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

HIRESHINDHOGI (4D4A1W1e) MICRO WATERSHED

Alavandi Hobli, 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 Hire Shindhogi (4D4A1W1e) Microwatershed, Alavandi Hobli, Koppal Taluk and District, Karnataka", ICAR-NBSS&LUP Sujala MWS Publ .385, ICAR – NBSS & LUP, RC, Bangalore. p.139 & 51.

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PREFACE

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

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

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

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

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

ICAR-NBSS&LUP, Regional Centre, Bangalore has taken up a project sponsored by the Karnataka Watershed Development Project-II, (Sujala-III), Government of Karnataka funded by the World Bank under Component -1 Land Resource Inventry. This study was taken up to demonstrate the utility of such a database in reviewing, monitoring and evaluating all the land based watershed development programs on a scientific footing. To meet the requirements of various land use planners at grassroots level, the present study on "Land Resource Inventory and Socio-Economic Status of Farm Households for Watershed Planning and Development of for Hire Shindhogi 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:27-09-2019

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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

The land resource inventory of Hire Shindhogi 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 526 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 83 per cent is covered by soils and 17 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 9 soil series and 16 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 4 per cent of the soils are very shallow (<25 cm), 1 per cent of the soils are shallow (25-50 cm), 12 per cent of the soils are moderately deep (50-75 cm), 28 per cent of the soils are deep (75-100 cm) and 38 per cent area has very deep (100-150 cm) soils.*
- *An area of about 11 per cent has loamy soils and 72 per cent has clayey soils at the surface.*
- *About 71 per cent of the area has non-gravelly (<15%) soils, 11 per cent gravelly (15-35% gravel) and 1 per cent has very gravelly (35-60%) soils.*

- *About 5 per cent are very low (<50 mm/m), 11 per cent low (51-100 mm/m), 12 per cent medium (101-150 mm/m),3 per cent high (151-200 mm/m) and 52 per cent very high (>200 mm/m) in available water capacity.*
- *An area of about 18 per cent has nearly level (0-1%) and 65 per cent area has very gently sloping (1-3%) lands.*
- *An area of about 44 per cent has soils that are slightly eroded (e1) and 39 per cent moderately eroded (e2) lands.*
- *An area of about <1 per cent are slightly alkaline (pH 7.3-7.8), 8 per cent are moderately alkaline (pH pH 7.8-8.4), 74 per cent are strongly alkaline (pH 8.4-9.0) and <1 per cent are very strongly alkaline (pH >9.0) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils is non-saline (<2 dS m^{-1}) in 77 per cent and low (2-4 dS m^{-1}) in 5 per cent area.*
- *Organic carbon is low (<0.5%) in <1 per cent, medium (0.5-0.75%) in 50 per cent and high (>0.75%) in 32 per cent area of the soils.*
- *Available phosphorus is medium (23-57 kg/ha) in entire area of about 83 per cent in the microwatershed.*
- *About 2 per cent of the soils are medium (145-337 kg/ha) and 81 per cent soils are high (>337 kg/ha) in available potassium content.*
- *Available sulphur is high (>320 ppm) in the entire area of the microwatershed.*
- *Available boron is low (0.5 ppm) in about 48 per cent area and 35 per cent are medium (0.5-1.0 ppm).*
- *Available iron is sufficient (>4.5 ppm) in 81 per cent and deficient (<4.5 ppm) in about 2 per cent area.*
- *Available zinc is deficient (<0.6 ppm) in 23 per cent and sufficient (>0.6 ppm) in about 60 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	*70 (13)*	*283 (54)*	*Sapota*	*18 (3)*	-
Maize	*1 (<1)*	*351 (67)*	*Pomegranate*	*18 (3)*	*335 (64)*
Bajra	*18 (3)*	*334 (64)*	*Musambi*	*70 (13)*	*283 (54)*
Groundnut	*17 (3)*	*57 (11)*	*Lime*	*70 (13)*	*283 (54)*
Sunflower	*70 (13)*	*283 (54)*	*Amla*	*18 (3)*	*391 (74)*
Red gram	*18 (3)*	*272 (52)*	*Cashew*	*17 (3)*	*1 (<1)*
Bengalgram	*52 (10)*	*301 (57)*	*Jackfruit*	*18 (3)*	-
Cotton	*70 (13)*	*283 (54)*	*Jamun*	*18 (3)*	*272 (52)*
Chilli	*18 (3)*	-	*Custard apple*	*70 (13)*	*338 (64)*
Tomato	*18 (3)*	-	*Tamarind*	*18 (3)*	*273 (52)*
Brinjal	-	*410 (78)*	*Mulberry*	*18 (3)*	*207 (39)*
Onion	-	*75 (14)*	*Marigold*	*18 (3)*	*334 (64)*
Bhendi	-	*410 (78)*	*Chrysanthemum*	*18 (3)*	*334 (64)*
Drumstick	*18 (3)*	*392 (74)*	*Jasmine*	*18 (3)*	-
Mango	*18 (3)*	-	*Crossandra*	*18 (3)*	*79 (15)*
Guava	*17 (3)*	*1 (<1)*			

- *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 Hire Shindhogi 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.

Chapter 2

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Hire Shindhogi Microwatershed is located in the central part of northern Karnataka in Koppal Taluk and District, Karnataka State (Fig. 2.1). It comprises parts of Chikkashindhogi, Hireshindhogi, Katrahalli, Narasapura and Gunnahalli Villages. It lies between $15^0$17' – $15^0$19' North latitudes and $76^0$4' – $76^0$6' East longitudes and covers an area of 526 ha. It is about 12 km from Koppal town. It is surrounded by Chikkashindhogi village on the east, Hireshindhogi on the west and south and Katrahalli on the northern side.

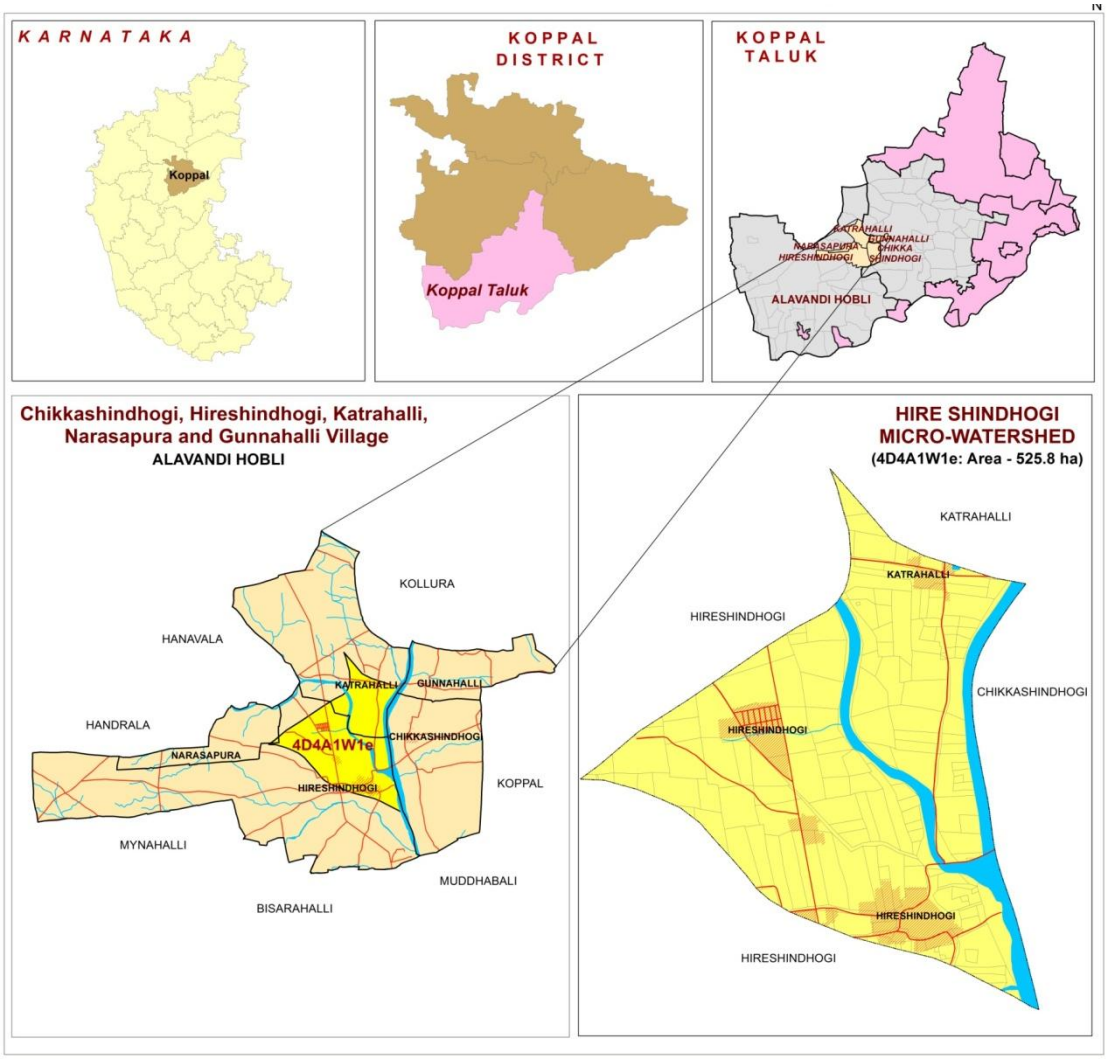


Fig. 2.1 Location map of Hire Shindhogi Microwatershed

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. 2.2 a 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 503 to 556 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**	

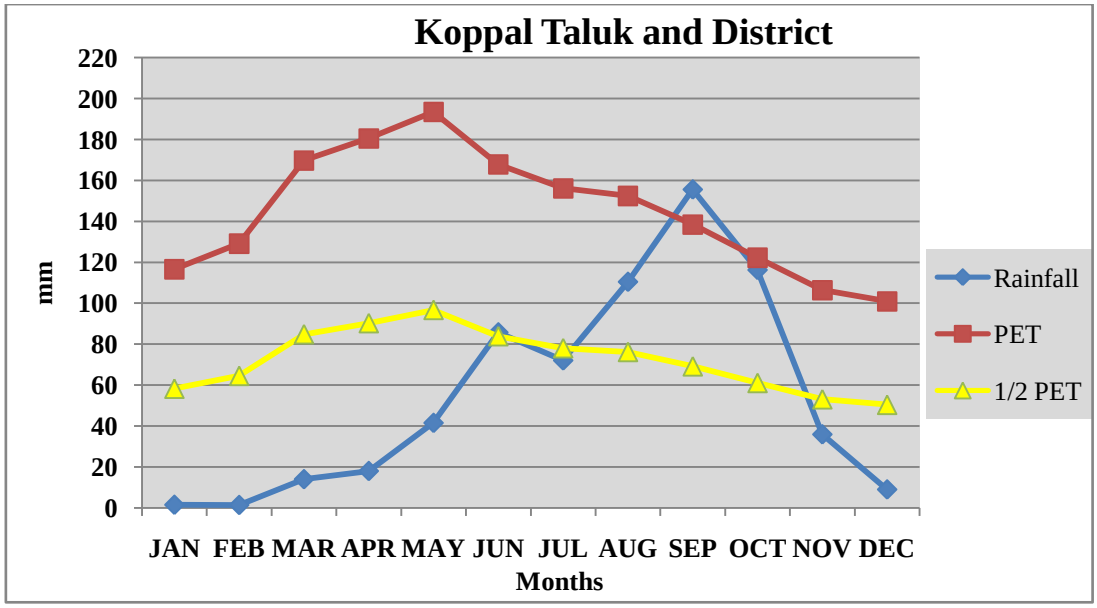


Fig. 2.3 Rainfall distribution in Koppal Taluk and District

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 Hire Shindhogi 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 Hire Shindhogi 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 and conservation structures in Hire Shindhogi 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 Hire Shindhogi Microwatershed

Fig. 2.5 (b) Different crops and cropping systems in Hire Shindhogi Microwatershed

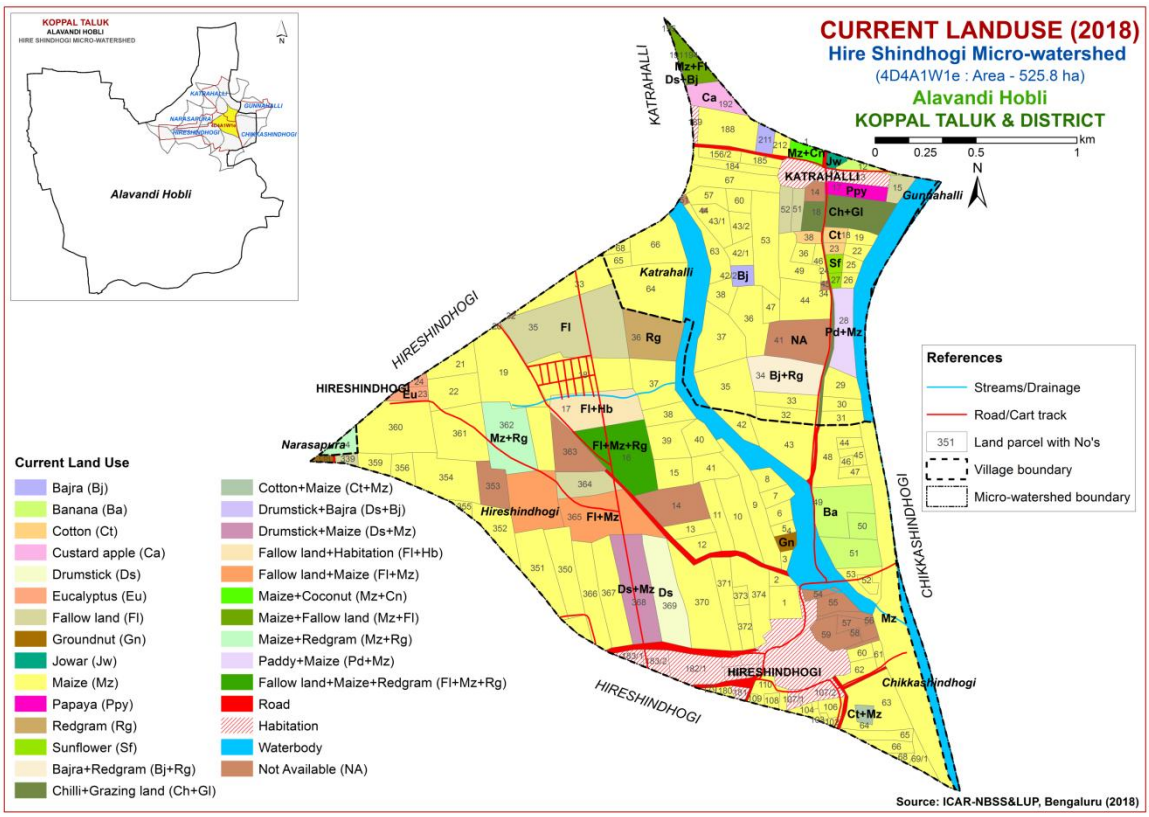


Fig. 2.6 Current Land Use – Hire Shindhogi Microwatershed

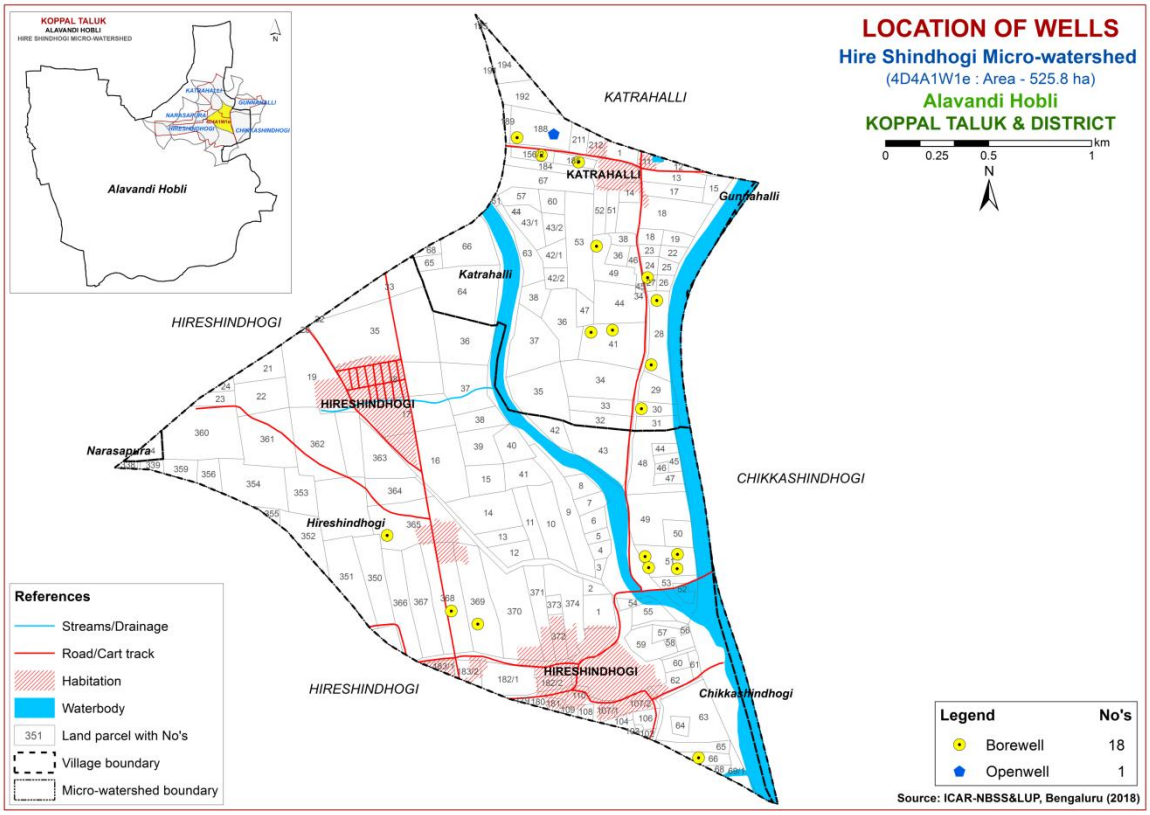


Fig. 2.7 Location of wells-Hire Shindhogi Microwatershed

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 Hire Shindhogi 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 526 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

