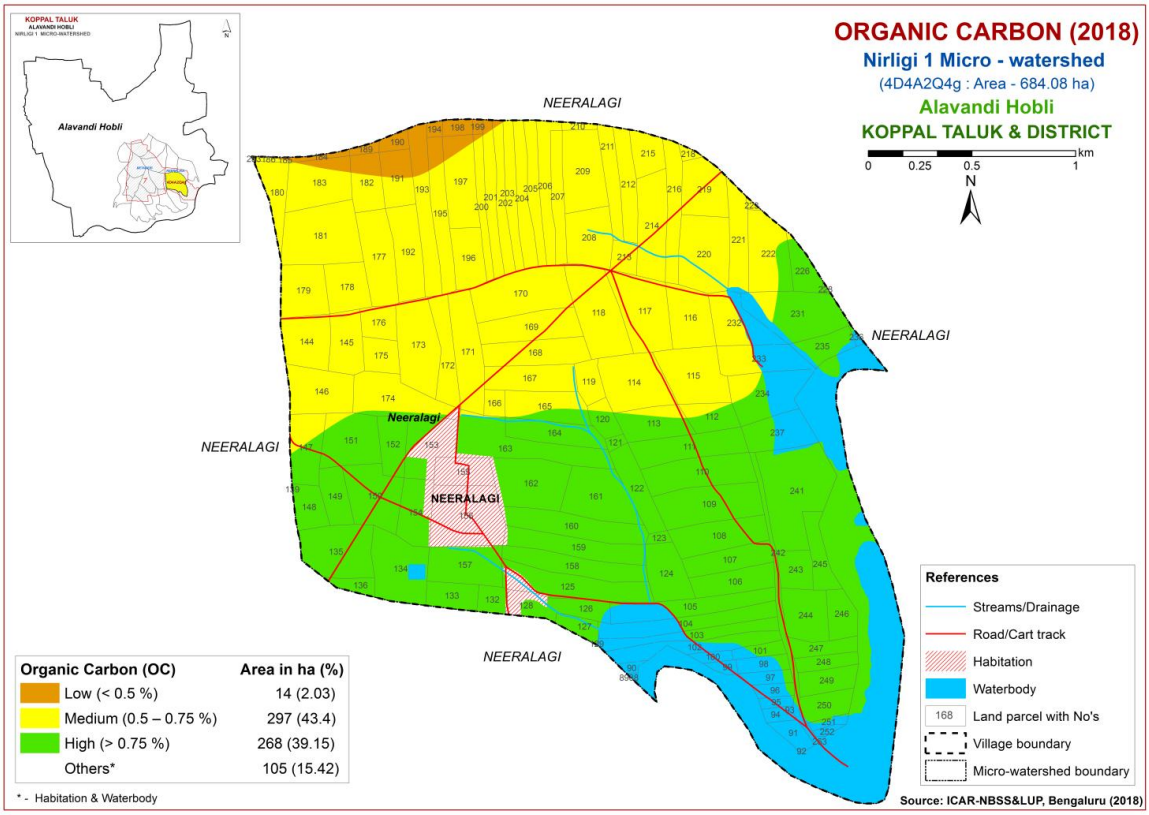


Fig. 6.3 Soil Organic Carbon map of Nirligi-1 Microwatershed

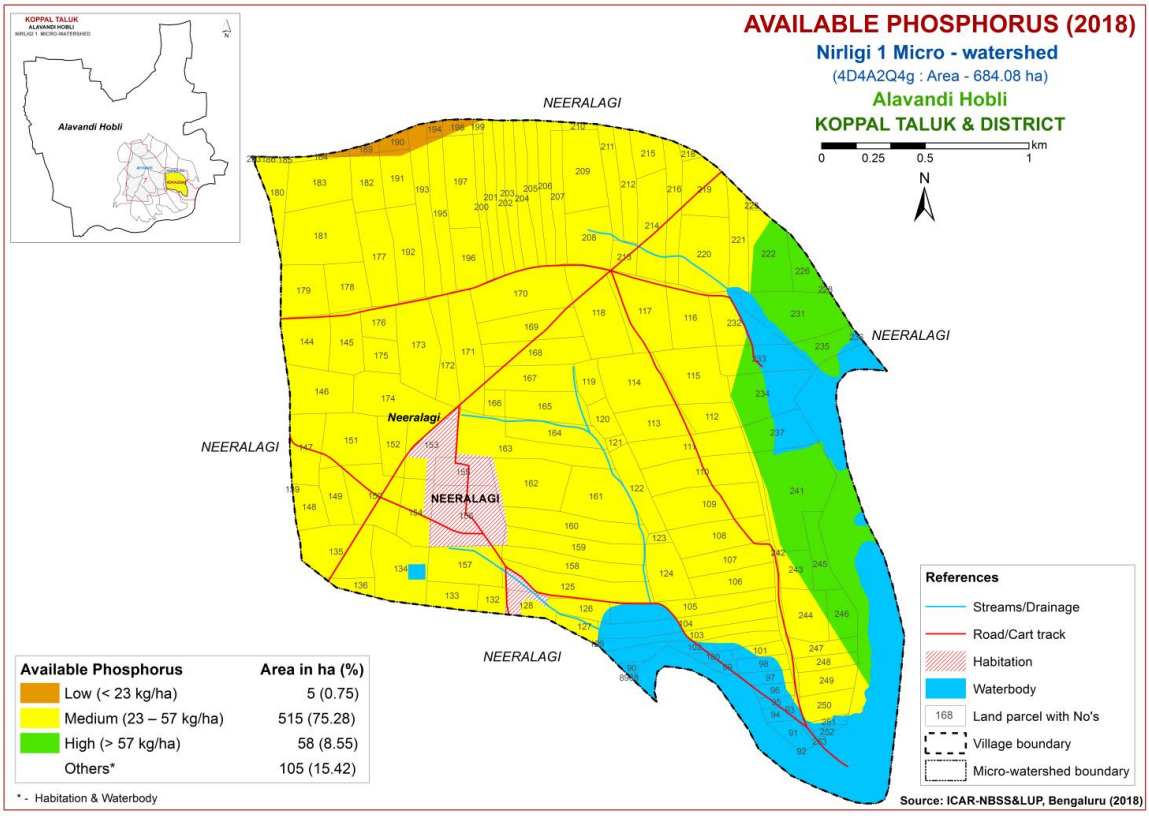


Fig. 6.4 Soil Available Phosphorus map of Nirligi-1 Microwatershed

6.4 Available Phosphorus

Major cultivated area of about 5 ha (1%) is low (<23 kg/ha) and is distributed in the northern part of the microwatershed. Maximum area of 515 ha (75%) is medium (23-57 kg/ha) and is distributed in the all parts of the microwatershed. An area of 58 ha (9%) is high (>57 kg/ha) and is distributed in the eastern part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

Medium (145-337 kg/ha) in available potassium content occupy an area of 176 ha (26%) and is distributed in the central and eastern part of the microwatershed. An area of about 403 ha (59%) is high (>337 kg/ha) and is distributed in the major part of the microwatershed (Fig. 6.5).

6.6 Available Sulphur

Soils that are low in available sulphur (<10 ppm) in a maximum area of 391 ha (57%) and is distributed in all parts of the microwatershed. An area of 185 ha (27%) is medium (10-20 ppm) and is distributed in the southern part of the microwatershed. High (>20 ppm) in available potassium occur in an area of 3 ha (<1%) and are distributed in the southern part of the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is low (<0.5 ppm) in an area of 3 ha (<1%) and is distributed in the eastern part of the microwatershed. Maximum area of about 575 ha (84%) is medium (0.5-1.0 ppm) in available boron and is distributed in the major part of the microwatershed. A minor area of 0.001 ha (<1%) is high (>1.0 ppm) and are distributed in the western part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Maximum area of about 356 ha (52%) is deficient (<4.5 ppm) and is distributed in the major part of the microwatershed. An area of 222 ha (32%) is sufficient (>4.5 ppm) and is distributed in the southern, central and western part of the microwatershed (Fig. 6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

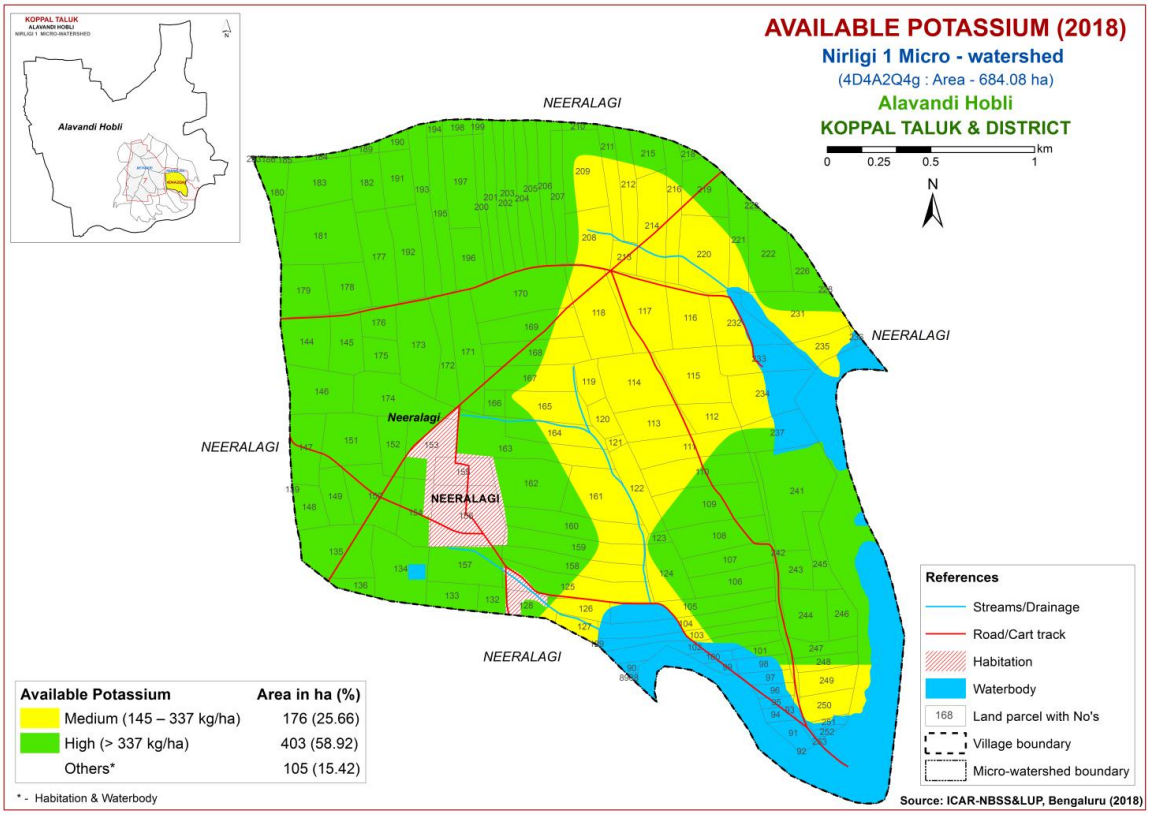


Fig. 6.5 Soil Available Potassium map of Nirligi-1 Microwatershed

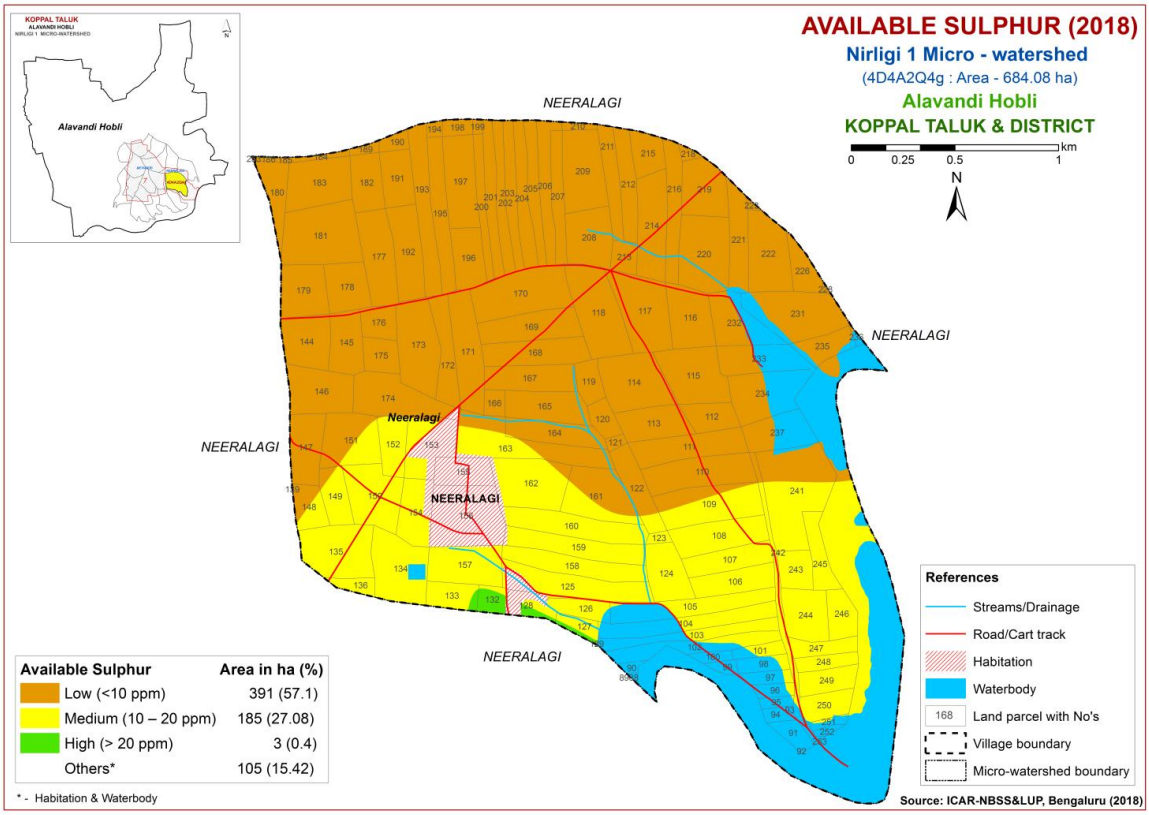


Fig. 6.6 Soil Available Sulphur map of Nirligi-1 Microwatershed

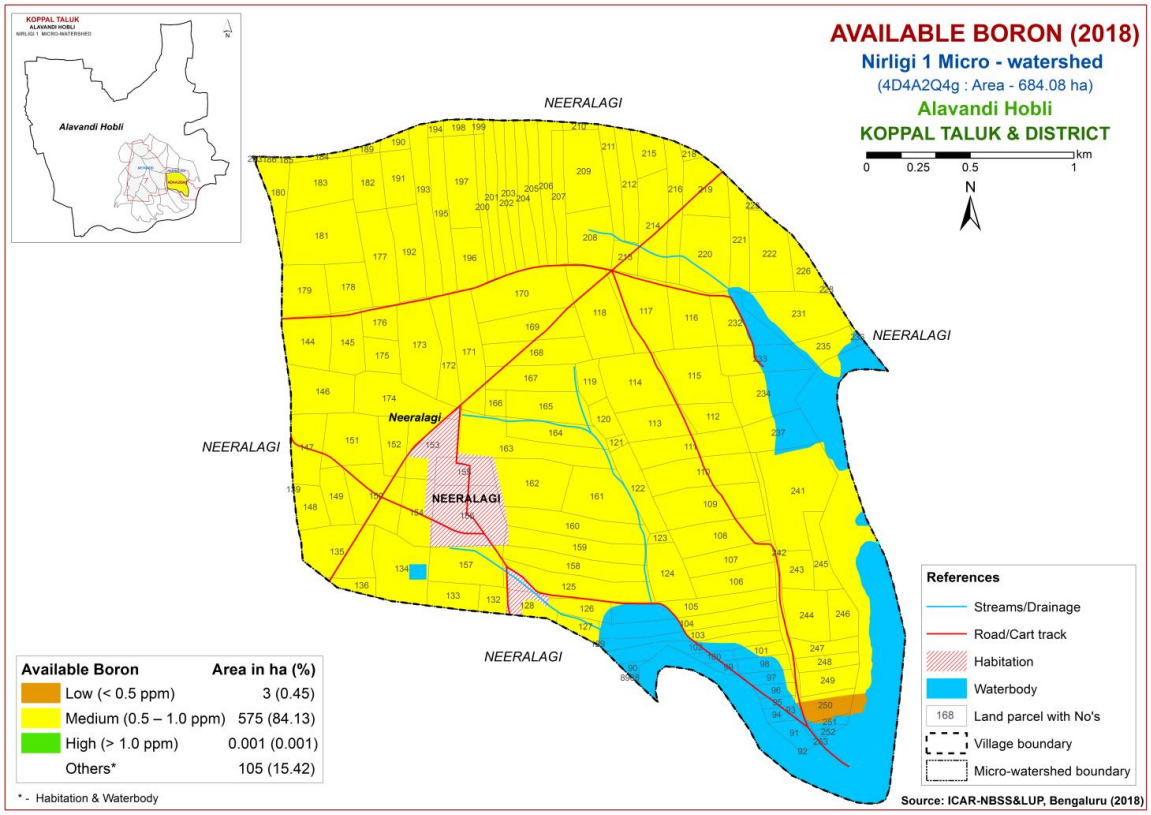


Fig. 6.7 Soil Available Boron map of Nirligi-1 Microwatershed

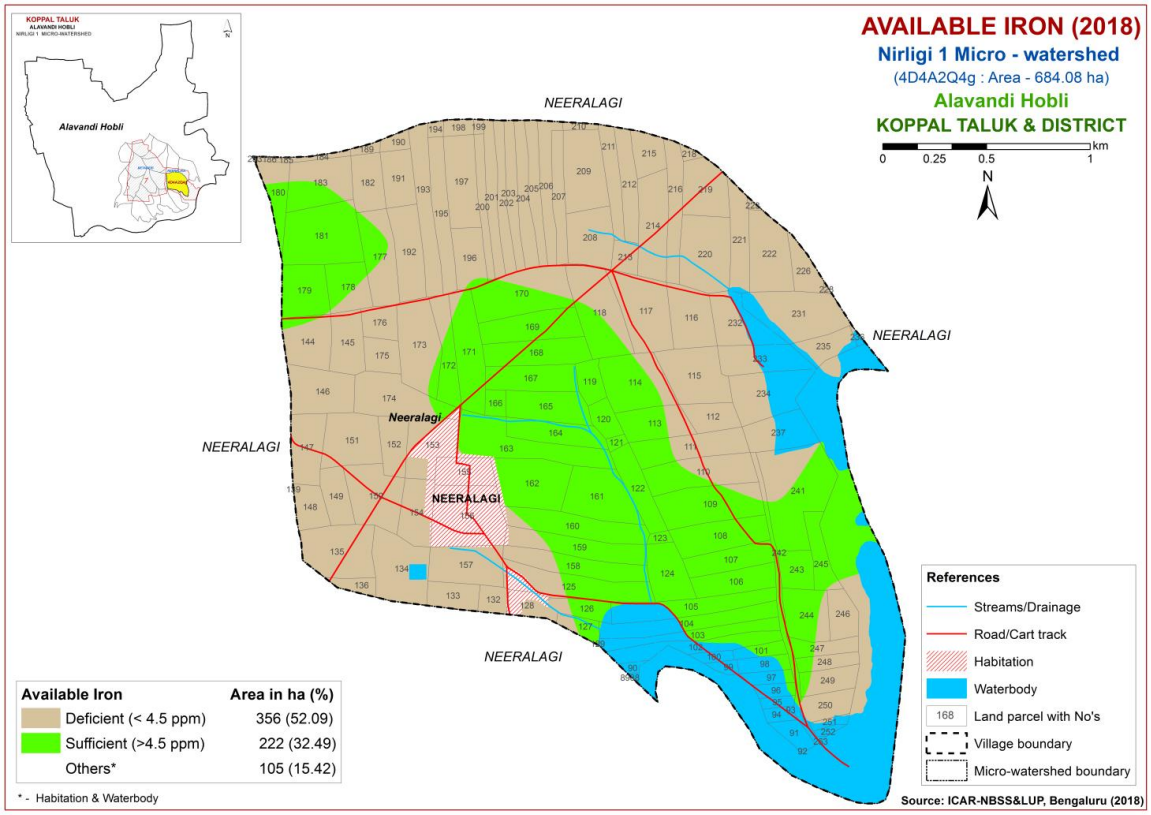


Fig. 6.8 Soil Available Iron map of Nirligi-1 Microwatershed

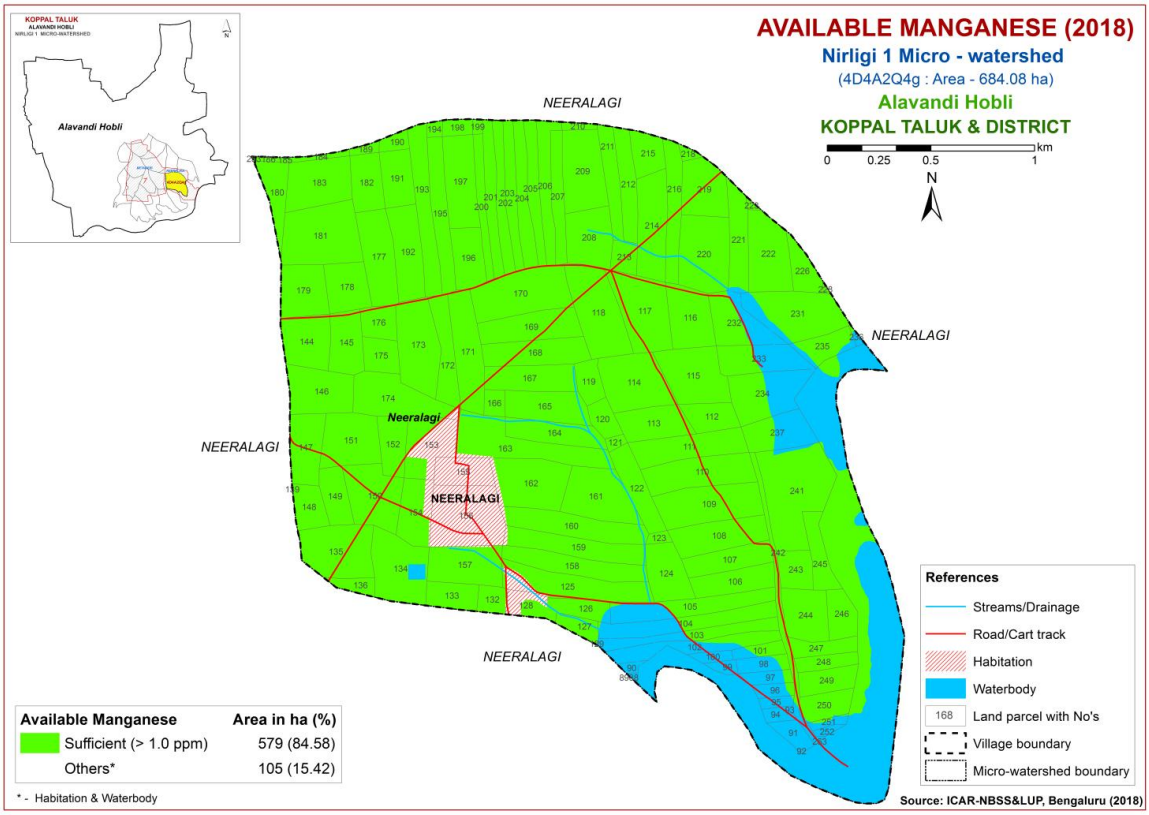


Fig. 6.9 Soil Available Manganese map of Nirligi-1 Microwatershed

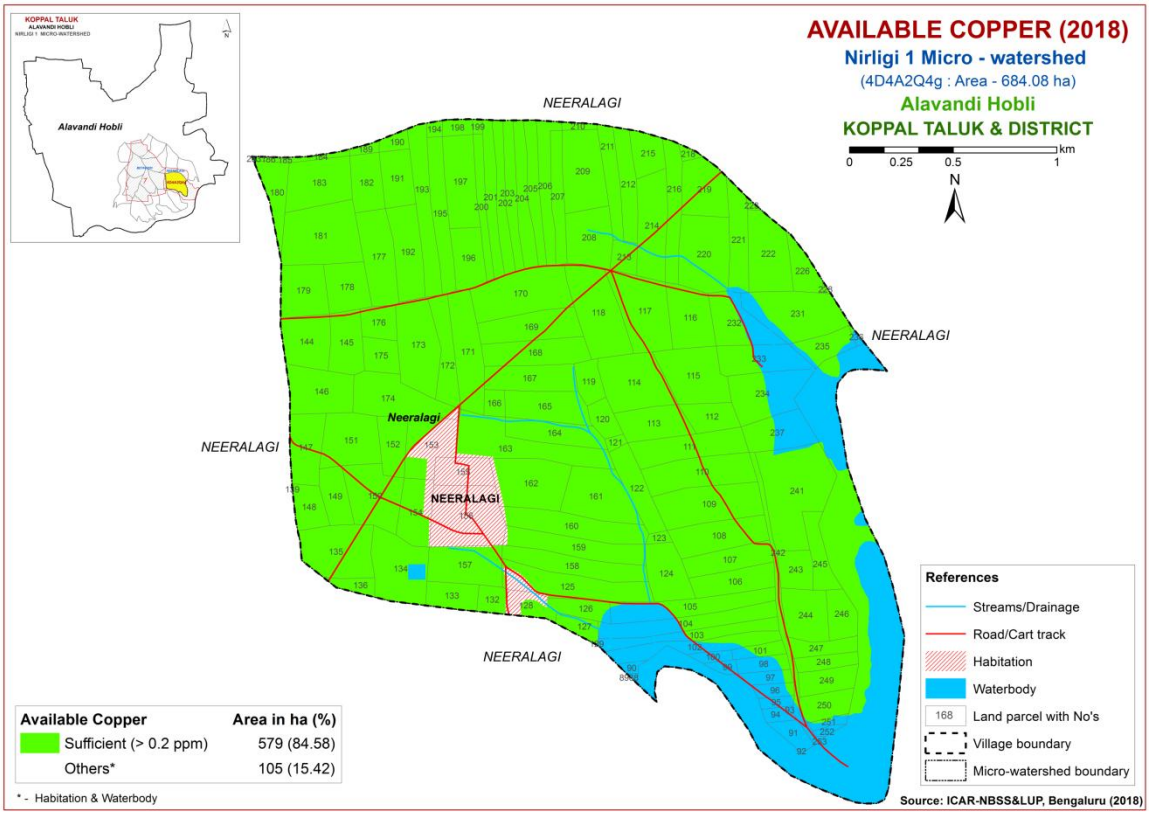


Fig. 6.10 Soil Available Copper map of Nirligi-1 Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in a maximum area of 329 ha (48%) and is distributed in the major part of the microwatershed. An area of 249 ha (36%) is sufficient (>0.6 ppm) and are distributed in the central and eastern part of the microwatershed (Fig. 6.11).

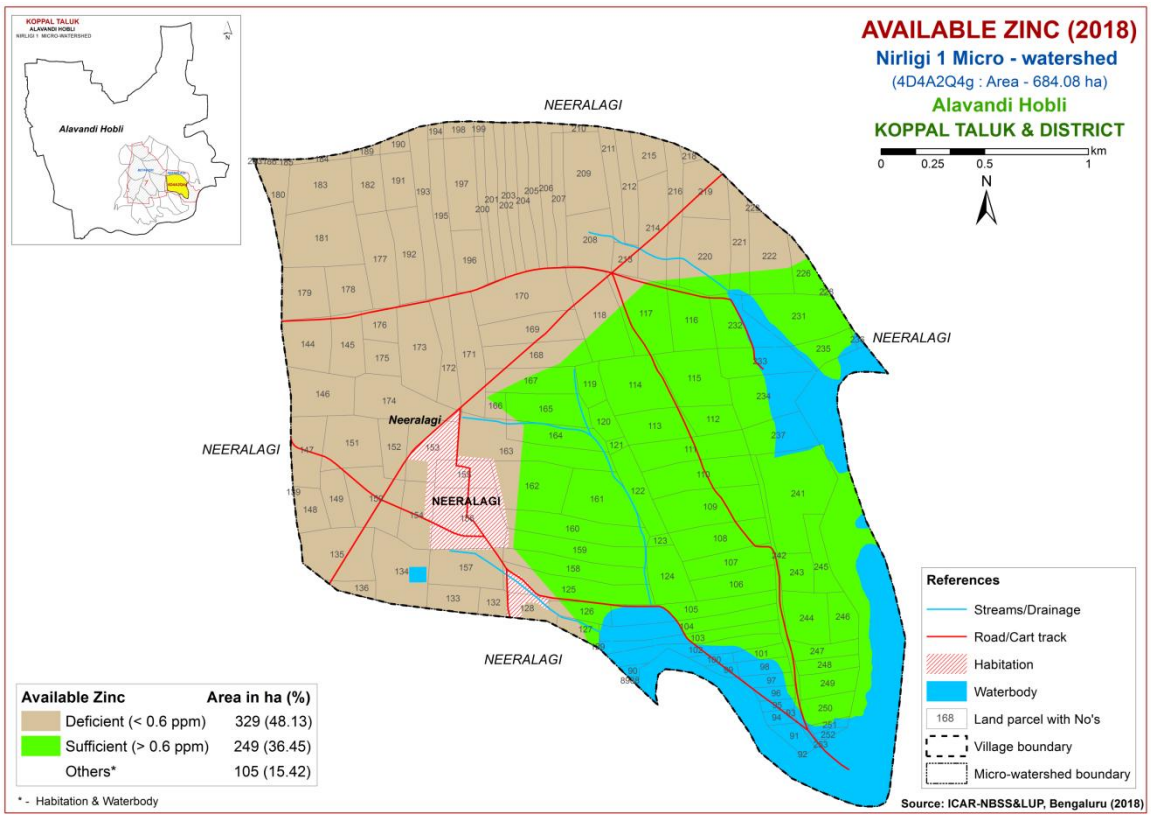


Fig. 6.11 Soil Available Zinc map of Nirligi-1 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Nirligi-1 Microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements (Table 7.2 to 7.33) were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. The criteria 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, N1 and N2 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'z' for calcareousness 's' for sodium and 'w' for drainage. These limitations are indicated as lower case letters to the class symbol. For example, moderately suitable 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.

An area of 193 ha (28%) is highly suitable (Class S1) lands for growing sorghum and are distributed in the northern, western and southern part of the microwatershed. An area of 78 ha (11%) is moderately suitable (Class S2) and are distributed in the northern,

southern and central part of the microwatershed. They have minor limitations of gravelliness and calcareousness. Maximum area of about 290 ha (43%) is marginally suitable (Class S3) for growing sorghum and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

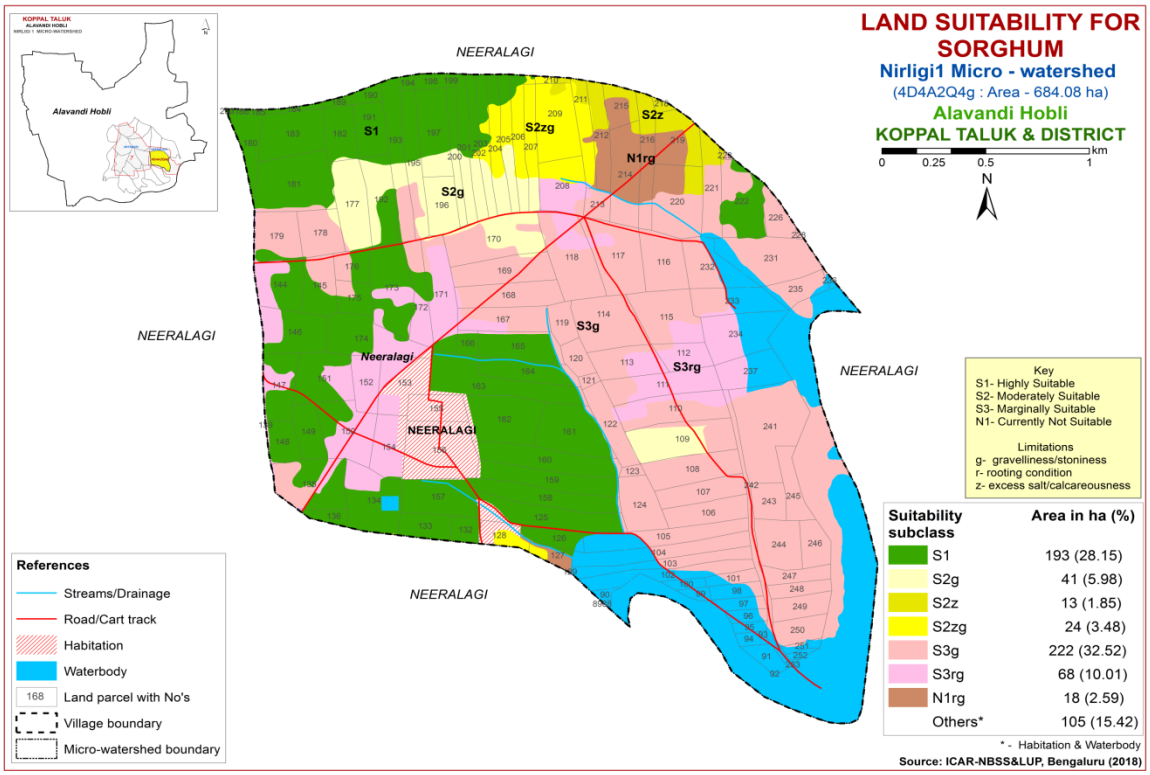


Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

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

An area of 54 ha (8%) is highly suitable (Class S1) for growing maize and are distributed in the northern and western part of the microwatershed. An area of 217 ha (32%) is moderately suitable (Class S2) for growing maize and are distributed in the northern, central and southern part of the microwatershed with minor limitations of calcareousness, gravelliness and texture. Marginally suitable (Class S3) lands cover a maximum area of 290 ha (43%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. Currently not suitable (Class N1) lands occur in an area of 18 ha (3%) and are distributed

in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

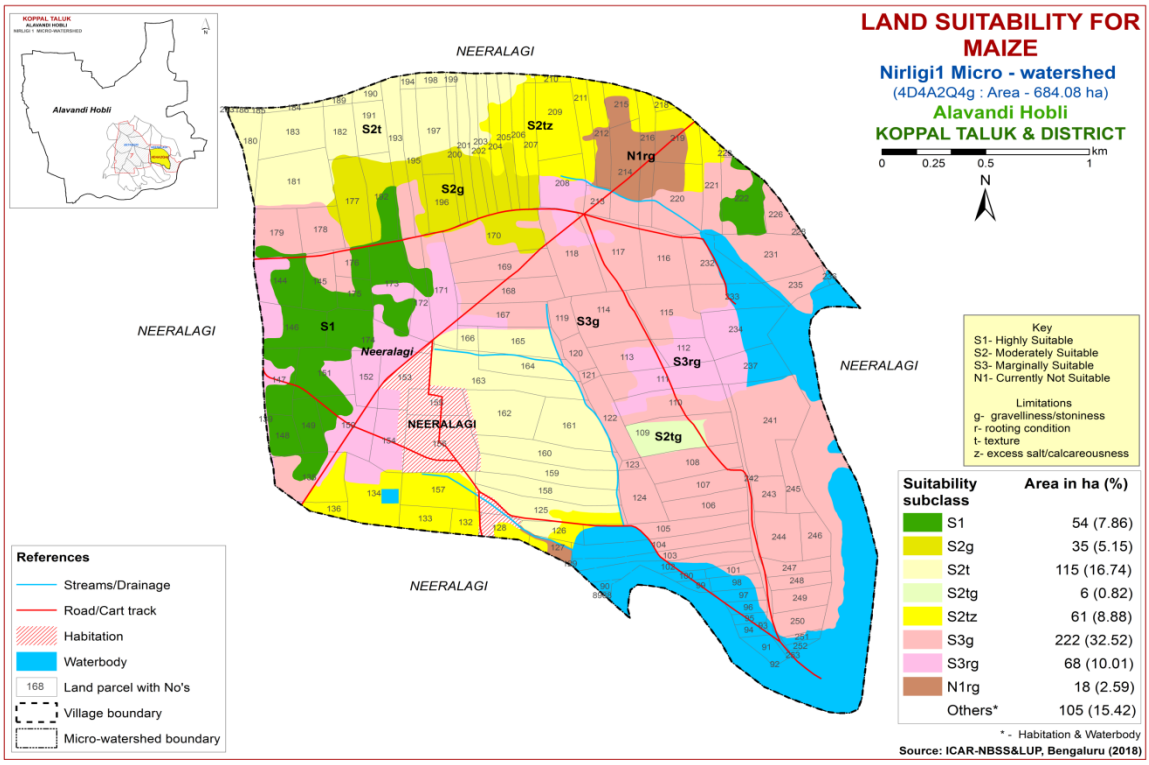


Fig. 7.2 Land Suitability map of Maize

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

An area of 89 ha (13%) is highly suitable (Class S1) for growing bajra and are distributed in the northern, western and central part of the microwatershed. An area of 206 ha (30%) is moderately suitable (Class S2) and are distributed in the northern, northwestern, southern and western part of the microwatershed with minor limitations of gravelliness, rooting condition, texture and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of 265 ha (39%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and texture. An area of 18 ha (3%) is currently not suitable (Class N1) for growing bajra and are distributed in the northern and southern part of the microwatershed.