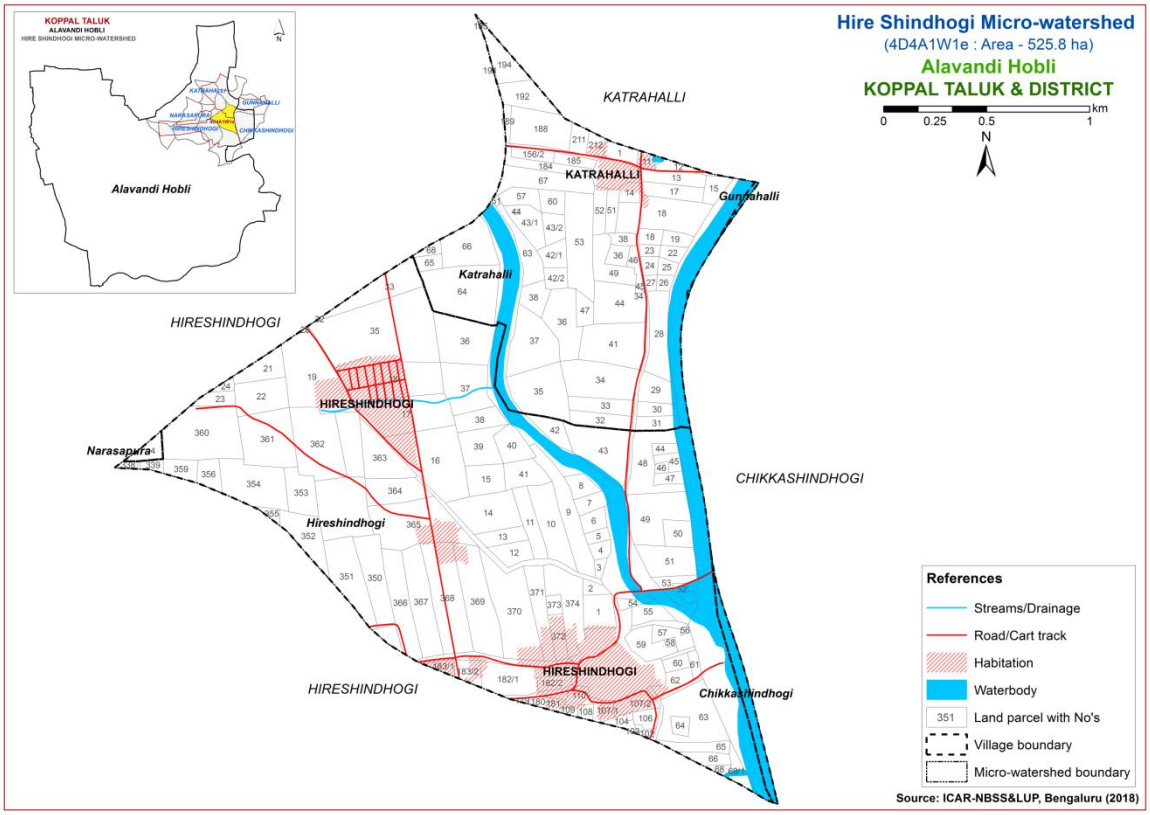


Fig. 3.1 Scanned and Digitized Cadastral map of Hire Shindhogi Microwatershed

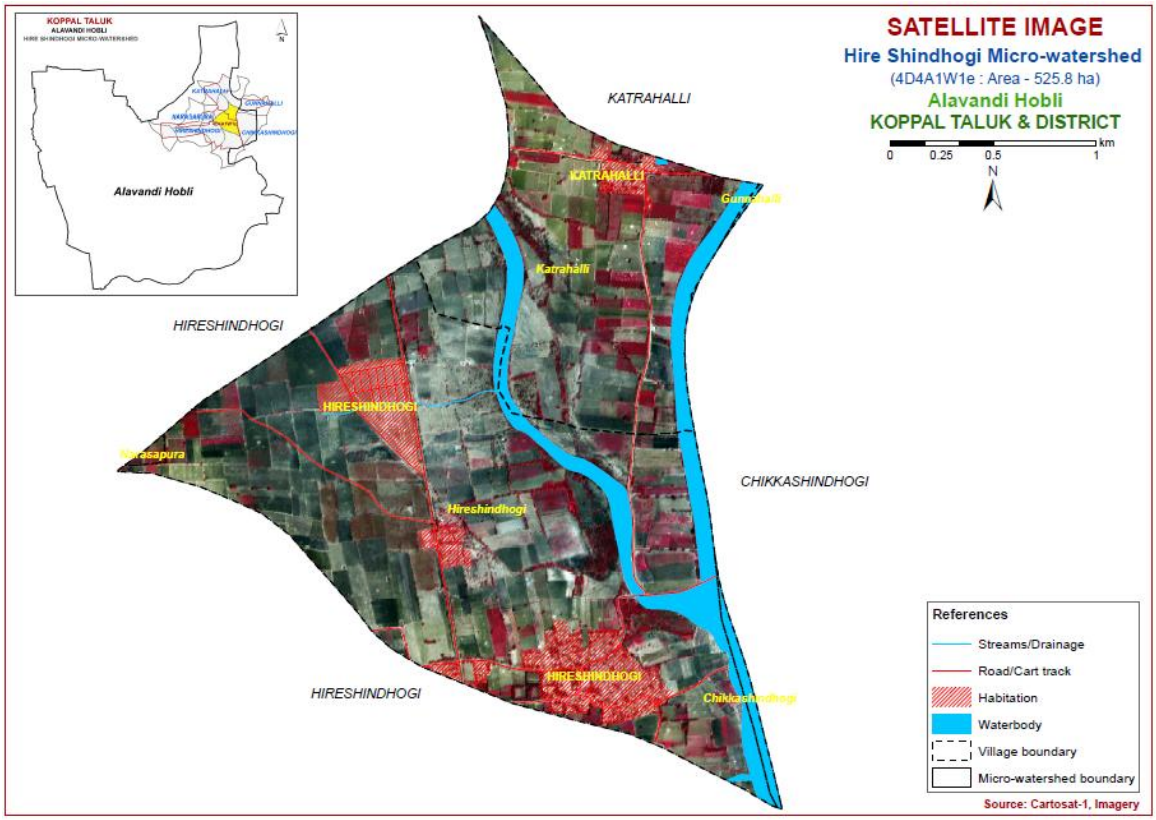


Fig. 3.2 Satellite Image of Hire Shindhogi Microwatershed

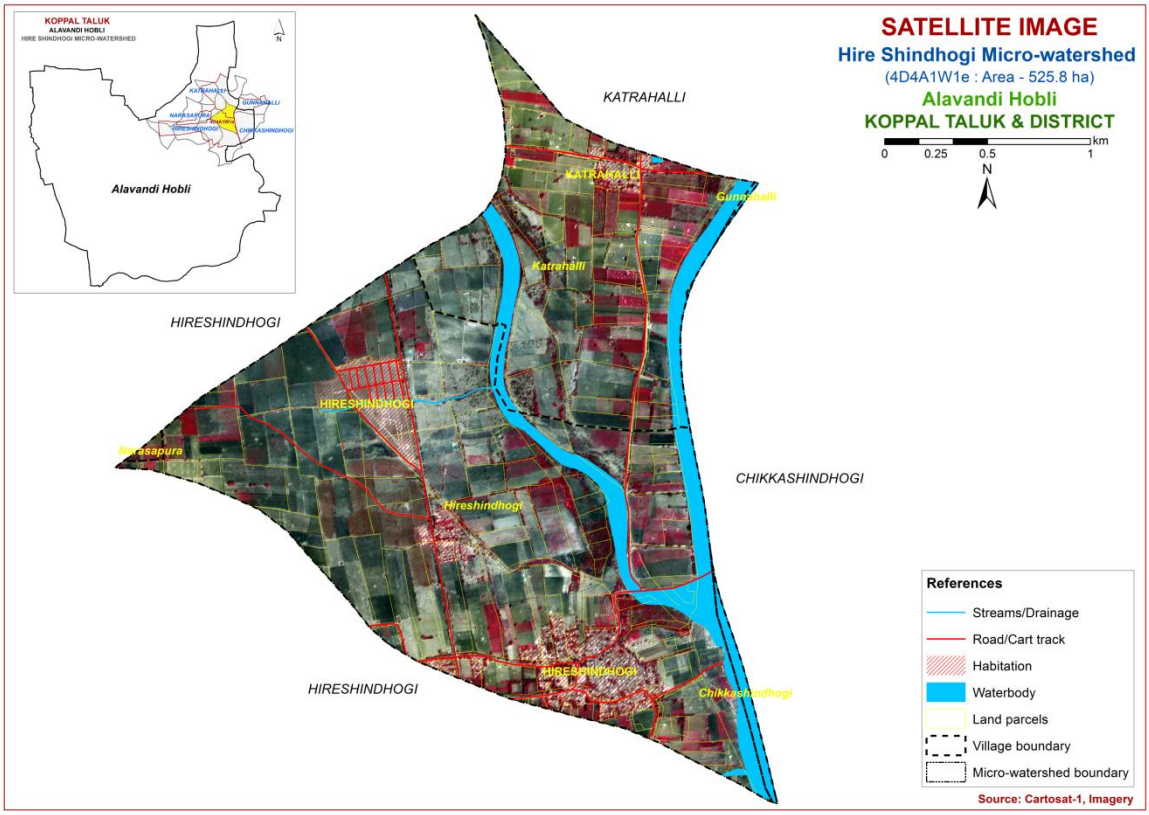


Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Hire Shindhogi Microwatershed

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).

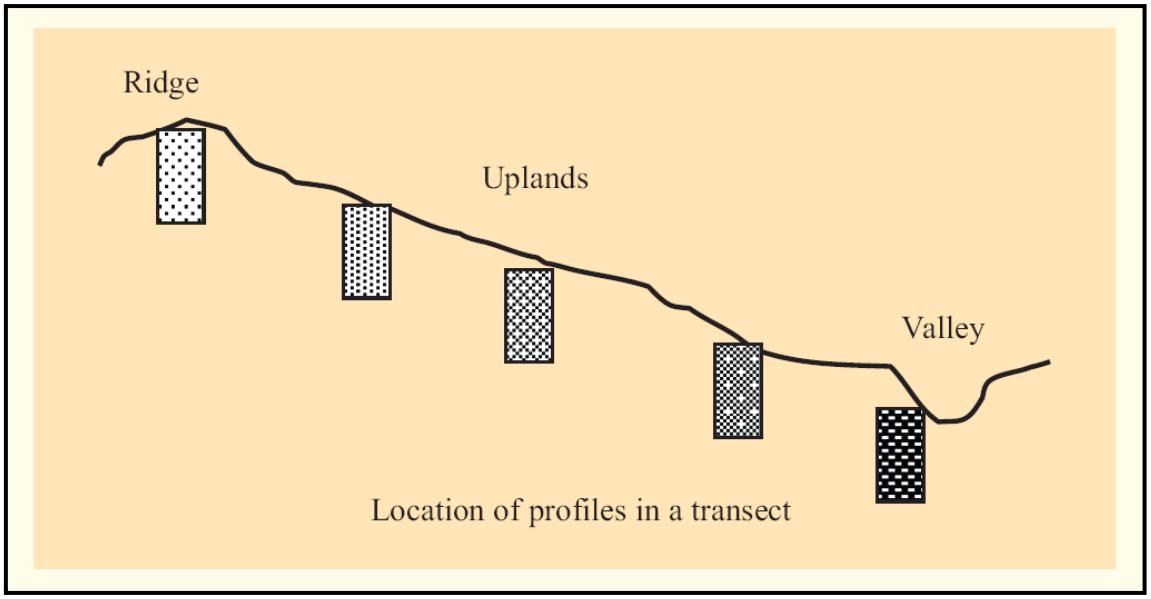


Fig. 3.4 Location of profiles in a transect

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, 9 soil series were identified in Hire Shindhogi 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	Harve (HRV)	25-50	2.5YR3/4,3/6 5YR3/3,4/4,3/4	gscl	>35	Ap-Bt-Cr-	
3	Giddadapalya (GDP)	100-150	2.5YR3/4, 3/6	gsc-gc	30-60 after 60 cm	Ap-Bt-Cr	-
4	Balapur (BPR)	100-150	2.5YR2.5/4,3/4	gsc-gc	>35	Ap-Bt-Cr	-
5	Ranatur (RTR)	>150	2.5YR2.5/3,2.5/4, 3/3,4/6	c	-	Ap-Bt	
Soils of Alluvial Landscape							
6	Dambarahalli (DRL)	75-100	10YR 2/1, 3/1, 4/3	c	<15	Ap-Bss-Ck	e-es
7	Handrala (HDL)	100-150	10 YR 2/1, 3/1,4/1,	c	-	Ap-Bss-Ck	es
8	Gatareddihal (GRH)	100-150	10YR 2/1, 3/1, 2.5Y 4/3, 5/4	c	<15	Ap-Bss-BC-C	es
9	Murlapur (MLR)	>150	10YR 2/1, 2/2, 3/1, 3/2, 4/1,	c	10-20	Ap-Bss	e-es

3.4 Soil Mapping

The area under each soil series was further separated into 16 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 16 mapping units representing 9 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 16 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 Hire Shindhogi farmer's fields (51 samples) for fertility status (major and micronutrients) at 320 m grid interval were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated using Kriging method for the microwatershed.

Table 3.2 Soil map unit description of Hire Shindhogi 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 very dark gray to very dark grayish brown, calcareous gravelly clay black soils occurring on very gently to gently sloping uplands under cultivation		**21 (3.94)**
6		BGTiB2g1	Sandy clay surface, slope 1-3 % moderate erosion, gravelly (15-35%)	21 (3.94)
	HRV	Harve soils are shallow (25-50 cm), well drained, dark red to dark reddish brown, red gravelly sandy clay loamy soils occurring on nearly level to gently sloping uplands under cultivation		**6 (1.09)**
30		HRViB1g2	Sandy clay surface, slope 1-3%, slight erosion, very gravelly (35-60%)	6 (1.09)
	GDP	Giddadapalya soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on very gently sloping uplands under cultivation		**1 (0.2)**
267		GDPcB2	Sandy loam surface, slope 1-3%, moderate erosion	1 (0.2)
	BPR	Balapur soils are deep (100-150 cm), well drained, have dark reddish brown to dark red gravelly sandy clay to clay soils occurring on nearly level to gently sloping uplands under cultivation		**57 (10.77)**
220		BPRcA1	Sandy loam surface, slope 0-1%, slight erosion	32 (6.04)
228		BPRhB1	Sandy clay loam surface, slope 1-3%, slight erosion	8 (1.45)
239		BPRiB2	Sandy clay surface, slope 1-3 % moderate erosion	17 (3.28)
	RTR	Ranatur soils are very deep (>150 cm), well drained, have dark reddish brown to dark red clay soils occurring on nearly level to very gently sloping uplands under cultivation		**17 (3.28)**

Soil map unit No*	Soil Series	Soil Phase Symbol	Mapping Unit Description	Area in ha (%)
284		RTRcB1	Sandy loam surface, slope 1-3%, slight erosion	17 (3.28)
Soils of Alluvial Landscape				
	DRL	Dambarahalli soils are moderately deep (75-100 cm), moderately well drained, have dark brown to very dark gray, calcareous black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**62 (11.92)**
348		DRLmB1	Clay surface, slope 1-3%, slight erosion	22 (4.25)
350		DRLmB2	Clay surface, slope 1-3%, moderate erosion	40 (7.67)
	HDL	Handrala soils are deep (100-150 cm), moderately well drained, have dark gray to very dark gray, black calcareous cracking clay soils occurring on very gently sloping plains under cultivation		**16 (2.95)**
380		HDLmB1	Clay surface, slope 1-3%, slight erosion	16 (2.95)
	GRH	Gatareddihal soils are deep (100-150 cm), moderately well drained, have light olive brown to very dark gray, calcareous black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**71 (13.6)**
371		GRHmB1	Clay surface, slope 1-3%, slight erosion	15 (2.88)
373		GRHmB2	Clay surface, slope 1-3%, moderate erosion	21 (4.09)
374		GRHmB2g1	Clay surface, slope 1-3%, moderate erosion, gravelly (15-35%)	35 (6.63)
	MLR	Murlapur soils are very deep (>150 cm), moderately well drained, have very dark grayish brown to very dark gray, calcareous black cracking clay soils occurring on nearly level to very gently sloping plains under cultivation		**185 (35.12)**
411		MLRmA1	Clay surface, slope 0-1%, slight erosion	64 (12.09)
415		MLRmB1	Clay surface, slope 1-3 %, slight erosion	53 (10.17)
418		MLRmB2	Clay surface, slope 1-3%, moderate erosion	68 (12.86)
1000	Others	Habitation and waterbody		90 (17.13)

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

3.6 Land Management Units (LMU's)

The 16 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 Hire Shindhogi 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.