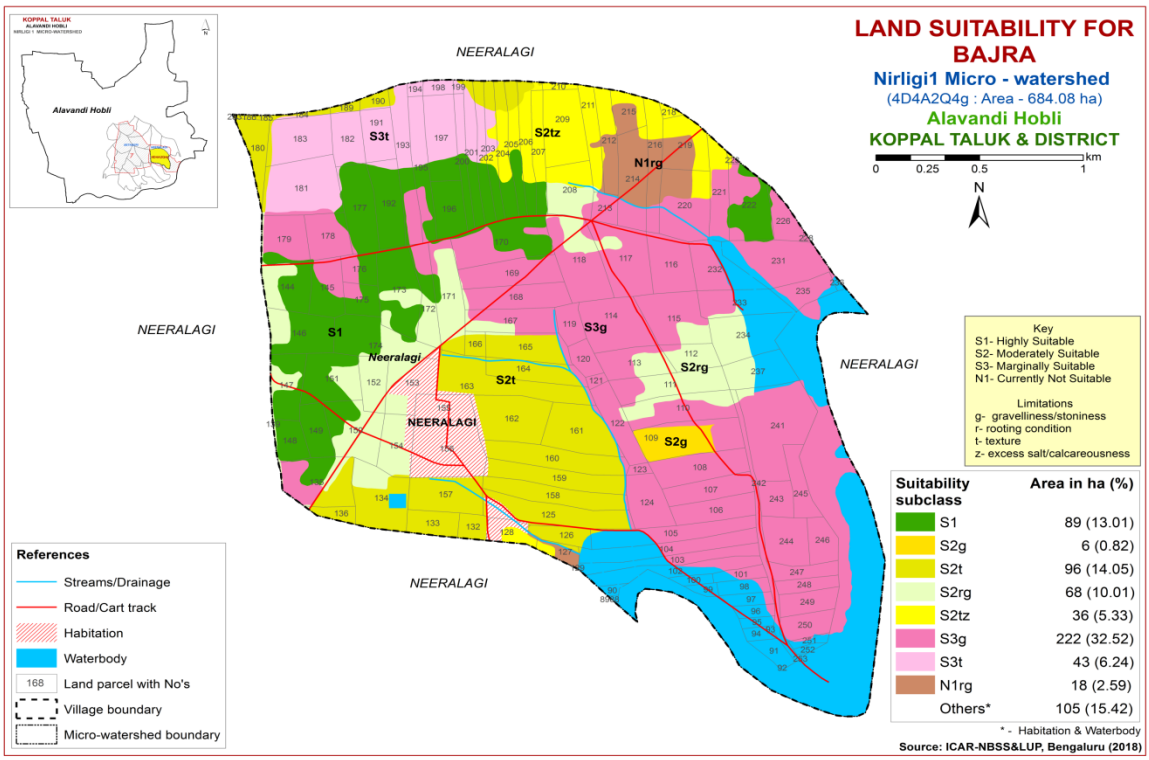


Fig. 7.3 Land Suitability map of Bajra

7.4 Land Suitability for Groundnut (*Arachis hypogaea*)

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

An area of 68 ha (10%) is highly suitable (Class S1) for growing groundnut and are distributed in the western and northern part of the microwatershed. Maximum area of 248 ha (36%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of texture and gravelliness. An area of 243 ha (36%) is marginally suitable (Class S3) and are distributed in the northern, western, central and southern part of the microwatershed. They have moderate limitations of rooting condition, gravelliness, calcareousness and texture. Currently not suitable lands (Class N1) occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

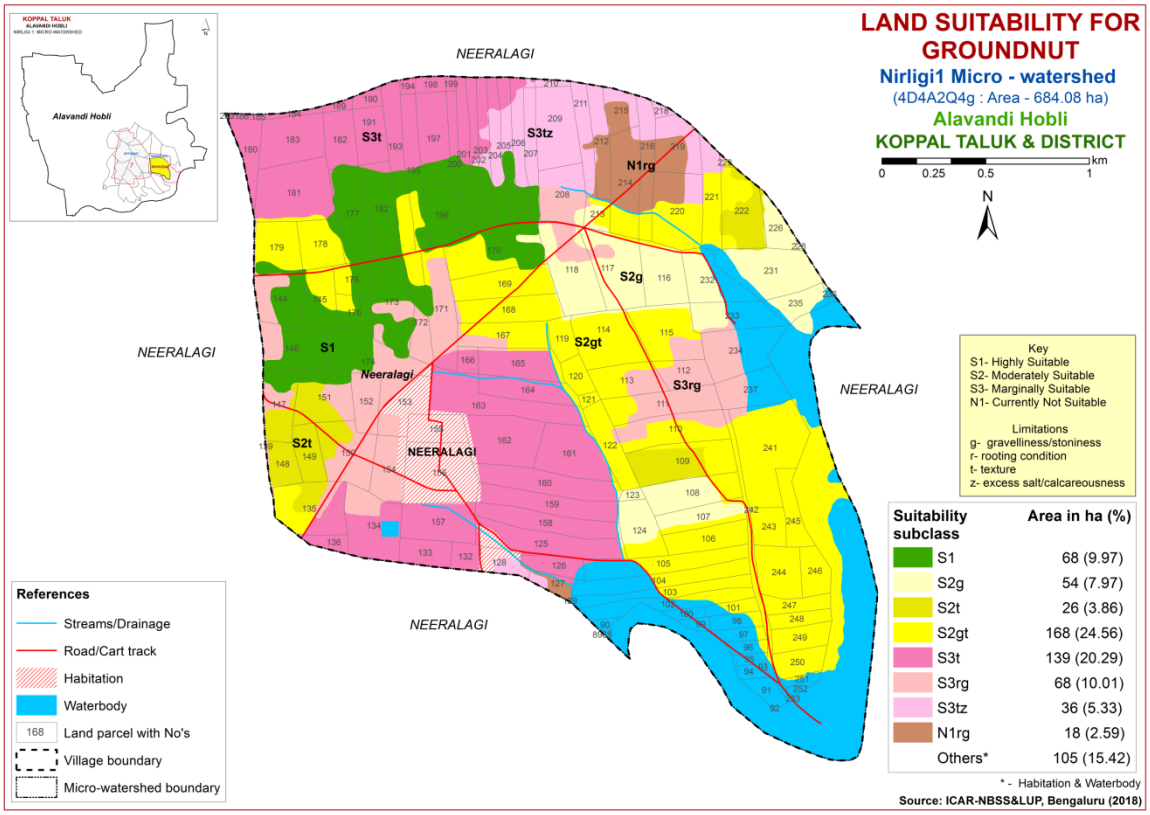


Fig. 7.4 Land Suitability map of Groundnut

7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 3.56 lakh ha in the State in all the districts. The crop requirements for growing sunflower (Table 7.6) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sunflower was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.5.

An area of 168 ha (25%) is highly suitable (Class S1) for growing sunflower and are distributed in the northern, western and southern part of the microwatershed. An area of 101 ha (15%) is moderately suitable (Class S2) and are distributed in the northern, central and southern part of the microwatershed. They have minor limitations of calcareousness, gravelliness and rooting condition. Maximum area of 290 ha (43%) is marginally suitable (Class S3) for growing sunflower and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

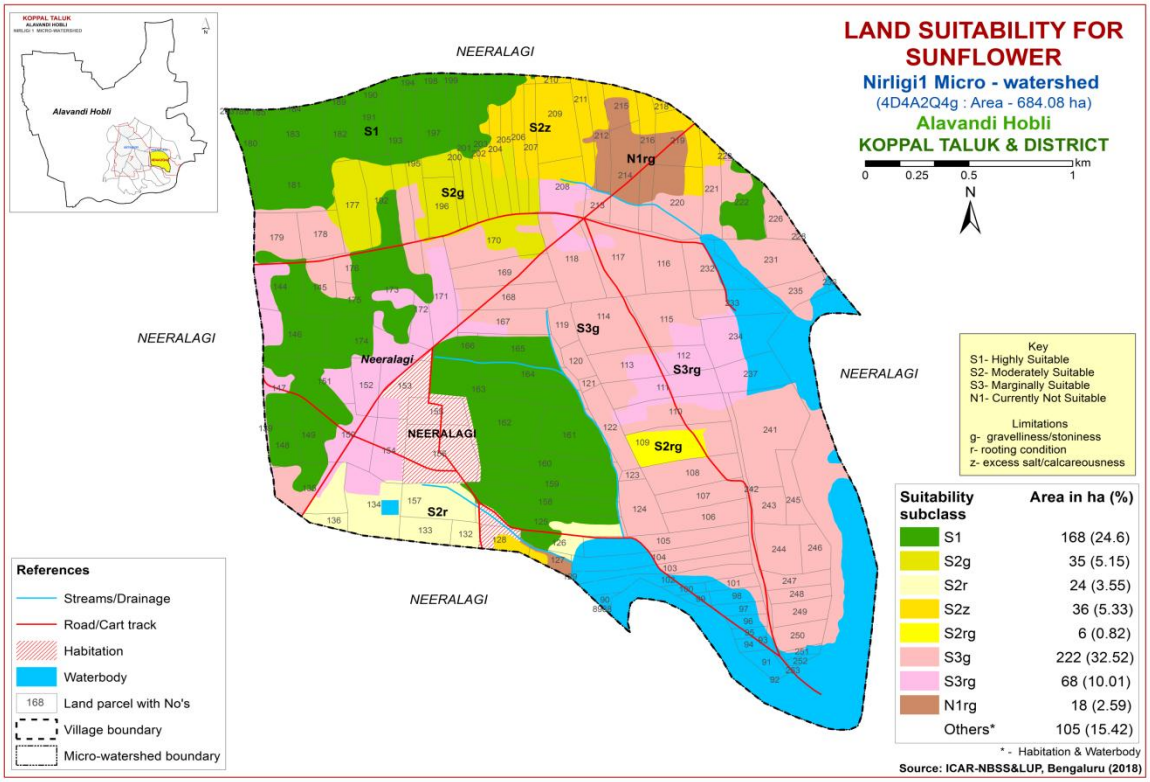


Fig. 7.5 Land Suitability map of Sunflower

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

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

An area of 54 ha (8%) is highly suitable (Class S1) for growing red gram and are distributed in the western and northern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 217 ha (32%) and are distributed in the northern, northwestern and southern part of the microwatershed with minor limitations of gravelliness, rooting condition, texture and calcareousness. Marginally suitable (Class S3) lands cover a maximum area of 290 ha (43%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. Currently suitable (Class N1) lands occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

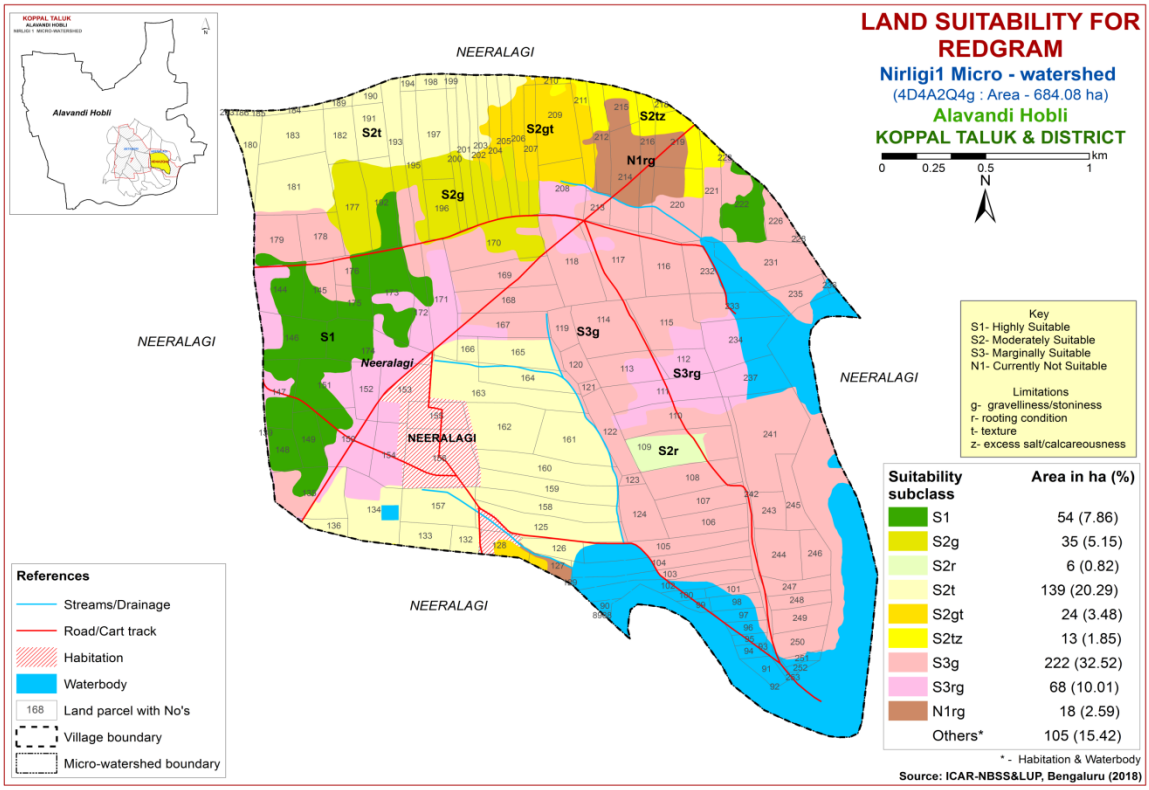


Fig. 7.6 Land Suitability map of Redgram

7.7 Land Suitability for Bengalgram (*Cicer arietinum*)

Bengalgram is one of the major pulse crop grown in an area of 9.39 lakh ha in northern Karnataka in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad and Bellary districts. The crop requirements for growing Bengalgram (Table 7.8) were matched with the soil-site characteristics (Table 7.1) of the soils of the microwatershed and a land suitability map for growing Bengalgram was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.7.

An area of 139 ha (20%) is highly suitable (Class S1) for growing bengalgram and are distributed in the northern and southern part of the microwatershed. Moderately suitable lands (Class S2) occupy an area of 200 ha (29%) and are distributed in the northern, western, southern and central part of the microwatershed with minor limitations of gravelliness, calcareousness, texture and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 222 ha (33%) and are distributed in the major part of the microwatershed. They have moderate limitation of gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

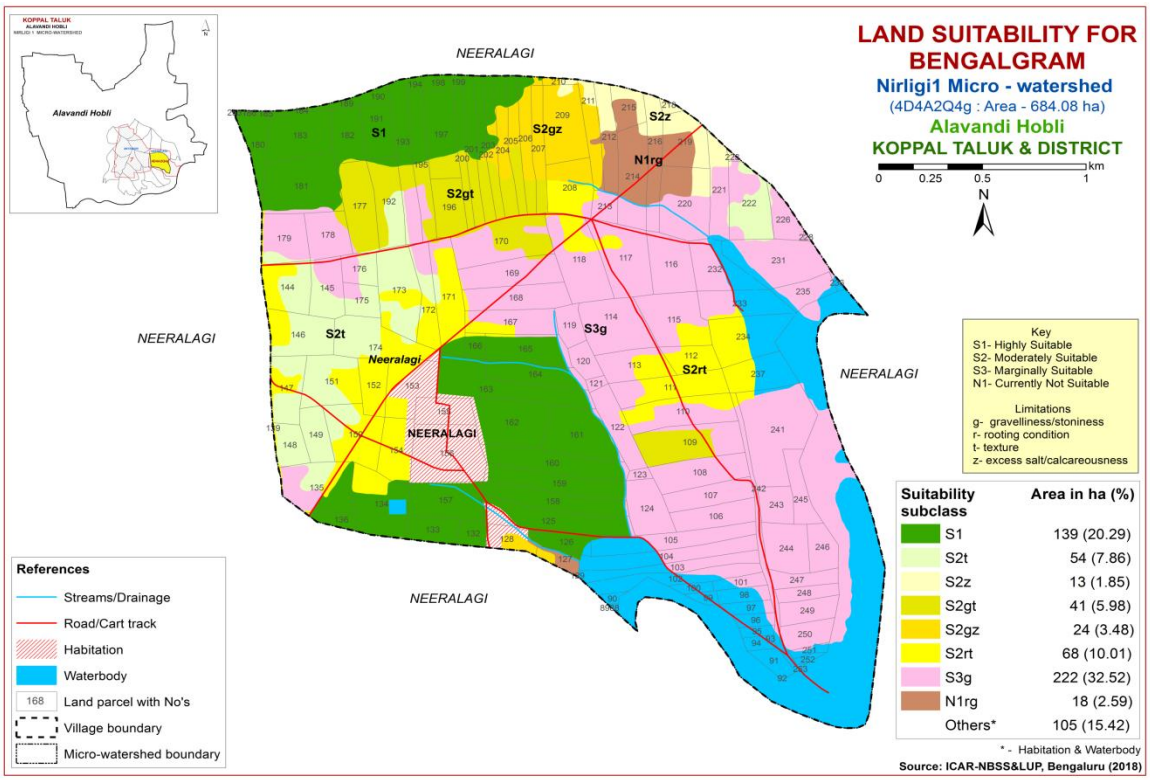


Fig. 7.7 Land Suitability map of Bengalgram

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 160 ha (23%) is highly suitable (Class S1) for growing cotton and are distributed in the northern, western and southern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 111 ha (16%) and are distributed in the northern, western and southern part of the microwatershed. They have minor limitations of rooting condition, texture, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of 291 ha (43%) and are distributed in the major part of the microwatershed. They have moderate limitation of gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

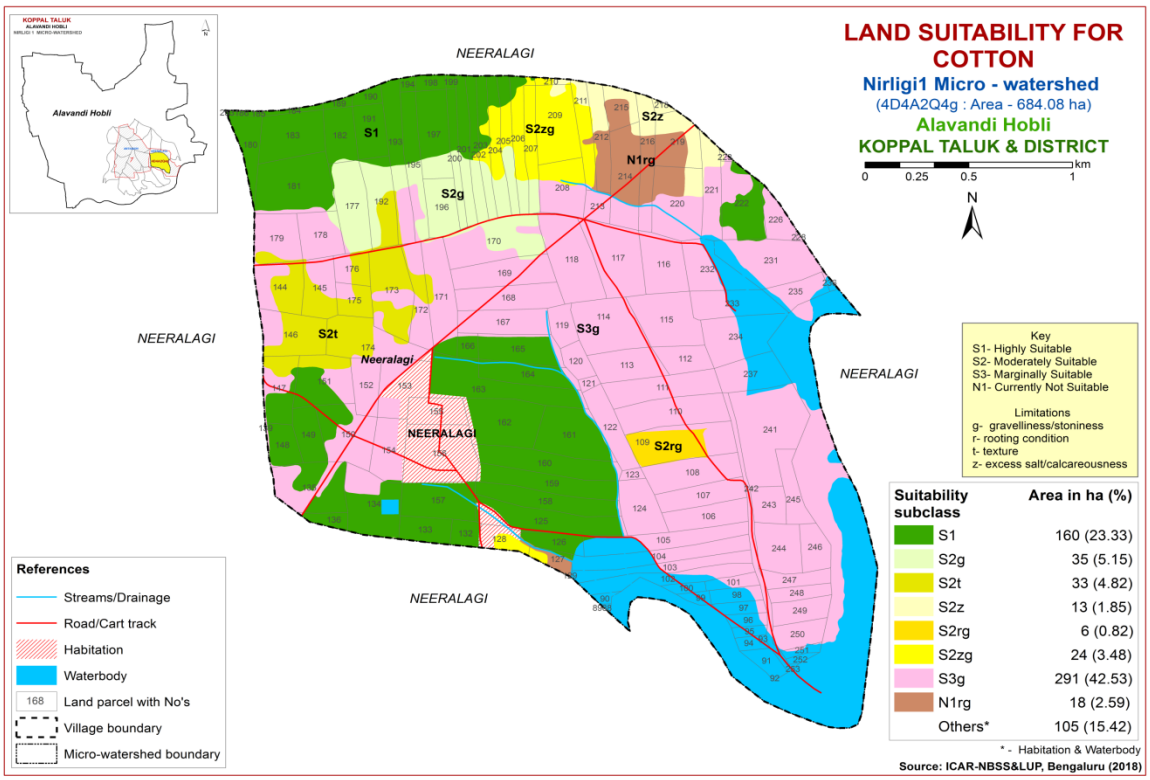


Fig. 7.8 Land Suitability map of Cotton

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

Chilli is one of the most important commercial spice crop grown in an area of 0.89 lakh ha in all the districts of 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 54 ha (8%) is highly (Class S1) suitable for growing chilli and are distributed in the northern and western part of the microwatershed. An area of 41 ha (6%) is moderately suitable (Class S2) for growing chilli and are distributed in the northern and eastern part of the microwatershed. They have minor limitation of gravelliness. Maximum area of 466 ha (68%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, calcareousness and gravelliness s. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

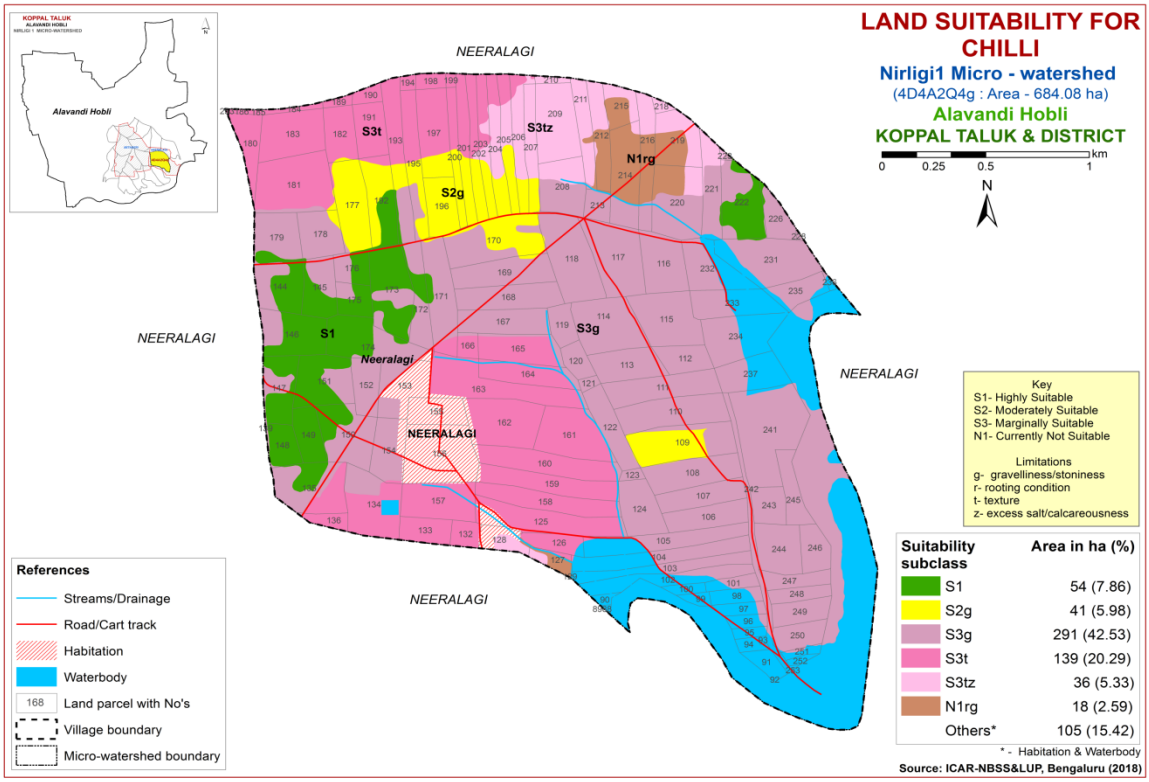


Fig. 7.9 Land Suitability map of Chilli

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 7.11) 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 54 ha (8%) is highly (Class S1) suitable for growing tomato and are distributed in the northern and western part of the microwatershed. An area of 41 ha (6%) is moderately suitable (Class S2) and are distributed in the northern and eastern part of the microwaterhsed. They have minor limitation of gravelliness. Marginally suitable (Class S3) lands occupy a maximum area of 466 ha (68%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness, texture, drainage, calcareousness and rooting condition. Currently not suitable (Class N1) lands occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

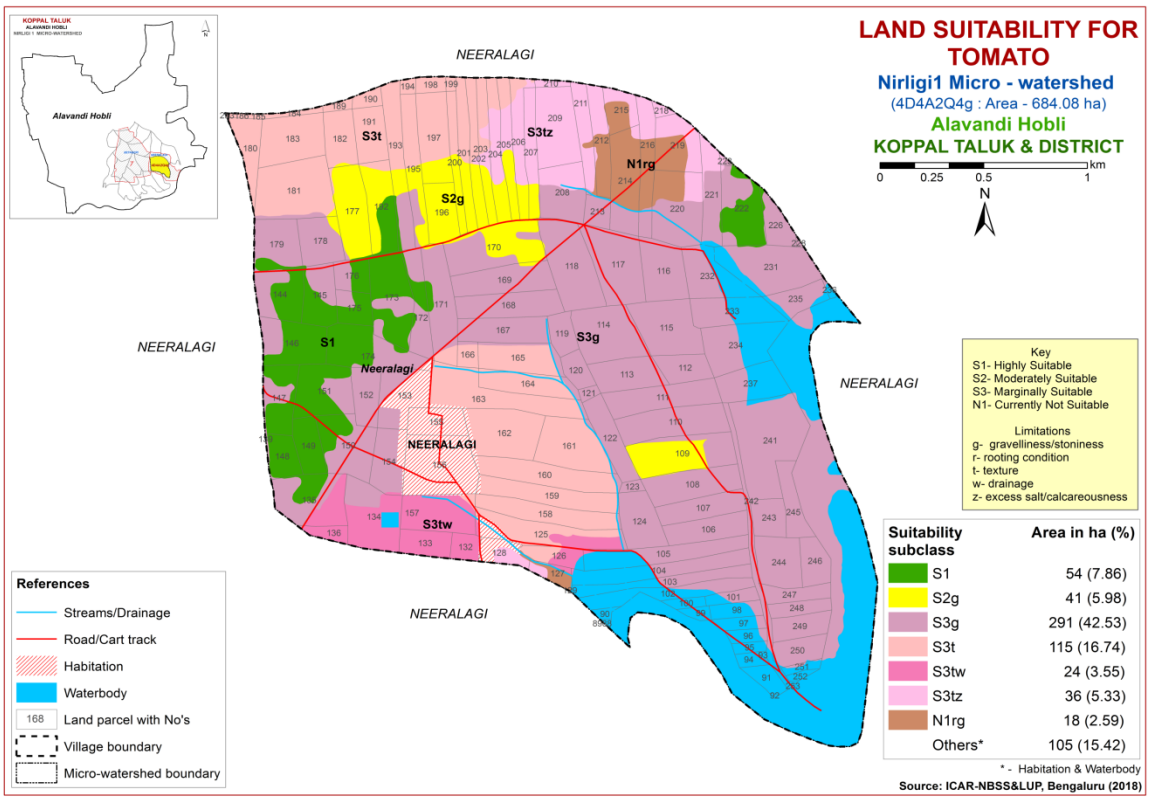


Fig. 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

Brinjal is one of the most important vegetable crop grown in all the districts. 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 are given in Figure 7.11.

An area of 6 ha (1%) is highly suitable (Class S1) for growing brinjal and are distributed in the central part of the microwatershed. Maximum area of about 487 ha (71%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness and gravelliness. Marginally suitable lands (Class S3) occur in an area of 68 ha (10%) and are distributed in the western and central part of the microwatershed with moderate limitation of gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitation of rooting condition.

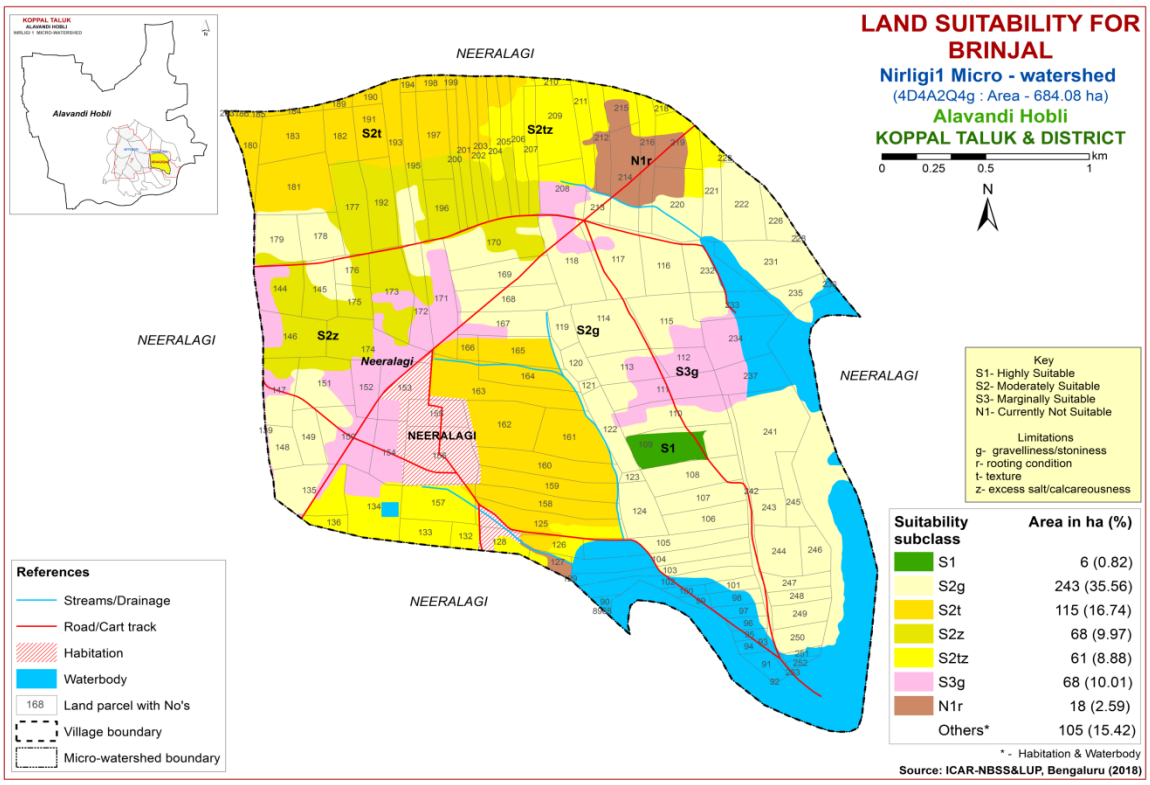


Fig. 7.11 Land Suitability map of Brinjal

7.12 Land Suitability for Onion (*Allium cepa*)

Onion is one of the most important vegetable crop grown in Raichur, Dharwad, Belgaum, Gulbarga, Bijapur, Bidar, Bellary, Chitradurga and Tumakuru districts. 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 are given in Figure 7.12.