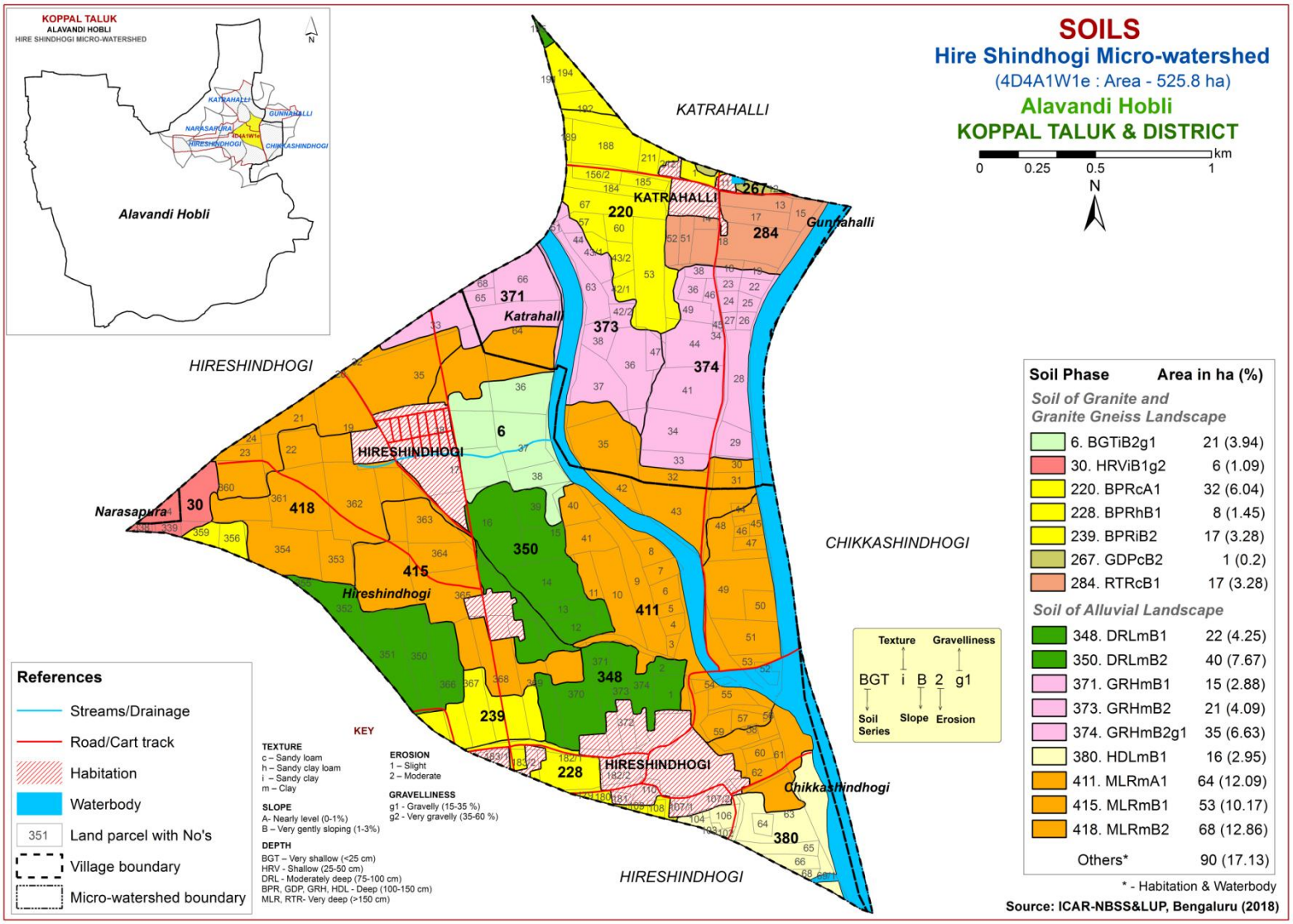


Fig 3.4 Soil Phase or Management Units-Hire Shindhogi Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Hire Shindhogi Microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 9 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 9 soil series identified followed by 16 soil phases (management units) mapped (Fig. 3.4) are furnished below. The physical and chemical characteristics of soil series identified in Hire Shindhogi 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, 5 soil series are identified and mapped. Of these, Balapur (BPR) series occupies maximum area of 57 (11%), Belagatti (BGT) 21 (4%), Ranatur (RTR) 17 ha (3%), Harve (HRV) 6 ha (1%) and Giddadapalya (GDP) occupy minor area of about 1 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 gravelly clay soils. They have developed from 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). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Belagatti (BGT) Series

4.1.2 Harve (HRV) Series: Harve soils are shallow (25-50 cm), well drained, have reddish brown to dark red sandy clay loam soils. They have developed from granite gneiss and occur on very gently to moderately sloping uplands. The Harve series has been classified as a member of the Loamy-skeletal, mixed isohyperthermic, family of (Paralithic) Rhodustalfs.

The thickness of the solum ranges from 28 to 48 cm. The thickness of A-horizon ranges from 12 to 17 cm. Its colour is in 5YR and 2.5 YR hue with value 3 to 4 and chroma 4 to 6. The texture varies from loamy sand to sandy loam with 20 to 60 per cent gravel. The thickness of B-horizon ranges from 16 to 32 cm. Its colour is in 2.5 YR and 5 YR hue with value 3 to 4 and chroma 4 to 6. Its texture is sandy clay loam with gravel content of more than 35 per cent. The available water capacity is very low (<50 mm/m). Only one phase was identified and mapped.

Landscape and soil profile characteristics of Harve (HRV) Series

4.1.3 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.

4.1.4 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). Three phases were identified and mapped.

Landscape and soil profile characteristics of Balapur (BPR) Series

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

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

Landscape and soil profile characteristics of Ranatur (RTR) Series

4.2 Soils of Alluvial landscape

In this landscape, seven soil series have been identified and mapped. Of these, Murlapur (MLR) series occupies maximum area of 185 ha (35%), Gatareddihal (GRH) 71 ha (14%), Dambarahalli (DRL) 62 ha (12%) and Handrala (HDL) occupy an area of

about 16 ha (3%) in the microwatershed. The brief description of soil series along with the soil phases identified and mapped is given below.

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

The thickness of the solum ranges from 75 to 99 cm. The thickness of A horizon ranges from 13 to 24 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture is clay. The thickness of B horizon ranges from 54 to 85 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 3. Its texture is clay and are calcareous. The available water capacity is high (151-200 mm/m). Two soil phases were identified and mapped.

Landscape and soil profile characteristics of Dambarahalli (DRL) Series

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

The thickness of the solum ranges from 102 to 149 cm. The thickness of A horizon ranges from 14 to 26 cm. Its colour is in 10 YR hue with value 3 and chroma 1. The texture is clay. The thickness of B horizon ranges from 103 to 127 cm. Its colour is in 10 YR hue with value 2 to 4 and chroma 1 to 2. Texture is dominantly clay. The available water capacity is very high (>200 mm/m). Only one phase was identified and mapped.

Landscape and soil Profile Characteristics of Handrala (HDL) Series

4.2.3 Gatareddihal (GRH) Series: Gatareddihal soils are deep (100-150 cm), moderately well drained, have black or dark grey to light olive brown, calcareous sodic clay soils. They are developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Gatareddihal series has been classified as a member of the very fine, smectitic, isohyperthermic family of Sodic Haplusterts.

The thickness of the solum ranges from 102 to 149 cm. The thickness of A-horizon ranges from 12 to 19 cm. Its colour is in 7.5 YR, 10 YR hue with value 3 to 4 and chroma 1 to 6. The texture is sandy clay loam to clay. The thickness of B-horizon ranges from 86 to 117 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 and chroma 2 to 6. Texture is clay 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 Gatareddihal (GRH) Series

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

The thickness of the solum is >150 cm. The thickness of A horizon ranges from 20 to 25 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 150 to 190 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. Its texture is clay. The available water capacity is very high (>200 mm/m). Three phases were identified and mapped.

Landscape and soil profile characteristics of Murlapur (MLR) series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Hire Shindhogi 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, (calc) 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...

Series Name: Harve (HRV)**, Pedon:** R-10
Location: $15^0$25'11.63"N, $76^0$22'03.65"E Jabbaragudda village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Loamy-skeletal, mixed isohyperthermic, (Paralithic) Rhodustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-15	Ap	65.64	9.07	25.28	29.04	12.99	9.00	3.48	11.15	50	scl	12.87	4.81
15-29	Bt1	56.13	7.75	36.12	27.81	11.43	7.21	1.44	8.24	60	sc	15.69	6.24
29-47	Bt2	63.42	6.53	30.05	32.38	13.93	7.48	5.74	3.89	60	scl	15.41	9.29

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-15	6.05	-	-	0.21	0.93	-	8.89	1.96	0.50	0.08	11.43	11.24	0.44	100.00	0.73
15-29	5.99	-	-	0.15	0.29	-	9.72	2.75	0.51	0.09	13.07	12.71	0.35	100.00	0.74
29-47	6.07	-	-	0.11	0.38	-	9.35	2.47	0.49	0.06	12.36	12.71	0.42	97.29	0.44

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...

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...

Soil Series: Ranatur (RTR), **Pedon:** RM-87
Location: $13^0$21'49.0"N, $76^0$38'06"E, (4B3D4L2a), J C Pura village, Chikkanayakanahalli taluk, Tumakuru district
Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, isohyperthermic Rhodic Paleustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-17	Ap	84.16	9.46	6.38	2.22	18.57	26.14	24.32	12.92	-	ls	-	-
17-47	Bt1	51.14	8.30	40.56	1.66	13.49	14.52	13.59	7.88	-	sc	-	-
47-89	Bt2	51.99	11.01	37.00	1.94	13.99	15.32	13.18	7.56	-	sc	-	-
89-123	Bt3	51.58	9.07	39.35	3.47	14.50	14.61	11.64	7.35	-	sc	-	-
123-152	Bt4	47.89	8.88	43.23	2.27	12.36	14.21	11.12	7.93	-	sc	-	-
152-198	Bt5	43.37	13.17	43.45	2.48	9.83	13.25	10.87	6.94	-	c	-	-

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-17	5.08	-	-	0.03	0.52	0.00	3.68	0.72	0.06	0.19	4.65	9.21	1.44	50.50	2.06
17-47	6.28	-	-	0.03	0.48	0.00	3.93	0.72	0.08	0.07	4.80	7.92	0.20	60.59	0.94
47-89	6.42	-	-	0.03	0.40	0.00	4.40	0.74	0.08	0.06	5.28	7.52	0.20	70.15	0.79
89-123	6.50	-	-	0.02	0.32	0.00	4.44	0.76	0.09	0.07	5.36	7.82	0.20	68.58	0.93
123-152	6.52	-	-	0.02	0.28	0.00	4.40	0.71	0.09	0.07	5.26	8.22	0.19	64.00	0.81
152-198	7.09	-	-	0.02	0.24	0.00	6.10	0.98	0.10	0.20	7.38	9.60	0.22	76.89	2.09

Contd...

Series Name: Dombarahalli (DRL) **Pedon:** R-8
Location: $15^0$13'96.2"N, $75^0$57'48.6" E Ragunathanahalli 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
0-15	Ap	28.25	19.48	52.27	4.76	4.44	4.87	8.23	5.95	-	c	39.86	27.20
15-27	BA1	21.55	20.00	58.45	3.76	2.76	3.43	6.30	5.30	-	c	46.35	34.84
27-45	Bss1	14.86	20.89	64.25	2.46	2.23	2.23	3.91	4.02	-	c	57.99	41.06
45-80	Bss2	10.42	19.04	70.54	1.74	1.97	1.27	2.78	2.66	-	c	66.36	36.24

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}							%	%
0-15	8.78	-	-	0.42	0.32	12.35	-	-	0.59	4.25	-	49.70	0.95	100.00	5.62
15-27	9.03	-	-	0.61	0.30	12.48	-	-	0.30	8.96	-	57.23	0.98	100.00	10.07
27-45	9.10	-	-	0.67	0.34	11.70	-	-	0.25	11.85	-	60.71	0.95	100.00	14.05
45-80	9.18	-	-	0.86	0.32	13.39	-	-	0.27	15.40	-	63.33	0.90	100.00	18.45

Contd...

Series Name: Handrala (HDL), **Pedon:** A2/RM-1
Location: $15^0$19'69.8"N, $75^0$58'00"E, Kavalura 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	21.68	16.62	61.70	4.42	3.98	3.43	5.64	4.20	10	c	41.36	31.27
25-50	Bss1	14.93	15.76	69.32	2.64	2.53	2.99	3.33	3.44	05	c	48.92	39.19
50-82	Bss2	23.11	16.60	60.29	4.51	3.61	6.31	4.74	3.95	05	c	42.46	33.85
82-117	Bss3	10.50	18.38	71.12	1.98	1.98	1.63	2.57	2.33	05	c	52.95	42.82

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-25	9.06	-	-	0.371	0.16	4.80	-	-	0.80	7.93	-	62.33	1.01	-	5.09
25-50	9.09	-	-	0.719	0.2	7.20	-	-	0.42	14.94	-	67.10	0.97	-	8.90
50-82	9.28	-	-	0.47	0.19	9.36	-	-	0.47	11.59	-	60.21	1.00	-	7.70
82-117	8.76	-	-	1.55	0.36	8.64	-	-	0.11	2.28	-	25.33	0.36	-	3.61

Contd...

Series Name: Gatareddihal (GRH) Pedon**:** R-7
Location: $15^0$14'20.8"N, $76^0$04'28.4" E Gudlanur village, Koppal Taluk and District
Analysis at: NBSS&LUP, Regional Centre, Bangalore. **Classification:** Very fine, smectitic, isohyperthermic (calc) Sodic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	20.07	19.71	60.23	1.76	3.75	3.64	3.42	7.50	-	c	41.70	29.56
18-51	Bss1	15.11	17.47	67.42	3.16	3.04	2.25	3.38	3.27	-	c	59.43	38.52
51-80	Bss2	13.19	18.74	68.07	1.80	2.93	2.37	3.04	3.04	-	c	60.69	40.91
80-107	Bss3	17.54	19.50	62.96	2.46	4.13	3.24	4.25	3.46	-	c	57.25	37.31
107-131	BC	9.42	17.48	73.10	1.48	1.82	1.36	1.93	2.84	-	c	64.62	43.98

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	9.08	-	-	0.23	0.33	6.89	-	-	0.70	6.36	-	63.21	1.05	100.00	7.11
18-51	9.19	-	-	0.61	0.49	9.10	-	-	0.54	14.20	-	66.05	0.98	100.00	15.98
51-80	9.27	-	-	0.56	0.29	9.36	-	-	0.49	14.75	-	65.63	0.96	100.00	17.07
80-107	9.28	-	-	0.57	0.39	9.62	-	-	0.44	14.64	-	63.95	1.02	100.00	17.49
107-131	9.04	-	-	1.08	0.31	8.32	-	-	0.52	16.40	-	68.36	0.94	100.00	17.30

Contd...

Series Name: Murlapur (MLR), **Pedon:** R-A1/16

Location: $15^0$19'42.9"N, $75^0$55'84.7"E, Kavalura 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
0-30	Ap	27.97	13.96	58.07	4.22	4.77	6.66	8.10	4.22	10	c	36.24	25.90
30-53	BA	26.34	17.48	56.17	4.17	5.05	6.04	7.24	3.84	05	c	38.55	28.98
53-83	Bss1	19.35	19.55	61.10	3.13	3.91	4.03	5.48	2.80	05	c	44.48	33.69
83-105	Bss2	16.63	17.47	65.90	2.70	3.93	2.92	3.93	3.15	<5	c	50.55	38.11
105-160	Bss3	14.69	20.34	64.97	0.79	2.26	4.07	4.18	3.39	<5	c	51.54	40.19

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-30	9.19	-	-	0.313	0.57	10.08	-	-	0.64	5.67	-	42.08	0.72	-	5.39
30-53	9.22	-	-	0.449	0.24	13.08	-	-	0.35	8.23	-	41.02	0.73	-	8.02
53-83	9.17	-	-	0.377	0.82	16.92	-	-	0.39	14.28	-	51.20	0.84	-	11.16
83-105	9.18	-	-	0.477	0.61	15.48	-	-	0.35	13.19	-	53.11	0.81	-	9.94
105-160	9.01	-	-	1.17	0.24	16.92	-	-	0.43	19.61	-	53.95	0.83	-	14.54

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 16 soil map units identified in the Hire Shindhogi Microwatershed are grouped under three land capability classes and five land capability subclasses (Fig. 5.1).