There are no highly (Class S1) suitable for growing onion in the microwatershed. Maximum area of 317 ha (46%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, calcareousness and texture. Marginally suitable lands (Class S3) occupy an area of 244 ha (36%) and are distributed in the northern, central, western and southern part of the microwatershed with moderate limitations of gravelliness, calcareousness and texture. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the southern and northern part of the microwatershed with severe limitation of rooting condition.

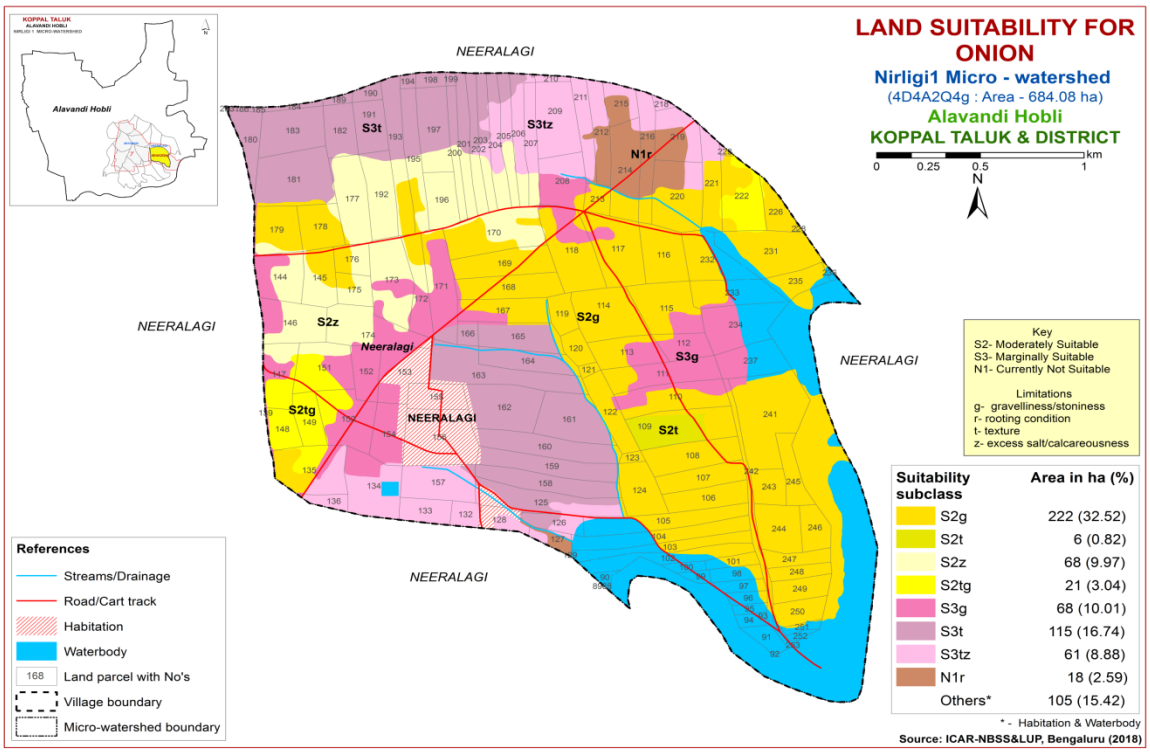


Fig. 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

Bhendi is one of the most important vegetable crop grown in all the districts. 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 are given in Figure 7.13.

There are no highly suitable (Class S1) for growing bhendi in the microwatershed. Maximum area of about 492 ha (72%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness and gravelliness. An area of 68 ha (10%) is marginally suitable (Class S3) for growing bhendi and are distributed in the central and western part of the microwatershed with moderate limitation of gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitation of rooting condition.

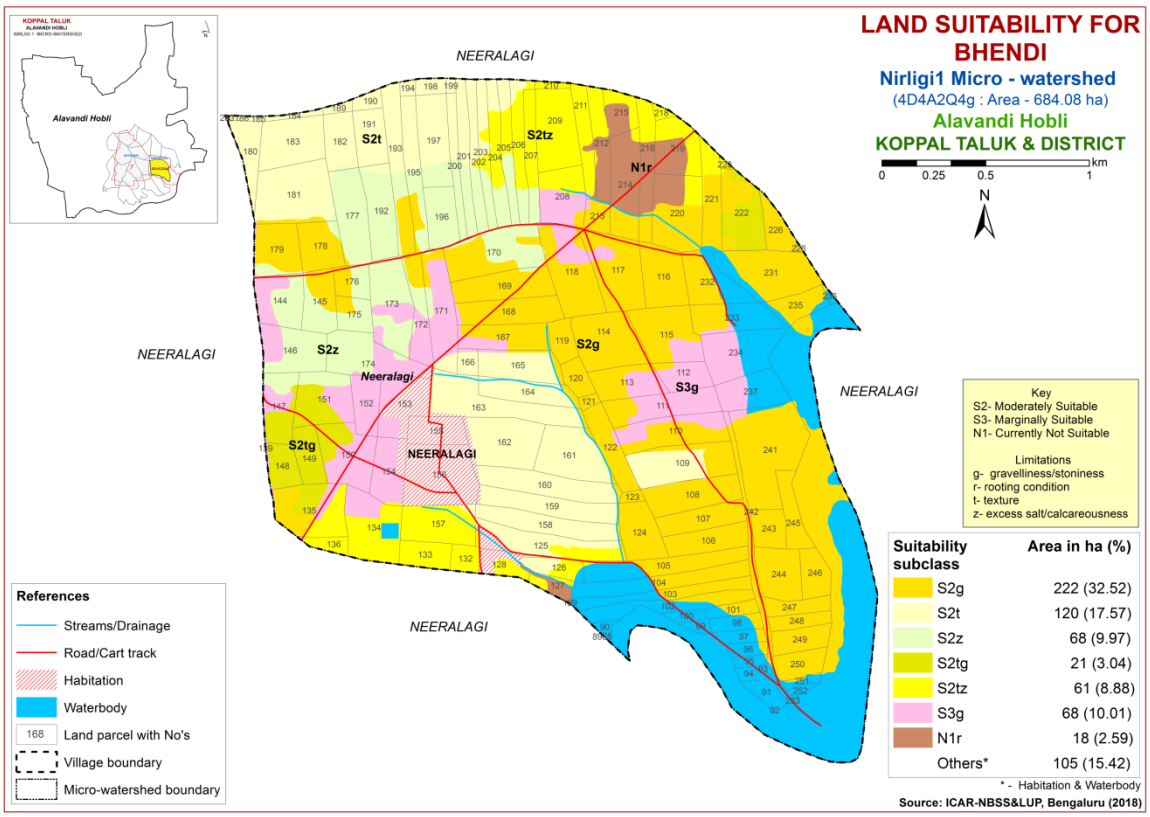


Fig. 7.13 Land Suitability map of Bhendi

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 is given in Figure 7.14.

An area of 54 ha (8%) is highly suitable (Class S1) for growing drumstick and are distributed in the central and northern and western part of the microwaterhsed. Maximum area of 439 ha (64%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, rooting condition, texture and calcareousness. An area of 68 ha (10%) is marginally suitable (Class S3) for growing drumstick and are distributed in the central and western part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

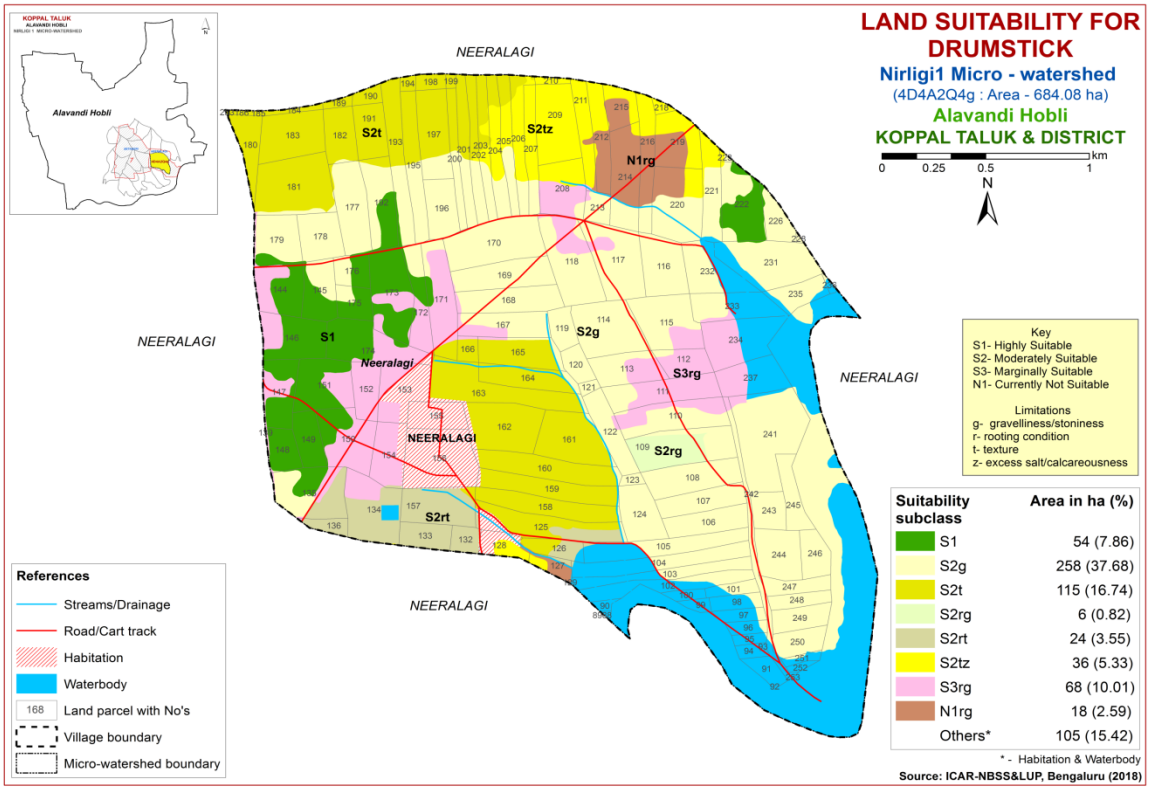


Fig. 7.14 Land Suitability map of Drumstick

7.15 Land Suitability for Mango (*Mangifera indica*)

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

An area of 21 ha (3%) is highly (Class S1) suitable for growing mango and are distributed in the northern and southwestern part of the microwatershed. An area of 92 ha (13%) is moderately suitable (Class S2) and are distributed in the northern, western and southern part of the microwatershed. They have minor limitations rooting condition, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover a maximum area of 380 ha (55%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, calcareousness, texture and rooting condition. An area of 86 ha (13%) is currently not suitable (Class N1) for growing mango and occur in the southern and central part of the microwatershed with severe limitation of rooting condition and gravelliness.

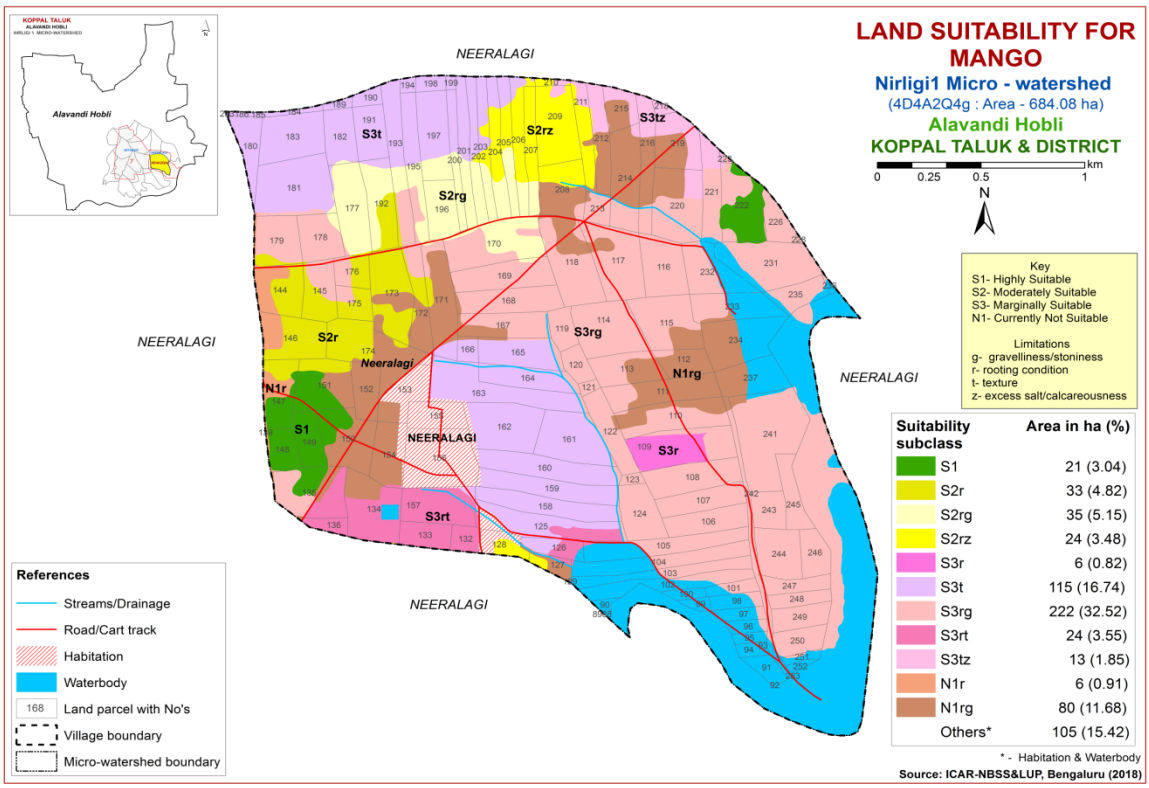


Fig. 7.15 Land Suitability map of Mango

7.16 Land Suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of about 0.64 lakh ha in almost all the districts of the State. The crop requirements (Table 7.17) for growing guava were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing guava was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.16.

An area of 33 ha (5%) is highly (Class S1) for growing guava and are distributed in the western part of the microwatershed. Moderately (Class S2) suitable lands occupy in an area of 62 ha (9%) and are distributed in the northern, central and southwestern part of the microwatershed. They have minor limitations of gravelliness, rooting condition and texture. Marginally suitable (Class S3) lands cover an area of 465 ha (68%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

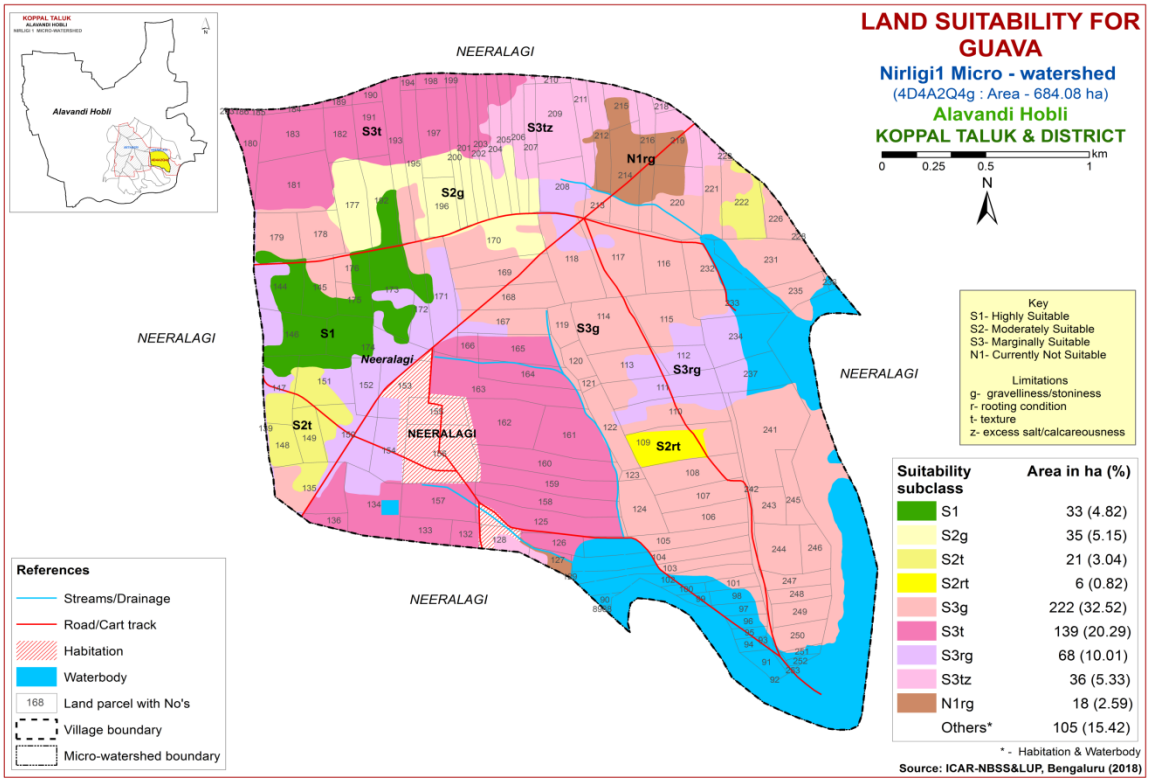


Fig. 7.16 Land Suitability map of Guava

7.17 Land Suitability for Sapota (*Manilkara zapota*)

Sapota is one of the most important fruit crop grown in an area of 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 54 ha (8%) is highly (Class S1) suitable for growing sapota and are distributed in the northern and western part of the microwatershed. Moderately (Class S2) suitable lands occupy an area of 41 ha (6%) and are distributed in the northern and central part of the microwatershed with minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 465 ha (68%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting condition. Currently not suitable (Class N1) lands occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

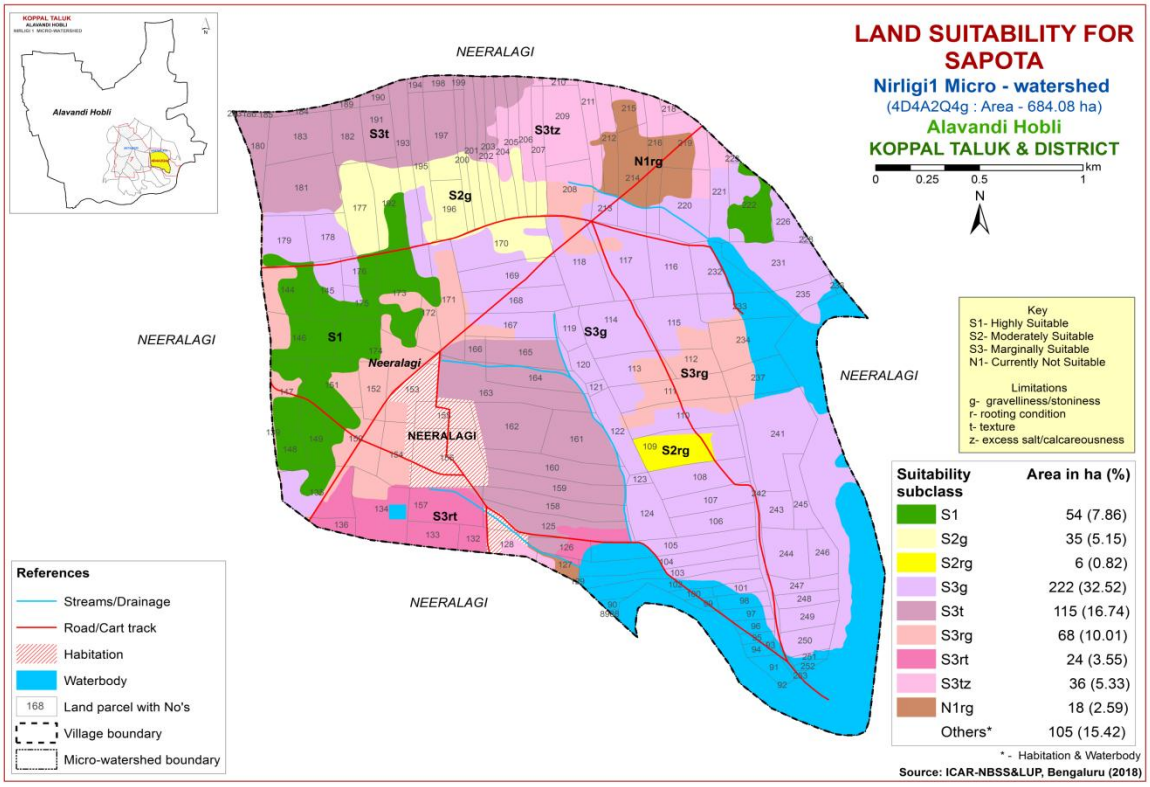


Fig. 7.17 Land Suitability map of Sapota

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 54 ha (8%) is highly suitable (Class S1) for growing pomegranate and are distributed in the northern and western part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 216 ha (32%) and are distributed in the northern, southern and central part of the microwatershed. They have minor limitations of rooting condition, gravelliness, texture and calcareousness. Maximum area of 290 ha (43%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

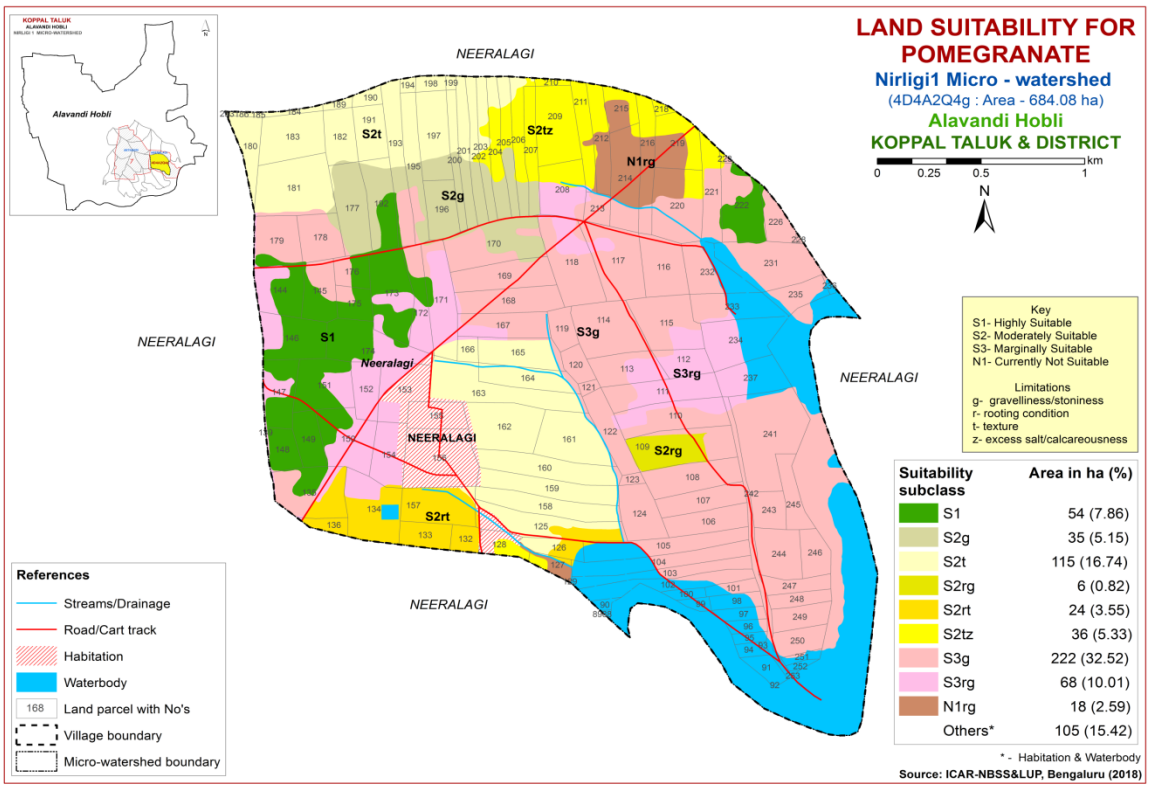


Fig. 7.18 Land Suitability map of Pomegranate

7.19 Land Suitability for Musambi (*Citrus limetta*)

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

An area of 168 ha (25%) is highly suitable (Class S1) for growing musambi and are distributed in the northern, western and southern part of the microwatershed. An area of 102 ha (15%) is moderately suitable (Class S2) and are distributed in the northern, southern and central part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in a maximum area of 290 ha (43%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

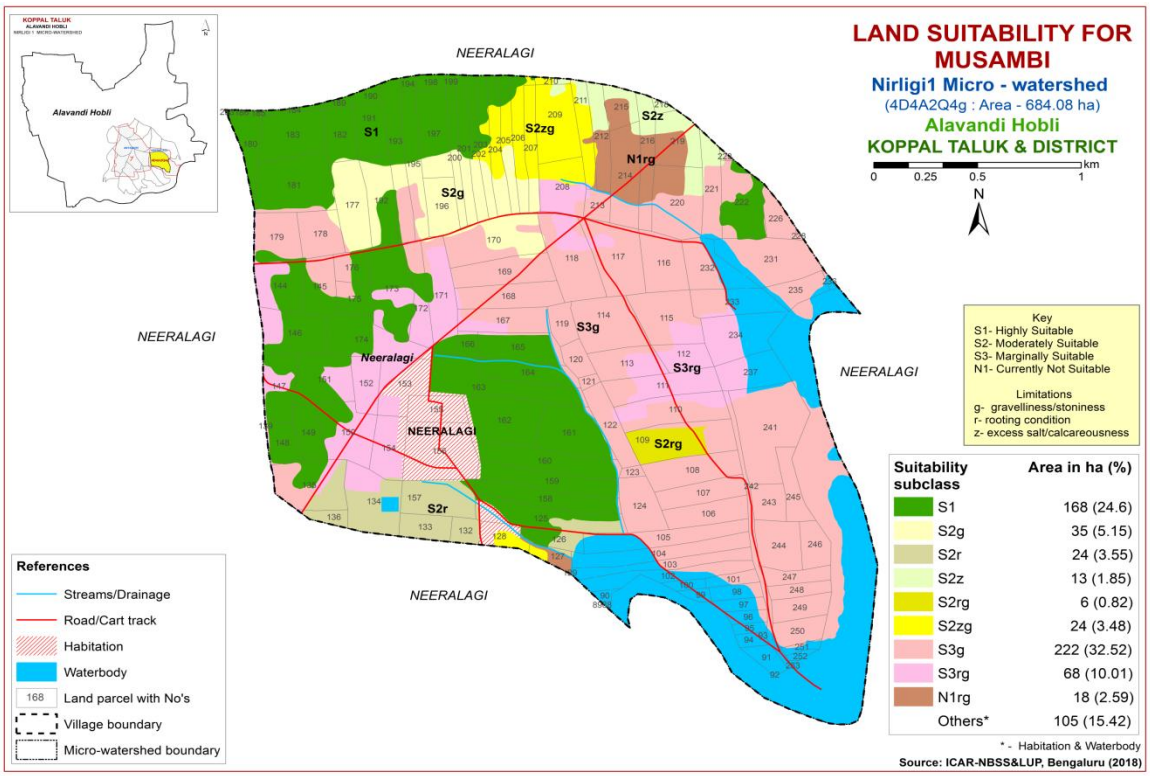


Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

Lime is one of the most important fruit crop grown in an area of 0.11 lakh ha in almost all the districts of the State. The crop requirements for growing lime (Table 7.21) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing lime was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.20.

An area of 168 ha (25%) is highly suitable (Class S1) for growing lime and are distributed in the northern, southern and western part of the microwatershed. An area of 102 ha (15%) is moderately suitable (Class S2) and are distributed in the northern, southern and central part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in a maximum area of 290 ha (43%) and distributed in the major part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

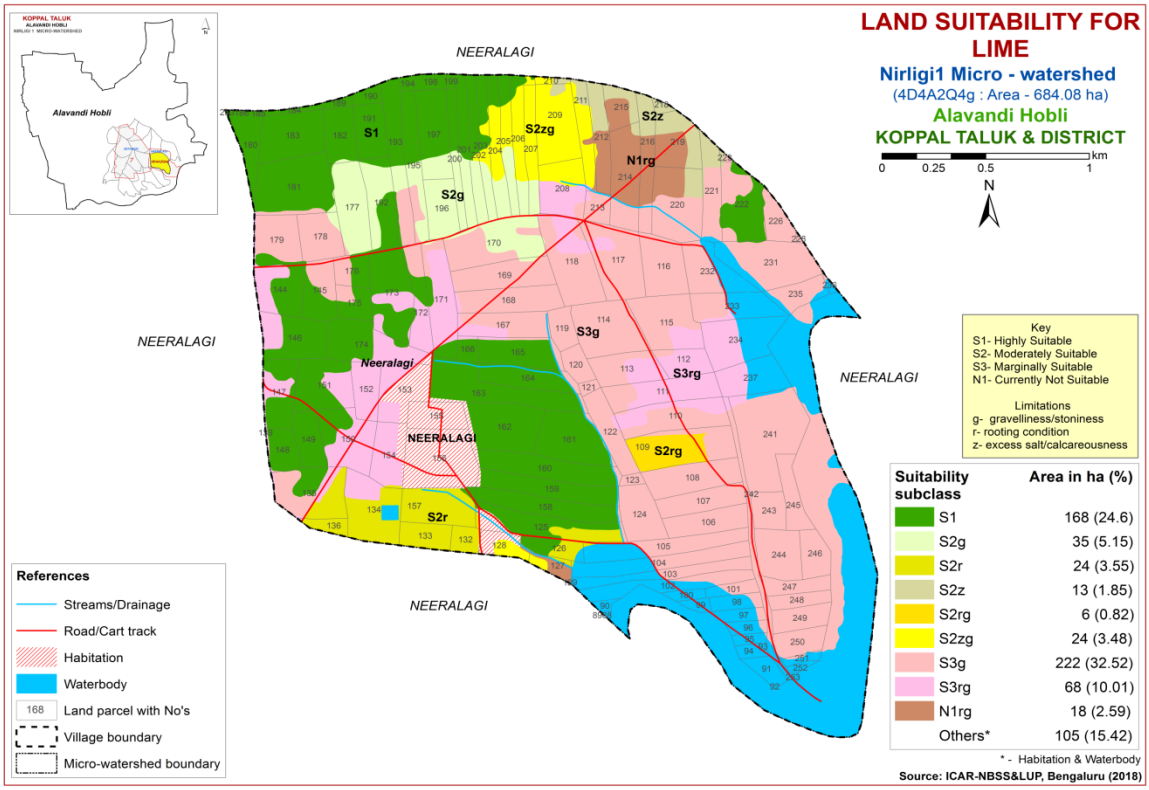


Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Amla (*Phyllanthus emblica*)

Amla is one of the most important medicinal crop grown in 151 ha area and distributed in almost all the districts of the State. The crop requirements for growing amla (Table 7.22) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing amla was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.21.

An area of 95 ha (14%) is highly suitable (Class S1) for growing amla and are distributed in the northern, central and western part of the microwatershed. Maximum area of 465 ha (68%) has soils that are moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness, texture and calcareousness. There are no marginally suitable (Class S3) lands for growing amla in the microwaterhsed. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of gravelliness and rooting condition.

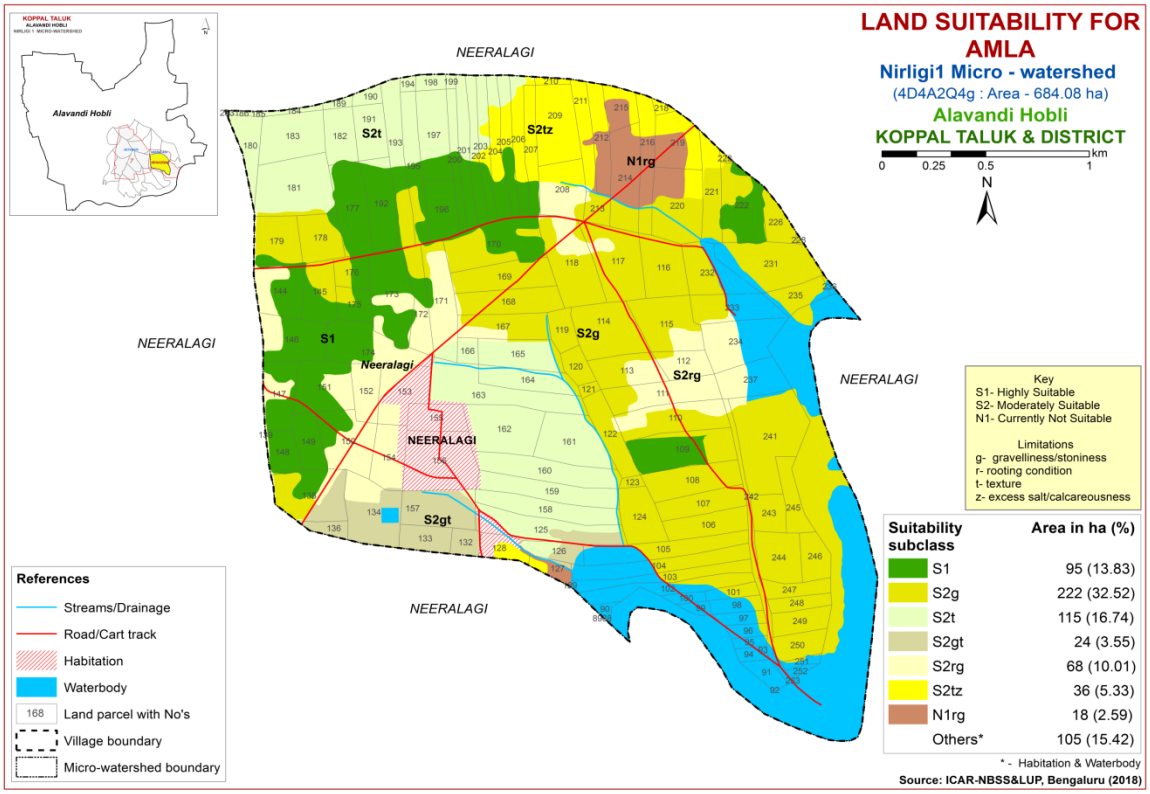


Fig. 7.21 Land Suitability map of Amla

7.22 Land Suitability for Cashew (*Anacardium occidentale)*

Cashew is one of the most important nut crop grown in an area of 1.24 lakh ha in almost all the districts of the State. The crop requirements for growing cashew (Table 7.23) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing cashew was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.22.

There are no highly (Class S1) suitable for growing cashew in the microwatershed. Moderately (Class S2) suitable lands occur in an area of 27 ha (4%) and are distributed in the northern, central and southwestern part of the microwatershed with minor limitations of texture and rooting condition. Marginally suitable (Class S3) lands occur in a maximum area of 290 ha (43%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition and gravelliness. An area of about 261 ha (38%) is currently not suitable (Class N1) for growing cashew and are distributed in the northern, southern and central part of the microwaterhsed with severe limitations of texture, rooting condition, gravelliness and calcareousness.

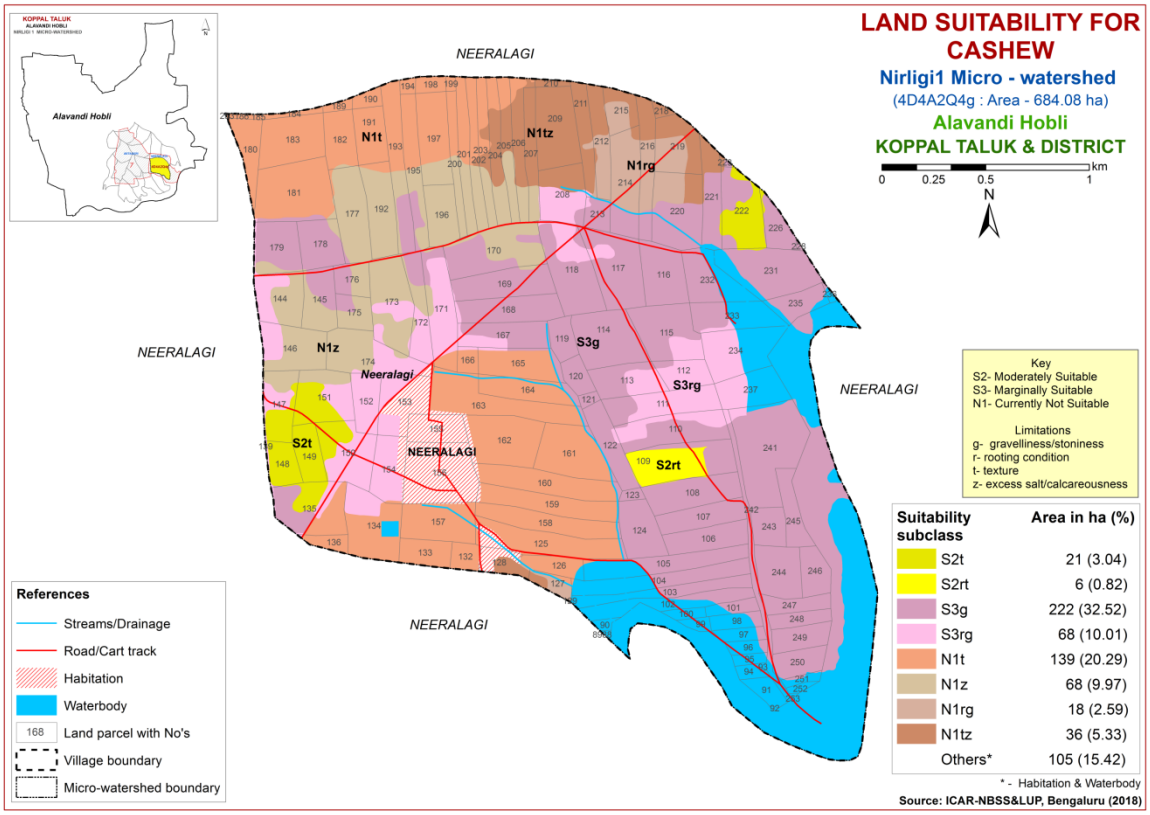


Fig. 7.22 Land Suitability map of Cashew

7.23 Land Suitability for Jackfruit (*Artocarpus heterophyllus*)

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

An area of 54 ha (8%) is highly (Class S1) for growing jackfruit and are distributed in the northern and western part of the microwatershed. Moderately (Class S2) suitable lands occupy an area of 41 ha (6%) and are distributed in the northern and central part of the microwatershed. They have minor limitations of gravelliness and rooting condition. Marginally suitable (Class S3) lands cover a maximum area of 465 ha (68%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, calcareousness and rooting condition. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

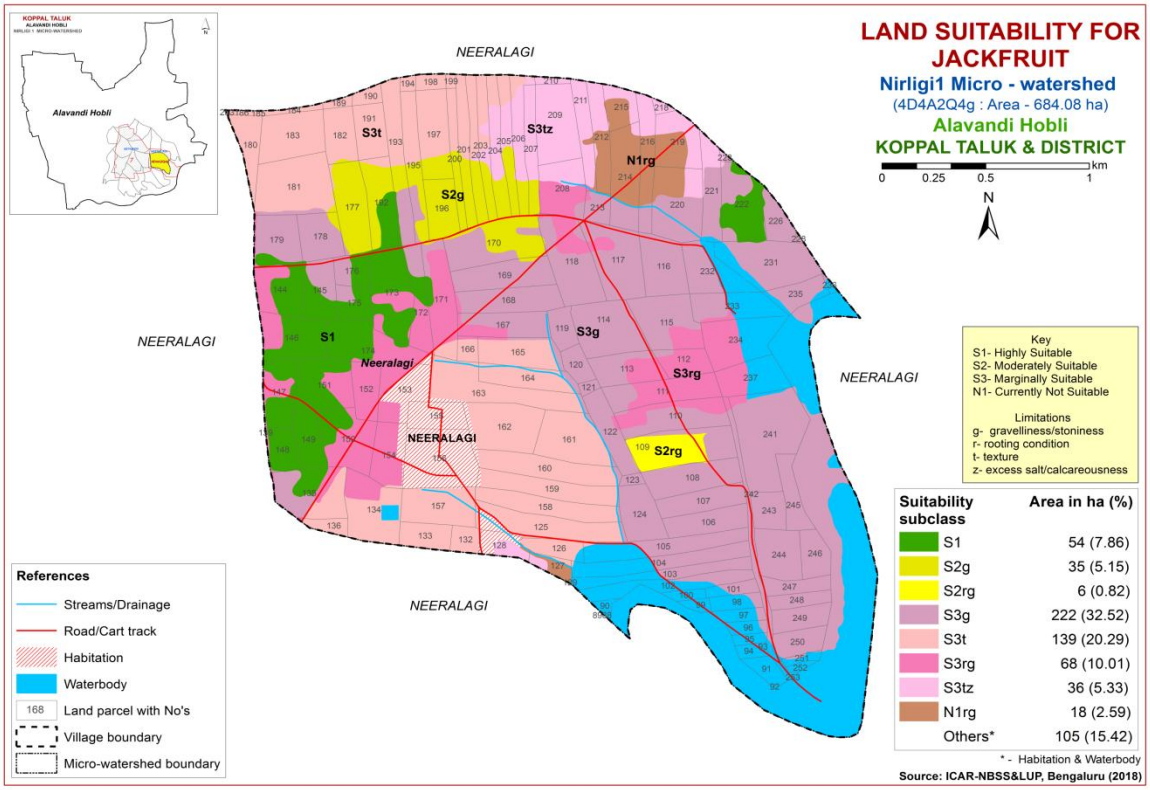


Fig. 7.23 Land Suitability map of Jackfruit

7.24 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 7.25) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing jamun was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.24.

An area of 21 ha (3%) is highly suitable (Class S1) for growing jamun and are distributed in the northern and southwestern part of the microwatershed. An area of 226 ha (33%) is moderately suitable (Class S2) and occur in the northern, southern and western part of the microwatershed. They have minor limitations of rooting condition, texture, calcareousness and gravelliness. Marginally suitable (Class S3) lands cover a Maximum area of 314 ha (46%) and are distributed in the major part of the microwatershed with moderate limitations of rooting condition, texture and gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

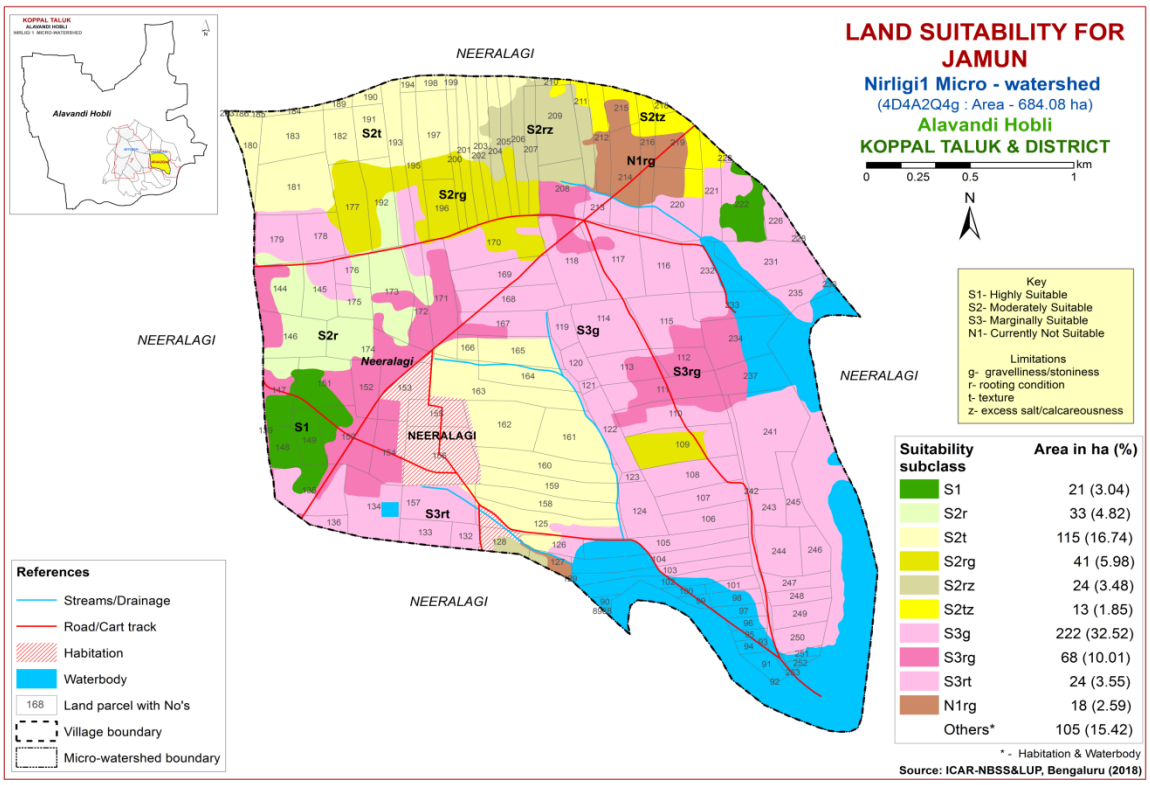


Fig. 7.24 Land Suitability map of Jamun

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

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple (Table 7.26) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing custard apple was generated. The area extent and their geographic distribution of different suitability subclasses in the microwatershed are given in Figure 7.25.

An area of 233 ha (34%) is highly (Class S1) suitable for growing custard apple and are distributed in the northern, western, central and southern part of the microwatershed. Maximum area of 326 ha (48%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, rooting condition and calcareousness. Marginally suitable (Class S3) lands occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

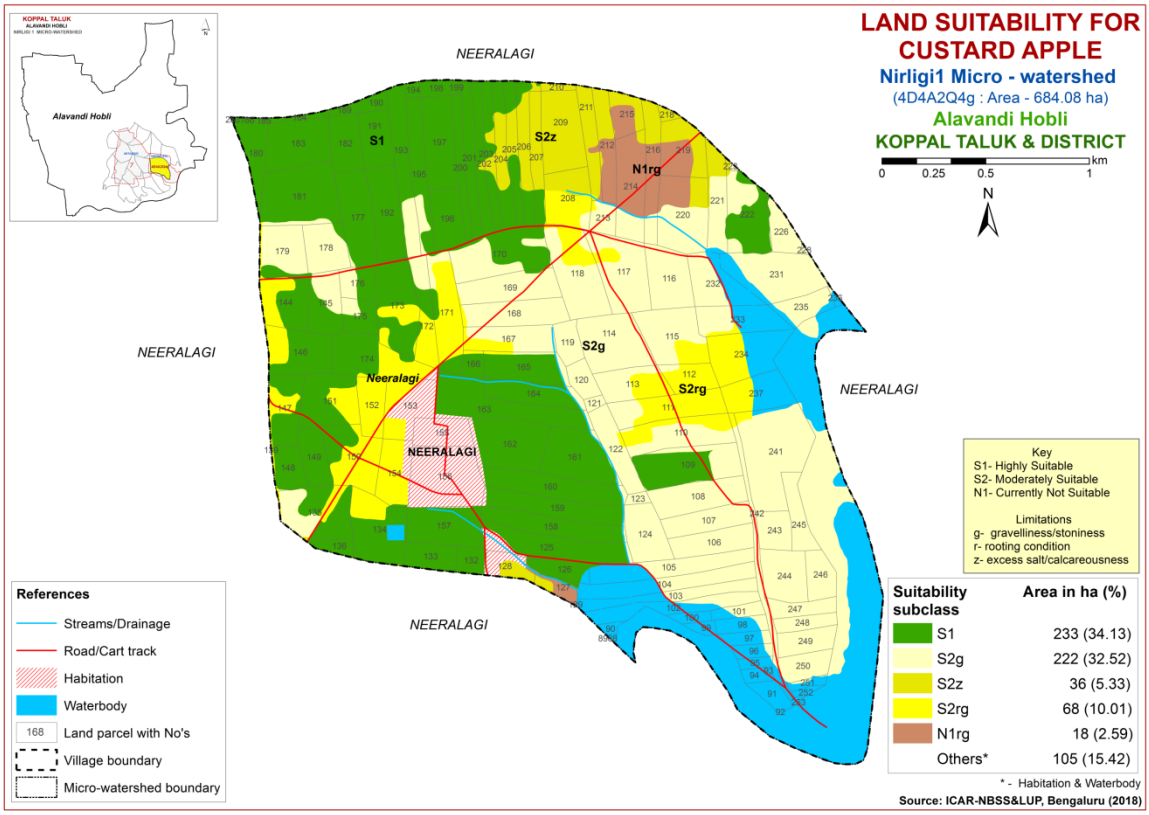


Fig. 7.25 Land Suitability map of Custard Apple

7.26 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is one of the most important spice crop grown in 14897 ha in all the districts of the State. The crop requirements for growing tamarind (Table 7.27) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing tamarind was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.26.

An area of 21 ha (3%) is highly (Class S1) suitable for growing tamarind and are distributed in the northern and southwestern part of the microwatershed. Maximum area of 263 ha (38%) is moderately suitable (Class S2) and occur in the major part of the microwatershed. They have minor limitations of rooting condition, texture, calcareousness and gravelliness. Maximum area of 210 ha (31%) is marginally suitable (Class S3) and occur in western, central, southern, northern and eastern part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 86 ha (13%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

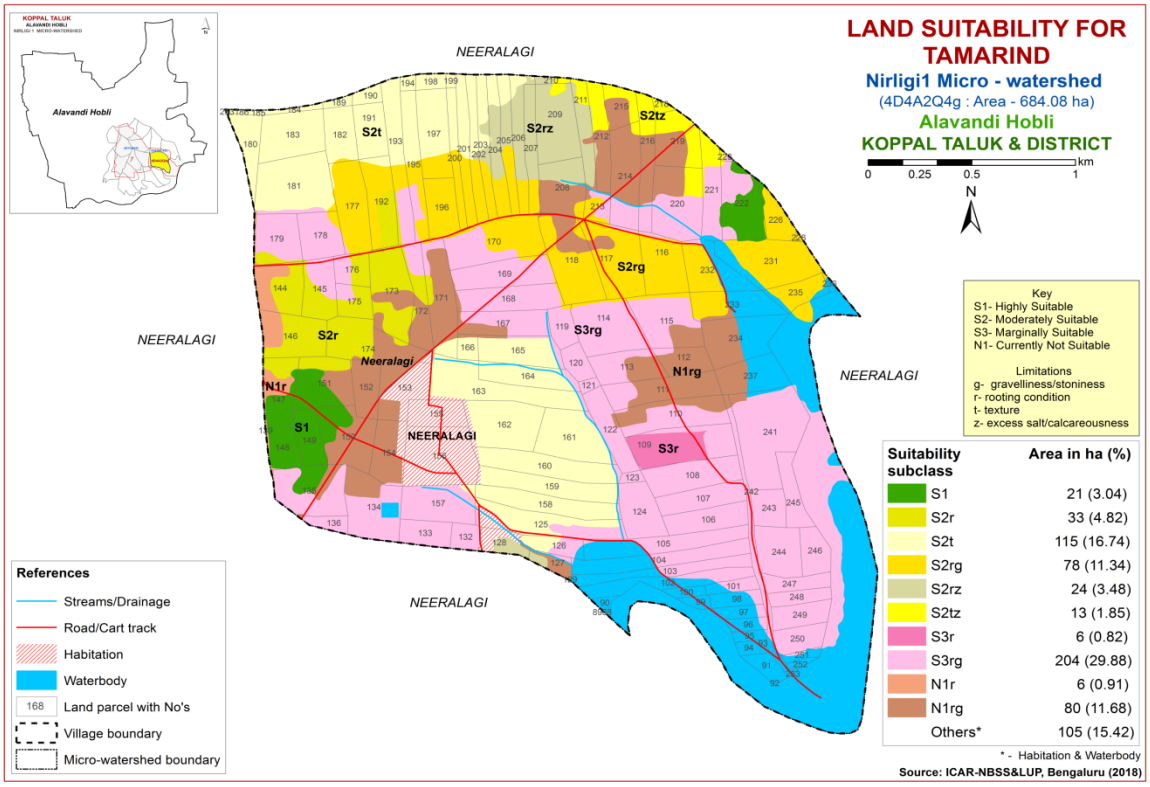


Fig. 7.26 Land Suitability map of Tamarind

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

An area of 89 ha (13) is highly suitable (Class S1) for growing mulberry and are distributed in the northern and western part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 327 ha (48%) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, calcareousness, rooting condition, drainage and texture. Marginally suitable (Class S3) lands cover an area of 145 ha (21%) and are distributed in the northern, central, western and southern part of the microwatershed. They have moderate limitations of rooting condition, gravelliness, texture and calcareousness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

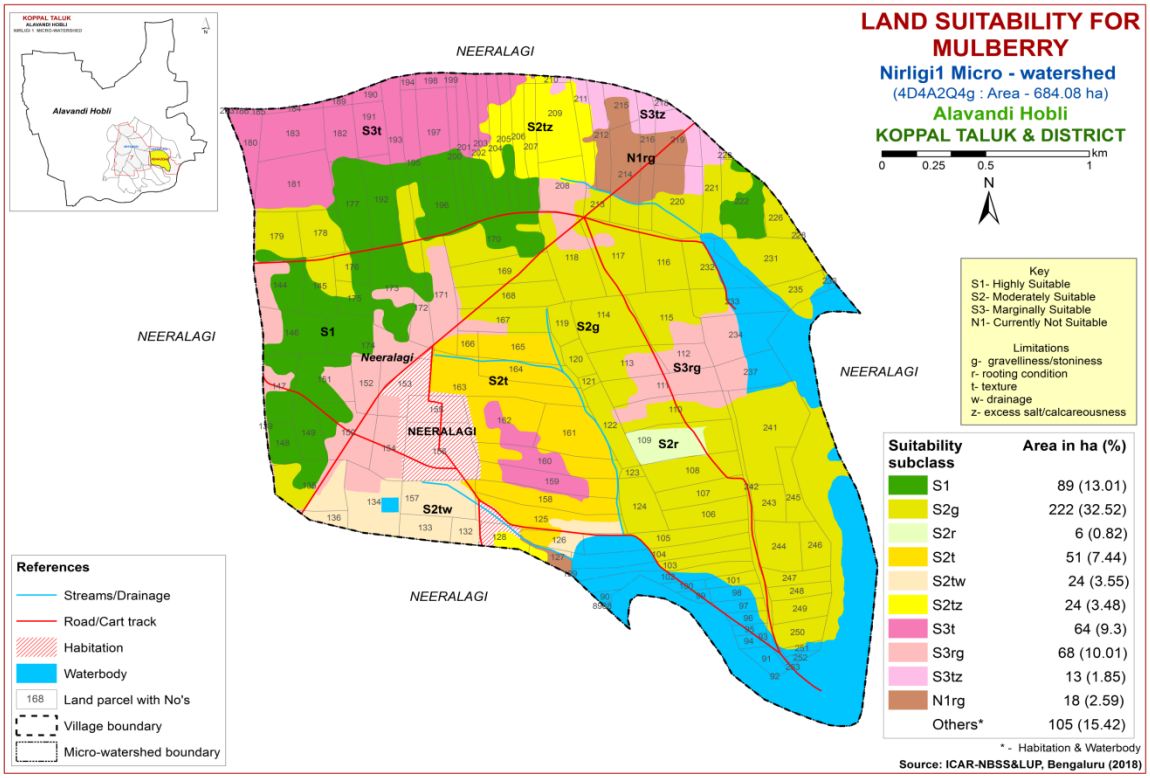


Fig. 7.27 Land Suitability map of Mulberry

7.28 Land Suitability for Marigold (*Tagetes erecta*)

Marigold is one of the most important flower crop grown in an area of 1858 ha in almost all the districts of the State. The crop requirements for growing marigold (Table 7.29) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing marigold was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.28.

An area of 54 ha (8%) is highly suitable (Class S1) for growing marigold and are distributed in the northern and western part of the microwatershed. An area of 216 ha (32%) is moderately suitable (Class S2) and are distributed in the northern and southern part of the microwatershed. They have minor limitations of texture, gravelliness, drainage and calcareousness. Maximum area of 291 ha (43%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitation of gravelliness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

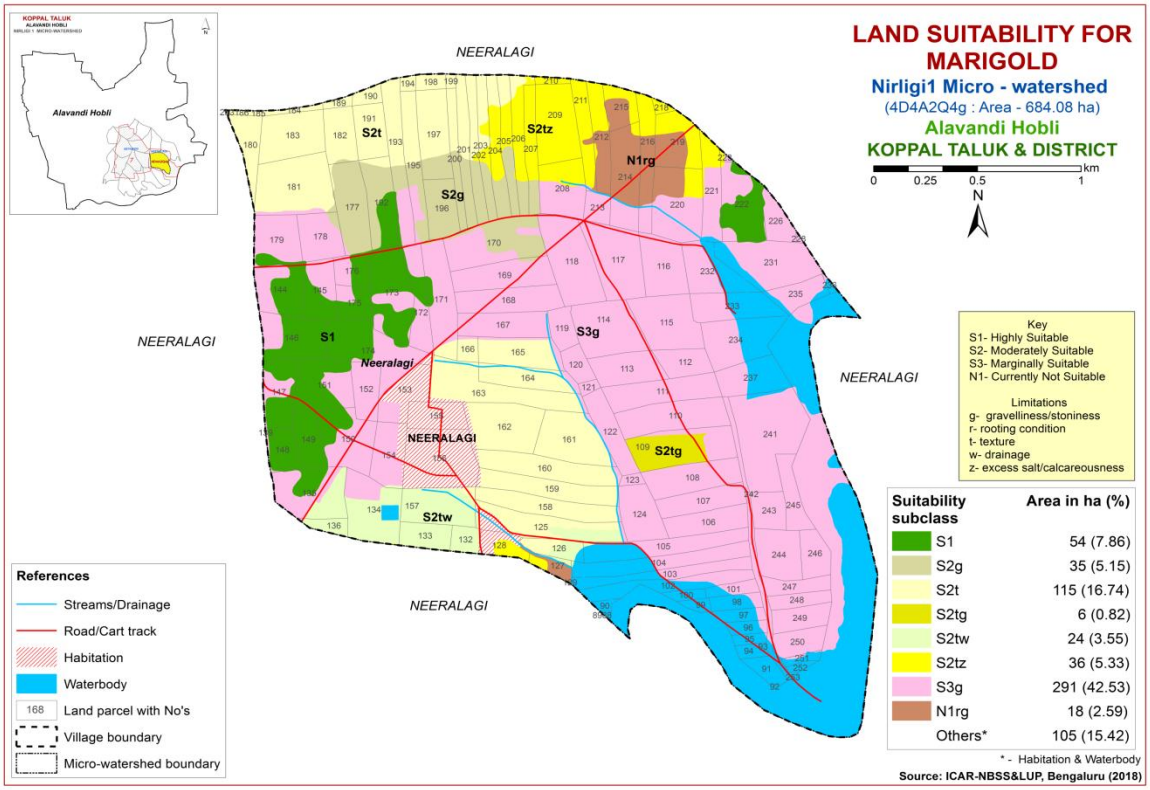


Fig. 7.28 Land Suitability map of Marigold

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 for growing chrysanthemum (Table 7.30) 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 54 ha (8%) is highly suitable (Class S1) for growing chrysanthemum and are distributed in the northern and western part of the microwatershed. An area of 216 ha (32%) is moderately suitable (Class S2) for and are distributed in the northern, western and southern part of the microwatershed. They have minor limitations of calcareousness, gravelliness, drainage and texture. Maximum area of 291 ha (43%) is marginally suitable (Class S3) and occur in the major part of the microwatershed. They have moderate limitation of gravelliness. Currently nor suitable (Class N1) lands occur in an area of 18 ha (3%) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

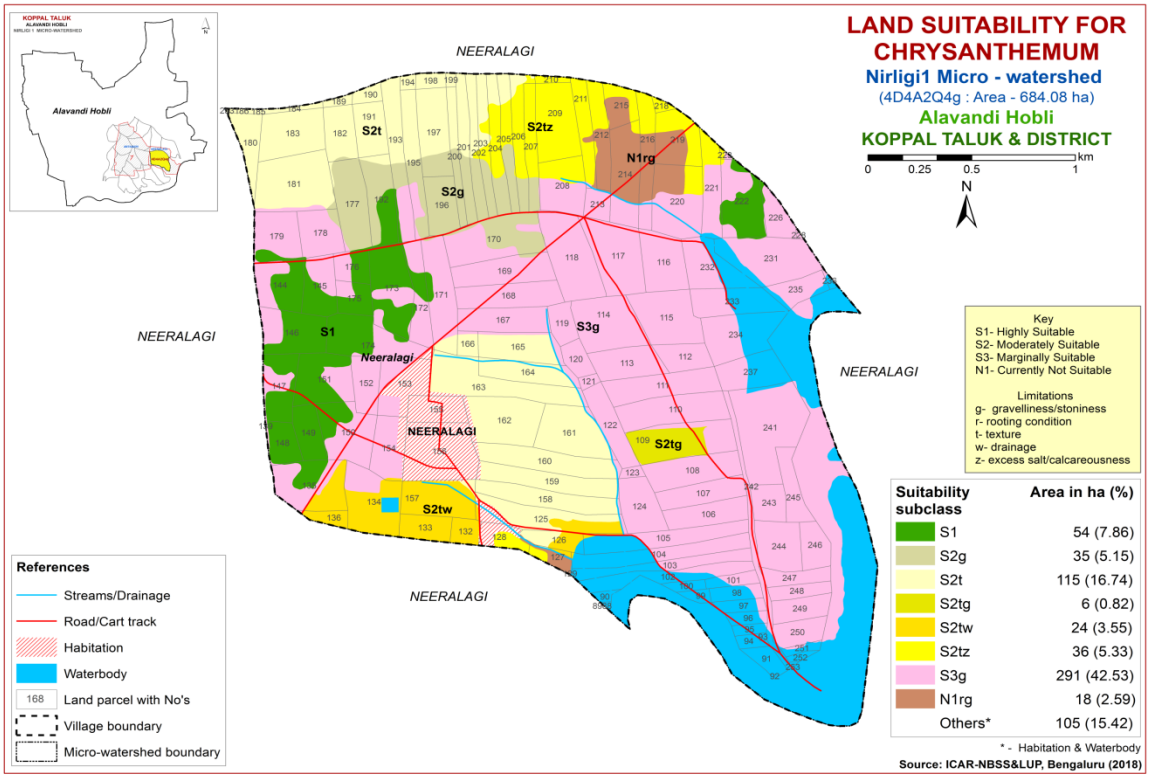


Fig. 7.29 Land Suitability map of Chrysanthemum

7. 30 Land Suitability for Jasmine *(Jasminum sp.)*

Jasmine is one of the most important flower crop grown in an area of 6146 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 54 ha (8%) is highly suitable (Class S1) for growing jasmine and are distributed in the northern and western part of the microwatershed. An area of 41 ha (6%) is moderately suitable (Class S2) and are distributed in the northern and central part of the microwatershed. They have minor limitations of texture and gravelliness. Maximum area of 466 ha (68%) is marginally suitable (Class S3) for growing jasmine and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, drainage and calcareousness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of gravelliness and rooting condition.

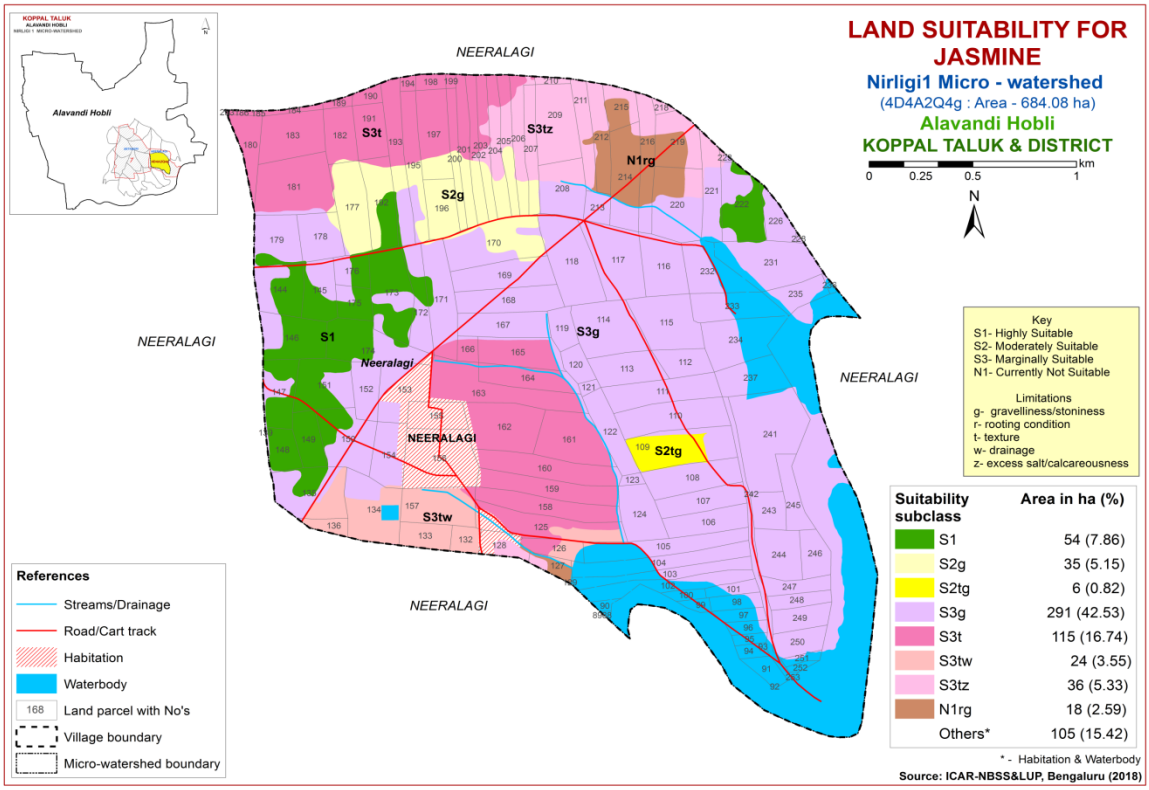


Fig. 7.30 Land Suitability map of Jasmine

7. 31 Land Suitability for Crossandra *(Crossandra in fundibuliformis)*

Crossandra is one of the most important flower crop grown in an area of 6146 ha 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 54 ha (8%) is highly suitable (Class S1) for growing crossandra and are distributed in the northern and western part of the microwatershed. An area of 156 ha (23%) is moderately suitable (Class S2) for growing crossandra and occur in the northern, northwestern and southern part of the microwatershed. They have minor limitations of gravelliness and texture. Maximum area of 351 ha (51%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and calcareousness. An area of 18 ha (3%) is currently not suitable (Class N1) and are distributed in the northern and southern part of the microwatershed with severe limitations of rooting condition and gravelliness.