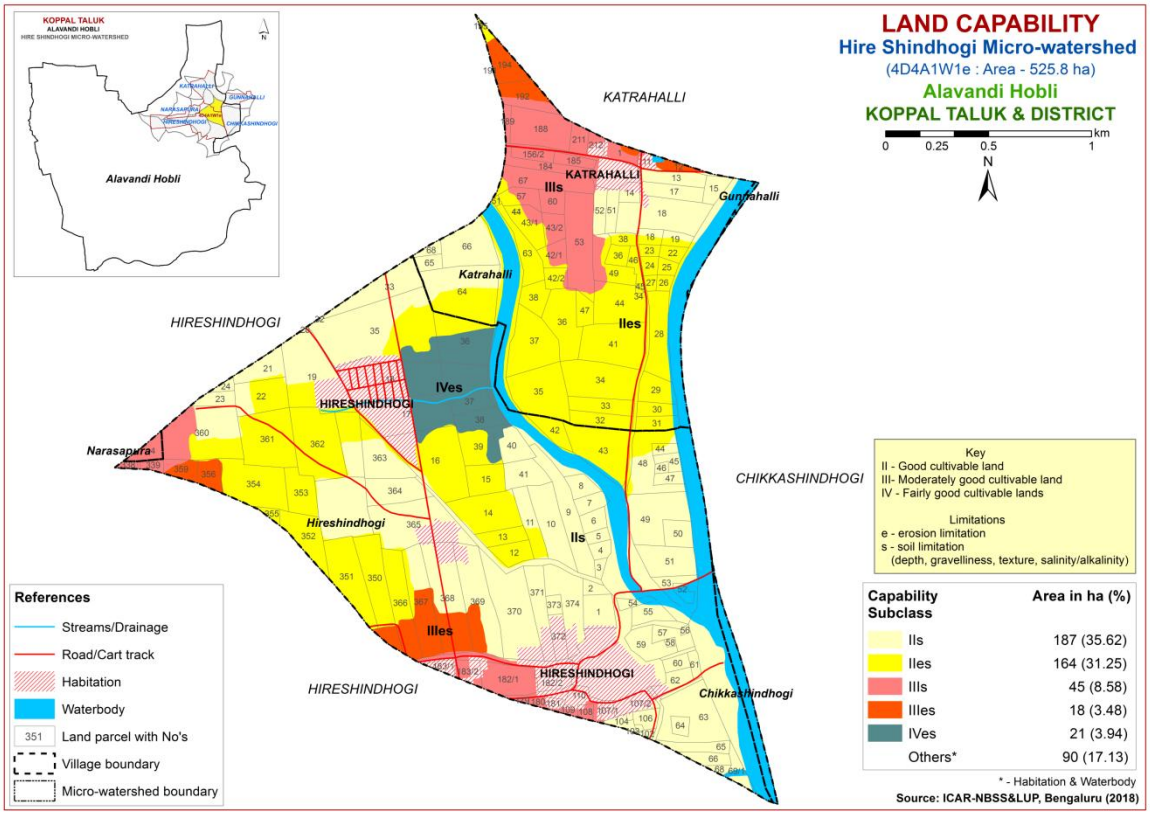


Fig. 5.1 Land Capability map of Hire Shindhogi Microwatershed

Entire area of the microwatershed is suitable for agriculture. An area of 351 ha (67%) are good lands (Class II) that have minor limitations and require moderate conservation practices and are distributed in the major part of the microwatershed. Moderately good lands (Class III) cover an area of 63 ha (12%) and are distributed in the northern, western and southern part of the microwatershed with moderate problems of soil that require special conservation practices. An area of 21 ha (4%) is fairly good lands and are distributed in the central 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 cover about 17 per cent is habitations and water bodies.

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).

Very shallow (<25 cm) soils occupy an area of 21 ha (4%) and are distributed in the central part of the microwatershed. An area of 6 ha (1%) is shallow (25-50 cm) and are distributed in the western part of the microwatershed. Moderately deep soils (75-100 cm) occupy an area of 63 ha (12%) and occur in the southwestern and southern part of the microwatershed. Deep (100-150 cm) to very deep (>150 cm) soils occupy a maximum area of 347 ha (66%) and are distributed in the major part of the microwatershed.

The most problem lands with an area of about 21 ha (4%) 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 347 ha (66%) where all climatically adapted long duration crops be grown.

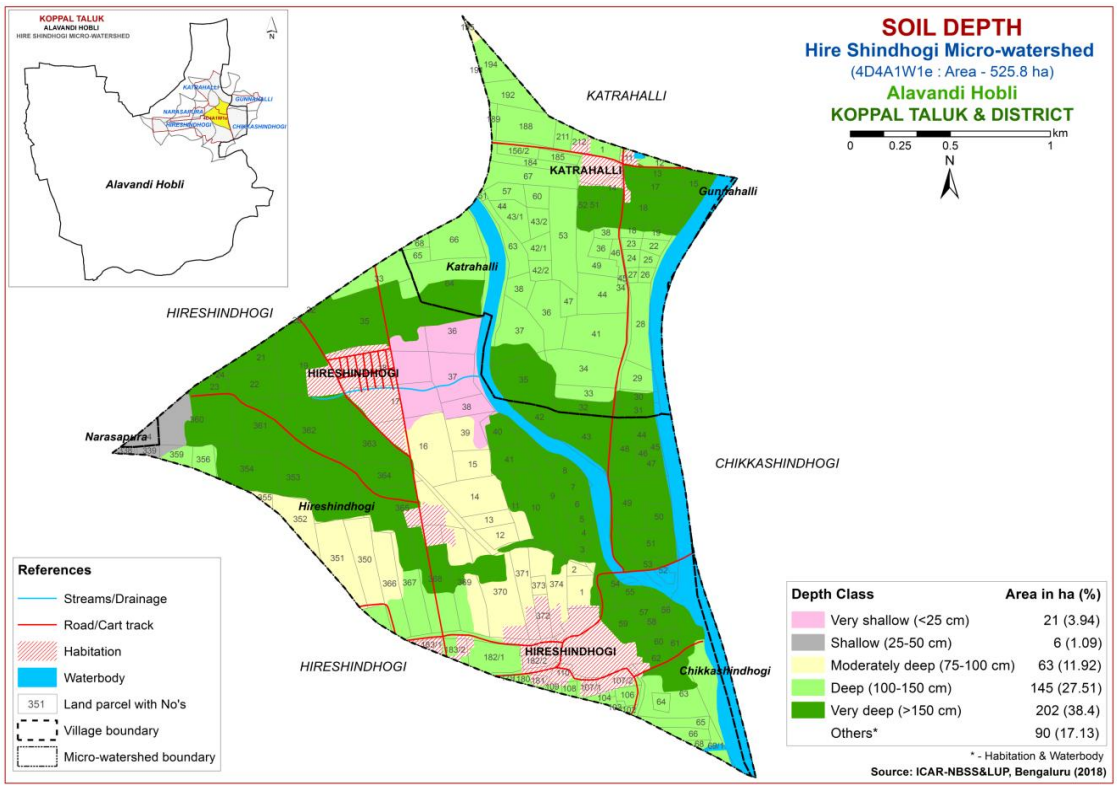


Fig. 5.2 Soil Depth map of Hire Shindhogi Microwatershed

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 58 ha (11%) has loamy soils at the surface and are distributed in the northern, central, southern and western part of the microwatershed. Major area of 378 ha (72%) has clayey soils at the surface and are distributed in all parts of the microwatershed (Fig. 5.3).

The most productive lands 378 ha (72%) 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 50 ha (10%) are loamy soils which also have high potential for AWC, nutrient availability but have no drainage or other physical problems compared to loamy soils.

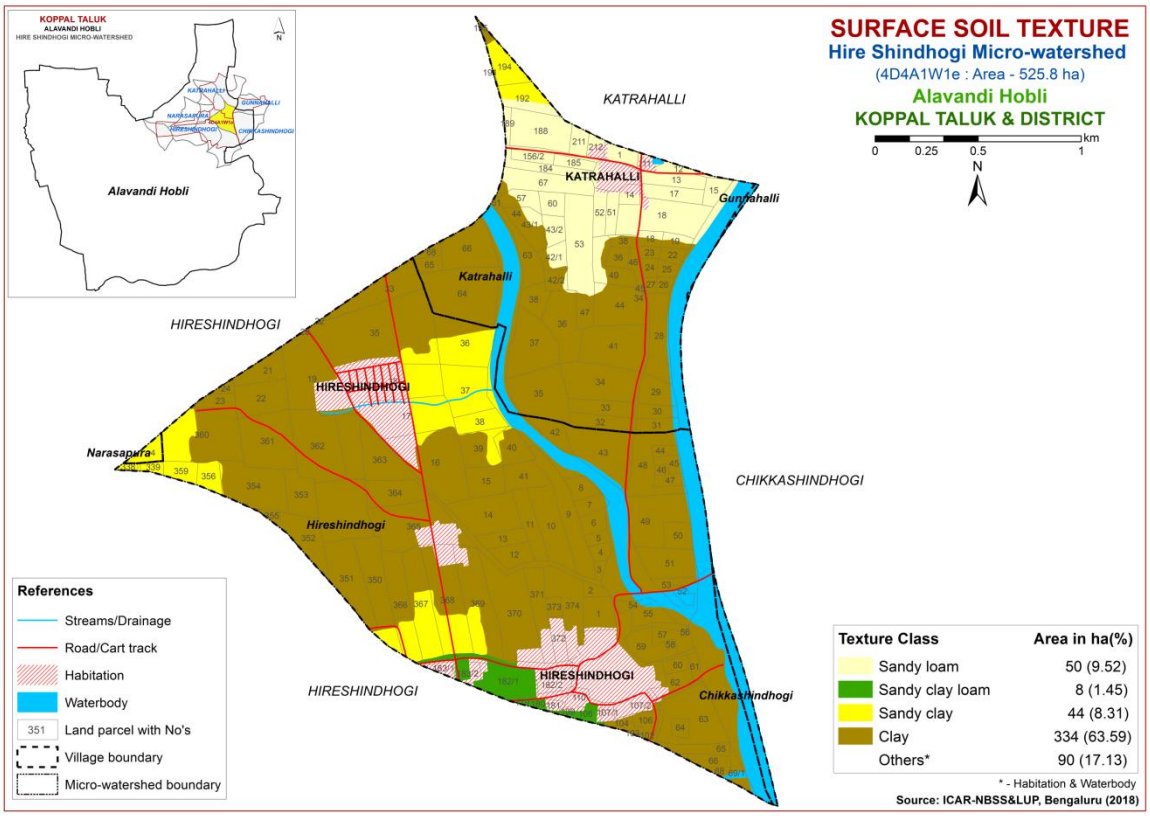


Fig. 5.3 Surface Soil Texture map of Hire Shindhogi Microwatershed

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 374 ha (71%) and are distributed in the major part of the microwatershed. An area of 56 ha (11%) is covered by gravelly (15-35% gravel) soils and are distributed in the central and northeastern part of the microwatershed. An area of 6 ha (1%) is very gravelly (35-60%) and are distributed in the western part of the microwatershed (Fig. 5.4).

The most productive lands with respect to gravelliness are found to be 71%. 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 62 ha (12%) where only short or medium duration crops can be grown.

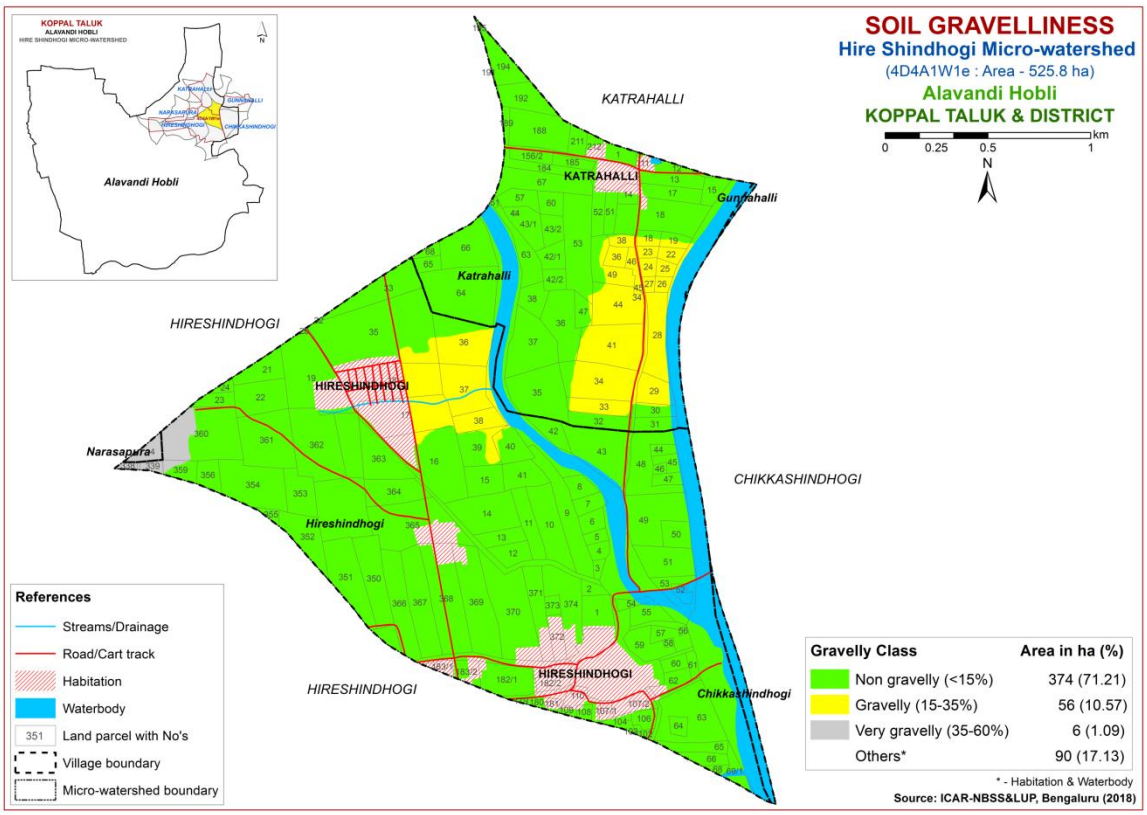


Fig. 5.4 Soil Gravelliness map of Hire Shindhogi Microwatershed

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 26 ha (5%) are very low (<50 mm/m) in available water capacity and are distributed in the central part of the microwatershed. An area of about 58 ha (11%) has soils that are low (51-100 mm/m) in available water capacity and are distributed in the northern, western and southern part of the microwatershed. Soils with medium available water capacity (101-150 mm/m) occupy an area of 63 ha (12%) and are distributed in the western, southern and central part of the microwatershed. Maximum area of about 289 ha (55%) is high to very high (151- >200 mm/m) in available water capacity and are distributed in the major part of the microwatershed.

An area of about 26 ha (5%) 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 289 ha (55%) that have high to very high AWC, where all climatically adapted long duration crops can be grown.

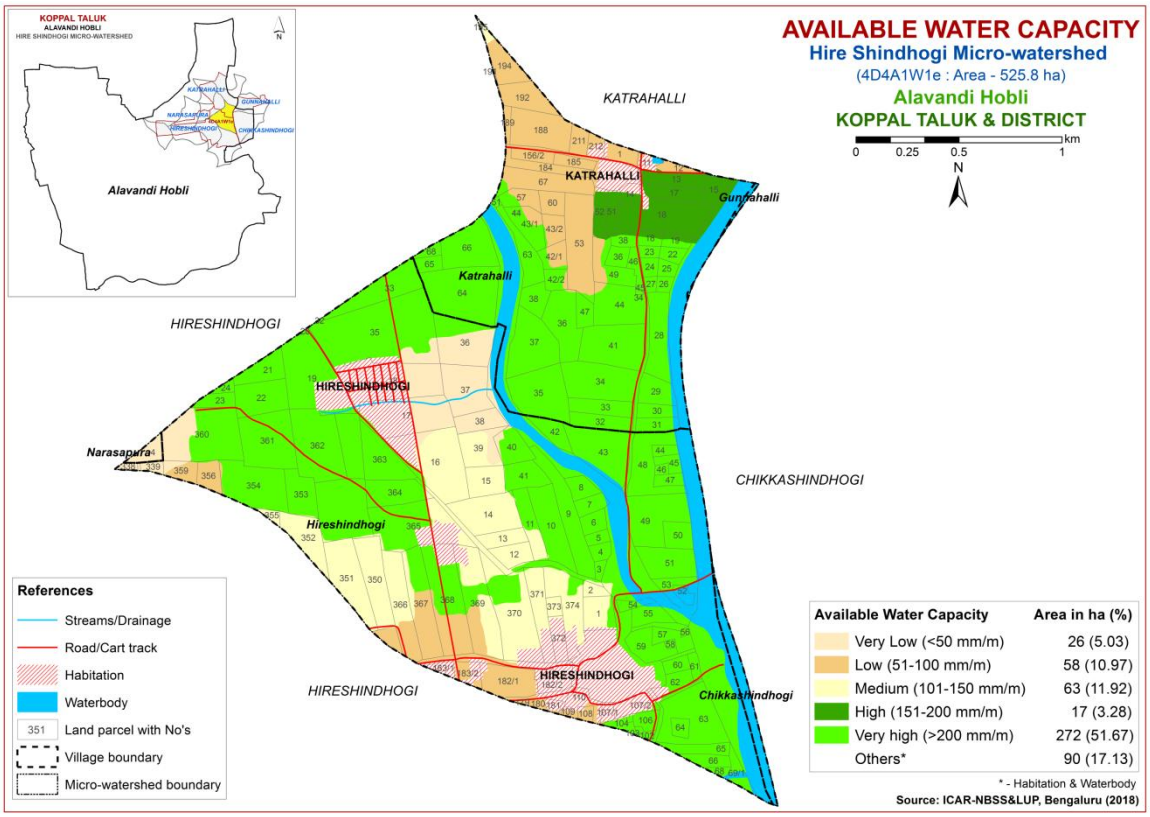


Fig. 5.5 Soil Available Water Capacity map of Hire Shindhogi Microwatershed

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 95 ha (18%) is nearly level (0-1%) and are distributed in the northern, central and eastern part of the microwatershed. Major area of about 340 ha (65%) falls under very gently sloping (1-3% slope) lands 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.