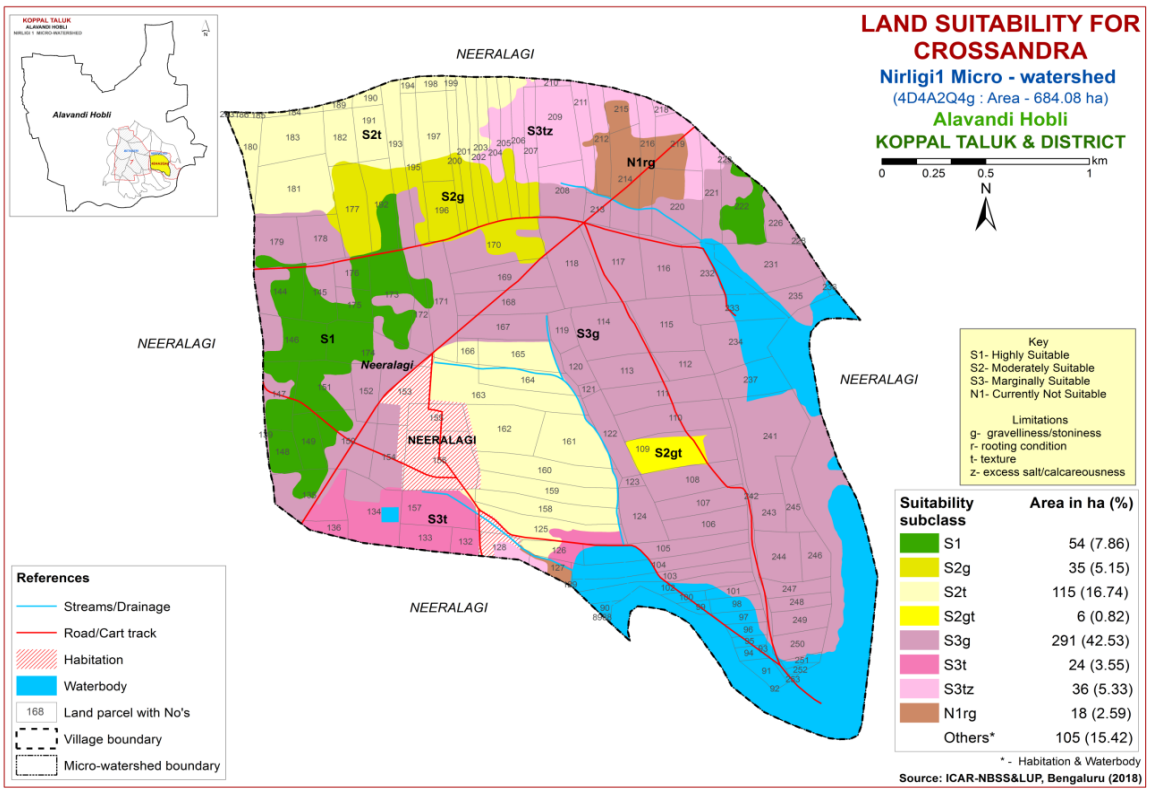


Fig. 7.31 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Nirligi-1 Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC	ESP	CEC [Cmol (p^+) kg^{-1}]	BS (%)
					Surf-ace	Sub-surface	Sur-face	Sub-surface								
BGTmB1g2	662	90	WD	<25	c	gc	35-60	>35	<50	1-3	Slight	8.4	0.15	1.11	44.84	-
BGTmB2g1	662	90	WD	<25	c	gc	15-35	>35	<50	1-3	Moderate	8.4	0.15	1.11	44.84	-
LKRcB2g1	662	90	WD	50-75	sl	gsc	15-35	40-0	50-100	1-3	Moderate	8.18	0.30	4.51	12.19	100
LKRcB2g2	662	90	WD	50-75	sl	gsc	35-60	40-60	50-100	1-3	Moderate	8.18	0.30	4.51	12.19	100
LKRiB2g1	662	90	WD	50-75	sc	gsc	15-35	40-60	50-100	1-3	Moderate	8.18	0.30	4.51	12.19	100
MKHcB2g2	662	90	WD	50-75	sl	gsc	35-60	>35	50-100	1-3	Moderate	7.38	0.09	1.49	14.84	93
BSRiB2g1	662	90	WD	75-100	sc	gsc	15-35	15-35	50-100	1-3	Moderate	6.59	0.12	6.00	8.80	77.55
MNLiB2	662	90	WD	100-150	sc	gsc	-	15-35	101-150	1-3	Moderate	7.89	0.13	5.04	9.01	100
MNLiB2g1	662	90	WD	100-150	sc	gsc	15-35	15-35	101-150	1-3	Moderate	7.89	0.13	5.04	9.01	100
MNLmB2g1	662	90	WD	100-150	c	gsc	15-35	15-35	101-150	1-3	Moderate	7.89	0.13	5.04	9.01	100
BPRcA1g1	662	90	WD	100-150	sl	gsc-gc	15-35	>35	51-100	0-1	Slight	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
BPRiB1	662	90	WD	100-150	sc	gsc-gc	-	>35	51-100	1-3	Slight	6.64	0.03	0.51	5.45	63.48
BPRiB1g1	662	90	WD	100-150	sc	gsc-gc	15-35	>35	51-100	1-3	Slight	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
GDPiB2	662	90	WD	100-150	sc	gsc-gc	-	35-60	51-100	1-3	Moderate	7.88	0.10	2.87	7.8	97
NSPmB2g1	662	90	MWD	75-100	c	c	15-35	-	101-150	1-3	Moderate	9.16	0.61	8.60	51.09	-
KVRmA1	662	90	MWD	100-150	c	c	-	-	>200	0-1	Slight	8.4	0.26	0.60	43.25	-
KVRmB2g1	662	90	MWD	100-150	c	c	15-35	-	>200	1-3	Moderate	8.4	0.26	0.60	43.25	-
KDTiB1	662	90	MWD	>150	sc	sc-c	-	-	>200	1-3	Slight	6.95	0.17	0.65	12.10	100
KDTmB2	662	90	MWD	>150	c	sc-c	-	-	>200	1-3	Moderate	6.95	0.17	0.65	12.10	100
AWDmB2	662	90	MWD	>150	c	c	-	<15	>200	1-3	Moderate	8.10	0.37	1.22	51.30	100
BDRmA1	662	90	MWD	>150	c	c	-	<15	>200	0-1	Slight	8.73	0.20	4.37	40.56	-
BDRmB1	662	90	MWD	>150	c	c	-	<15	>200	1-3	Slight	8.73	0.20	4.37	40.56	-
BDRmB2	662	90	MWD	>150	c	c	-	<15	>200	1-3	Moderate	8.73	0.20	4.37	40.56	-

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

Table 7.2 Land suitability criteria for Sorghum

Land use requirement			Rating			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N1)**
Climatic 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+)/K g				
	BS	%				
	CaCO3 in root zone	%		<5	5-10	10-15
	OC	%				
Rooting conditions	Effective soil depth	cm	>75	50-75	25-50	<25
	Stoniness	%				
	Coarse fragments	Vol %	<15	15-35	35-60	60-80
Soil toxicity	Salinity (EC saturation extract)	dS/m	<2	2-4	4-8	>8
	Sodicity (ESP)	%	5-10	10-15	>15	
Erosion hazard	Slope	%	0-3	3-5	5-10	>10

Table 7.3 Land suitability criteria for Maize

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

Table 7.4 Land suitability criteria for Bajra

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

Table 7.5 Land suitability criteria for Groundnut

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

Table 7.6 Land suitability criteria for Sunflower

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

Table 7.7 Land suitability criteria for 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 7.8 Land suitability criteria for Bengal gram

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

Table 7.9 Land suitability criteria for Cotton

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

Table 7.10 Land suitability criteria for Chilli

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

Table 7.11 Land suitability criteria for Tomato

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

Table 7.12 Land suitability criteria for Brinjal

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

Table 7.13 Land suitability criteria for Onion

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

Table 7.14 Land suitability criteria for Bhendi

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

Table 7.15 Land suitability criteria for Drumstick

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

Table 7.16 Land suitability criteria for Mango

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

Table 7.17 Land suitability criteria for Guava

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

Table 7.18 Land suitability criteria for Sapota

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

Table 7.19 Land suitability criteria for Pomegranate

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

Table 7.20 Land suitability criteria for Musambi

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

Table 7.21 Land suitability criteria for Lime

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

Table 7.22 Land suitability criteria for Amla

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

Table 7.23 Land suitability criteria for Cashew

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

Table 7.24 Land suitability criteria for Jackfruit

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

Table 7.25 Land suitability criteria for Jamun

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

Table 7.26 Land suitability criteria for Custard apple

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

Table 7.27 Land suitability criteria for Tamarind

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

Table 7.28 Land suitability criteria for Mulberry

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

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

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 24 soil map units identified in Nirligi-1 Microwatershed have been grouped into 5 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 five Land Management Units along with brief description of soil and site characteristics are given below.

LMU	Soil map unit number	Mapping unit	Soil and site characteristics
1	424, 428, 430, 433, 401, 405, 386, 390, 363	AWDmB2, BDRmA1, BDRmB1, BDRmB2, KDTiB1, KDTmB2, KVRmA1, KVRmB2g1, NSPmB2g1	Moderately deep to very deep black calcareous clay soils
2	221, 231, 237, 238, 239, 269	BPRcA1g1, BPRhB2g1, BPRiB1, BPRiB1g1, BPRiB2, GDPiB2	Deep, red gravelly sandy clay to clay soils
3	208, 209, 210,168	MNLiB2, MNLiB2g1, MNLmB2g1, BSRiB2g1	Moderately deep to deep red sandy clay to clay soils
4	43, 44, 54,78	LKRcB2g1, LKRcB2g2, LKRiB2g1, MKHcB2g2	Moderately shallow, red gravelly sandy clay to sandy clay soils
5	8,10	BGTmB1g2, BGTmB2g1	Very shallow, black gravelly calcareous clay soil

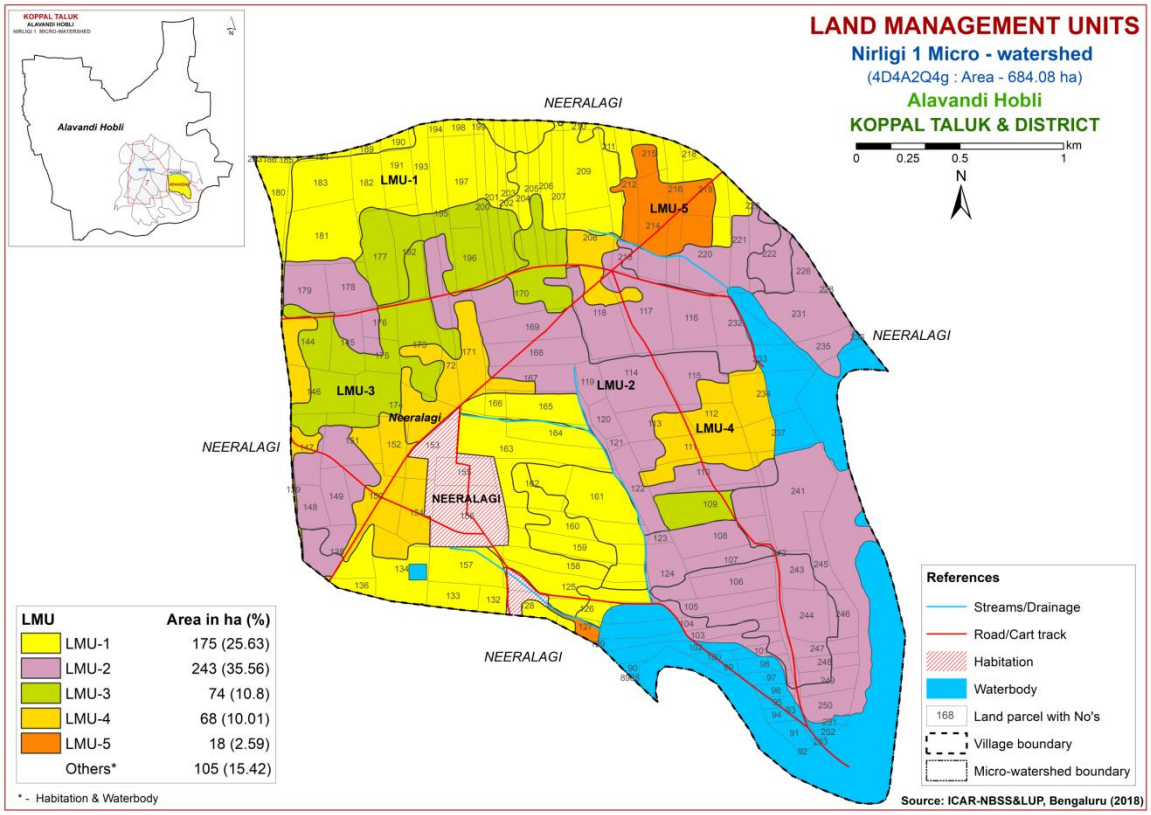


Fig 7.32 Land Management Units map of Nirligi-1 Microwatershed

7.33 Proposed Crop Plan for Nirligi-1 Microwatershed

After assessing the land suitability for the 31 crops, the proposed crop plan has been prepared for the 5 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 31 crops. The resultant proposed crop plan is presented in Table 7.33.

Table 7.33 Proposed Crop Plan for Nirligi-1 Microwatershed

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 1 175 ha (26%)	424.AWDmB2 428.BDRmA1 430.BDRmB1 433.BDRmB2 401.KDTiB1 405.KDTmB2 386.KVRmA1 390.KVRmB2g1 363.NSPmB2g1	**Neeralagi:**125,126,132,133,134,136,157,158,159,160,161,162,163,164,165,166,180,181,182,183,184,185,186,189,190,191,193,194,195,197,198,199,201,203,204,206,207,209,210,211,218,219, 223	Moderately deep to very deep black calcareous clay soils	Maize, Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra, Soybean	**Fruit crops:** Sapota, Pomegranate, Jamun, Lime, Musambi, Tamarind, Amla, Custard apple **Vegetables:** Drumstick, Chilli, Coriander, Tomato, Bhendi **Flowers:** Marigold, Chrysanthemum, Crossandra, Jasmine	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
LMU 2 243 ha (36%)	221.BPRcA1g1 231.BPRhB2g1 237.BPRiB1 238.BPRiB1g1 239.BPRiB2 269.GDPiB2	**Neeralagi:**101,105,106,107,108,110,113,114,115,116,117,118,119,120,121,122,123,124,135,147,148,149,151,167,168,169,178,179,213,220,221,222,226,228,231,232,235,241,242,243,244,245,246,247,248,249,250	Deep, red gravelly sandy clay to clay soils	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)
LMU 3 74 ha (11%)	208.MNLiB2 209.MNLiB2g1 210.MNLmB2g1 168.BSRiB2g1	**Neeralagi:**109,144,145,146,170,173,174,175,176,177, 1	Moderately deep to deep red sandy clay to clay soils	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram,	**Fruit crops:** Mango, Pomegranate, Guava, Sapota, Jackfruit, Jamun, Tamarind, Lime, Musambi, Amla, Custard apple, Cashew **Vegetable crops:**	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
				Cowpea, Field bean, Castor, Mulberry	Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold, Chrysanthemum, Jasmine, Crossandra	
LMU 4 68 ha (10%)	43.LKRcB2g1 44.LKRcB2g2 54.LKRiB2g1 78.MKHcB2g2	**Neeralagi:**111,112,139,150,152,154,171,172,208,234	Moderately shallow, red gravelly sandy clay to sandy clay soils	Sorghum, Groundnut, Bajra, Castor	**Fruit crops:** Lime, Musambi, Amla, Cashew, Custard apple,	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
LMU 5 18 ha (3%)	8.BGTmB1g2 10.BGTmB2g1	**Neeralagi:**127,129,212,214,215,216	Very shallow, black gravelly calcareous clay soil	-	**Agri-Silvi-Pasture:***Styloxanthes hamata*, *Styloxanthes scabra*	Suitable soil and water conservation practices

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 Nirligi-1 Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Balapur (BPR) 222 ha (32.53%), Mornal (MNL) 68 ha (10%), Bardur (BDR) 64 ha (9%), Lakkur (LKR) 61 ha (9%), Kadagathur (KDT) 51 ha (7%), Narasapura (NSP) 24 ha (6%), Kavalur (KVR) 24 ha (3%), Giddadapalya (GDP) 21 ha (3%), Belagatti (BGT) 17 ha (3%), Alawandi (AWD) 13 ha (2%), Mukhadahalli (MKH) 6 ha (1%) and Bisarahalli (BSR) occupy an area of about 6 ha (1%) in the microwatershed.

- As per land capability classification, entire area in the microwatershed falls under arable land category (Class II, III, & IV). The major limitations identified in the arable lands were soil and erosion.
- On the basis of soil reaction, a minor area of 0.46 ha (<1%) is slightly acid (pH 6.0-6.5), 35 ha (5%) is neutral (pH 6.5-7.3), a major area of 301 ha (44%) is slightly alkaline (pH 7.3-7.8), 189 ha (28%) is moderately alkaline (pH 7.8-8.4) and about 53 ha (8%) is strongly alkaline (pH 8.4-9.0) in the microwatershed. Entire area in the microwatershed is neutral to alkaline in reaction.

Soil Health Management

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

Acid soils

Slightly acid soils cover an area of 0.46 ha.

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

Slightly to strongly alkaline soils cover an entire cultivated area of 543 ha.

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 35 ha area in the microwatershed.

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

3. Application of 100 per cent RDF.
4. Need based micronutrient applications.

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

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 684 ha area in the microwatershed, an area of about 132 ha (19%) is suffering from slight erosion and 447 ha (65%) is suffering from moderate erosion. The areas suffering from moderate erosion need immediate soil and water conservation and, other land development and land husbandry practices for restoring soil health.

Dissemination of Information and Communication of Benefits

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

Inputs for Net Planning (Saturation Plan) and Interventions needed

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

1. Soil and Water Conservation Treatment 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 Nirligi-1 Microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in 14 ha (2%), medium (0.5-0.75%) in 297 ha (43%) and high (>0.75%) in 268 ha (39%). The areas that are low and medium in OC needs to be further improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.
- **Promoting green manuring:** Growing of green manuring crops costs Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in the area where OC is low and medium. 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:** An area of about 5 ha (1%) is low (<23 kg/ha), 515 ha (75%) is medium (23-57 kg/ha) in available phosphorus. Hence for all the crops, 25% additional P-needs to be applied where it is low and medium. It is high (>57 kg/ha) in an area of about 58 ha (9%) in the microwatershed.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in 176 ha (26%) and high (>337 kg/ha) in 403 (59%) in the microwatershed. Additional 25% potassium needs to be applied in areas where it is medium.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. Available sulphur is low (<10 ppm) in 391 ha (57%) and medium (10-20 ppm) in 185 ha (27%) in the microwatershed. These areas 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. It is high (>20 ppm) in 3 ha (<1%) in the microwatershed.
- **Available Boron:** An area of about 3 ha (<1%) is low (<0.5 ppm) and 575 ha (84%) is medium (0.5-1.0 ppm) in available boron content. The areas that are low and

medium need to be applied with sodium borate @ 10 kg/ha as soil application or 0.2% borax as foliar spray to correct the deficiency. It is high (>1.0 ppm) in .0001 ha (<1%) in the microwatershed.

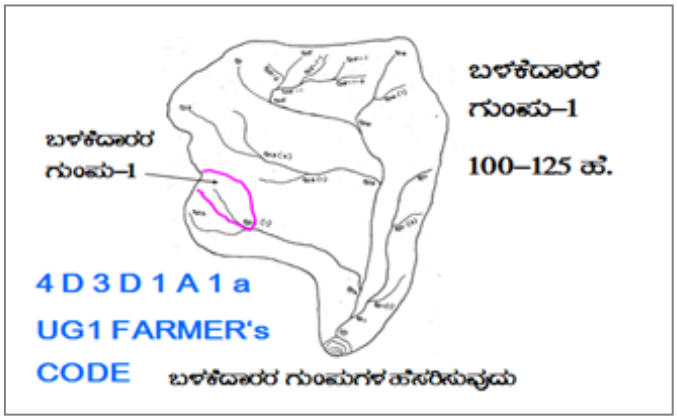
- **Available Iron:** An area of 356 ha (52%) is deficient (<4.5 ppm) in available iron in the microwatershed. To manage iron deficiency, iron sulphate@25 kg/ha needs to be applied for 2-3 years in the deficient areas. It is sufficient (>4.5 ppm) in an area of 222 ha (32%) in the microwatershed.
- **Available Manganese:** Entire area in the microwatershed is sufficient (>1.0 ppm) in available manganese.
- **Available Copper:** Entire area is sufficient (>0.2 ppm) in available copper in the microwatershed.
- **Available Zinc:** An area of 329 ha (48%) is deficient (<0.6 ppm) in available zinc content in the microwatershed. Application of zinc sulphate @ 25 kg/ha is to be followed in areas that are deficient in available zinc. It is sufficient (>0.6 ppm) in an area of 249 ha (36%) in the microwatershed.
- **Soil Acidity:** The microwatershed has 0.46 ha (<1%) area with soils that are slightly acid. These areas need application of lime (Calcium Carbonate).
- **Soil Alkalinity:** Maximum area of the microwatershed has 543 ha (79%) soils that are slightly to strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land suitability for various crops:** Areas that are highly, moderately and marginally suitable 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 Nirligi-1 Microwatershed, the land resource inventory database generated under Sujala-III project has been transformed as information through series of interpretative (thematic) maps using soil phase map as a base. The various thematic maps (1:7920 scale) generated were

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



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

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

Steps for Survey and Preparation of Treatment Plan

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

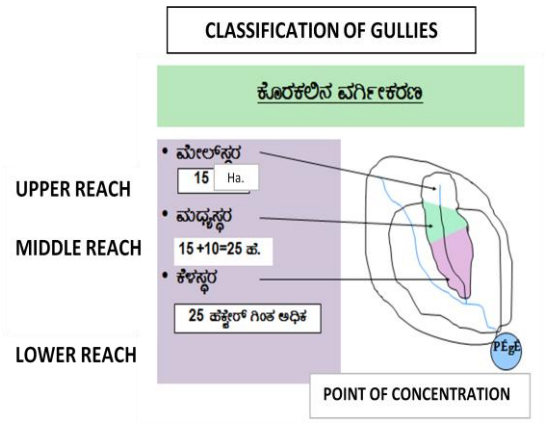
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

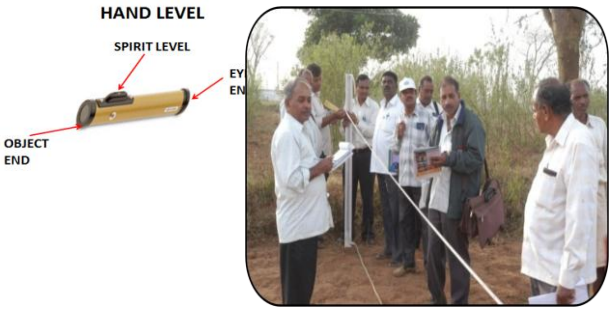
9.1.1 Arable Land Treatment

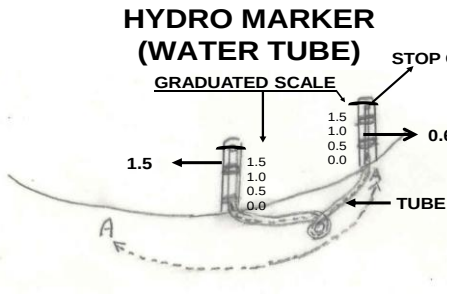
A. BUNDING

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

Measurement of Land Slope

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





FALL: 1.5 - 0.6 = 0.9 m.

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

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

Note: i) The above intervals are maximum.

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

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

Section of the Bund

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

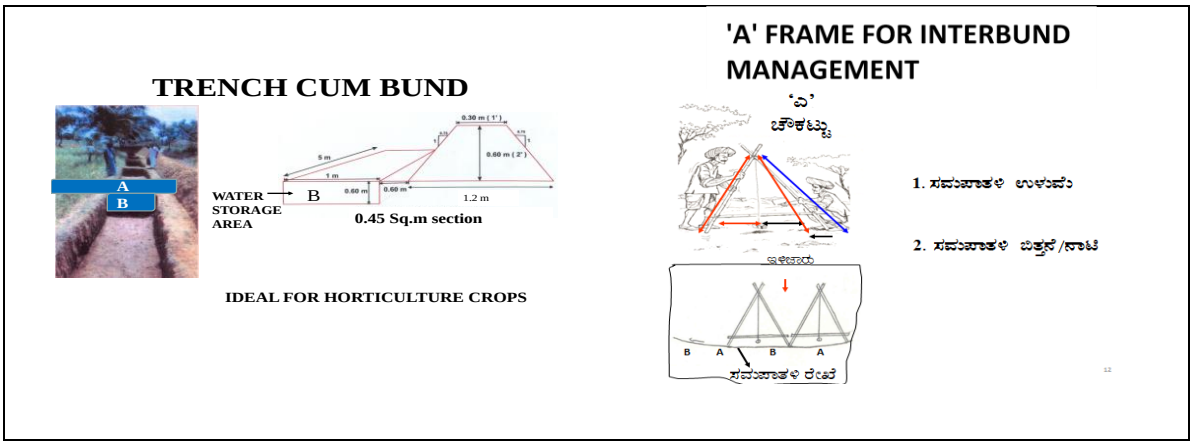
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below



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

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

B. Waterways

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

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

c) The design details are given in the Manual.

C. Farm Ponds

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

D. Diversion channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 373 ha (55%) requires Trench cum Bunding, 177 ha (26%) requires Graded bunding and 28 ha (4%) requires in Strengthening of existing bunds/bunding in the microwatershed. The conservation plan prepared may be presented to all the stakeholders including farmers and after including their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

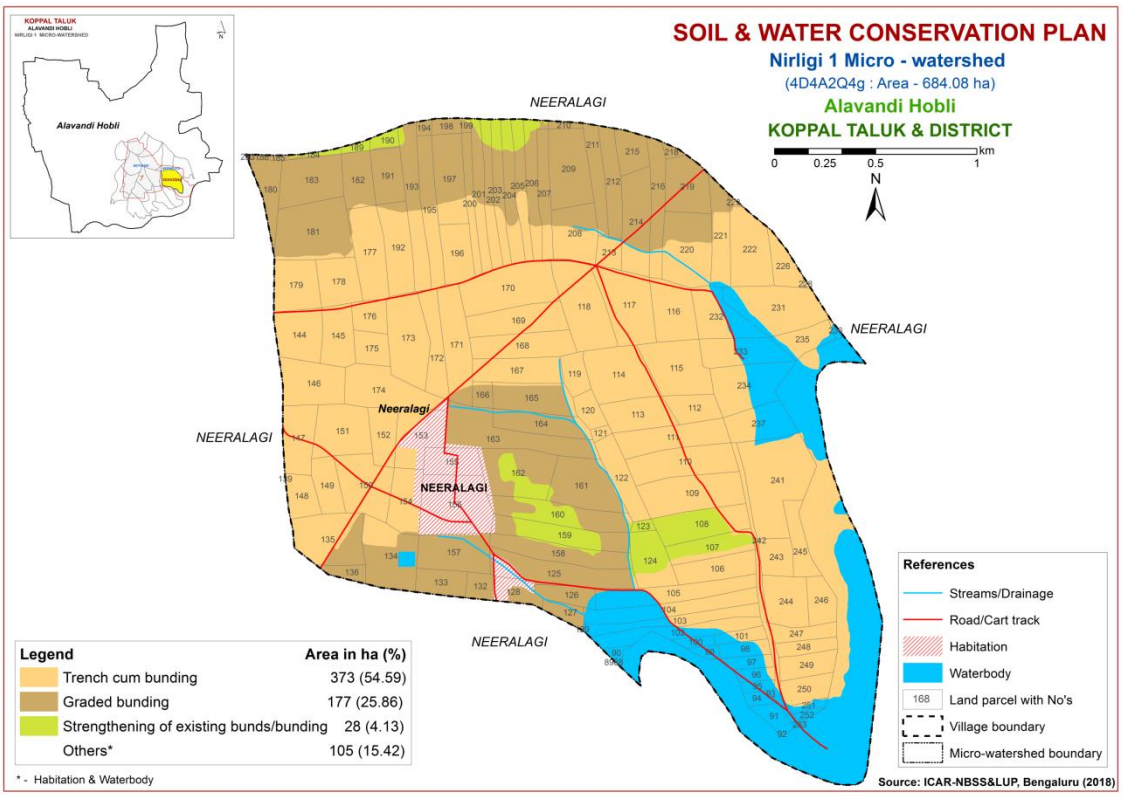


Fig. 9.1 Soil and Water Conservation Plan map of Nirligi-1 Microwatershed

9.3 Greening of Microwatershed

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

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

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

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

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

Nirligi-1 (2Q4g) 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
Neeralagi	88	0.14	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	89	0	Waterbody	Others	Others	Others	Others	Others	Others	Others	Redgram (Rg)	Not Available	Others	Others
Neeralagi	90	0.48	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	91	1.73	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	92	0.05	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	93	0.12	Waterbody	Others	Others	Others	Others	Others	Others	Others	Greengram (Gg)	Not Available	Others	Others
Neeralagi	94	0.89	Waterbody	Others	Others	Others	Others	Others	Others	Others	Greengram (Gg)	Not Available	Others	Others
Neeralagi	95	0.84	Waterbody	Others	Others	Others	Others	Others	Others	Others	Greengram (Gg)	Not Available	Others	Others
Neeralagi	96	1.24	Waterbody	Others	Others	Others	Others	Others	Others	Others	Greengram (Gg)	Not Available	Others	Others
Neeralagi	97	1.43	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	98	1.83	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	99	0.77	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	100	0.92	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	101	1.5	BPRiB2	LMU-2	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
Neeralagi	102	5.13	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize+Cotton (Mz+Ct)	Not Available	Others	Others
Neeralagi	103	4.28	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize+Cotton (Mz+Ct)	Not Available	Others	Others
Neeralagi	104	6.19	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	105	6.68	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	Trench cum bunding
Neeralagi	106	4.48	BPRiB2	LMU-2	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
Neeralagi	107	4.47	BPRcA1g1	LMU-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Current fallow+Nigas (Cf+Ng)	Not Available	IIIs	Graded bunding
Neeralagi	108	6.35	BPRcA1g1	LMU-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Neeralagi	109	8.62	BSRiB2g1	LMU-3	Moderately deep (75-100 cm)	Sandy clay	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	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
Neeralagi	110	7.47	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	Trench cum bunding
Neeralagi	111	6.58	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Trench cum bunding
Neeralagi	112	3.22	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Nigas (Mz+Ni)	Not Available	IIes	Trench cum bunding
Neeralagi	113	4.99	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	2 Borewell	IIIes	Trench cum bunding
Neeralagi	114	8.04	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIIes	Trench cum bunding
Neeralagi	115	7.63	BPRiB2	LMU-2	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
Neeralagi	116	5.97	BPRhB2g1	LMU-2	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
Neeralagi	117	8.54	BPRhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	2 Borewell	IIIes	Trench cum bunding
Neeralagi	118	9.27	BPRhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cowpea (Mz+Cw)	2 Borewell	IIIes	Trench cum bunding
Neeralagi	119	2.34	BPRiB2	LMU-2	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
Neeralagi	120	2.02	BPRiB2	LMU-2	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
Neeralagi	121	0.55	BPRiB2	LMU-2	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
Neeralagi	122	4.42	BPRiB2	LMU-2	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
Neeralagi	123	0.59	BPRcA1g1	LMU-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Neeralagi	124	5.03	BPRcA1g1	LMU-2	Deep (100-150 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Current fallow (Cf)	Not Available	IIIs	Graded bunding
Neeralagi	125	8.19	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	126	2.55	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	127	1.74	BGTmB2g1	LMU-5	Very shallow (<25 cm)	Clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IVes	Graded bunding
Neeralagi	128	2.55	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	129	0.02	BGTmB2g1	LMU-5	Very shallow (<25 cm)	Clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IVes	Graded bunding
Neeralagi	132	1.79	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	133	3.1	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	134	8.12	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	135	8.21	BPRiB2	LMU-2	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

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
Neeralagi	136	1.42	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	139	0	MKHcB2g2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Trench cum bunding
Neeralagi	144	5.62	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Currentfallow+Maize+ Redgram (Cf+Mz+Rg)	Not Available	IIes	Trench cum bunding
Neeralagi	145	4.69	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	146	6.57	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	Trench cum bunding
Neeralagi	147	5.2	GDPiB2	LMU-2	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
Neeralagi	148	3.07	GDPiB2	LMU-2	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
Neeralagi	149	3.43	GDPiB2	LMU-2	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
Neeralagi	150	7.19	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cowpea (Mz+Cw)	Not Available	IIes	Trench cum bunding
Neeralagi	151	6.79	GDPiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIIes	Trench cum bunding
Neeralagi	152	3.65	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	153	6.22	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	1 Borewell	Others	Others
Neeralagi	154	4.87	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	155	3.73	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Neeralagi	156	9.83	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Neeralagi	157	6.51	NSPmB2g1	LMU-1	Moderately deep (75-100 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Bajra (Mz+Bj)	Not Available	IIes	Graded bunding
Neeralagi	158	6.08	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Cowpea (Cw)	Not Available	IIs	Graded bunding
Neeralagi	159	6.32	BDRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	160	7.21	BDRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	161	7.62	KDTmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	162	8.2	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	163	9.56	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	164	4.8	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	165	5.69	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Neeralagi	166	1.27	KDTiB1	LMU-1	Very deep (>150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Neeralagi	167	5.45	BPRiB2	LMU-2	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
Neeralagi	168	6.05	BPRiB2	LMU-2	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
Neeralagi	169	6.31	BPRiB2	LMU-2	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
Neeralagi	170	9.44	MNLmB2g1	LMU-3	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Cowpea (Mz+Cw)	2 Borewell	IIes	Trench cum bunding
Neeralagi	171	7.32	LKRcB2g1	LMU-4	Moderately shallow (50-75 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
Neeralagi	172	4.54	LKRcB2g1	LMU-4	Moderately shallow (50-75 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
Neeralagi	173	8.2	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	174	7.57	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	175	2.76	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Neeralagi	176	2.64	MNLiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Trench cum bunding
Neeralagi	177	6.83	MNLiB2g1	LMU-3	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
Neeralagi	178	4.65	BPRiB2	LMU-2	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
Neeralagi	179	5.47	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Cowpea (Cw)	2 Borewell	IIIes	Trench cum bunding
Neeralagi	180	3.46	BDRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIs	Graded bunding
Neeralagi	181	10.26	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	182	4.06	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Neeralagi	183	6.93	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Bengalgram (Bg)	Not Available	IIes	Graded bunding
Neeralagi	184	0.7	BDRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Bengalgram (Bg)	Not Available	IIs	Graded bunding
Neeralagi	185	0.1	BDRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bengalgram (Bg)	Not Available	IIs	Graded bunding
Neeralagi	186	0.28	BDRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Bengalgram (Bg)	Not Available	IIs	Graded bunding
Neeralagi	189	0.62	BDRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Maize+Bengalgram (Mz+Bg)	Not Available	IIs	Graded bunding
Neeralagi	190	1.11	BDRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Sugarcane+Current fallow (SC+Cf)	Not Available	IIs	Graded bunding
Neeralagi	191	4.03	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Neeralagi	192	6.15	MNLiB2g1	LMU-3	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
Neeralagi	193	6.52	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Bengalgram+Sugarcane (Bg+Sc)	Not Available	IIes	Graded bunding
Neeralagi	194	0.56	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sugarcane+Current fallow (SC+Cf)	Not Available	IIes	Graded bunding
Neeralagi	195	5.52	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Graded bunding
Neeralagi	196	4.29	MNLiB2g1	LMU-3	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
Neeralagi	197	6.61	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Graded bunding
Neeralagi	198	1.13	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Graded bunding
Neeralagi	199	0.34	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Graded bunding
Neeralagi	200	2.86	MNLiB2g1	LMU-3	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	Not Available	IIes	Trench cum bunding
Neeralagi	201	3.95	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Sunflower (Mz+SF)	Not Available	IIes	Graded bunding
Neeralagi	202	3.53	MNLiB2g1	LMU-3	Deep (100-150 cm)	Sandy clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Bengalgram (Mz+Bg)	Not Available	IIes	Trench cum bunding
Neeralagi	203	3.63	BDRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Graded bunding
Neeralagi	204	4.3	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIIes	Graded bunding
Neeralagi	205	3.68	MNLmB2g1	LMU-3	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Current fallow (Mz+Cf)	Not Available	IIes	Trench cum bunding
Neeralagi	206	4.25	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Sunflower (Mz+SF)	Not Available	IIIes	Graded bunding
Neeralagi	207	3.62	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Graded bunding
Neeralagi	208	5.93	LKRcB2g2	LMU-4	Moderately shallow (50-75 cm)	Sandy loam	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	2 Borewell	IIIes	Trench cum bunding
Neeralagi	209	7.55	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Graded bunding
Neeralagi	210	0.56	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIes	Graded bunding
Neeralagi	211	3.68	KVRmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Bajra (Mz+Bj)	Not Available	IIIes	Graded bunding
Neeralagi	212	4.18	BGTmB1g2	LMU-5	Very shallow (<25 cm)	Clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IVs	Graded bunding
Neeralagi	213	1.87	BPRhB2g1	LMU-2	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
Neeralagi	214	7.17	BGTmB1g2	LMU-5	Very shallow (<25 cm)	Clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	1 Borewell	IVs	Graded bunding
Neeralagi	215	3	BGTmB1g2	LMU-5	Very shallow (<25 cm)	Clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IVs	Graded bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Neeralagi	216	4.8	BGTmB1g2	LMU-5	Very shallow (<25 cm)	Clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IVs	Graded bunding
Neeralagi	218	0.51	AWDmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIe	Graded bunding
Neeralagi	219	5.62	AWDmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIIe	Graded bunding
Neeralagi	220	8.62	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Greengram (Mz+Gg)	Not Available	IIIes	Trench cum bunding
Neeralagi	221	4.69	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIes	Trench cum bunding
Neeralagi	222	7.13	GDPiB2	LMU-2	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
Neeralagi	223	0.22	AWDmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIIe	Graded bunding
Neeralagi	226	2.73	BPRhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Sugarcane (Mz+Sc)	Not Available	IIIes	Trench cum bunding
Neeralagi	228	0.11	BPRhB2g1	LMU-2	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Sugarcane (Mz+Sc)	Not Available	IIIes	Trench cum bunding
Neeralagi	231	9.22	BPRhB2g1	LMU-2	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
Neeralagi	232	5.74	BPRhB2g1	LMU-2	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
Neeralagi	233	5.45	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	234	7.48	LKRiB2g1	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Redgram (Mz+Rg)	Not Available	IIes	Trench cum bunding
Neeralagi	235	3.15	BPRhB2g1	LMU-2	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
Neeralagi	236	0.27	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	237	5.11	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	241	13.18	BPRiB1	LMU-2	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
Neeralagi	242	0.02	BPRiB1	LMU-2	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
Neeralagi	243	2.97	BPRiB2	LMU-2	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
Neeralagi	244	5.25	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Greengram (Mz+Gg)	Not Available	IIIes	Trench cum bunding
Neeralagi	245	3.28	BPRiB1	LMU-2	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
Neeralagi	246	3.03	BPRiB1	LMU-2	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
Neeralagi	247	2.44	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Onion (On)	Not Available	IIIes	Trench cum bunding
Neeralagi	248	2.04	BPRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Current fallow (Cf)	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
Neeralagi	249	3.15	BPRiB1	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Greengram (Gg)	Not Available	IIIs	Trench cum bunding
Neeralagi	250	3.06	BPRiB1	LMU-2	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Greengram (Gg)	Not Available	IIIs	Trench cum bunding
Neeralagi	251	0.77	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	252	0.45	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Neeralagi	253	0.06	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Betageri	253	0.03	BDRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Not Avalaible (NA)	Not Available	IIs	Graded bunding

Appendix II

Nirligi-1 (2Q4g) Microwatershed

Soil Fertility Information

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	88	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	89	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	90	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	91	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	92	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	93	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	94	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	95	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	96	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	97	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	98	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	99	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	100	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	101	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	102	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	103	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	104	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	105	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	106	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	107	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	108	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	109	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	110	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	111	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	112	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	113	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	114	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	115	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	116	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	117	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	118	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	119	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	120	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	121	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	122	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	123	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	124	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	125	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	126	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	127	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	128	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	129	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	132	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	133	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	134	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	135	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	136	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	139	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	144	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	145	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	146	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	147	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	148	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	149	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	150	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	151	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	152	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	153	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	154	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	155	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	156	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	157	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	158	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	159	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	160	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	161	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	162	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	163	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	164	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	165	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	166	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	167	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	168	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	169	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	170	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	171	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	172	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	173	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	174	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	175	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	176	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	177	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	178	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	179	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	180	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	181	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)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	182	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	183	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	184	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	185	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	186	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	189	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	190	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	191	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	192	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	193	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	194	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	195	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	196	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)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	197	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	198	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Low (< 23 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	199	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	200	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	201	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	202	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	203	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	204	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	205	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	206	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	207	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	208	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	209	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	210	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	211	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	212	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	213	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	214	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	215	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	216	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	218	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	219	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	220	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Neeralagi	221	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	222	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	223	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Neeralagi	226	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	228	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	231	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	232	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	233	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	234	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Others	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	235	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	236	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	237	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	241	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	242	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	243	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	244	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	245	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	246	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	High (> 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	247	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	248	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	249	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	250	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Neeralagi	251	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	252	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	253	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others

Village	Survey No	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Betageri	253	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Nirligi-1 (2Q4g) 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
Neeralagi	88	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
Neeralagi	89	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
Neeralagi	90	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
Neeralagi	91	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
Neeralagi	92	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
Neeralagi	93	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
Neeralagi	94	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
Neeralagi	95	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
Neeralagi	96	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
Neeralagi	97	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
Neeralagi	98	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
Neeralagi	99	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
Neeralagi	100	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
Neeralagi	101	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
Neeralagi	102	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
Neeralagi	103	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
Neeralagi	104	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
Neeralagi	105	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
Neeralagi	106	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
Neeralagi	107	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
Neeralagi	108	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
Neeralagi	109	S3r	S2tg	S2rg	S2g	S2rt	S2rg	S3r	S2rg	S2gt	S2rg	S2r	S1	S2rg	S1	S2rt	S2rg	S2rg	S2t	S2g	S2g	S2tg	S2tg	S2rg	S2g	S2tg	S2t	S1	S2gt	S2rg	S2r	S2t
Neeralagi	110	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
Neeralagi	111	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g

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
Neeralagi	112	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	113	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
Neeralagi	114	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
Neeralagi	115	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
Neeralagi	116	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
Neeralagi	117	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
Neeralagi	118	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
Neeralagi	119	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
Neeralagi	120	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
Neeralagi	121	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
Neeralagi	122	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
Neeralagi	123	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
Neeralagi	124	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
Neeralagi	125	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	126	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3t w	S2t w	S2t w	S2rt	S2t	S3t w	S2tz	S2tz	S3t	S2rt	S2t w	S3tz
Neeralagi	127	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	128	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Neeralagi	129	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	132	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3t w	S2t w	S2t w	S2rt	S2t	S3t w	S2tz	S2tz	S3t	S2rt	S2t w	S3tz
Neeralagi	133	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3t w	S2t w	S2t w	S2rt	S2t	S3t w	S2tz	S2tz	S3t	S2rt	S2t w	S3tz
Neeralagi	134	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3t w	S2t w	S2t w	S2rt	S2t	S3t w	S2tz	S2tz	S3t	S2rt	S2t w	S3tz
Neeralagi	135	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
Neeralagi	136	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3t w	S2t w	S2t w	S2rt	S2t	S3t w	S2tz	S2tz	S3t	S2rt	S2t w	S3tz
Neeralagi	139	N1r	S3rg	S3rg	S3rg	S3rg	S3g	N1r	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	144	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	145	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z

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
Neeralagi	146	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	147	S1	S1	S1	S1	S2t	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S2tg	S2g	S1	S1	S1	S2tg
Neeralagi	148	S1	S1	S1	S1	S2t	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S2tg	S2g	S1	S1	S1	S2tg
Neeralagi	149	S1	S1	S1	S1	S2t	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S2tg	S2g	S1	S1	S1	S2tg
Neeralagi	150	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	151	S1	S1	S1	S1	S2t	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S2tg	S2g	S1	S1	S1	S2tg
Neeralagi	152	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	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
Neeralagi	154	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	155	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
Neeralagi	156	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
Neeralagi	157	S3rt	S2tz	S3rt	S1	S3t	S1	S3rg	S2r	S1	S2r	S2t	S2gt	S3t	S1	N1t	S3rt	S2r	S3t	S3t	S3tw	S2tw	S2tw	S2rt	S2t	S3tw	S2tz	S2tz	S3t	S2rt	S2tw	S3tz
Neeralagi	158	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	159	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	160	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	161	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	162	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	163	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	164	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	165	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	166	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S2t	S3t
Neeralagi	167	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
Neeralagi	168	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
Neeralagi	169	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
Neeralagi	170	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	171	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	172	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g

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
Neeralagi	173	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	174	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	175	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	176	S2r	S1	S1	S1	S1	S2t	S2r	S1	S2t	S1	S1	S1	S1	S1	N1z	S2r	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2z	S2z	S1	S1	S1	S2z
Neeralagi	177	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	178	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
Neeralagi	179	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
Neeralagi	180	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	181	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	182	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	183	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	184	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	185	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	186	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	189	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	190	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	191	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	192	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	193	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	194	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	195	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	196	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	197	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	198	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	199	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	200	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	201	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Jasmine	Bhendi	Brinjal	Crossandra	Drumstick	Mulberry	Onion
Neeralagi	202	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	203	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S3t
Neeralagi	204	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	205	S2rg	S2g	S2g	S2g	S2g	S2g	S2rg	S2g	S2gt	S2g	S2g	S1	S2g	S1	N1z	S2rg	S2g	S1	S2g	S2g	S2g	S2g	S2g	S1	S2g	S2z	S2z	S2g	S2g	S1	S2z
Neeralagi	206	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	207	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	208	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g
Neeralagi	209	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	210	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	211	S2rz	S2tz	S3tz	S2zg	S3tz	S2zg	S2rz	S2zg	S2gz	S2z	S2gt	S2tz	S3tz	S2z	N1tz	S2rz	S2zg	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz
Neeralagi	212	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	213	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
Neeralagi	214	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	215	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	216	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1rg	N1r	N1r	N1rg	N1rg	N1rg	N1r
Neeralagi	218	S3tz	S2tz	S3tz	S2z	S3tz	S2z	S2tz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2tz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S3tz	S3tz
Neeralagi	219	S3tz	S2tz	S3tz	S2z	S3tz	S2z	S2tz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2tz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S3tz	S3tz
Neeralagi	220	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
Neeralagi	221	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
Neeralagi	222	S1	S1	S1	S1	S2t	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S2t	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S2tg	S2g	S1	S1	S1	S2tg
Neeralagi	223	S3tz	S2tz	S3tz	S2z	S3tz	S2z	S2tz	S2z	S2z	S2z	S2tz	S2tz	S3tz	S2z	N1tz	S2tz	S2z	S3tz	S3tz	S3tz	S2tz	S2tz	S2tz	S2tz	S3tz	S2tz	S2tz	S3tz	S2tz	S3tz	S3tz
Neeralagi	226	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
Neeralagi	228	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
Neeralagi	231	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
Neeralagi	232	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
Neeralagi	233	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
Neeralagi	234	N1rg	S3rg	S3rg	S3rg	S3rg	S3g	N1rg	S3rg	S2rt	S3rg	S3rg	S2rg	S3rg	S2rg	S3rg	S3rg	S3rg	S3rg	S3g	S3g	S3g	S3g	S3rg	S2rg	S3g	S3g	S3g	S3g	S3rg	S3rg	S3g

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
Neeralagi	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
Neeralagi	236	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
Neeralagi	237	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
Neeralagi	241	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
Neeralagi	242	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
Neeralagi	243	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
Neeralagi	244	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
Neeralagi	245	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
Neeralagi	246	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
Neeralagi	247	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
Neeralagi	248	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
Neeralagi	249	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
Neeralagi	250	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
Neeralagi	251	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
Neeralagi	252	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
Neeralagi	253	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
Betageri	253	S3t	S2t	S3t	S1	S3t	S1	S2t	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2t	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S3t

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE STUDY

- *Results indicated that 35 farmers were sampled in Nirligi-1 micro watershed among them 4 (11.43 %) were marginal farmers, 10 (28.57 %) were small farmers, 3 (8.57 %) were semi medium farmers, 12 (34.29%) were medium farmers, 1(2.86%) was large farmer and 5 (14.29 %) landless farmers were also interviewed for the survey.*
- *The data indicated that there were 170 population households in the studied micro watershed. Among them 85 (50%) men and 85(50 %) were women. The average family size of landless, marginal, small and large farmers was 5, semi medium and medium farmer was 6.*
- *The data indicated that 39 (22.94%) people were in 0-15 years of age, 73 (42.94 %) were in 16-35 years of age, 51 (30 %) were in 36-60 years of age and 7 (4.12%) were above 61 years of age.*
- *The results indicated that the Nirligi-1 had 23.53 per cent illiterates, 32.35 per cent of them had primary school education, 11.18 per cent of them had middle school, 11.76 per cent of them had high school education, 12.94 per cent of them had PUC education, 1.18 per cent of them had diploma and ITI education, 4.12 per cent of them had degree education and 0.59 per cent them had masters.*
- *The results indicated that, 71.43 per cent of households practicing agriculture, 20 per cent of the household heads were agricultural labour and 2.86 per cent of them were general labour, in government service and housewives respectively.*
- *The results indicated that agriculture was the occupation for 51.18 per cent of the household members, 10.59 per cent were agricultural labourers, 0.59 per cent of them were general labour, in government service, housewives and children's respectively. 4.71 per cent were in private service and 30 per cent were students. In case of landless farmers, 45.45 per cent were agricultural labour and students respectively. In case of marginal farmers 55 per cent were agriculturist, 10 percent was in private service and 25 per cent were students. In case of small farmers 65.79 per cent of them were agriculturist, 2.63 per cent of them were private service and 31.58 per cent of them were students. In case of semi medium farmers 64.71 per cent of the family members were agriculturist, 11.76 per cent were in private service and 23.53 per cent of them were students. In case of medium farmers 56.52 per cent of the family members were agriculturist, 10.14 per cent of them were general labours, 1.14 per cent were in government service, 4.35 per cent were in private service and 26.09 per cent were students. In case of large farmers 25 per cent of the family members were agriculturist, agriculture labour and 50 per cent of them were students.*

- *The results showed that 1.76 per cent of the household participated in self help group, 0.59 per cent of the households participated in user group and 97.65 per cent of them have not participated in any local institutions.*
- *The results indicated that 34.29 per cent of the households possess Katcha house, 42.86 per cent of the household possess thatched house and 22.86 per cent of the households possess Pucca house.*
- *The results showed that, 94.29 per cent of the households possess TV, 91.43 per cent of the households possess Mixer grinder, 34.29 per cent of the households possess bicycle, 42.86 per cent of the household possess motor cycle and 100 per cent of the households possess mobile.*
- *The results showed that the average value of television was Rs.4757; the average value of television was mixer grinder was Rs.1312, the average value of television was bicycle was Rs. 1333, the average value of television was motor cycle was Rs.34333 and the average value of television was mobile phone was Rs.1569.*
- *Data showed that 25.71 per cent of the households possess bullock cart, 31.43 per cent of them possess plough, 2.86 per cent of the households possess power tiller and tractor, 17.14 per cent of the households possess sprayer, 100 per cent of the households possess weeder, 2.86 per cent of them possess thresher and 11.43 per cent of them possess chaff cutter.*
- *The results showed that the average value of bullock cart was Rs.18222; the average value of plough was Rs. 970, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 600000, the average value of sprayer was Rs. 4666, the average value of weeder was Rs.30, the average value of thresher was Rs.15000 and the average value of chaff cutter was Rs. 3000.*
- *The results indicated that, 34.29 per cent of the households possess bullocks, 20 per cent of the households possess local cow and 2.86 per cent of the household possess cross bread cow and buffalo respectively.*
- *The results indicated that, average own labour men available in the micro watershed was 1.67, average own labour (women) available was 1.47, average hired labour (men) available was 10.87 and average hired labour (women) available was 10.77.*
- *In case of marginal farmers, average own labour men available was 1.75, average own labour (women) was also 1.25, average hired labour (men) was 9.50 and average hired labour (women) available was 8.50. In case of small farmers, average own labour men available was 1.20, average own labour (women) was 1.40, average hired labour (men) was 15.40 and average hired labour (women) available was 14.40. In case of semi medium farmers, average own labour men available was 1.67, average own labour (women) was 1.33, average hired labour (men) was 14 and average hired labour (women) available was also 14. In medium farmers average own labour men available was 2.08, average own labour*

(women) was 1.67, average hired labour (men) was 7.08 and average hired labour (women) available was 7.92. In large farmers average own labour men available was 1, average own labour (women) was 1, average hired labour (men) was 7 and average hired labour (women) available was 8.

- *The data showed that, in case of landless farmers 20 per cent of the household possess bullock and local cow. In case of marginal farmers, 25 per cent of the households possess bullock. In case of small farmers, 50 per cent of households possess bullock. In case of semi medium farmers, 33.33 per cent of the households possess cross bread cow. In medium farmers, 41.67 per cent of the households possess bullock, 50 per cent of the household possess local cow and 8.33 per cent of the household possess buffalo.*
- *The results indicated that, 88.57 per cent of the household opined that hired labour was adequate.*
- *The results indicated that, households of the Nirligi-1 micro watershed possess 29.29 ha (43.12%) of dry land and 38.64 ha (56.88%) of irrigated land. Marginal farmers possess 2.65 ha (84.52 %) of dry land and 0.49ha (15.48%) of irrigated land. Small farmers possess 12.90 ha (94.10 %) of dry land and 0.81 ha (5.90%) of irrigated land. Semi medium farmers possess 0.41 ha (11.31%) of dry land and 3.24 ha (88.69%) of irrigated land. Medium farmers possess 4.48 ha (12.55%) of dry land and 31.21 ha (87.45%) of irrigated land and large farmers possess 8.85 ha (75.33%) of dry land and 2.90 ha (24.67 %) of irrigated land.*
- *The results indicated that, the average value of dry land was Rs. 225,259.29 and average value of irrigated was Rs. 408,356.92. In case of marginal famers, the average land value was Rs. 527,938.93 for dry land and Rs. 1,029,166.63 for irrigated land. In case of small famers, the average land value was Rs. 186,005.65 for dry land and Rs. 741,000 for irrigated land. In case of semi medium famers, the average land value was Rs. 1,937,254.94 for dry land and was Rs. 586,625 for irrigated land. In case of medium famers, the average land value was Rs. 178,501.79 for dry land and was Rs. 371,573.08 for irrigated land. In large farmers the average land value was Rs. 135,590.12 for dry land and Rs. 172,486.04 for irrigated land.*
- *The results indicated that, there were 10 functioning and 3 de-functioning bore wells in the micro watershed.*
- *The results indicated that, bore well was the major irrigation source for 28.57 per cent of the farmers, 5.71 per cent of households were using canal as a source of irrigation and 2.86 per cent of the farmers were using tank for irrigation.*
- *The results indicated that, in case of marginal farmers there was 0.49 ha of irrigated land and semi medium farmers were having 1.21 ha of irrigated land and medium farmers having 28.57 ha irrigated land. On an average there were 30.57 ha of irrigated land.*

- *The results indicated that, farmers have grown bajra (4.20 ha), cotton (6.88 ha), groundnut (5.75 ha), maize (30.73 ha), navane (2.43 ha), onion (3.32 ha), red gram (1.34 ha) and sunflower (0.81 ha) in kharif season. Marginal and small farmers have grown groundnut, maize, onion and sunflower. Semi medium farmers have grown bajra, cotton and onion. Medium farmers have grown bajra, cotton, groundnut, maize and onion. Large farmers have grown bajra and navane.*
- *The results indicated that, the cropping intensity in Nirligi-1 micro watershed was found to be 72.63 per cent. In case of marginal and small farmers cropping intensity was 100 per cent, in case of semi medium farmers it was 99.56 per cent, in medium farmers it was 61.06 per cent and in case of large farmers it was 74.53 per cent.*
- *The results indicated that, 100 per cent of the households have bank account and 42.86 per cent of having savings. Among land less farmers 100 per cent of the household possess bank account; marginal farmers 100 percent of them possess both bank account and 75 per cent of the household possess savings. 100 per cent of small, farmers possess per cent of bank account and 90 per cent possess savings, in semi medium farmers 100 per cent of the farmers possess bank account and 66.67 per cent savings, in case of medium farmers 100 per cent of the farmers possess bank account and 8.33 per cent of them possess savings and large category of farmers possess 100 per cent of bank account.*
- *The results indicated that, 100 per cent of marginal, small, semi medium and large farmers and 66.67 per cent of the medium farmers have borrowed credit from different sources.*
- *The results indicated that, 23.08 per cent have availed loan in commercial bank, 3.85 per cent have availed loan from Cooperative Bank, money lender and SHGs/CBOs respectively. 38.46 per cent have availed loan from Grameena bank and 15.38 per cent of the household's availed loan from friends/relatives.*
- *The results indicated that, marginal, small, semi medium, medium and large farmers have availed Rs. 130000, Rs. 79000, Rs. 178333.33, Rs. 66,250 and Rs.50000 respectively. Overall average credit amount availed by households in the micro watershed is 94807.69.*
- *The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.*
- *The results indicated that, 85.71per cent of the households have borrowed loan for agriculture production and 14.29 per cent of the household barrowed money for household consumption.*
- *. Results indicated that 82.35 percent of the households have unpaid their institutional loan and 17.65 per cent of them fully paid their institutional loan.*

- *Results indicated that 14.29 percent of the households have partially paid their private credit and 85.71 per cent of the households have unpaid their private credit.*
- *The results indicated that 23.53 per cent of the households were opined that they were helped to perform timely agricultural operations and 11.76 per cent opined that higher rate of interest.*
- *The results indicated that 14.29 per cent of the households were opined that loan amount was adequate to fulfill the requirement and 28.57 per cent opined that higher rate of interest.*
- *The results indicated that, the total cost of cultivation for bajra was Rs. 34996.06. The gross income realized by the farmers was Rs. 26639.98. The net income from bajra cultivation was Rs. -8356.08. Thus the benefit cost ratio was found to be 1:0.76.*
- *The results indicated that, the total cost of cultivation for cotton was Rs. 27652.39. The gross income realized by the farmers was Rs. 94691.73. The net income from cotton cultivation was Rs. 67039.34. Thus the benefit cost ratio was found to be 1:3.42.*
- *The results indicated that, the total cost of cultivation for groundnut was Rs. 30764.01. The gross income realized by the farmers was Rs. 50101.70. The net income from groundnut cultivation was Rs. 19337.69. Thus the benefit cost ratio was found to be 1:1.63.*
- *The results indicated that, the total cost of cultivation for maize was Rs. 161340.12. The gross income realized by the farmers was Rs. 30924.25. The net income from maize cultivation was Rs. -130415.87. Thus the benefit cost ratio was found to be 1:0.19.*
- *The results indicated that, the total cost of cultivation for navane was Rs. 11505.44. The gross income realized by the farmers was Rs. 22230. The net income from navane cultivation was Rs. 10724.56. Thus the benefit cost ratio was found to be 1:1.93.*
- *The results indicated that, the total cost of cultivation for red gram was Rs. 19733.93. The gross income realized by the farmers was Rs. 38835.54. The net income from red gram cultivation was Rs. 19101.62. Thus the benefit cost ratio was found to be 1:1.97.*
- *The results indicated that, the total cost of cultivation for onion was Rs. 37429.69. The gross income realized by the farmers was Rs. 104434.69. The net income from onion cultivation was Rs. 67005. Thus the benefit cost ratio was found to be 1:2.79.*
- *The results indicated that, the total cost of cultivation for sunflower was Rs. 26987.81. The gross income realized by the farmers was Rs. 50388. The net*

income from sunflower cultivation was Rs. 23400.19. Thus the benefit cost ratio was found to be 1:1.87.

- *The results indicated that, 57.14 per cent of the households opined that dry fodder was adequate and 8.57 per cent of the households opined that green fodder was adequate.*
- *The table indicated that the in case of landless farmers the average annual income from wage was Rs.28000 and dairy farm was Rs.600, in marginal farmers, average income from service/salary was Rs.3750, business was Rs.60000, wage was Rs.27500 and agriculture Rs. 46950. In case of small farmers the average income from wage was Rs. 81700 and agriculture was Rs.47610. In semi medium farmers the average income from service/salary was Rs.33333.33, wage was Rs.6000 and agriculture was Rs.97666.67. Medium farmer's average income from service/salary was Rs.5000, business was Rs.1666.67, wage was Rs.15666.67, agriculture was Rs.99166.67 and dairy farm was Rs.4416.67. Similarly in large farmers the average income from wage was Rs.20000 and agriculture was Rs.110000.*
- *The results indicated that, in case of marginal, the average annual expenditure from business was Rs. 170000 and agriculture was Rs.26750. In case of small farmers the average annual expenditure from agriculture was Rs. 25300. In case of semi medium farmers the average expenditure from agriculture was Rs.55666.67 and dairy farm was Rs. 17000. In medium farmers the average annual expenditure from business was Rs.12000 and agriculture was Rs.45818.18.In large farmers the average expenditure from agriculture was Rs. 50000.*
- *The results indicate that, households have an average additional investment capacity of Rs. 3285.71 for land development and Rs. 1600 in irrigation facility, Rs.1742.86 for improved crop production and Rs.142.86 for improved livestock management. Marginal farmers have an average additional investment capacity of Rs. 2500 for land development and Rs. 2000 in improved crop production. Medium farmers have an average additional investment capacity of Rs.7500 for land development, Rs.4000 for irrigation facility, Rs. 4416.67 for improved crop production and Rs. 416.67 for improved livestock management. Large farmers have an average additional investment of Rs.15000 for land development and have an investment capacity of Rs. 8000 for irrigation facility.*
- *The results indicated that for 5.71 per cent and 20 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 14.29 per cent of household were dependent on loan from the bank and 5.71 per cent of the household were dependent on soft loan. 11.43 per cent of the household were depending on loan from bank and soft loan for*

improved crop production respectively. 2.86 per cent of the household were dependent on loan from bank for improved livestock management.

- *The results indicated that, bajra, cotton, groundnut, navane, onion, red gram and sunflower crops were sold to the extent of 100 per cent. Only maize was sold to the extent of 93.79 per cent.*
- *The results indicated that, 88.57 percent of the households have sold their produce to local/village merchant and 22.86 percent of the households have sold their produce to regulated market.*
- *The results indicated that, 100 per cent of households used tractor as a mode of transport.*
- *The results indicated that, 85.71 per cent of the households have shown interest in soil testing.*
- *The results indicated that, 42.86 per cent of the households have experienced the soil and water erosion problems i.e. 25 percent of marginal farmers, 33.33 per cent of semi medium farmers, 100 percent of medium farmers and 100 per cent of the large farmers.*
- *The results indicated that, 91.43 percent of the household used fire wood as a source of fuel, 2.86 per cent of the household used kerosene and 25.71 per cent of the household used LPG as source of fuel.*
- *The results indicated that, piped supply was the major source of drinking water for 60 per cent of the households and 40 per cent of the household were using bore well as a source of drinking water.*
- *The results indicated that, electricity was the major source of light for 100 per cent of the households.*
- *The results indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility.*
- *The results indicated that, 100 per cent of the sampled household's possessed BPL card.*
- *The results indicated that, 91.43 per cent of the households participated in NREGA programme which included 20 per cent of the landless and 100 percent of the marginal, small, semi medium, medium farmers and large farmers.*
- *The results indicated that, cereals and pulses were adequate for 97.14 per cent of the household respectively. Oilseed were adequate for 2.86 per cent of the households, vegetables were adequate for 77.14 per cent of the households, milk were adequate for 88.57 per cent of the households, egg were adequate for 57.14 per cent of the households and meat were adequate for 25.71 per cent of the household.*

- *The results indicated that, cereals and pulses were inadequate for 2.86 per cent of the household. Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 57.14 per cent, 22.86 per cent, 74.29 per cent, 5.71 per cent, 42.86 per cent and 71.43 per cent of the household respectively.*
- *. The results indicated that, oilseed and fruits were inadequate for 40 per cent and 25.71 per cent of the household respectively.*
- *The results indicated that, Lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (68.57%), frequent incidence of pest and diseases (54.29%), inadequacy of irrigation water (57.14%), high cost of Fertilizers and plant protection chemicals (48.57%), high rate of interest on credit (48.57%), low price for the agricultural commodities (77.14%), lack of marketing facilities in the area (62.86%), inadequate extension services (57.14 %), lack of transport for safe transport of the agricultural produce to the market (48.57%) and less rain fall (11.43%) .*

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 Jains. 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. It consists of four taluks namely Koppal, Gangavathi, Kushtagi and Yelburga. The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. The Koppal district is having partly red sandy and black soil suitable for agriculture and horticulture crops. Majority of Gangavathi taluk is having black soil. The taluk is also having very few hills with xerophilous vegetation. The partly red sandy soil and black soil of mixed geographical origin are found in the Yelburga taluk.

Three physiographic divisions have made considering the local conditions of landforms and crops grown in the district. On the basis of physiographic, Koppal district can be divided into three major divisions. They are (a) Koppal & Yelburga plateau, (b) Maidan division, (c) Tungabhadra valley. The district is part of Krishna basin the main streams draining the area are Maskinala, Ilkal-nadi and Hirenala. These are Ephemeral in nature, these come under Tungabhadra sub-basin. The drainage exhibit dendritic to subdendritic 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

Nirligi-1 micro-watershed (Bettageri sub-watershed, Koppal Taluk and District) is located at North latitude $15^0$13’0.043’’ to 15^0 11’16.931’’and East longitude 76^0 5’44.05’’ to 76^0 4’4.458’’ E covering an area of 684.38 ha and spread across Betageri, Gudlanura, Matthura and Neeralagi villages.

Methodology followed in assessing socio-economic status of households

In order to assess the socio-economic condition of the farmers in the watershed a comprehensive questionnaire was prepared. Major components such as demographic conditions, migration details, food consumption and family expenditure pattern, material possession, land holding, land use management, cropping pattern, cost of cultivation of crops, livestock management. The statistical components such as frequency and

percentage were used to analyze the data. About 35 households located in the micro-watershed were interviewed for the survey.

Chapter 4

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Nirligi-1 micro watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Nirligi-1 micro watershed among them 4 (11.43 %) were marginal farmers, 10 (28.57 %) were small farmers, 3 (8.57 %) were semi medium farmers, 12 (34.29%) were medium farmers, 1(2.86%) was large farmer and 5 (14.29 %) landless farmers were also interviewed for the survey.

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

S. N.	Particulars	LL (5)		MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	14.29	4	11.43	10	28.57	3	8.57	12	34.29	1	2.86	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Nirligi-1 micro watershed is presented in Table 2. The data indicated that there were 170 population households in the studied micro watershed. Among them 85 (50%) men and 85(50 %) were women. The average family size of landless, marginal, small and large farmers was 5, semi medium and medium farmer was 6.

Table 2: Population characteristics of Nirligi-1 micro-watershed

Sl. No.	Particulars	LL (22)		MF(20)		SF (38)		SMF (17)		MDF(69)		LF (4)		All (170)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Male	9	40.91	11	55	21	55.26	8	47.06	35	50.72	1	25	85	50
2	Female	13	59.09	9	45	17	44.74	9	52.94	34	49.28	3	75	85	50
Total		22	100	20	100	38	100	17	100	69	100	4	100	170	100
		5		5		5		6		6		5		4	

Age wise classification of population: The age wise classification of household members in Nirligi-1 micro watershed is presented in Table 3. The data indicated that 39 (22.94%) people were in 0-15 years of age, 73 (42.94 %) were in 16-35 years of age, 51 (30 %) were in 36-60 years of age and 7 (4.12%) were above 61 years of age.

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

S. N.	Particulars	LL (22)		MF(20)		SF (38)		SMF (17)		MDF(69)		LF (4)		All (170)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years	10	45.45	1	5	7	18.42	2	11.76	17	24.64	2	50	39	22.94
2	16-35 years	8	36.36	8	40	15	39.47	9	52.94	33	47.83	0	0	73	42.94
3	36-60 years	4	18.18	10	50	15	39.47	4	23.53	16	23.19	2	50	51	30
4	> 61 years	0	0	1	5	1	2.63	2	11.76	3	4.35	0	0	7	4.12
Total		22	100	20	100	38	100	17	100	69	100	4	100	170	100

Education level of household members: Education level of household members in Nirligi-1 micro watershed is presented in Table 4. The results indicated that the Nirligi-1 had 23.53 per cent illiterates, 32.35 per cent of them had primary school education, 11.18 per cent of them had middle school, 11.76 per cent of them had high school education,

12.94 per cent of them had PUC education, 1.18 per cent of them had diploma and ITI education, 4.12 per cent of them had degree education and 0.59 per cent them had masters.