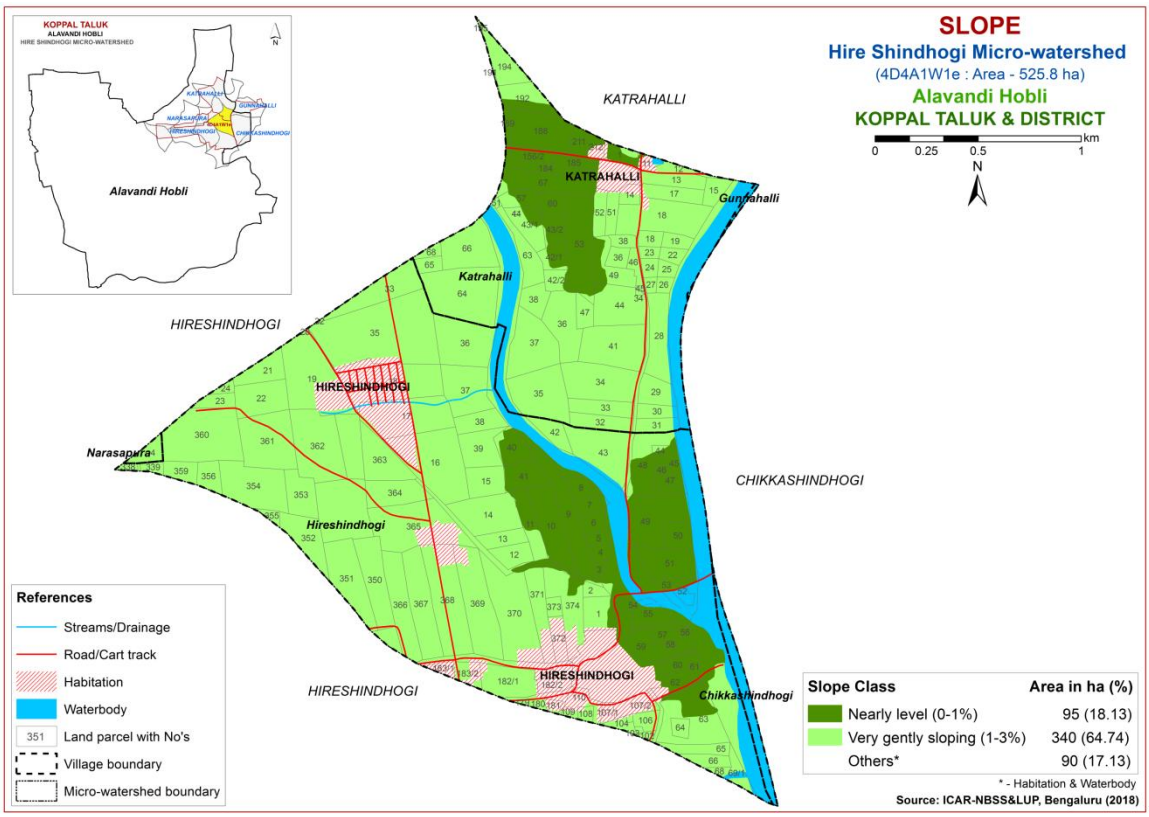


Fig. 5.6 Soil Slope map of Hire Shindhogi Microwatershed

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 a maximum area of about 232 ha (44%) and are distributed in the major part of the microwatershed. Moderately eroded (e2 Class) soils cover an area of 203 ha (39%) and are distributed in the northern, central, southern and western part of the microwatershed.

An area of about 203 ha (39%) 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.

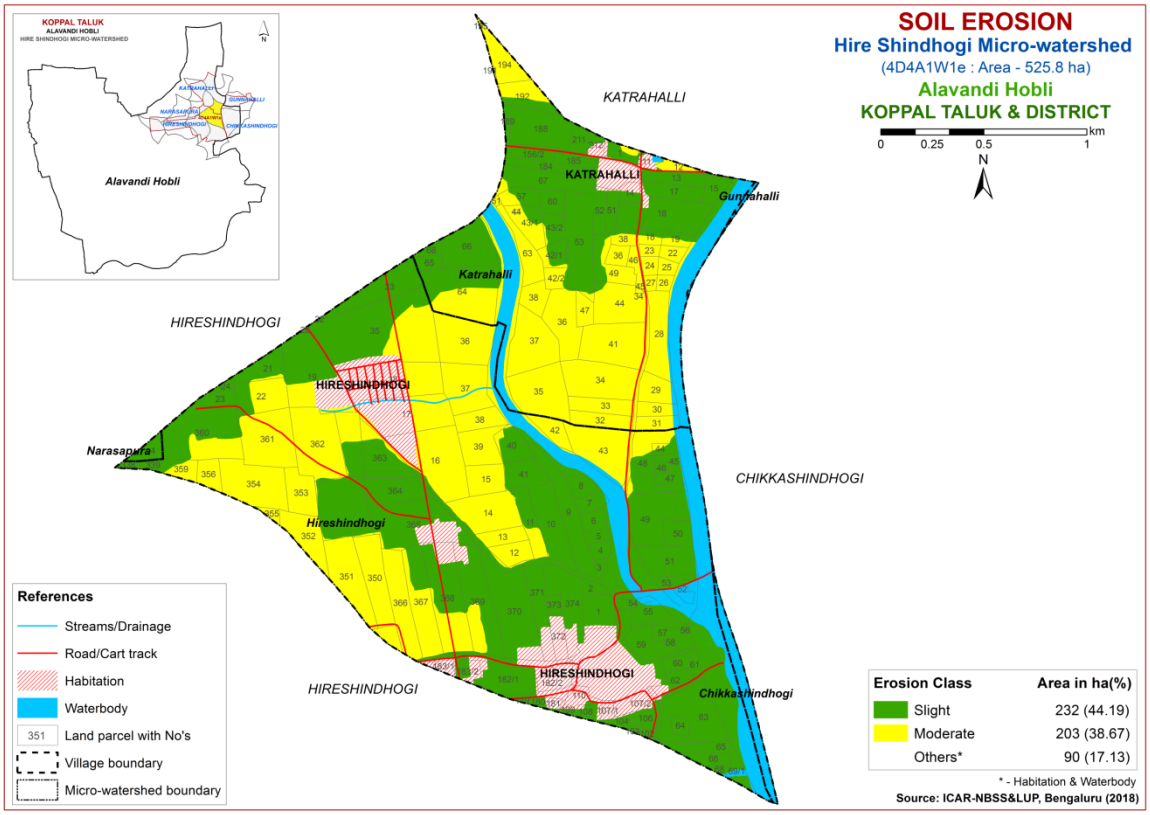


Fig. 5.7 Soil Erosion map of Hire Shindhogi Microwatershed

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 Hire Shindhogi Microwatershed for soil reaction (pH) showed that an area of 2 ha (<1%) is slightly alkaline (pH 7.3-7.8) and are distributed in the southwestern part of the microwatershed. An area of 41 ha (8%) is moderately alkaline (pH 7.8-8.4) and are distributed in the southern part of the microwatershed. Major area of 391 ha (74%) is strongly alkaline (pH 8.4-9.0) and are distributed in all parts of the microwatershed. A minor area of about 1 ha (<1%) is very strongly alkaline (pH >9.0) and are distributed in the eastern part of the microwatershed. Thus, major soils in the microwatershed are alkaline covering 435 ha.

6.2 Electrical Conductivity (EC)

The Electrical Conductivity of the soils is non saline (<2 dS m^{-1}) in an area of 407 ha (77%) and is distributed in all parts of the microwatershed (Fig. 6.2). An area of 28 ha (5%) is low (2-4 (<2 dS m^{-1}) and are distributed in the southern part of the microwatershed.

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 of 0.2 ha (<1%) and is distributed in the eastern part of the microwatershed. Maximum area of 265 ha (50%) is medium (0.5-0.75%) and are distributed in the major part of the microwatershed. An area of 170 ha (32%) is high (>0.75%) and are distributed in the southern and western part of the microwatershed (Fig. 6.3).