Table 4: Education level of household members in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (22)		MF(20)		SF (38)		SMF (17)		MDF(69)		LF (4)		All (170)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	3	13.64	3	15	8	21.05	5	29.41	19	27.54	2	50	40	23.53
2	Primary School	9	40.91	3	15	15	39.47	5	29.41	23	33.33	0	0	55	32.35
3	Middle School	5	22.73	1	5	1	2.63	2	11.76	9	13.04	1	25	19	11.18
4	High School	2	9.09	3	15	4	10.53	0	0	10	14.49	1	25	20	11.76
5	PUC	2	9.09	7	35	5	13.16	1	5.88	7	10.14	0	0	22	12.94
6	Diploma	0	0	0	0	1	2.63	1	5.88	0	0	0	0	2	1.18
7	ITI	0	0	0	0	2	5.26	0	0	0	0	0	0	2	1.18
8	Degree	0	0	3	15	1	2.63	3	17.65	0	0	0	0	7	4.12
9	Masters	0	0	0	0	1	2.63	0	0	0	0	0	0	1	0.59
10	Others	1	4.55	0	0	0	0	0	0	1	1.45	0	0	2	1.18
Total		22	100	20	100	38	100	17	100	69	100	4	100	170	100

Occupation of household heads: The data regarding the occupation of the household heads in Nirligi-1 micro watershed is presented in Table 5. The results indicated that, 71.43 per cent of households practicing agriculture, 20 per cent of the household heads were agricultural labour and 2.86 per cent of them were general labour, in government service and housewives respectively.

Table 5: Occupation of household heads in Nirligi-1 micro watershed

S. N.	Particulars	LL (5)		MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	3	75	10	100	3	100	9	75	0	0	25	71.43
2	Agricultural Labour	4	80	0	0	0	0	0	0	2	16.67	1	100	7	20
3	General Labour	1	20	0	0	0	0	0	0	0	0	0	0	1	2.86
4	Government Service	0	0	0	0	0	0	0	0	1	8.33	0	0	1	2.86
5	Housewife	0	0	1	25	0	0	0	0	0	0	0	0	1	2.86
Total		5	100	4	100	10	100	3	100	12	100	1	100	35	100

Occupation of the household members: The data regarding the occupation of the household members in Nirligi-1 micro watershed is presented in Table 6. The results indicated that agriculture was the occupation for 51.18 per cent of the household members, 10.59 per cent were agricultural labourers, 0.59 per cent of them were general labour, in government service, housewives and children's respectively. 4.71 per cent were in private service and 30 per cent were students. In case of landless farmers, 45.45 per cent were agricultural labour and students respectively. In case of marginal farmers 55 per cent were agriculturist, 10 percent was in private service and 25 per cent were students. In case of small farmers 65.79 per cent of them were agriculturist, 2.63 per cent of them were private service and 31.58 per cent of them were students. In case of semi medium farmers 64.71 per cent of the family members were agriculturist, 11.76 per cent were in private service and 23.53 per cent of them were students. In case of medium farmers

56.52 per cent of the family members were agriculturist, 10.14 per cent of them were general labours, 1.14 per cent were in government service, 4.35 per cent were in private service and 26.09 per cent were students. In case of large farmers 25 per cent of the family members were agriculturist, agriculture labour and 50 per cent of them were students.

Table 6: Occupation of family members in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (22)		MF (20)		SF (38)		SMF (17)		MDF(69)		LF (4)		All (170)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	11	55	25	65.79	11	64.71	39	56.52	1	25	87	51.18
2	Agricultural Labour	10	45.45	0	0	0	0	0	0	7	10.14	1	25	18	10.59
3	General Labour	1	4.55	0	0	0	0	0	0	0	0	0	0	1	0.59
4	Government Service	0	0	0	0	0	0	0	0	1	1.45	0	0	1	0.59
5	Private Service	0	0	2	10	1	2.63	2	11.76	3	4.35	0	0	8	4.71
6	Trade & Business	0	0	1	5	0	0	0	0	0	0	0	0	1	0.59
7	Student	10	45.45	5	25	12	31.58	4	23.53	18	26.09	2	50	51	30
8	Others	0	0	0	0	0	0	0	0	1	1.45	0	0	1	0.59
9	Housewife	0	0	1	5	0	0	0	0	0	0	0	0	1	0.59
10	Children	1	4.55	0	0	0	0	0	0	0	0	0	0	1	0.59
Total		22	100	20	100	38	100	17	100	69	100	4	100	170	100

Institutional participation of the household members: The data regarding the institutional participation of the household members in Nirligi-1 micro-watershed is presented in Table 7. The results showed that 1.76 per cent of the household participated in self help group, 0.59 per cent of the households participated in user group and 97.65 per cent of them have not participated in any local institutions.

Table 7: Institutional Participation of household members in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (22)		MF(20)		SF (38)		SMF(17)		MDF(69)		LF (4)		All (170)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Self Help Group	0	0	2	10	1	2.63	0	0	0	0	0	0	3	1.76
2	User Group	0	0	0	0	1	2.63	0	0	0	0	0	0	1	0.59
3	No Participation	22	100	18	90	36	94.74	17	100	69	100	4	100	166	97.65
Total		22	100	20	100	38	100	17	100	69	100	4	100	170	100

Type of house owned: The data regarding the type of house owned by the households in Nirligi-1 micro watershed is presented in Table 8. The results indicated that 34.29 per cent of the households possess Katcha house, 42.86 per cent of the household possess thatched house and 22.86 per cent of the households possess Pucca house.

Table 8: Type of house owned by households in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	5	100	1	25	0	0	1	33.33	7	58.33	1	100	15	42.86
2	Katcha	0	0	1	25	10	100	1	33.33	0	0	0	0	12	34.29
3	Pucca/RCC	0	0	2	50	0	0	1	33.33	5	41.67	0	0	8	22.86
Total		5	100	4	100	10	100	3	100	12	100	1	100	35	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Nirligi-1 micro watershed is presented in Table 9. The results showed that, 94.29 per cent of the households possess TV, 91.43 per cent of the households possess Mixer grinder, 34.29 per cent of the households possess bicycle, 42.86 per cent of the household possess motor cycle and 100 per cent of the households possess mobile.

Table 9: Durable Assets owned by households in Nirligi-1 micro watershed

S. N.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Television	5	100	4	100	8	80	3	100	12	100	1	100	33	94.29
2	Mixer/Grinder	5	100	4	100	7	70	3	100	12	100	1	100	32	91.43
3	Bicycle	1	20	2	50	6	60	1	33.33	1	8.33	1	100	12	34.29
4	Motor Cycle	0	0	2	50	4	40	2	66.67	7	58.33	0	0	15	42.86
5	Mobile Phone	5	100	4	100	10	100	3	100	12	100	1	100	35	100

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Nirligi-1 micro watershed is presented in Table 10. The results showed that the average value of television was Rs.4757; the average value of television was mixer grinder was Rs.1312, the average value of television was bicycle was Rs. 1333, the average value of television was motor cycle was Rs.34333 and the average value of television was mobile phone was Rs.1569.

Table 10: Average value of durable assets owned by households in Nirligi-1 micro watershed

Average value in (Rs.)

Sl.No.	Particulars	LL (5)	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
1	Television	6,000	4,000	2,125	4,000	6,333	6,000	4,757
2	Mixer/Grinder	1,500	1,125	1,000	1,166	1,500	1,500	1,312
3	Bicycle	3,000	1,000	1,000	1,000	1,000	3,000	1,333
4	Motor Cycle	0	40,000	30,000	30,000	36,428	0	34,333
5	Mobile Phone	4,375	650	721	512	1,710	4,000	1,569

Table 11: Farm Implements owned by households in Nirligi-1 micro watershed

S.N.	Particulars	LL (5)		MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	1	20.	0	0	2	20	0	0	6	50	0	0	9	25.71
2	Plough	1	20	0	0	4	40	0	0	6	50	0	0	11	31.43
3	Power Tiller	0	0	0	0	0	0	0	0	1	8.33	0	0	1	2.86
4	Tractor	0	0	0	0	0	0	0	0	1	8.33	0	0	1	2.86
5	Sprayer	0	0	0	0	1	10	0	0	5	41.67	0	0	6	17.14
6	Weeder	5	100	4	100	10	100	3	100	12	100	1	100	35	100
7	Thresher	0	0	0	0	0	0	0	0	1	8.33	0	0	1	2.86
8	Chaff Cutter	0	0	0	0	4	40	0	0	0	0	0	0	4	11.43

Farm Implements owned: The data regarding the farm implements owned by the households in Nirligi-1 micro watershed is presented in Table 11. About 25.71 per cent of the households possess bullock cart, 31.43 per cent of them possess plough, 2.86 per cent

of the households possess power tiller and tractor, 17.14 per cent of the households possess sprayer, 100 per cent of the households possess weeder, 2.86 per cent of them possess thresher and 11.43 per cent of them possess chaff cutter.

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Nirligi-1 micro watershed is presented in Table 12. The results showed that the average value of bullock cart was Rs.18222; the average value of plough was Rs. 970, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 600000, the average value of sprayer was Rs. 4666, the average value of weeder was Rs.30, the average value of thresher was Rs.15000 and the average value of chaff cutter was Rs. 3000.

Table 12: Average value of farm implements owned by households in Nirligi-1 micro watershed

Average value in (Rs.)

Sl. No.	Particulars	LL (5)	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
1	Bullock Cart	18,000	0	20,000	0	17,666	0	18,222
2	Plough	1,500	0	600	0	1,500	0	970
3	Power Tiller	0	0	0	0	25,000	0	25,000
4	Tractor	0	0	0	0	600,000	0	600,000
5	Sprayer	0	0	4,000	0	4,800	0	4,666
6	Weeder	27	33	40	30	25	25	30
7	Thresher	0	0	0	0	15,000	0	15,000
8	Chaff Cutter	0	0	3,000	0	0	0	3,000

Livestock possession by the households: The data regarding the Livestock possession by the households in Nirligi-1 micro watershed is presented in Table 13. The results indicated that, 34.29 per cent of the households possess bullocks, 20 per cent of the households possess local cow and 2.86 per cent of the household possess cross bread cow and buffalo respectively.

Table 13: Livestock possession by households in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	1	20	1	25	5	50	0	0	5	41.67	12	34.29
2	Local cow	1	20	0	0	0	0	0	0	6	50	7	20
3	Crossbred cow	0	0	0	0	0	0	1	33.33	0	0.	1	2.86
4	Buffalo	0	0	0	0	0	0	0	0	1	8.33	1	2.86

Table 14: Average Labour availability in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
		N	N	N	N	N	N
1	Own labour Male	1.75	1.20	1.67	2.08	1.00	1.67
2	Own Labour Female	1.25	1.40	1.33	1.67	1.00	1.47
3	Hired labour Male	9.50	15.40	14.00	7.08	7.00	10.87
4	Hired labour Female	8.50	14.40	14.00	7.92	8.00	10.77

Average Labour availability: The data regarding the average labour availability in Nirligi-1 micro watershed is presented in Table 14. The results indicated that, average own labour men available in the micro watershed was 1.67, average own labour (women) available was 1.47, average hired labour (men) available was 10.87 and average hired labour (women) available was 10.77.

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Nirligi-1 micro watershed is presented in Table 15. The results indicated that, 88.57 per cent of the household opined that hired labour was adequate.

Table 15: Adequacy of Hired Labour in Nirligi-1 micro watershed

S.N.	Particulars	MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	4	100	10	100	3	100	12	100	1	100	31	88.57

Distribution of land (ha): The data regarding the distribution of land (ha) in Nirligi-1 micro watershed is presented in Table 16. The results indicated that, households of the Nirligi-1 micro watershed possess 29.29 ha (43.12%) of dry land and 38.64 ha (56.88%) of irrigated land. Marginal farmers possess 2.65 ha (84.52 %) of dry land and 0.49ha (15.48%) of irrigated land. Small farmers possess 12.90 ha (94.10 %) of dry land and 0.81 ha (5.90%) of irrigated land. Semi medium farmers possess 0.41 ha (11.31%) of dry land and 3.24 ha (88.69%) of irrigated land. Medium farmers possess 4.48 ha (12.55%) of dry land and 31.21 ha (87.45%) of irrigated land and large farmers possess 8.85 ha (75.33%) of dry land and 2.90 ha (24.67 %) of irrigated land.

Table 16: Distribution of land (Ha) in Nirligi-1 micro watershed

S. N.	Particulars	MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	2.65	84.52	12.90	94.10	0.41	11.31	4.48	12.55	8.85	75.33	29.29	43.12
2	Irrigated	0.49	15.48	0.81	5.90	3.24	88.69	31.21	87.45	2.90	24.67	38.64	56.88
Total		3.14	100	13.71	100	3.65	100	35.69	100	11.74	100	67.93	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Nirligi-1 micro watershed is presented in Table 17. The results indicated that, the average value of dry land was Rs. 225,259.29 and average value of irrigated was Rs. 408,356.92.

Table 17: Average land value (Rs. /ha) in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
		N	N	N	N	N	N
1	Dry	527,938.93	186,005.65	1,937,254.94	178,501.79	135,590.12	225,259.29
2	Irrigated	1,029,166.63	741,000.00	586,625.00	371,573.08	172,486.04	408,356.92

Table 18: Status of bore wells in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)	SMF (3)	MDF (12)	LF (1)	All (35)
		N	N	N	N	N
1	De-functioning	0	0	3	0	3
2	Functioning	1	1	8	0	10

Status of bore wells: The data regarding the status of bore wells in Nirligi-1 micro watershed is presented in Table 18. The results indicated that, there were 10 functioning and 3 de-functioning bore wells in the micro watershed.

Source of irrigation: The data regarding the source of irrigation in Nirligi-1 micro watershed is presented in Table 19. The results indicated that, bore well was the major irrigation source for 28.57 per cent of the farmers, 5.71 per cent of households were using canal as a source of irrigation and 2.86 per cent of the farmers were using tank for irrigation.

Table 19: Source of irrigation in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)		SMF (3)		MDF (12)		All (35)	
		N	%	N	%	N	%	N	%
1	Bore Well	1	25	1	33.33	8	66.67	10	28.57
2	Canal	0	0	2	66.67	0	0	2	5.71
3	Tank	0	0	1	33.33	0	0	1	2.86

Irrigated Area (ha): The data regarding the irrigated area (ha) in Nirligi-1 micro watershed is presented in Table 20. The results indicated that, in case of marginal farmers there was 0.49 ha of irrigated land and semi medium farmers were having 1.21 ha of irrigated land and medium farmers having 28.57 ha irrigated land. On an average there were 30.57 ha of irrigated land.

Table 20: Irrigated Area (ha) in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)	SMF (3)	MDF (12)	All (35)
1	Kharif	0.49	1.21	21.52	23.22
2	Rabi	0.00	0.00	7.35	7.35
Total		0.49	1.21	28.87	30.57

Cropping pattern: The data regarding the cropping pattern in Nirligi-1 micro watershed is presented in Table 21. The results indicated that, farmers have grown bajra (4.20 ha), cotton (6.88 ha), groundnut (5.75 ha), maize (30.73 ha), navane (2.43 ha), onion (3.32 ha), red gram (1.34 ha) and sunflower (0.81 ha) in kharif season. Marginal and small farmers have grown groundnut, maize, onion and sunflower. Semi medium farmers have grown bajra, cotton and onion. Medium farmers have grown bajra, cotton, groundnut, maize and onion. Large farmers have grown bajra and navane.

Table 21: Cropping pattern in Nirligi-1 micro watershed (Area in ha)

Sl. No.	Particulars	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
1	Kharif - Bajra	0.00	0.00	0.41	1.36	2.43	4.20
2	Kharif - Cotton	0.00	0.00	2.02	4.86	0.00	6.88
3	Kharif - Groundnut	0.89	2.43	0.00	2.43	0.00	5.75
4	Kharif - Maize	0.91	9.13	0.00	20.69	0.00	30.73
5	Kharif - Navane	0.00	0.00	0.00	0.00	2.43	2.43
6	Kharif - Onion	0.49	0.81	1.21	0.81	0.00	3.32
7	Kharif - Red gram	0.00	1.34	0.00	0.00	0.00	1.34
8	Kharif - Sunflower	0.81	0.00	0.00	0.00	0.00	0.81
Total		3.10	13.71	3.65	30.15	4.86	55.47

Cropping intensity: The data regarding the cropping intensity in Nirligi-1 micro watershed is presented in Table 22. The results indicated that, the cropping intensity in Nirligi-1 micro watershed was found to be 72.63 per cent. In case of marginal and small farmers cropping intensity was 100 per cent, in case of semi medium farmers it was 99.56 per cent, in medium farmers it was 61.06 per cent and in case of large farmers it was 74.53 per cent.

Table 22: Cropping intensity (%) in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
1	Cropping Intensity	100	100	99.56	61.06	74.53	72.63

Possession of Bank account: The data regarding the possession of Bank account and savings in Nirligi-1 micro watershed is presented in Table 23. The results indicated that, 100 per cent of the households have bank account and 42.86 per cent of having savings.

Table 23: Possession of Bank account and savings in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Account	5	100	4	100	10	100	3	100	12	100	1	100	35	100
2	Savings	0	0	3	75	9	90	2	66.67	1	8.33	0	0	15	42.86

Borrowing status: The data regarding the possession of borrowing status in Nirligi-1 micro watershed is presented in Table 24. The results indicated that, 100 per cent of marginal, small, semi medium and large farmers and 66.67 per cent of the medium farmers have borrowed credit from different sources.

Table 24: Borrowing status in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Credit Availed	4	100	10	100	3	100	8	66.67	1	100	26	74.29

Source of credit: The data regarding the source of credit availed by households in Nirligi-1 micro watershed is presented in Table 25. The results indicated that, 23.08 per cent have availed loan in commercial bank, 3.85 per cent have availed loan from Cooperative Bank, money lender and SHGs/CBOs respectively. 38.46 per cent have availed loan from Grameena bank and 15.38 per cent of the household's availed loan from friends/relatives.

Table 25: Source of credit availed by households in Nirligi-1 micro watershed

Sl. No.	Particulars	MF(4)		SF(10)		SMF (3)		MDF (8)		LF (1)		All (26)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Commercial Bank	2	50	3	30	1	33.33	0	0	0	0	6	23.08
2	Cooperative Bank	0	0	0	0	1	33.33	0	0	0	0	1	3.85
3	Friends/Relatives	1	25	0	0	0	0	1	12.50	1	100	4	15.38
4	Grameena Bank	1	25	4	40	1	33.33	4	50	0	0	10	38.46
5	Money Lender	0	0	1	10	0	0	0	0	0	0	1	3.85
6	SHGs/CBOs	0	0	1	10	0	0	0	0	0	0	1	3.85

Average credit amount: The data regarding the average credit amount availed by households in Nirligi-1 micro watershed is presented in Table 26. The results indicated that, marginal, small, semi medium, medium and large farmers have availed Rs. 130000, Rs. 79000, Rs. 178333.33, Rs. 66,250 and Rs.50000 respectively. Overall average credit amount availed by households in the micro watershed is 94807.69.

Table 26: Average Credit amount availed by households in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)	SF (10)	SMF (3)	MDF (8)	LF (1)	All (26)
		N	N	N	N	N	N
1	Average Credit	130000	79000	178333.33	66,250	50000	94807.69

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Nirligi-1 micro watershed is presented in Table 27. The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.

Table 27: Purpose of credit borrowed (institutional Source) by households in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (3)		SF (7)		SMF (3)		MDF (4)		All (17)	
		N	%	N	%	N	%	N	%	N	%
1	Agriculture production	3	100	7	100	3	100	4	100	17	100

Purpose of credit borrowed (private): The data regarding the purpose of credit borrowed from private sources by households in Nirligi-1 micro watershed is presented in Table 28. The results indicated that, 85.71per cent of the households have borrowed loan for agriculture production and 14.29 per cent of the household barrowed money for household consumption.

Table 28: Purpose of credit borrowed (private) by households in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (1)		MF (1)		SF (2)		MDF(2)		LF (1)		All (7)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture production	1	100	1	100	1	50	2	100	1	100	6	85.71
2	Household consumption	0	0	0	0	1	50	0	0	0	0	1	14.29

Table 29: Repayment status of households (Institutional) in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (3)		SF (7)		SMF (3)		MDF (4)		All (17)	
		N	%	N	%	N	%	N	%	N	%
1	Un paid	3	100	4	57.14	3	100	4	100	14	82.35
2	Fully paid	0	0	3	42.86	0	0	0	0	3	17.65

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Nirligi-1 micro watershed is presented in Table 29. Results indicated that 82.35 percent of the households

have unpaid their institutional loan and 17.65 per cent of them fully paid their institutional loan.

Repayment status of households (private): The data regarding the repayment status of credit borrowed from private sources by households in Nirligi-1 micro watershed is presented in Table 30. Results indicated that 14.29 percent of the households have partially paid their private credit and 85.71 per cent of the households have unpaid their private credit.

Table 30: Repayment status of households (Private) in Nirligi-1 micro watershed

Sl.No.	Particulars	LL (1)		MF (1)		SF (2)		MDF (2)		LF (1)		All (7)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Partially paid	0	0	0	0	1	50	0	0	0	0	1	14.29
2	Un paid	1	100	1	100	1	50	2	100	1	100	6	85.71

Opinion on institutional sources of credit: The data regarding opinion on institutional sources of credit by households in Nirligi-1 micro watershed is presented in Table 31. The results indicated that 23.53 per cent of the households were opined that they were helped to perform timely agricultural operations and 11.76 per cent opined that higher rate of interest.

Table 31: Opinion on institutional sources of credit in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (3)		SF (7)		SMF (3)		MDF(4)		All (17)	
		N	%	N	%	N	%	N	%	N	%
1	Helped to perform timely agricultural operations	1	33.33	2	28.57	1	33.33	0	0	4	23.53
2	Higher rate of interest	0	0	0	0	1	33.33	1	25	2	11.76

Opinion on non-institutional sources of credit: The data regarding opinion on non-institutional sources of credit by households in Nirligi-1 micro watershed is presented in Table 32. The results indicated that 14.29 per cent of the households were opined that loan amount was adequate to fulfil the requirement and 28.57 per cent opined that higher rate of interest.

Table 32: Opinion on non-institutional sources of credit in Nirligi-1 micro watershed

S.N.	Particulars	MF (1)		SF (2)		LF (1)		All (7)	
		N	%	N	%	N	%	N	%
1	Loan amount was adequate to fulfil the requirement	0	0	1	50	0	0	1	14.29
2	Higher rate of interest	1	100	0	0	1	100	2	28.57

Cost of Cultivation of Bajra: The data regarding the cost of cultivation of bajra in Nirligi-1 micro watershed is presented in Table 33. The results indicated that, the total cost of cultivation for bajra was Rs. 34996.06. The gross income realized by the farmers was Rs. 26639.98. The net income from bajra cultivation was Rs. -8356.08. Thus the benefit cost ratio was found to be 1:0.76.

Table 33: Cost of Cultivation of Bajra in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	52.69	8612.31	24.61
2	Bullock		Pairs/day	0.21	102.92	0.29
3	Tractor		Hours	3.66	2193.94	6.27
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	24.34	3290.91	9.40
6	FYM		Quintal	28.33	3399.88	9.72
7	Fertilizer + micronutrients		Quintal	4.04	3648.70	10.43
8	Pesticides (PPC)		Kgs / liters	2.42	2421.57	6.92
9	Irrigation		Number	12.11	0.00	0.00
10	Depreciation charges			0.00	2.83	0.01
11	Land revenue and Taxes			0.00	4.94	0.01
II	**Cost B1**					
12	Interest on working capital				1531.33	4.38
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				25209.33	72.03
III	**Cost B2**					
14	Rental Value of Land				400.00	1.14
15	**Cost B2 = (Cost B1 + Rental value)**				25609.33	73.18
IV	**Cost C1**					
16	Family Human Labour			29.11	6205.27	17.73
17	**Cost C1 = (Cost B2 + Family Labour)**				31814.60	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				31814.60	90.91
VI	**Cost C3**					
20	Managerial Cost				3181.46	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				34996.06	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.67	19810.85	
		b) Main Crop Sales Price (Rs.)			1350.00	
	By Product	e) Main Product (q)		24.83	6829.13	
		f) Main Crop Sales Price (Rs.)			275.00	
b.	Gross Income (Rs.)				26639.98	
c.	Net Income (Rs.)				-8356.08	
d.	Cost per Quintal (Rs./q.)				2384.79	
e.	Benefit Cost Ratio (BC Ratio)				1:0.76	

Cost of Cultivation of Cotton: The data regarding the cost of cultivation of cotton in Nirligi-1 micro watershed is presented in Table 34. The results indicated that, the total cost of cultivation for cotton was Rs. 27652.39. The gross income realized by the farmers was Rs. 94691.73. The net income from cotton cultivation was Rs. 67039.34. Thus the benefit cost ratio was found to be 1:3.42.

Table 34: Cost of Cultivation of Cotton in Nirligi-1 micro watershed

Sl. No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	38.05	6342.61	22.94
2	Bullock	Pairs/day	1.18	588.10	2.13
3	Tractor	Hours	3.59	2152.43	7.78
4	Machinery	Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	4.00	4263.69	15.42
6	FYM	Quintal	20.58	2524.89	9.13
7	Fertilizer + micronutrients	Quintal	2.53	2228.88	8.06
8	Pesticides (PPC)	Kgs / liters	1.24	1235.00	4.47
9	Irrigation	Number	4.41	0.00	0.00
10	Depreciation charges		0.00	135.61	0.49
11	Land revenue and Taxes		0.00	4.94	0.02
II	**Cost B1**				
12	Interest on working capital			1230.30	4.45
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**			20706.44	74.88
III	**Cost B2**				
14	Rental Value of Land			409.52	1.48
15	**Cost B2 = (Cost B1 + Rental value)**			21115.97	76.36
IV	**Cost C1**				
16	Family Human Labour		18.70	4022.57	14.55
17	**Cost C1 = (Cost B2 + Family Labour)**			25138.54	90.91
V	**Cost C2**				
18	Risk Premium			0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**			25138.54	90.91
VI	**Cost C3**				
20	Managerial Cost			2513.85	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**			27652.39	100.00
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	25.99	94691.73	
		b) Main Crop Sales Price (Rs.)		3642.86	
b.	Gross Income (Rs.)			94691.73	
c.	Net Income (Rs.)			67039.34	
d.	Cost per Quintal (Rs./q.)			1063.81	
e.	Benefit Cost Ratio (BC Ratio)			1:3.42	

Cost of Cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Nirligi-1 micro watershed is presented in Table 35. The results indicated that, the total cost of cultivation for groundnut was Rs. 30764.01. The gross income realized by the farmers was Rs. 50101.70. The net income from groundnut cultivation was Rs. 19337.69. Thus the benefit cost ratio was found to be 1:1.63.

Table 35: Cost of Cultivation of Groundnut in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	31.13	5276.35	17.15
2	Bullock		Pairs/day	0.69	374.24	1.22
3	Tractor		Hours	2.80	1657.89	5.39
4	Machinery		Hours	0.28	213.32	0.69
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	108.34	8802.18	28.61
6	FYM		Quintal	21.52	2582.27	8.39
7	Fertilizer + micronutrients		Quintal	2.11	1608.31	5.23
8	Pesticides (PPC)		Kgs / liters	0.80	795.27	2.59
9	Irrigation		Number	0.41	0.00	0.00
10	Depreciation charges			0.00	1344.65	4.37
11	Land revenue and Taxes			0.00	4.67	0.02
II	**Cost B1**					
12	Interest on working capital				1654.56	5.38
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				24313.71	79.03
III	**Cost B2**					
14	Rental Value of Land				400.00	1.30
15	**Cost B2 = (Cost B1 + Rental value)**				24713.71	80.33
IV	**Cost C1**					
16	Family Human Labour			14.98	3253.57	10.58
17	**Cost C1 = (Cost B2 + Family Labour)**				27967.28	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				27967.28	90.91
VI	**Cost C3**					
20	Managerial Cost				2796.73	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				30764.01	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		11.45	50101.70	
		b) Main Crop Sales Price (Rs.)			4375.00	
b.	Gross Income (Rs.)				50101.70	
c.	Net Income (Rs.)				19337.69	
d.	Cost per Quintal (Rs./q.)				2686.39	
e.	Benefit Cost Ratio (BC Ratio)				1:1.63	

Cost of Cultivation of maize: The data regarding the cost of cultivation of maize in Nirligi-1 micro watershed is presented in Table 36. The results indicated that, the total cost of cultivation for maize was Rs. 161340.12. The gross income realized by the farmers was Rs. 30924.25. The net income from maize cultivation was Rs. -130415.87. Thus the benefit cost ratio was found to be 1:0.19.

Table 36: Cost of Cultivation of maize in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	29.60	68919.07	42.72
2	Bullock		Pairs/day	0.86	442.90	0.27
3	Tractor		Hours	2.56	1533.43	0.95
4	Machinery		Hours	0.30	178.71	0.11
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	15.95	3054.86	1.89
6	FYM		Quintal	15.20	1862.16	1.15
7	Fertilizer + micronutrients		Quintal	3.43	1827.12	1.13
8	Pesticides (PPC)		Kgs / liters	0.71	711.14	0.44
9	Irrigation		Number	1.71	0.00	0.00
10	Depreciation charges			0.00	444.63	0.28
11	Land revenue and Taxes			0.00	5.13	0.00
II	**Cost B1**					
12	Interest on working capital				894.63	0.55
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				79873.78	49.51
III	**Cost B2**					
14	Rental Value of Land				383.33	0.24
15	**Cost B2 = (Cost B1 + Rental value)**				80257.11	49.74
IV	**Cost C1**					
16	Family Human Labour			12.93	66415.72	41.17
17	**Cost C1 = (Cost B2 + Family Labour)**				146672.84	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				146672.84	90.91
VI	**Cost C3**					
20	Managerial Cost				14667.28	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				161340.12	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		23.57	29805.31	
		b) Main Crop Sales Price (Rs.)			1264.71	
	By Product	e) Main Product (q)		3.25	1118.94	
		f) Main Crop Sales Price (Rs.)			344.71	
b.	Gross Income (Rs.)				30924.25	
c.	Net Income (Rs.)				-130415.87	
d.	Cost per Quintal (Rs./q.)				6846.02	
e.	Benefit Cost Ratio (BC Ratio)				1:0.19	

Cost of Cultivation of Navane: The data regarding the cost of cultivation of navane in Nirligi-1 micro watershed is presented in Table 37. The results indicated that, the total cost of cultivation for navane was Rs. 11505.44. The gross income realized by the farmers was Rs. 22230. The net income from navane cultivation was Rs. 10724.56. Thus the benefit cost ratio was found to be 1:1.93.

Table 37: Cost of Cultivation of Navane in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	23.47	3766.75	32.74
2	Bullock		Pairs/day	0.41	205.83	1.79
3	Tractor		Hours	2.47	1482.00	12.88
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.35	1852.50	16.10
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	8.23	988.00	8.59
8	Fertilizer + micronutrients		Quintal	0.41	494.00	4.29
9	Pesticides (PPC)		Kgs / liters	0.00	0.00	0.00
10	Irrigation		Number	0.00	0.00	0.00
11	Depreciation charges			0.00	0.82	0.01
12	Land revenue and Taxes			0.00	4.94	0.04
II	**Cost B1**					
13	Interest on working capital				400.14	3.48
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				9194.99	79.92
III	**Cost B2**					
15	Rental Value of Land				400.00	3.48
16	**Cost B2 = (Cost B1 + Rental value)**				9594.99	83.40
IV	**Cost C1**					
17	Family Human Labour			4.12	864.50	7.51
18	**Cost C1 = (Cost B2 + Family Labour)**				10459.49	90.91
V	**Cost C2**					
19	Risk Premium				0.00	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**				10459.49	90.91
VI	**Cost C3**					
21	Managerial Cost				1045.95	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				11505.44	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.82	22230.00	
		b) Main Crop Sales Price (Rs.)			1500.00	
b.	Gross Income (Rs.)				22230.00	
c.	Net Income (Rs.)				10724.56	
d.	Cost per Quintal (Rs./q.)				776.35	
e.	Benefit Cost Ratio (BC Ratio)				1:1.93	

Cost of Cultivation of Red gram: The data regarding the cost of cultivation of red gram in Nirligi-1 micro watershed is presented in Table 38. The results indicated that, the total cost of cultivation for red gram was Rs. 19733.93. The gross income realized by the farmers was Rs. 38835.54. The net income from red gram cultivation was Rs. 19101.62. Thus the benefit cost ratio was found to be 1:1.97.

Table 38: Cost of Cultivation of Red gram in Nirligi-1 micro watershed

Sl. No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	32.73	5356.63	27.14
2	Bullock	Pairs/day	0.00	0.00	0.00
3	Tractor	Hours	4.46	3124.70	15.83
4	Machinery	Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)	Kgs (Rs.)	22.32	4463.86	22.62
6	FYM	Quintal	0.00	0.00	0.00
7	Fertilizer + micronutrients	Quintal	2.98	2306.33	11.69
8	Pesticides (PPC)	Kgs / liters	0.00	0.00	0.00
9	Irrigation	Number	0.00	0.00	0.00
10	Depreciation charges		0.00	1.49	0.01
11	Land revenue and Taxes		0.00	4.94	0.03
II	**Cost B1**				
13	Interest on working capital			812.42	4.12
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**			16070.36	81.44
III	**Cost B2**				
15	Rental Value of Land			1200.00	6.08
16	**Cost B2 = (Cost B1 + Rental value)**			17270.36	87.52
IV	**Cost C1**				
17	Family Human Labour		4.46	669.58	3.39
18	**Cost C1 = (Cost B2 + Family Labour)**			17939.93	90.91
V	**Cost C2**				
19	Risk Premium			0.00	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**			17939.93	90.91
VI	**Cost C3**				
21	Managerial Cost			1793.99	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**			19733.93	100.00
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	6.70	38835.54	
		b) Main Crop Sales Price (Rs.)		5800.00	
b.	Gross Income (Rs.)			38835.54	
c.	Net Income (Rs.)			19101.62	
d.	Cost per Quintal (Rs./q.)			2947.22	
e.	Benefit Cost Ratio (BC Ratio)			1:1.97	

Cost of Cultivation of Onion: The data regarding the cost of cultivation of onion in Nirligi-1 micro watershed is presented in Table 39. The results indicated that, the total cost of cultivation for onion was Rs. 37429.69. The gross income realized by the farmers was Rs. 104434.69. The net income from onion cultivation was Rs. 67005. Thus the benefit cost ratio was found to be 1:2.79.