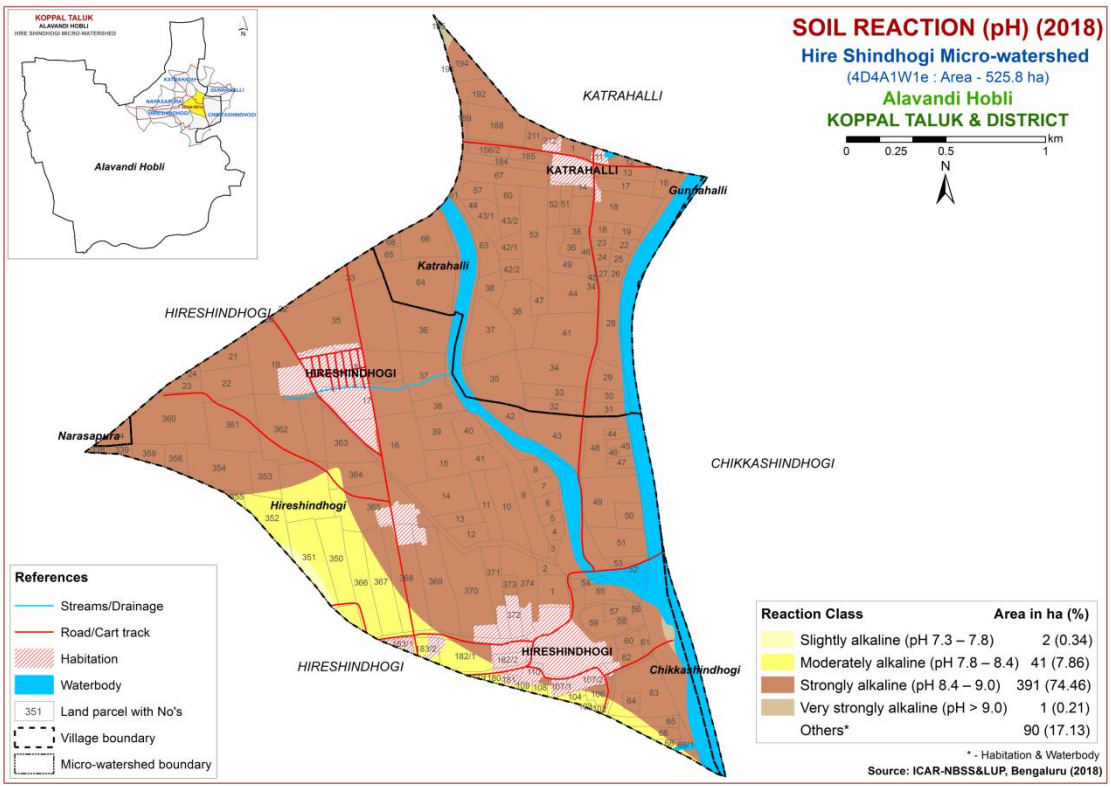


Fig. 6.1 Soil Reaction (pH) map of Hire Shindhogi Microwatershed

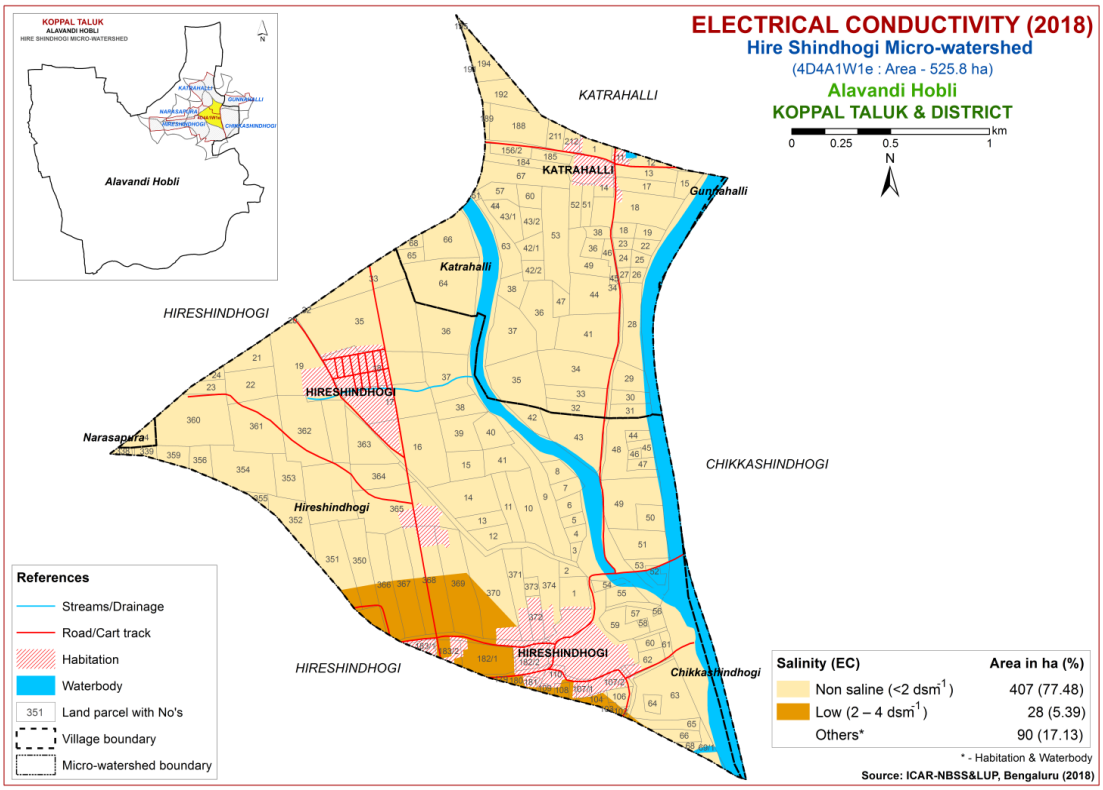


Fig. 6.2 Electrical Conductivity (EC) map of Hire Shindhogi Microwatershed

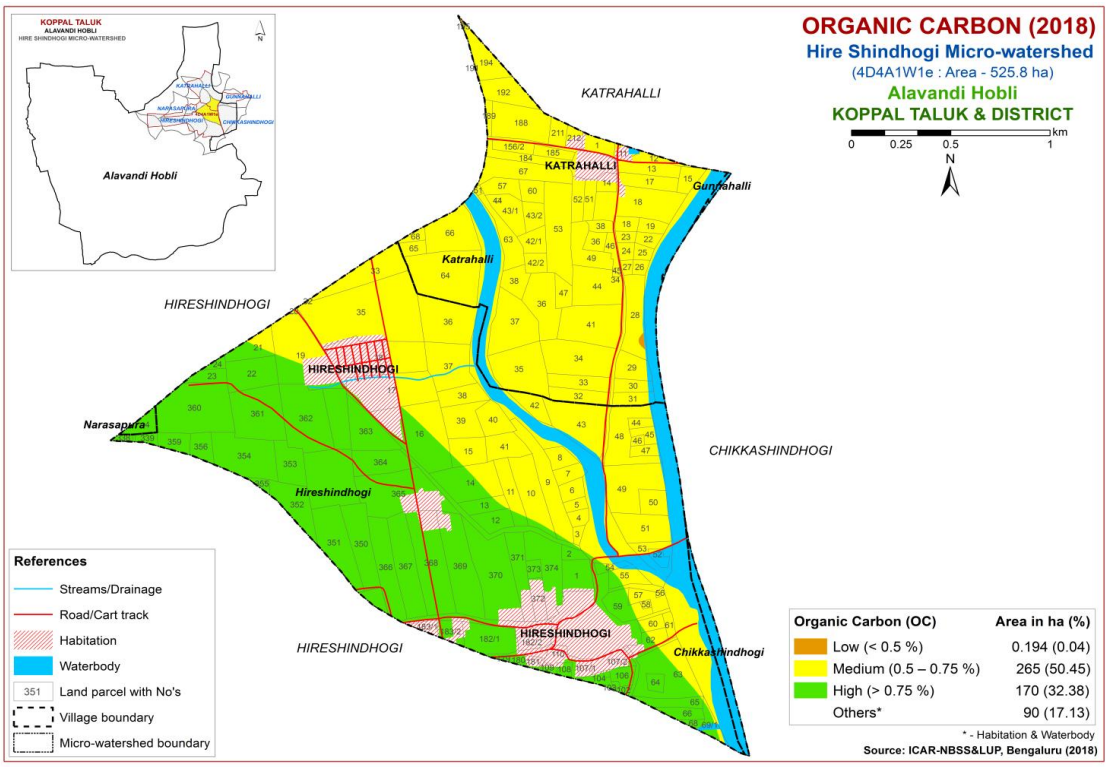


Fig. 6.3 Soil Organic Carbon map of Hire Shindhogi Microwatershed

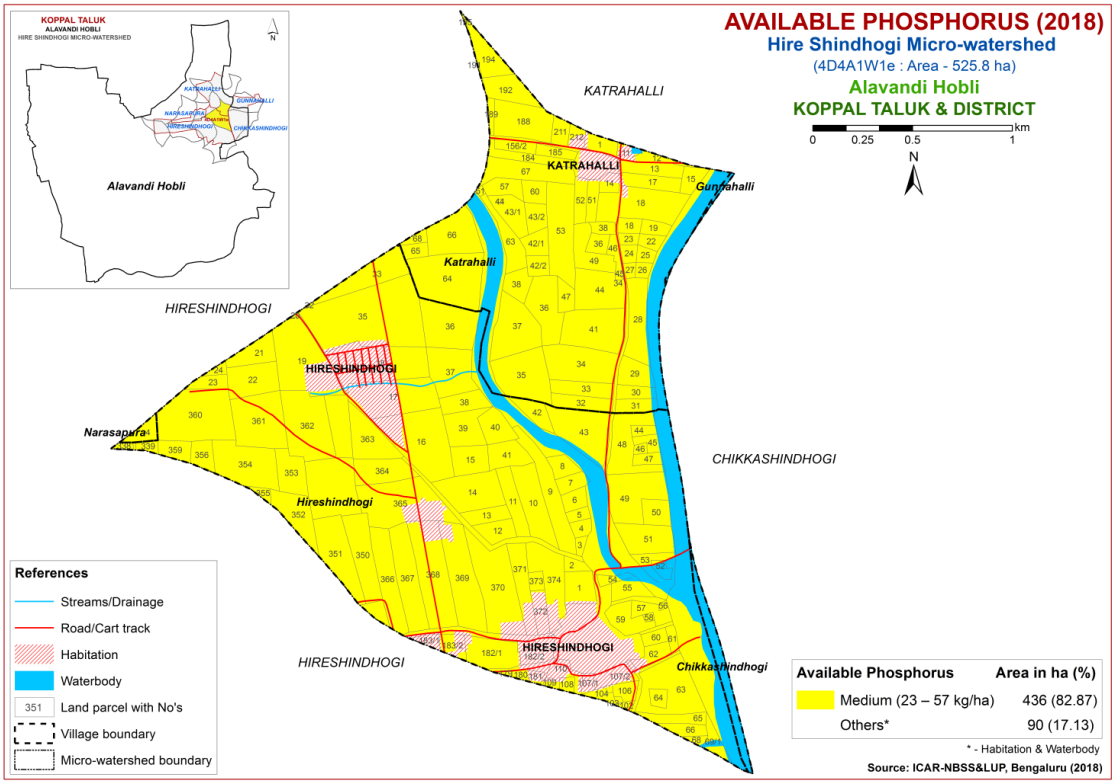


Fig. 6.4 Soil Available Phosphorus map of Hire Shindhogi Microwatershed

6.4 Available Phosphorus

Entire cultivated area of about 436 ha (83%) is medium (23-57 kg/ha) in available phosphorus and is distributed in the major part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

Medium (145-337 kg/ha) in available potassium content occupy an area of 9 ha (2%) and are distributed in the southern and eastern part of the microwatershed. An area of about 427 ha (81%) is high (>337 kg/ha) and are distributed in all parts of the microwatershed (Fig. 6.5).

6.6 Available Sulphur

Soils that are high (>20 ppm) in available sulphur content occupy an entire area of the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is low (<0.5 ppm) in a maximum area of 252 ha (48%) and are distributed in the major part of the microwatershed. An area of about 183 ha (35%) is medium (0.5-1.0 ppm) in available boron and are distributed in the northern, western, souteastern part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in a maximum area of 426 ha (81%) and are distributed in the major part of the microwatershed. An area of 10 ha (2%) is deficient (<4.5 ppm) and distributed in the eastern 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).

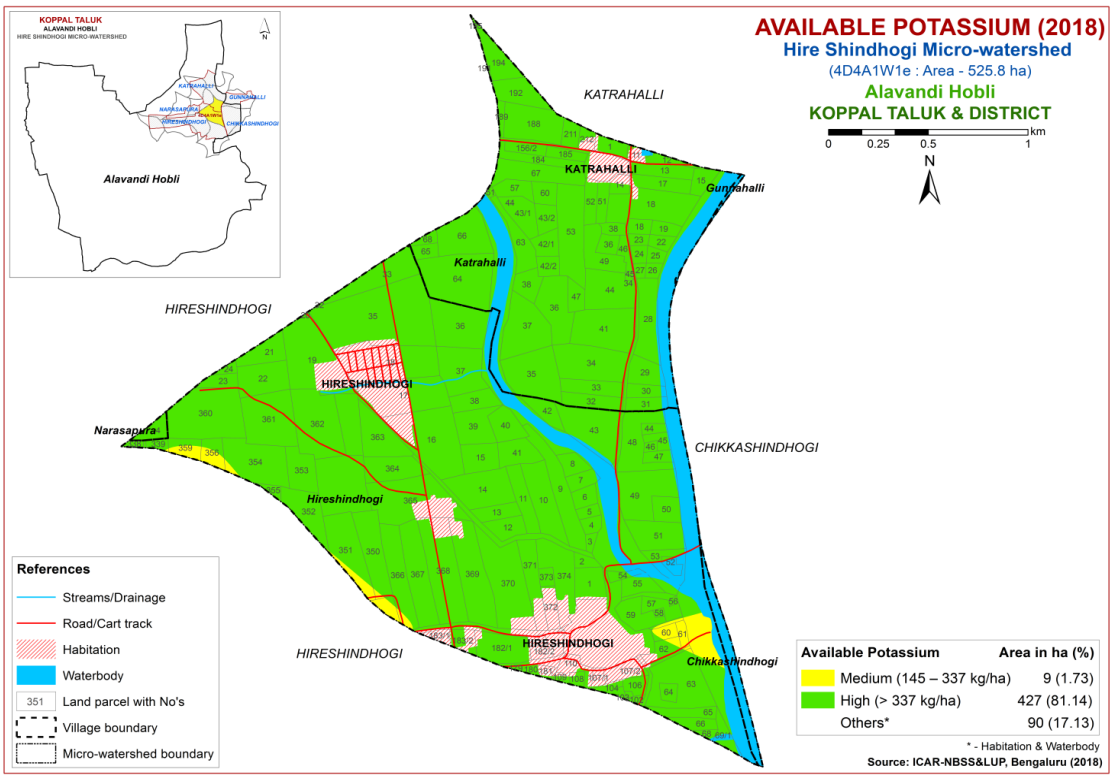


Fig. 6.5 Soil Available Potassium map of Hire Shindhogi Microwatershed

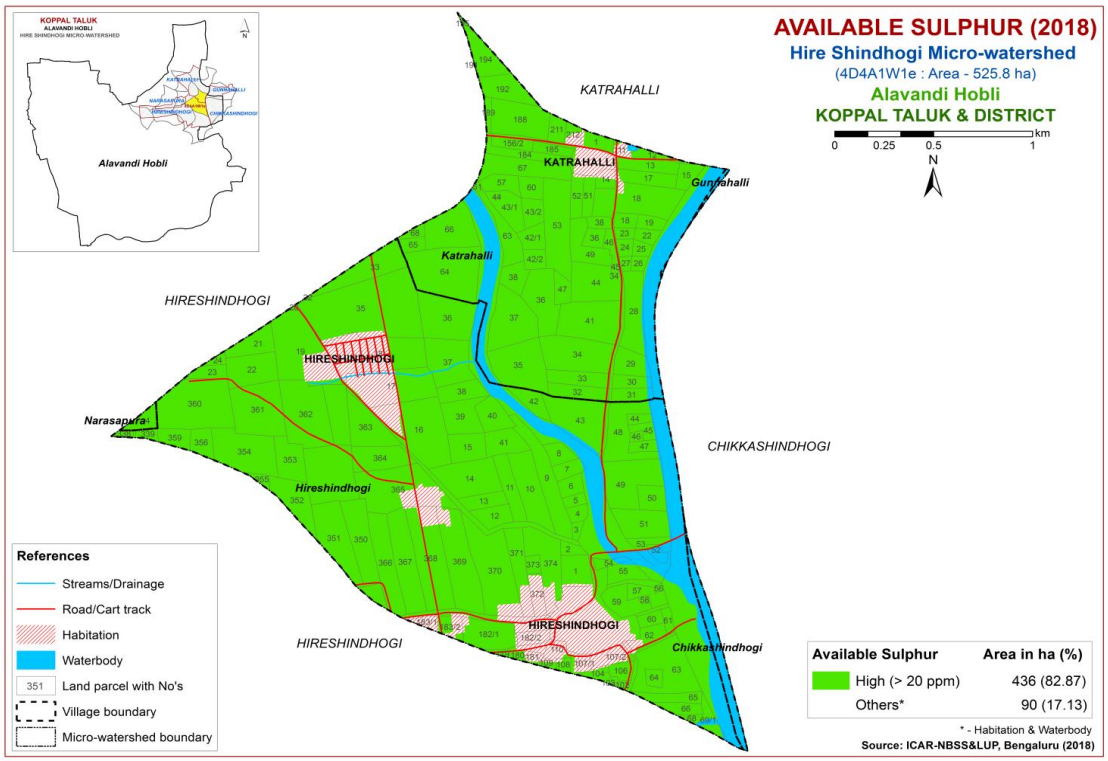


Fig. 6.6 Soil Available Sulphur map of Hire Shindhogi Microwatershed

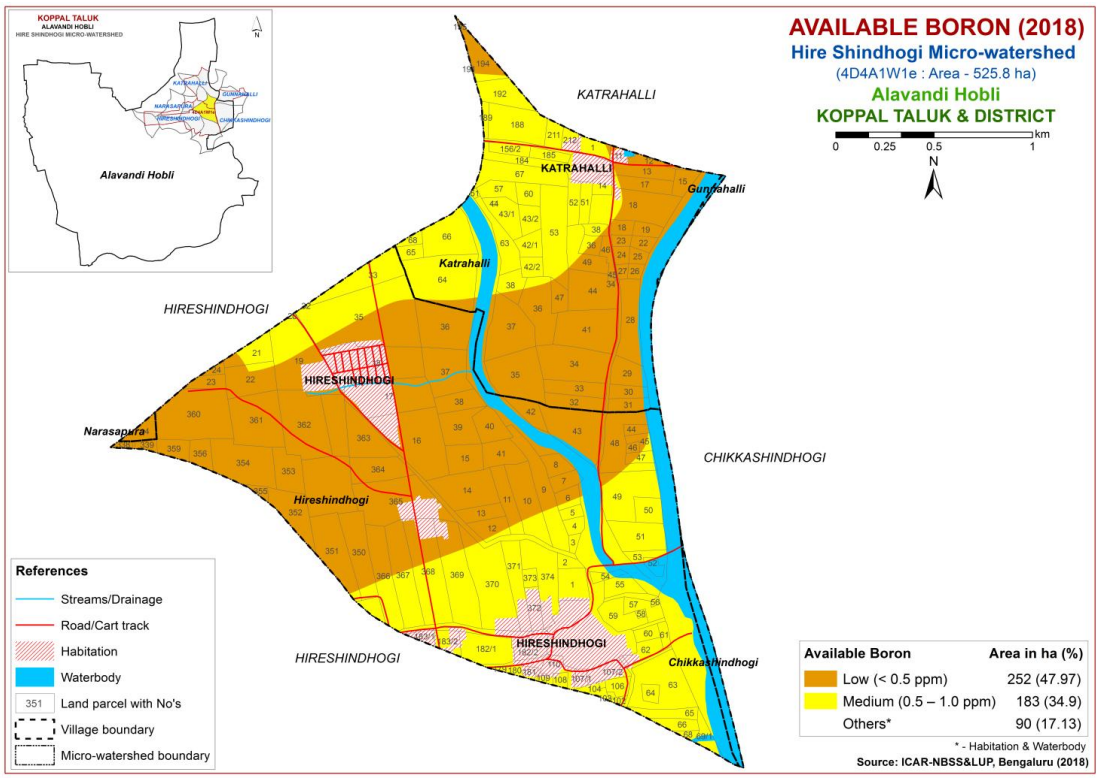


Fig. 6.7 Soil Available Boron map of Hire Shindhogi Microwatershed

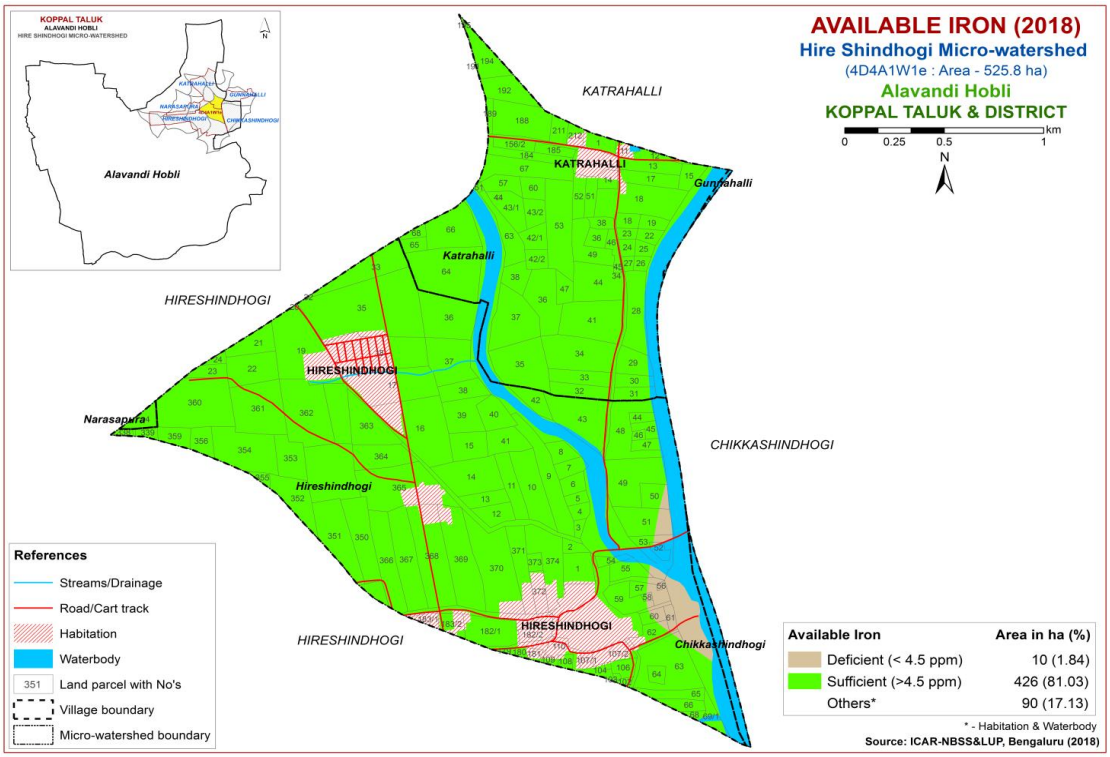


Fig. 6.8 Soil Available Iron map of Hire Shindhogi Microwatershed

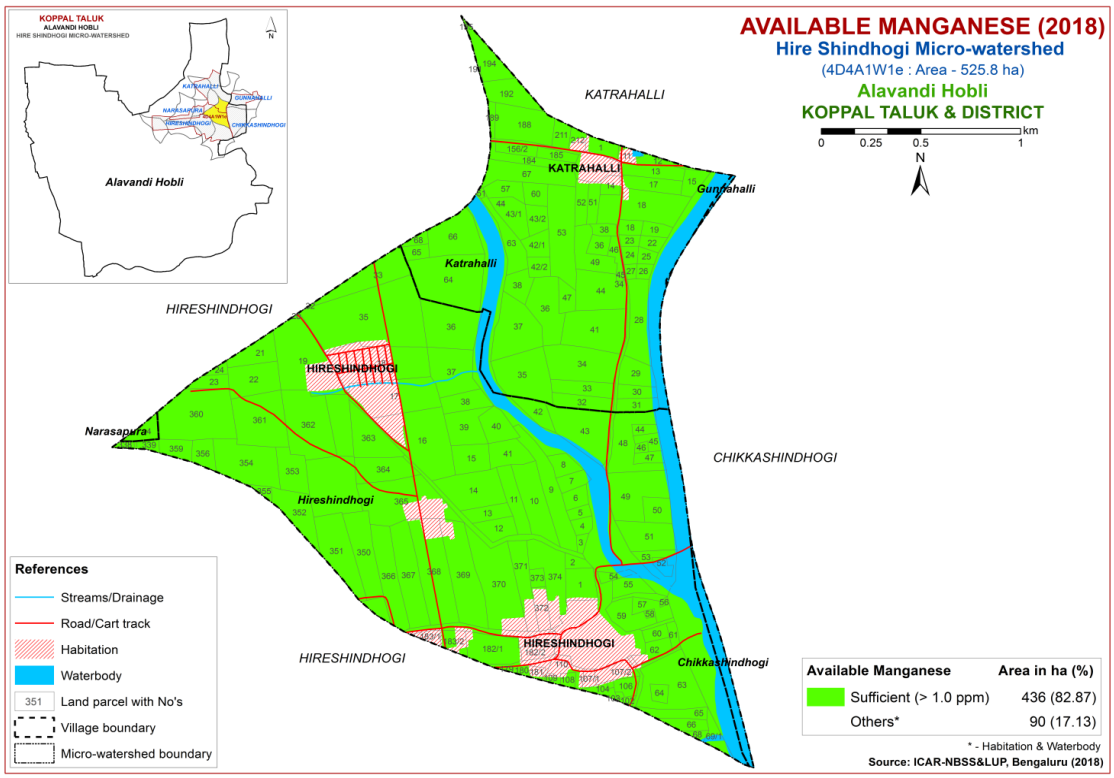


Fig. 6.9 Soil Available Manganese map of Hire Shindhogi Microwatershed

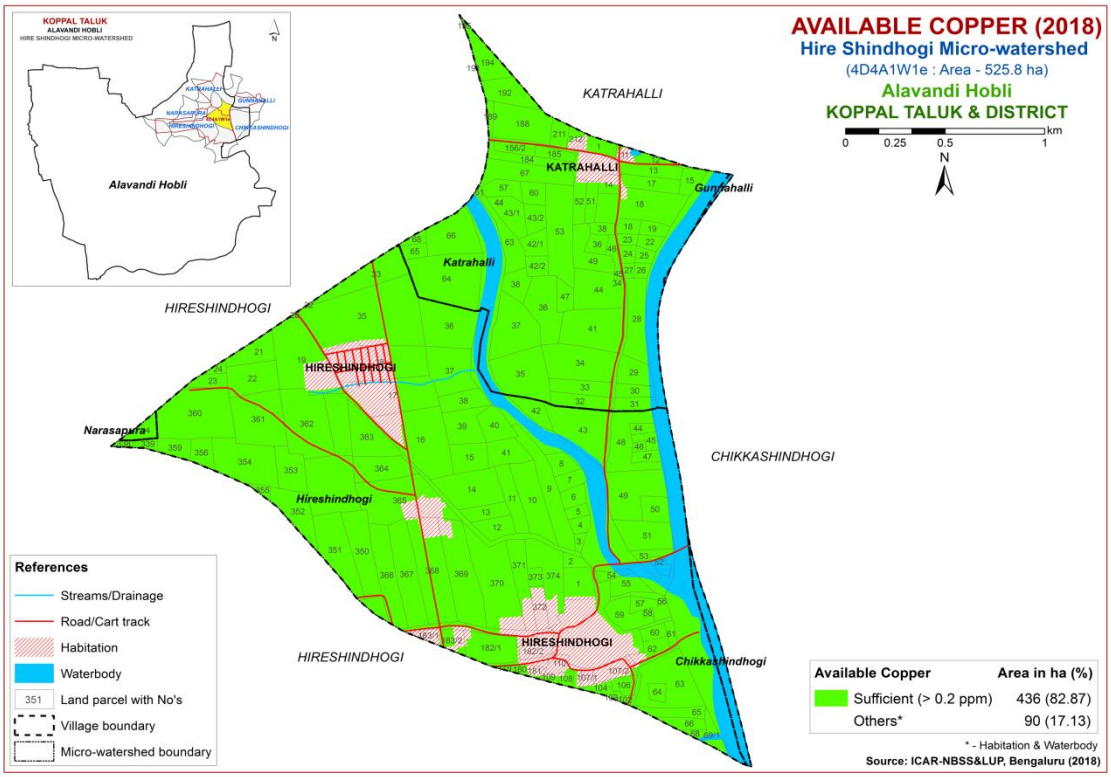


Fig. 6.10 Soil Available Copper map of Hire Shindhogi Microwatershed

6.11 Available Zinc

Available zinc content is deficient (<0.6 ppm) in an area of 121 ha (23%) and are distributed in the western and southeastern part of the microwatershed. A maximum area

of 314 ha (60%) is sufficient (>0.6 ppm) and are distributed in the major part of the microwatershed (Fig. 6.11).

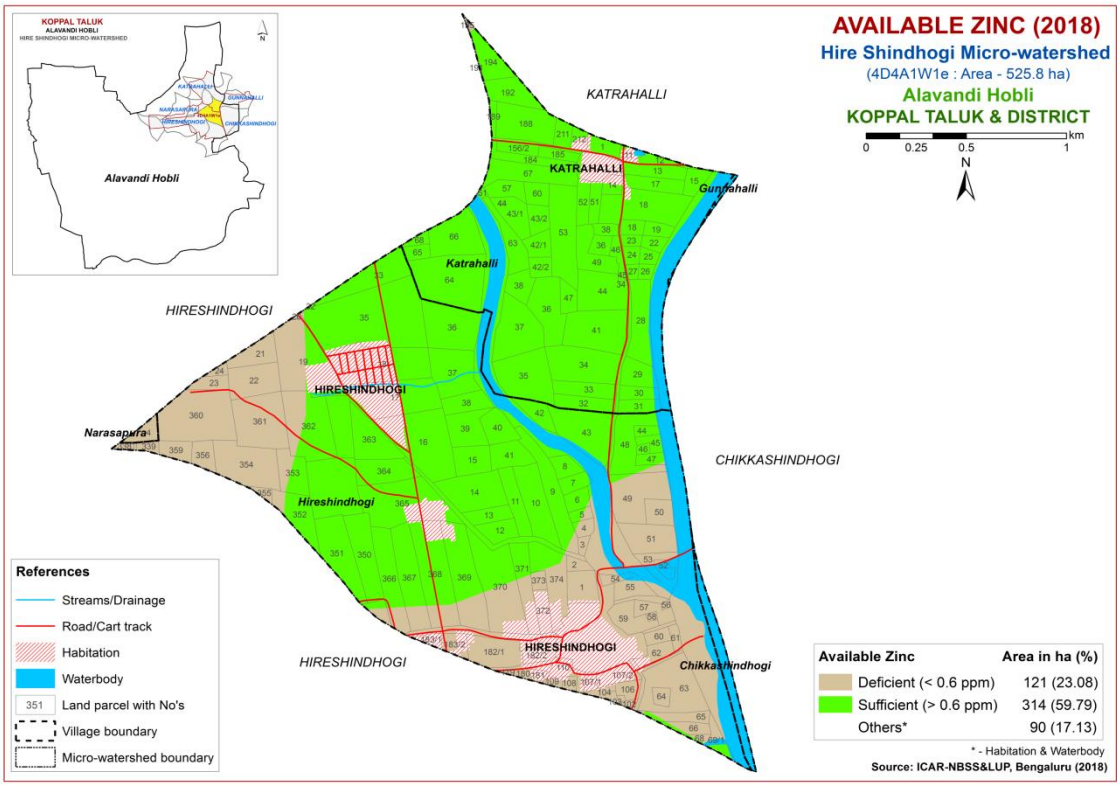


Fig. 6.11 Soil Available Zinc map of Hire Shindhogi Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Hire Shindhogi 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 entire 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 70 ha (13%) is highly suitable (Class S1) lands for growing sorghum and are distributed in the northern, western and southeastern part of the microwatershed. An area of 283 ha (54%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, calcareousness,

and nutrient availability. An area of about 63 ha (12%) is marginally suitable (Class S3) for growing sorghum and are distributed in the northern, western and southern part of the microwatershed with moderate limitations of gravelliness and rooting condition. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

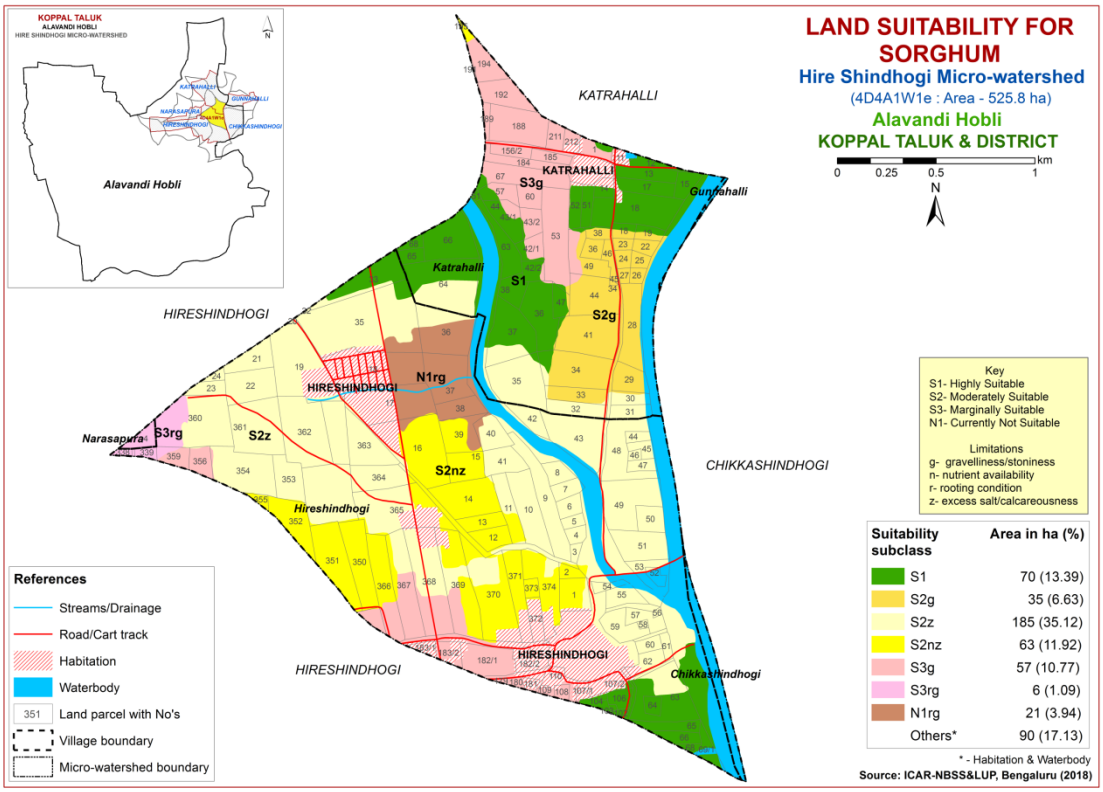


Fig. 7.1 Land Suitability map of Sorghum

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 1 ha (<1%) is highly suitable (Class S1) lands for growing maize and are distributed in the northern part of the microwatershed. Maximum area of 351 ha (67%) is moderately suitable (Class S2) for growing maize and are distributed in the major part of the microwatershed with minor limitations of calcareousness and texture. Marginally suitable (Class S3) lands cover an area of 63 ha (12%) and are distributed in the northern, western and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. Currently not suitable (Class N1) lands occur in an area of 21 ha (4%) and are distributed in the central part of the microwatershed with severe limitations of gravelliness and rooting condition.

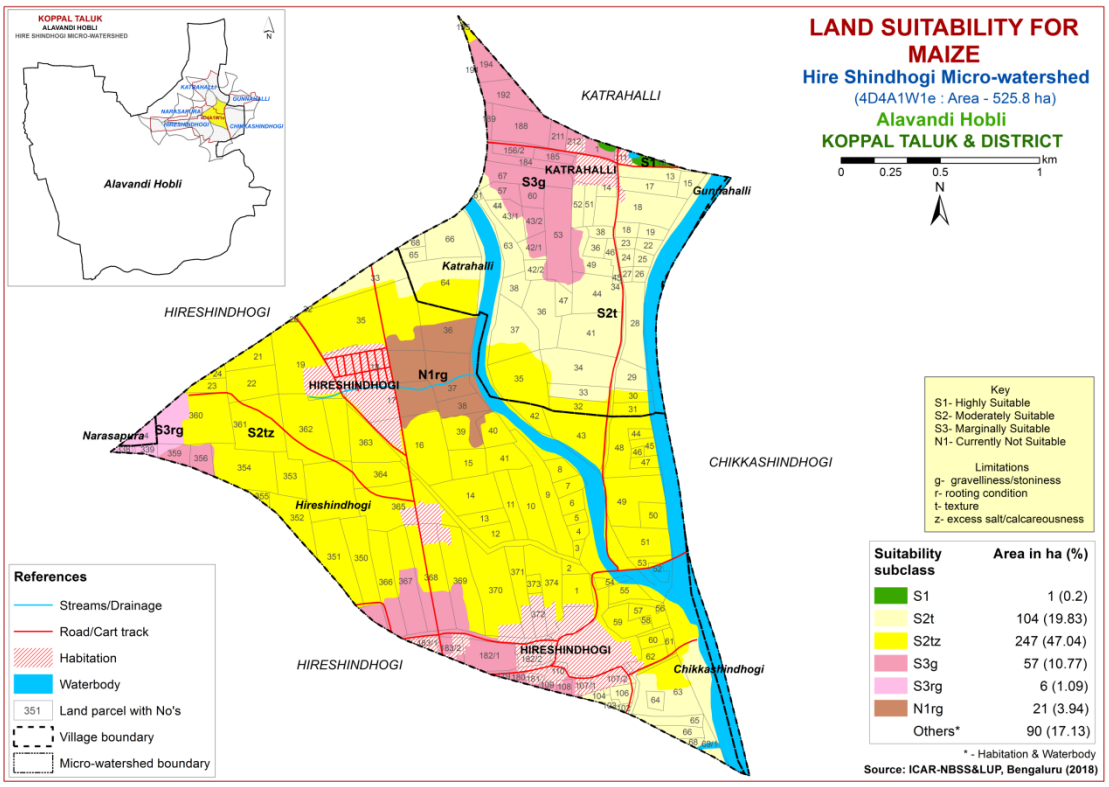


Fig. 7.2 Land Suitability map of Maize

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 18 ha (3%) is highly suitable (Class S1) lands for growing bajra and are distributed in the northern part of the microwatershed. Maximum area of 334 ha (64%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture and calcareousness. Marginally suitable (Class S3) lands cover an area of 63 ha (12%) and are distributed in the northern, western and southern part of the microwatershed. They have moderate limitations of gravelliness and rooting depth. Currently not suitable (Class N1) lands occur in an area of 21 ha (4%) for growing bajra and are distributed in the central part of the microwatershed with severe limitations of gravelliness and rooting condition.

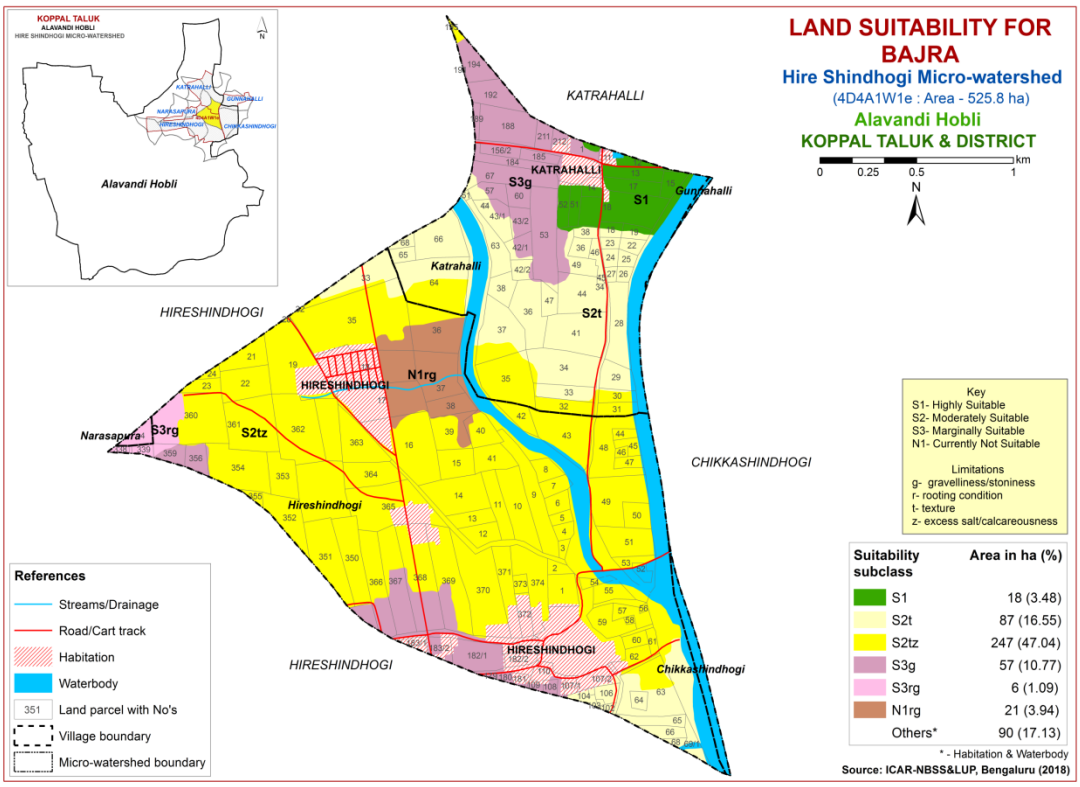


Fig. 7.3 Land Suitability map of Bajra

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 17 ha (3%) is highly suitable (Class S1) lands for growing groundnut and are distributed in the northern part of the microwatershed. An area of 57 ha (11%) is moderately suitable (Class S2) and are distributed in the northern, southern and western part of the microwatershed. They have minor limitations of texture and gravelliness. Maximum area of 340 ha (65%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of rooting condition, gravelliness, calcareousness and texture. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of gravelliness and rooting condition.