Table 39: Cost of Cultivation of Onion in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	56.50	9673.14	25.84
2	Bullock		Pairs/day	1.34	771.87	2.06
3	Tractor		Hours	3.40	2140.67	5.72
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	5.35	7307.08	19.52
6	Seed Inter Crop		Kgs.	0.00	0.00	0.00
7	FYM		Quintal	21.96	2634.67	7.04
8	Fertilizer + micronutrients		Quintal	5.04	4394.54	11.74
9	Pesticides (PPC)		Kgs /liters	1.34	1337.92	3.57
10	Irrigation		Number	10.81	0.00	0.00
11	Depreciation charges			0.00	33.55	0.09
12	Land revenue and Taxes			0.00	4.94	0.01
II	**Cost B1**					
13	Interest on working capital				1880.90	5.03
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				30179.28	80.63
III	**Cost B2**					
15	Rental Value of Land				400.00	1.07
16	**Cost B2 = (Cost B1 + Rental value)**				30579.28	81.70
IV	**Cost C1**					
17	Family Human Labour			16.26	3447.71	9.21
18	**Cost C1 = (Cost B2 + Family Labour)**				34026.99	90.91
V	**Cost C2**					
19	Risk Premium				0.00	0.00
20	**Cost C2 = (Cost C1 + Risk Premium)**				34026.99	90.91
VI	**Cost C3**					
21	Managerial Cost				3402.70	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				37429.69	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		101.89	104434.69	
		b) Main Crop Sales Price (Rs.)			1025.00	
b.	Gross Income (Rs.)				104434.69	
c.	Net Income (Rs.)				67005.00	
d.	Cost per Quintal (Rs./q.)				367.36	
e.	Benefit Cost Ratio (BC Ratio)				1:2.79	

Cost of Cultivation of Sunflower: The data regarding the cost of cultivation of sunflower in Nirligi-1 micro watershed is presented in Table 40. The results indicated that, the total cost of cultivation for sunflower was Rs. 26987.81. The gross income realized by the farmers was Rs. 50388. The net income from sunflower cultivation was Rs. 23400.19. Thus the benefit cost ratio was found to be 1:1.87.

Table 40: Cost of Cultivation of sunflower in Nirligi-1 micro watershed

Sl. No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	25.94	4013.75	14.87
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	4.94	2964.00	10.98
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	3.71	5557.50	20.59
6	FYM		Quintal	0.00	0.00	0.00
7	Fertilizer + micronutrients		Quintal	3.71	2840.50	10.53
8	Pesticides (PPC)		Kgs / liters	1.24	1235.00	4.58
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	2.47	0.01
11	Land revenue and Taxes			0.00	4.94	0.02
II	**Cost B1**					
12	Interest on working capital				1155.96	4.28
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				17774.12	65.86
III	**Cost B2**					
14	Rental Value of Land				400.00	1.48
15	**Cost B2 = (Cost B1 + Rental value)**				18174.12	67.34
IV	**Cost C1**					
16	Family Human Labour			28.41	6360.25	23.57
17	**Cost C1 = (Cost B2 + Family Labour)**				24534.37	90.91
V	**Cost C2**					
18	Risk Premium				0.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				24534.37	90.91
VI	**Cost C3**					
20	Managerial Cost				2453.44	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				26987.81	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		9.88	50388.00	
		b) Main Crop Sales Price (Rs.)			5100.00	
b.	Gross Income (Rs.)				50388.00	
c.	Net Income (Rs.)				23400.19	
d.	Cost per Quintal (Rs./q.)				2731.56	
e.	Benefit Cost Ratio (BC Ratio)				1:1.87	

Adequacy of fodder: The data regarding the adequacy of fodder in Nirligi-1 micro watershed is presented in Table 41. The results indicated that, 57.14 per cent of the households opined that dry fodder was adequate and 8.57 per cent of the households opined that green fodder was adequate.

Table 41: Adequacy of fodder in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)		SF (10)		SMF(3)		MDF (12)		LF(1)		All(35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	2	50	7	70	1	33.33	9	75	1	100	20	57.14
2	Adequate-Green Fodder	0	0	0	0	0	0	3	25	0	0	3	8.57

Average Annual gross income of households: The (table 42) indicated that the in case of landless farmers the average annual income from wage was Rs.28000 and dairy farm was Rs.600, in marginal farmers, average income from service/salary was Rs.3750, business was Rs.60000, wage was Rs.27500 and agriculture Rs. 46950. In case of small farmers the average income from wage was Rs. 81700 and agriculture was Rs.47610. In semi medium farmers the average income from service/salary was Rs.33333.33, wage was Rs.6000 and agriculture was Rs.97666.67. Medium farmer's average income from service/salary was Rs.5000, business was Rs.1666.67, wage was Rs.15666.67, agriculture was Rs.99166.67 and dairy farm was Rs.4416.67. Similarly in large farmers the average income from wage was Rs.20000 and agriculture was Rs.110000.

Table 42: Average Annual gross income of households in Nirligi-1 micro watershed

S.N.	Particulars	LL (5)	MF (4)	SF (10)	SMF (3)	MDF (12)	LF (1)	All (35)
1	Service/salary	0	3750	0	33333.33	5,000	0	5000
2	Business	0	60000	0	0	1666.67	0	7428.57
3	Wage	28000	27500	81,700	6000	15666.67	20000	36942.86
4	Agriculture	0	46950	47,610	97666.67	99166.67	110000	64482.86
5	Dairy Farm	600	0	0	11440	4416.67	0	2580.57
Income(Rs.)		28600	138200	129310	148440	125916.67	130000	116434.86

Table 43: Average Annual expenditure of households in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)	SF(10)	SMF (3)	MDF(12)	LF (1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Business	170000	0	0	12000	0	5200
2	Agriculture	26750	25300	55666.67	45818.18	50000	30885.71
3	Dairy Farm	0	0	17000	0	0	485.71
Total		196750	25300	72666.67	57818.18	50000	402534.85
Average		49187.50	2530	24222.22	4818.18	50000	11501

Average Annual expenditure of households: The results of the overall average annual expenditure of the household in Nirligi-1 were presented in Table 43. The results indicated that, in case of marginal, the average annual expenditure from business was Rs. 170000 and agriculture was Rs.26750. In case of small farmers the average annual expenditure from agriculture was Rs. 25300. In case of semi medium farmers the average expenditure from agriculture was Rs.55666.67 and dairy farm was Rs. 17000. In medium

farmers the average annual expenditure from business was Rs.12000 and agriculture was Rs.45818.18.In large farmers the average expenditure from agriculture was Rs. 50000.

Average additional investment capacity: The results (Table 44) indicate that, households have an average additional investment capacity of Rs. 3285.71 for land development and Rs. 1600 in irrigation facility, Rs.1742.86 for improved crop production and Rs.142.86 for improved livestock management. Marginal farmers have an average additional investment capacity of Rs. 2500 for land development and Rs. 2000 in improved crop production. Medium farmers have an average additional investment capacity of Rs.7500 for land development, Rs.4000 for irrigation facility, Rs. 4416.67 for improved crop production and Rs. 416.67 for improved livestock management. Large farmers have an average additional investment of Rs.15000 for land development and have an investment capacity of Rs. 8000 for irrigation facility.

Table 44: Average additional investment (Rs.) capacity of households in Nirligi-1 micro –watershed

Sl.No.	Particulars	MF (4)	MDF (12)	LF (1)	All (35)
1	Land development	2,500	7,500	15,000	3,285.71
2	Irrigation facility	0	4,000	8,000	1,600
3	Improved crop production	2,000	4,416.67	0	1,742.86
4	Improved livestock management	0	416.67	0	142.86

Source of funds for additional investment: The data regarding source of funds for additional investment in Nirligi-1 micro watershed is presented in Table 45. The results indicated that for 5.71 per cent and 20 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 14.29 per cent of household were dependent on loan from the bank and 5.71 per cent of the household were dependent on soft loan. 11.43 per cent of the household were depending on loan from bank and soft loan for improved crop production respectively. 2.86 per cent of the household were dependent on loan from bank for improved livestock management.

Table 45: Source of funds for additional investment capacity in Nirligi-1 micro watershed

S. N	Item	Land development		Irrigation facility		Improved crop production		Improved livestock management	
		N	%	N	%	N	%	N	%
1	Loan from bank	2	5.71	5	14.29	4	11.43	1	2.86
2	Soft loan	7	20.0	2	5.71	4	11.43	0	0.0

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Nirligi-1 micro watershed is presented in Table 46. The results indicated that, bajra, cotton, groundnut, navane, onion, red gram and sunflower crops were sold to the extent of 100 per cent. Only maize was sold to the extent of 93.79 per cent.

Table 46: Marketing of the agricultural produce in Nirligi-1 micro watershed

Sl. No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	42.0	0.0	42.0	100	1350.0
2	Cotton	171.0	0.0	171	100	3642.86
3	Groundnut	67.0	0.0	67	100	4375.0
4	Maize	725.0	0.0	725	93.79	1247.37
5	Navane	36.0	0.0	36.0	100	1500.0
6	Onion	315.0	0.0	315.0	100	1025.0
7	Redgram	9.0	0.0	9.0	100	5800.0
8	Sunflower	8.0	0.0	8.0	100	5100.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Nirligi-1 micro watershed is presented in Table 47. The results indicated that, 88.57 percent of the households have sold their produce to local/village merchant and 22.86 percent of the households have sold their produce to regulated market.

Table 47: Marketing Channels used for sale of agricultural produce in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)		SF(10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	3	75	5	5	2	66.67	12	100	1	100	31	88.57
2	Regulated Market	1	25	5	50	2	66.67	0	0	0	0	8	22.86

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Nirligi-1 micro watershed is presented in Table 48. The results indicated that, 100 per cent of households used tractor as a mode of transport.

Table 48: Mode of transport of agricultural produce in Nirligi-1 micro watershed

Sl.No.	Particulars	MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Tractor	4	100	9	90	3	100	12	100	1	100	35	100

Interest towards soil testing: The data regarding interest shown towards soil testing in Nirligi-1 micro watershed is presented in Table 49. The results indicated that, 85.71 per cent of the households have shown interest in soil testing.

Table 49: Interest shown towards soil testing in Nirligi-1 micro watershed

Sl. No.	Particulars	MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	4	100	10	100	3	100	12	100	1	100	30	85.71

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Nirligi-1 micro watershed is presented in Table 50. The results indicated that, 42.86 per cent of the households have experienced the soil and water erosion problems i.e. 25 percent of marginal farmers, 33.33 per cent of semi medium farmers, 100 percent of medium farmers and 100 per cent of the large farmers.

Table 50: Incidence of soil and water erosion problems in Nirligi-1 micro watershed

S. N.	Particulars	MF (4)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farı	1	25	1	33.33	12	100	1	100	15	42.86

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Nirligi-1 micro watershed is presented in Table 51. The results indicated that, 91.43 percent of the household used fire wood as a source of fuel, 2.86 per cent of the household used kerosene and 25.71 per cent of the household used LPG as source of fuel.

Table 51: Usage pattern of fuel for domestic use in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	2	50	9	90	3	100	12	100	1	100	32	91.43
2	Kerosene	0	0	0	0	1	10	0	0	0	0	0	0	1	2.86
3	LPG	2	40	2	50	0	0	0	0	5	41.67	0	0	9	25.71

Source of drinking water: The results (Table 52) indicated that, piped supply was the major source of drinking water for 60 per cent of the households and 40 per cent of the household were using bore well as a source of drinking water.

Table 52: Source of drinking water in Nirligi-1 micro watershed

Sl. No.	Particulars	LL(5)		MF(4)		SF (10)		SMF (3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	2	40	3	75	10	100	2	66.67	4	33.33	0	0	21	60
2	Bore Well	3	60	1	25	0	0	1	33.33	8	66.67	1	100	14	40

Source of light: The data regarding source of light in Nirligi-1 micro watershed is presented in Table 53. The results indicated that, electricity was the major source of light for 100 per cent of the households.

Table 53: Source of light in Nirligi-1 micro watershed

S. N.	Particulars	LL (5)		MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	6	100	4	100	10	100	3	100	12	100	1	100	35	100

Existence of Sanitary toilet facility: The results (Table 54) indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility.

Table 54: Existence of Sanitary toilet facility in Nirligi-1 micro watershed

S.N.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	2	40	5	100	5	50	2	66.67	1	8.33	1	100	16	45.71

Possession of PDS card: The data regarding possession of PDS card in Nirligi-1 micro watershed is presented in Table 55. The results indicated that, 100 per cent of the sampled household's possessed BPL card.

Table 55: Possession of PDS card in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	5	100	4	100	10	100	3	100	12	100	1	100	37	100

Participation in NREGA programme: The results (Table 56) indicated that, 91.43 per cent of the households participated in NREGA programme which included 20 per cent of the landless and 100 percent of the marginal, small, semi medium, medium farmers and large farmers.

Table 56: Participation in NREGA programme in Nirligi-1 micro watershed

Sl. No.	Particulars	LL(5)		MF (4)		SF (10)		SMF(3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	1	20	4	100	10	100	3	100	12	100	1	100	32	91.43

Adequacy of food items: The results (Table 57) indicated that, cereals and pulses were adequate for 97.14 per cent of the household respectively. Oilseed were adequate for 2.86 per cent of the households, vegetables were adequate for 77.14 per cent of the households, milk were adequate for 88.57 per cent of the households, egg were adequate for 57.14 per cent of the households and meat were adequate for 25.71 per cent of the household.

Table 57: Adequacy of food items in Nirligi-1 micro watershed

Sl. No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100	4	100	9	90	3	100	12	100	1	100	34	97.14
2	Pulses	4	80	4	100	10	100	3	100	12	100	1	100	34	97.14
3	Oilseed	0	0	1	25	0	0	0	0	0	0	0	0	1	2.86
4	Vegetables	2	40	3	75	6	60	3	100	12	100	1	10	27	77.14
5	Milk	2	40	3	75	10	100	3	100	12	100	1	100	31	88.57
6	Egg	3	60	2	50	6	60	1	33.33	7	58.33	1	100	20	57.14
7	Meat	2	40	1	25	0	0	0	0	6	50	0	0	9	25.71

Response on Inadequacy of food items: The results (Table 58) indicated that, cereals and pulses were inadequate for 2.86 per cent of the household. Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 57.14 per cent, 22.86 per cent, 74.29 per cent, 5.71 per cent, 42.86 per cent and 71.43 per cent of the household respectively.

Table 58: Response on Inadequacy of food items in Nirligi-1 micro watershed

Sl.No.	Particulars	LL (5)		MF (4)		SF (10)		SMF (3)		MDF (12)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	0	0	0	0	1	10	0	0	0	0	1	2.86
2	Pulses	1	20	0	0	0	0	0	0	0	0	1	2.86
3	Oilseed	2	40	2	50	9	90	3	100	4	33.33	20	57.14
4	Vegetables	3	60	1	25	4	40	0	0	0	0	8	22.86
5	Fruits	3	60	3	75	10	100	3	100	7	58.33	26	74.29
6	Milk	1	20	1	25	0	0	0	0	0	0	2	5.71
7	Egg	2	40	2	50	4	40	2	66.67	5	41.67	15	42.86
8	Meat	3	60	3	75	9	90	3	100	6	50	25	71.43

Response on market surplus of food items: The data regarding market surplus of food items in Nirligi-1 micro watershed is presented in Table 59. The results indicated that, oilseed and fruits were inadequate for 40 per cent and 25.71 per cent of the household respectively.

Table 59: Response on market surplus of food items in Nirligi-1 micro watershed

Sl.No.	Particulars	LL (5)		MF (4)		SF (10)		MDF (12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Oilseed	3	60	1	25	1	10	8	66.67	1	100	14	40
2	Fruits	2	40	1	25	0	0	5	41.67	1	100	9	25.71

Farming constraints: The data regarding farming constraints experienced by households in Nirligi-1 micro watershed is presented in Table 60. The results indicated that, Lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (68.57%), frequent incidence of pest and diseases (54.29%), inadequacy of irrigation water (57.14%), high cost of Fertilizers and plant protection chemicals (48.57%), high rate of interest on credit (48.57%), low price for the agricultural commodities (77.14%), lack of marketing facilities in the area (62.86%), inadequate extension services (57.14 %), lack of transport for safe transport of the agricultural produce to the market (48.57%) and less rain fall (11.43%) .

Table 60: Farming constraints Experienced in Nirligi-1 micro watershed

S. N.	Particulars	MF (4)		SF (10)		SMF (3)		MDF(12)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	4	100	10	100	3	100	11	91.67	1	100	29	82.86
2	Wild animal menace on farm field	3	75	9	90	2	66.67	10	83.33	0	0	24	68.57
3	Frequent incidence of pest and diseas	3	75	8	80	2	66.67	5	41.67	1	100	19	54.29
4	Inadequacy of irrigation water	3	75	8	80	2	66.67	7	58.33	0	0	20	57.14
5	High cost of Fertilizers and plant protection chemicals	2	50	6	60	2	66.67	7	58.33	0	0	17	48.57
6	High rate of interest on credit	2	50	6	60	2	66.67	6	50	1	100	17	48.57
7	Low price for the agricultural commodities	3	75	10	100	3	100	9	75	0	0	27	77.14
8	Lack of marketing facilities in the ar	3	75	5	50	3	100	10	83.33	1	100	22	62.86
9	Inadequate extension services	3	75	5	50	1	33.33	11	91.67	0	0	20	57.14
10	Lack of transport for safe transport o Agril produce to the market.	3	75	8	80	2	66.67	3	25	1	100	17	48.57
11	Less rainfall	0	0	3	30	1	33.33	0	0	0	0	4	11.43

Chapter 5

SUMMERY

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

Results indicated that 35 farmers were sampled in Nirligi-1 micro watershed among them 4 (11.43 %) were marginal farmers, 10 (28.57 %) were small farmers, 3 (28.57 %) were semi medium farmers, 12 (34.29%) were medium farmers, 1(2.86%) was large farmer and 5 (14.29 %) landless farmers were also interviewed for the survey. The data indicated that there were 170 population households in the studied micro watershed. Among them 85 (50%) men and 85(50 %) were women. The average family size of landless, marginal, small and large farmers was 5, semi medium and medium farmer was 6. The data indicated that 39 (22.94%) people were in 0-15 years of age, 73 (42.94 %) were in 16-35 years of age, 51 (30 %) were in 36-60 years of age and 7 (4.12%) were above 61 years of age.

The results indicated that the Nirligi-1 had 23.53 per cent illiterates, 32.35 per cent of them had primary school education, 11.18 per cent of them had middle school, 11.76 per cent of them had high school education, 12.94 per cent of them had PUC education, 1.18 per cent of them had diploma and ITI education, 4.12 per cent of them had degree education and 0.59 per cent them had masters. The results indicated that, 71.43 per cent of households practicing agriculture, 20 per cent of the household heads were agricultural labour and 2.86 per cent of them were general labour, in government service and housewives respectively.

The results indicated that agriculture was the occupation for 51.18 per cent of the household members, 10.59 per cent were agricultural labourers, 0.59 per cent of them were general labour, in government service, housewives and children's respectively. 4.71 per cent were in private service and 30 per cent were students. In case of landless farmers, 45.45 per cent were agricultural labour and students respectively. In case of marginal farmers 55 per cent were agriculturist, 10 percent was in private service and 25 per cent were students. In case of small farmers 65.79 per cent of them were agriculturist, 2.63 per cent of them were private service and 31.58 per cent of them were students. In case of semi medium farmers 64.71 per cent of the family members were agriculturist, 11.76 per cent were in private service and 23.53 per cent of them were students. In case of medium farmers 56.52 per cent of the family members were agriculturist, 10.14 per cent of them were general labours, 1.14 per cent were in government service, 4.35 per cent were in

private service and 26.09 per cent were students. In case of large farmers 25 per cent of the family members were agriculturist, agriculture labour and 50 per cent of them were students.

The results showed that 1.76 per cent of the household participated in self help group, 0.59 per cent of the households participated in user group and 97.65 per cent of them have not participated in any local institutions. The results indicated that 34.29 per cent of the households possess Katcha house, 42.86 per cent of the household possess thatched house and 22.86 per cent of the households possess Pucca house.

The results showed that, 94.29 per cent of the households possess TV, 91.43 per cent of the households possess Mixer grinder, 34.29 per cent of the households possess bicycle, 42.86 per cent of the household possess motor cycle and 100 per cent of the households possess mobile. The results showed that the average value of television was Rs.4757; the average value of television was mixer grinder was Rs.1312, the average value of television was bicycle was Rs. 1333, the average value of television was motor cycle was Rs.34333 and the average value of television was mobile phone was Rs.1569.

Data showed that 25.71 per cent of the households possess bullock cart, 31.43 per cent of them possess plough, 2.86 per cent of the households possess power tiller and tractor, 17.14 per cent of the households possess sprayer, 100 per cent of the households possess weeder, 2.86 per cent of them possess thresher and 11.43 per cent of them possess chaff cutter. The results showed that the average value of bullock cart was Rs.18222; the average value of plough was Rs. 970, the average value of power tiller was Rs. 25000, the average value of tractor was Rs. 600000, the average value of sprayer was Rs. 4666, the average value of weeder was Rs.30, the average value of thresher was Rs.15000 and the average value of chaff cutter was Rs. 3000.

The results indicated that, 34.29 per cent of the households possess bullocks, 20 per cent of the households possess local cow and 2.86 per cent of the household possess cross bread cow and buffalo respectively. The results indicated that, average own labour men available in the micro watershed was 1.67, average own labour (women) available was 1.47, average hired labour (men) available was 10.87 and average hired labour (women) available was 10.77.

In case of marginal farmers, average own labour men available was 1.75, average own labour (women) was also 1.25, average hired labour (men) was 9.50 and average hired labour (women) available was 8.50. In case of small farmers, average own labour men available was 1.20, average own labour (women) was 1.40, average hired labour (men) was 15.40 and average hired labour (women) available was 14.40. In case of semi medium farmers, average own labour men available was 1.67, average own labour (women) was 1.33, average hired labour (men) was 14 and average hired labour (women) available was also 14. In medium farmers average own labour men available was 2.08,

average own labour (women) was 1.67, average hired labour (men) was 7.08 and average hired labour (women) available was 7.92. In large farmers average own labour men available was 1, average own labour (women) was 1, average hired labour (men) was 7 and average hired labour (women) available was 8.

The data showed that, in case of landless farmers 20 per cent of the household possess bullock and local cow. In case of marginal farmers, 25 per cent of the households possess bullock. In case of small farmers, 50 per cent of households possess bullock. In case of semi medium farmers, 33.33 per cent of the households possess cross bread cow. In medium farmers, 41.67 per cent of the households possess bullock, 50 per cent of the household possess local cow and 8.33 per cent of the household possess buffalo. The results indicated that, 88.57 per cent of the household opined that hired labour was adequate.

The results indicated that, households of the Nirligi-1 micro watershed possess 29.29 ha (43.12%) of dry land and 38.64 ha (56.88%) of irrigated land. Marginal farmers possess 2.65 ha (84.52 %) of dry land and 0.49ha (15.48%) of irrigated land. Small farmers possess 12.90 ha (94.10 %) of dry land and 0.81 ha (5.90%) of irrigated land. Semi medium farmers possess 0.41 ha (11.31%) of dry land and 3.24 ha (88.69%) of irrigated land. Medium farmers possess 4.48 ha (12.55%) of dry land and 31.21 ha (87.45%) of irrigated land and large farmers possess 8.85 ha (75.33%) of dry land and 2.90 ha (24.67 %) of irrigated land. The results indicated that, the average value of dry land was Rs. 225,259.29 and average value of irrigated was Rs. 408,356.92. In case of marginal famers, the average land value was Rs. 527,938.93 for dry land and Rs. 1,029,166.63 for irrigated land. In case of small famers, the average land value was Rs. 186,005.65 for dry land and Rs. 741,000 for irrigated land. In case of semi medium famers, the average land value was Rs. 1,937,254.94 for dry land and was Rs. 586,625 for irrigated land. In case of medium famers, the average land value was Rs. 178,501.79 for dry land and was Rs. 371,573.08 for irrigated land. In large farmers the average land value was Rs. 135,590.12 for dry land and Rs. 172,486.04 for irrigated land.

The results indicated that, there were 10 functioning and 3 de-functioning bore wells in the micro watershed. The results indicated that, bore well was the major irrigation source for 28.57 per cent of the farmers, 5.71 per cent of households were using canal as a source of irrigation and 2.86 per cent of the farmers were using tank for irrigation. The results indicated that, in case of marginal farmers there was 0.49 ha of irrigated land and semi medium farmers were having 1.21 ha of irrigated land and medium farmers having 28.57 ha irrigated land. On an average there were 30.57 ha of irrigated land. The results indicated that, farmers have grown bajra (4.20 ha), cotton (6.88 ha), groundnut (5.75 ha), maize (30.73 ha), navane (2.43 ha), onion (3.32 ha), red gram (1.34 ha) and sunflower (0.81 ha) in kharif season. Marginal and small farmers have grown groundnut, maize, onion and sunflower. Semi medium farmers have grown bajra,

cotton and onion. Medium farmers have grown bajra, cotton, groundnut, maize and onion. Large farmers have grown bajra and navane.

The results indicated that, the cropping intensity in Nirligi-1 micro watershed was found to be 72.63 per cent. In case of marginal and small farmers cropping intensity was 100 per cent, in case of semi medium farmers it was 99.56 per cent, in medium farmers it was 61.06 per cent and in case of large farmers it was 74.53 per cent. The results indicated that, 100 per cent of the households have bank account and 42.86 per cent of having savings. Among land less farmers 100 per cent of the household possess bank account; marginal farmers 100 percent of them possess both bank account and 75 per cent of the household possess savings. 100 per cent of small, farmers possess per cent of bank account and 90 per cent possess savings, in semi medium farmers 100 per cent of the farmers possess bank account and 66.67 per cent savings, in case of medium farmers 100 per cent of the farmers possess bank account and 8.33 per cent of them possess savings and large category of farmers possess 100 per cent of bank account.

The results indicated that, 100 per cent of marginal, small, semi medium and large farmers and 66.67 per cent of the medium farmers have borrowed credit from different sources. The results indicated that, 23.08 per cent have availed loan in commercial bank, 3.85 per cent have availed loan from Cooperative Bank, money lender and SHGs/CBOs respectively. 38.46 per cent have availed loan from Grameena bank and 15.38 per cent of the household's availed loan from friends/relatives. The results indicated that, marginal, small, semi medium, medium and large farmers have availed Rs. 130000, Rs. 79000, Rs. 178333.33, Rs. 66,250 and Rs.50000 respectively. Overall average credit amount availed by households in the micro watershed is 94807.69.

The results indicated that, 100 per cent of the households have borrowed loan for agriculture production. The results indicated that, 85.71per cent of the households have borrowed loan for agriculture production and 14.29 per cent of the household barrowed money for household consumption. Results indicated that 82.35 percent of the households have unpaid their institutional loan and 17.65 per cent of them fully paid their institutional loan. Results indicated that 14.29 percent of the households have partially paid their private credit and 85.71 per cent of the households have unpaid their private credit. The results indicated that 23.53 per cent of the households were opined that they were helped to perform timely agricultural operations and 11.76 per cent opined that higher rate of interest. The results indicated that 14.29 per cent of the households were opined that loan amount was adequate to fulfill the requirement and 28.57 per cent opined that higher rate of interest.

The results indicated that, the total cost of cultivation for bajra was Rs. 34996.06. The gross income realized by the farmers was Rs. 26639.98. The net income from bajra cultivation was Rs. -8356.08. Thus the benefit cost ratio was found to be 1:0.76. The results indicated that, the total cost of cultivation for cotton was Rs. 27652.39. The gross

income realized by the farmers was Rs. 94691.73. The net income from cotton cultivation was Rs. 67039.34. Thus the benefit cost ratio was found to be 1:3.42. The results indicated that, the total cost of cultivation for groundnut was Rs. 30764.01. The gross income realized by the farmers was Rs. 50101.70. The net income from groundnut cultivation was Rs. 19337.69. Thus the benefit cost ratio was found to be 1:1.63. The results indicated that, the total cost of cultivation for maize was Rs. 161340.12. The gross income realized by the farmers was Rs. 30924.25. The net income from maize cultivation was Rs. -130415.87. Thus the benefit cost ratio was found to be 1:0.19. The results indicated that, the total cost of cultivation for navane was Rs. 11505.44. The gross income realized by the farmers was Rs. 22230. The net income from navane cultivation was Rs. 10724.56. Thus the benefit cost ratio was found to be 1:1.93. The results indicated that, the total cost of cultivation for red gram was Rs. 19733.93. The gross income realized by the farmers was Rs. 38835.54. The net income from red gram cultivation was Rs. 19101.62. Thus the benefit cost ratio was found to be 1:1.97.

The results indicated that, the total cost of cultivation for onion was Rs. 37429.69. The gross income realized by the farmers was Rs. 104434.69. The net income from onion cultivation was Rs. 67005. Thus the benefit cost ratio was found to be 1:2.79. The results indicated that, the total cost of cultivation for sunflower was Rs. 26987.81. The gross income realized by the farmers was Rs. 50388. The net income from sunflower cultivation was Rs. 23400.19. Thus the benefit cost ratio was found to be 1:1.87.The results indicated that, 57.14 per cent of the households opined that dry fodder was adequate and 8.57 per cent of the households opined that green fodder was adequate.

The table indicated that the in case of landless farmers the average annual income from wage was Rs.28000 and dairy farm was Rs.600, in marginal farmers, average income from service/salary was Rs.3750, business was Rs.60000, wage was Rs.27500 and agriculture Rs. 46950. In case of small farmers the average income from wage was Rs. 81700 and agriculture was Rs.47610. In semi medium farmers the average income from service/salary was Rs.33333.33, wage was Rs.6000 and agriculture was Rs.97666.67. Medium farmer's average income from service/salary was Rs.5000, business was Rs.1666.67, wage was Rs.15666.67, agriculture was Rs.99166.67 and dairy farm was Rs.4416.67. Similarly in large farmers the average income from wage was Rs.20000 and agriculture was Rs.110000.

The results indicated that, in case of marginal, the average annual expenditure from business was Rs. 170000 and agriculture was Rs.26750. In case of small farmers the average annual expenditure from agriculture was Rs. 25300. In case of semi medium farmers the average expenditure from agriculture was Rs.55666.67 and dairy farm was Rs. 17000. In medium farmers the average annual expenditure from business was Rs.12000 and agriculture was Rs.45818.18.In large farmers the average expenditure from agriculture was Rs. 50000.

The results indicate that, households have an average additional investment capacity of Rs. 3285.71 for land development and Rs. 1600 in irrigation facility, Rs.1742.86 for improved crop production and Rs.142.86 for improved livestock management. Marginal farmers have an average additional investment capacity of Rs. 2500 for land development and Rs. 2000 in improved crop production. Medium farmers have an average additional investment capacity of Rs.7500 for land development, Rs.4000 for irrigation facility, Rs. 4416.67 for improved crop production and Rs. 416.67 for improved livestock management. Large farmers have an average additional investment of Rs.15000 for land development and have an investment capacity of Rs. 8000 for irrigation facility.

The results indicated that for 5.71 per cent and 20 per cent of the households were dependent on loan from the bank and soft loan for land development respectively. For irrigation facility 14.29 per cent of household were dependent on loan from the bank and 5.71 per cent of the household were dependent on soft loan. 11.43 per cent of the household were depending on loan from bank and soft loan for improved crop production respectively. 2.86 per cent of the household were dependent on loan from bank for improved livestock management. The results indicated that, bajra, cotton, groundnut, navane, onion, red gram and sunflower crops were sold to the extent of 100 per cent. Only maize was sold to the extent of 93.79 per cent.

The results indicated that, 88.57 percent of the households have sold their produce to local/village merchant and 22.86 percent of the households have sold their produce to regulated market. The results indicated that, 100 per cent of households used tractor as a mode of transport.

The results indicated that, 85.71 per cent of the households have shown interest in soil testing. The results indicated that, 42.86 per cent of the households have experienced the soil and water erosion problems i.e. 25 percent of marginal farmers, 33.33 per cent of semi medium farmers, 100 percent of medium farmers and 100 per cent of the large farmers. The results indicated that, 91.43 percent of the household used fire wood as a source of fuel, 2.86 per cent of the household used kerosene and 25.71 per cent of the household used LPG as source of fuel. The results indicated that, piped supply was the major source of drinking water for 60 per cent of the households and 40 per cent of the household were using bore well as a source of drinking water. The results indicated that, electricity was the major source of light for 100 per cent of the households. The results indicated that, 45.71 per cent of the households possess sanitary toilet i.e. 40 per cent of the landless, 100 per cent of marginal, 50 per cent of small, 66.67 per cent of semi medium, 8.33 per cent of medium and 100 per cent of large farmers had sanitary toilet facility. The results indicated that, 100 per cent of the sampled household's possessed BPL card. The results indicated that, 91.43 per cent of the households participated in

NREGA programme which included 20 per cent of the landless and 100 percent of the marginal, small, semi medium, medium farmers and large farmers.

The results indicated that, cereals and pulses were adequate for 97.14 per cent of the household respectively. Oilseed were adequate for 2.86 per cent of the households, vegetables were adequate for 77.14 per cent of the households, milk were adequate for 88.57 per cent of the households, egg were adequate for 57.14 per cent of the households and meat were adequate for 25.71 per cent of the household. The results indicated that, cereals and pulses were inadequate for 2.86 per cent of the household. Oilseed, vegetables, fruits, milk, egg and meat were inadequate for 57.14 per cent, 22.86 per cent, 74.29 per cent, 5.71 per cent, 42.86 per cent and 71.43 per cent of the household respectively. The results indicated that, oilseed and fruits were inadequate for 40 per cent and 25.71 per cent of the household respectively.

The results indicated that, Lower fertility status of the soil was the constraint experienced by 82.86 per cent of the households, wild animal menace on farm field (68.57%), frequent incidence of pest and diseases (54.29%), inadequacy of irrigation water (57.14%), high cost of Fertilizers and plant protection chemicals (48.57%), high rate of interest on credit (48.57%), low price for the agricultural commodities (77.14%), lack of marketing facilities in the area (62.86%), inadequate extension services (57.14 %), lack of transport for safe transport of the agricultural produce to the market (48.57%) and less rain fall (11.43%) .