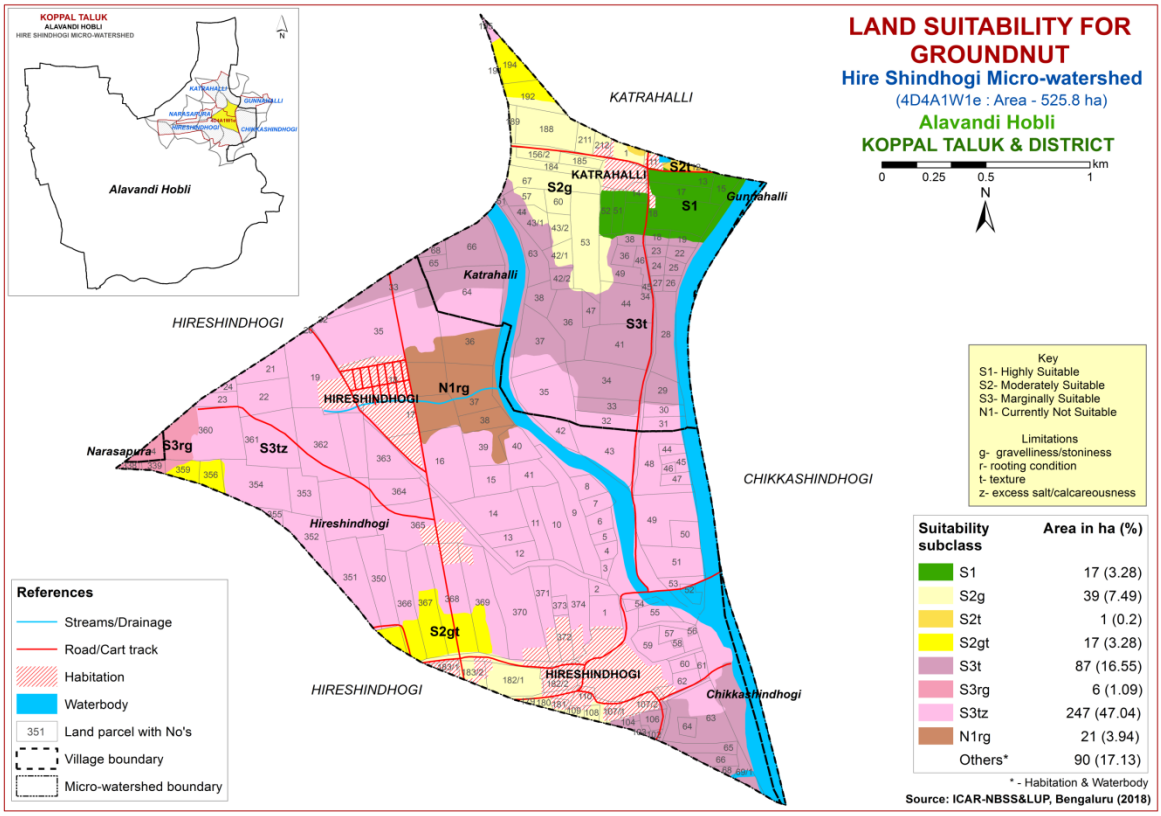


Fig. 7.4 Land Suitability map of Groundnut

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 70 ha (13%) is highly suitable (Class S1) lands for growing sunflower and are distributed in the northern, western and southeastern part of the microwatershed. Maximum area of 283 ha (54%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, gravelliness and rooting condition. An area of 57 ha (11%) is marginally suitable (Class S3) for growing sunflower and are distributed in the northern, southern and western part of the microwatershed with moderate limitation of gravelliness. Currently not suitable (Class N1) lands cover an area of 26 ha (5%) and are distributed in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

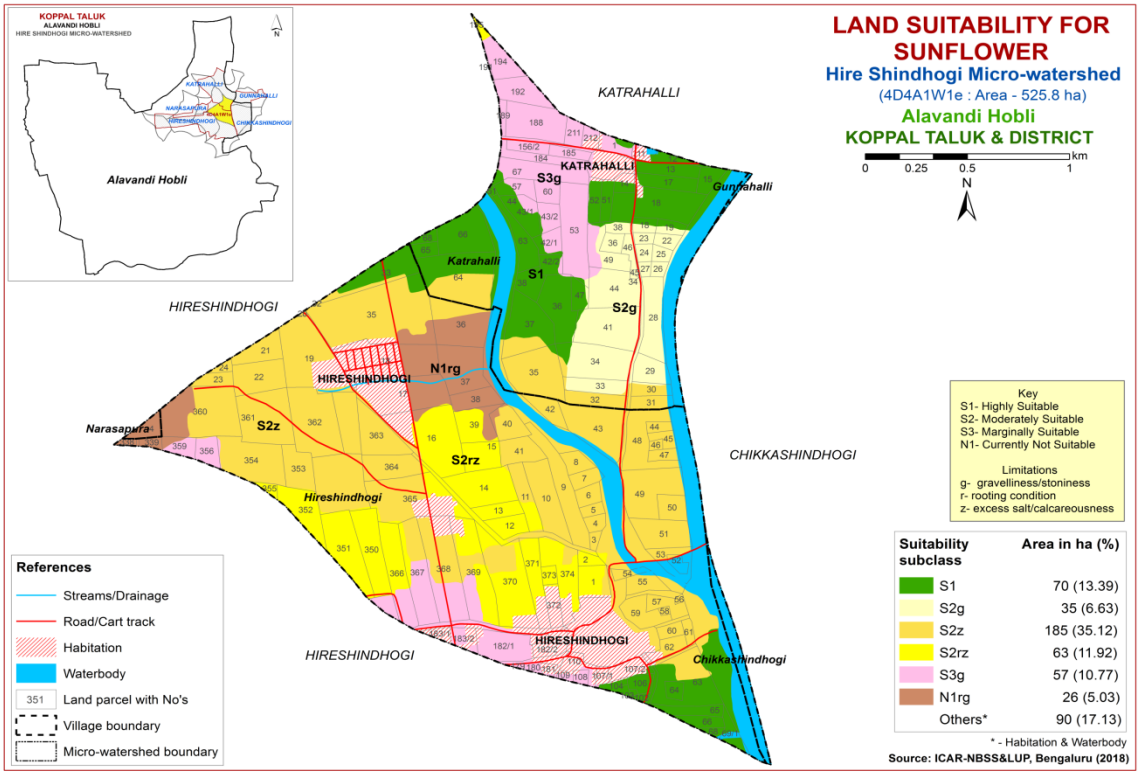


Fig. 7.5 Land Suitability map of Sunflower

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 18 ha (3%) is highly suitable (Class S1) lands for growing red gram and are distributed in the northern part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 272 ha (52%) and are distributed in the major part of the microwatershed with minor limitations of gravelliness, texture and calcareousness. Marginally suitable (Class S3) lands cover an area of 120 ha (23%) and are distributed in the northern, central, western and southern part of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting condition. Currently not suitable (Class N1) lands cover an area of 26 ha (5%) for growing red gram and are distributed in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

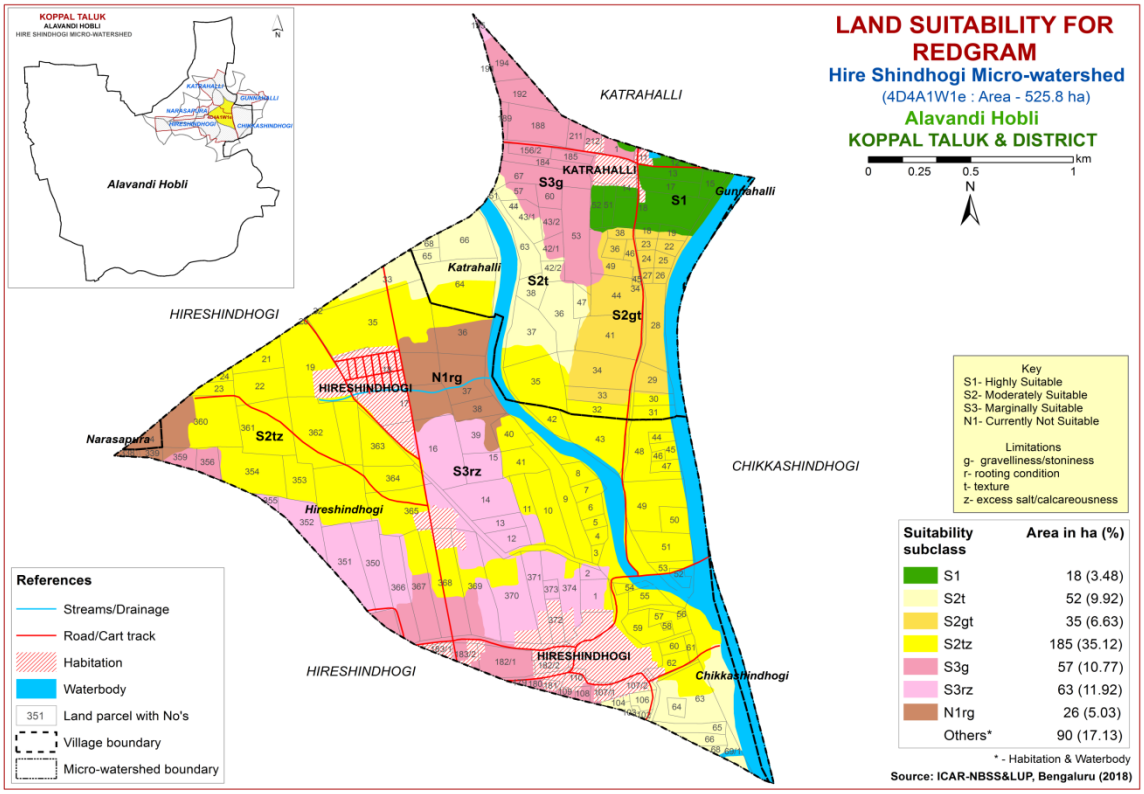


Fig. 7.6 Land Suitability map of Redgram

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 52 ha (10%) is highly suitable (Class S1) for growing bengalgram and are distributed in the western and southeastern part of the microwatershed. Moderately suitable lands (Class S2) occupy a maximum area of 301 ha (57%) and are distributed in the major part of the microwatershed with minor limitations of gravelliness, calcareousness, texture and rooting condition. Marginally suitable (Class S3) lands cover an area of 63 ha (12%) and are distributed in the northern, western and southern part of the microwatershed. They have moderate limitations of rooting condition, texture and gravelliness. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of gravelliness and rooting condition.

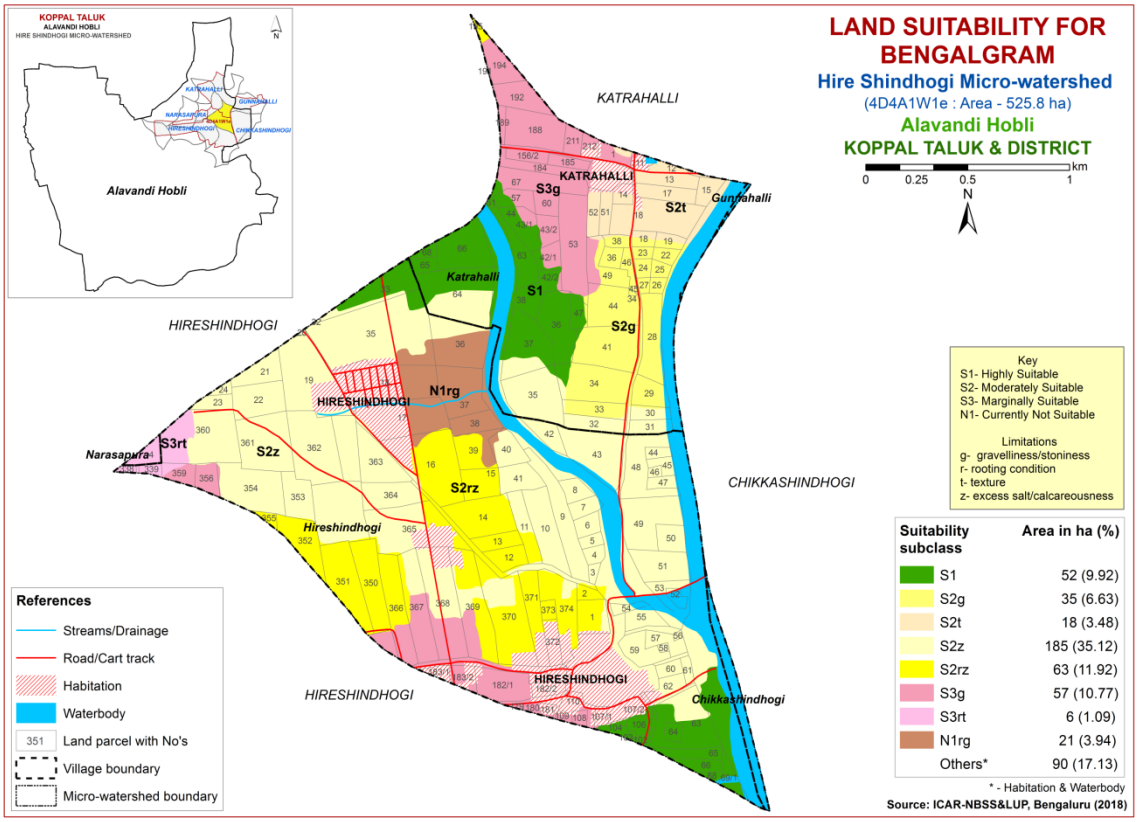


Fig. 7.7 Land Suitability map of Bengalgram

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 70 ha (13%) is highly suitable (Class S1) for growing cotton and are distributed in the northern, western and southeastern part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 283 ha (54%) and are distributed in the major part of the microwatershed. They have minor limitations of rooting condition, gravelliness and calcareousness. Marginally suitable (Class S3) lands cover an area of 63 ha (12%) and are distributed in the northern, western and southern part of the microwatershed. They have moderate limitations of gravelliness, calcareousness and rooting condition. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

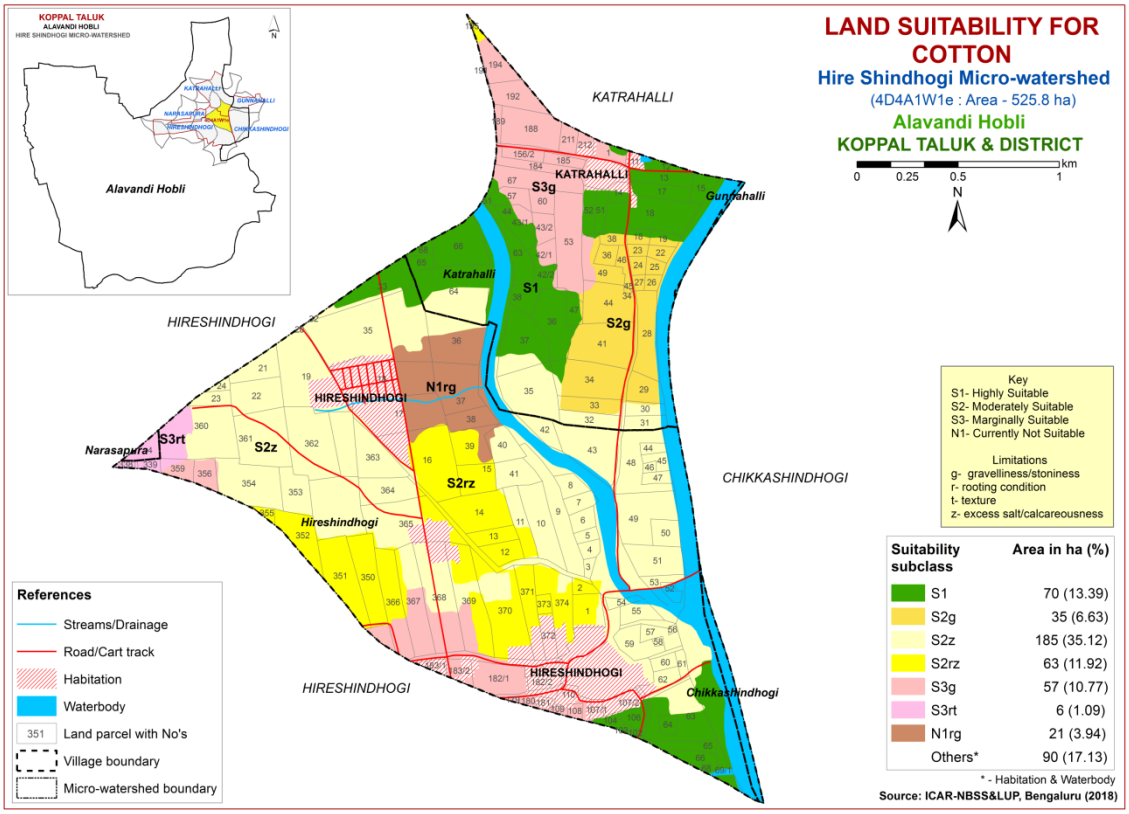


Fig. 7.8 Land Suitability map of Cotton

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 18 ha (3%) is highly (Class S1) for growing chilli and are distributed in the northern part of the microwatershed. There are no moderately suitable (Class S2) lands for growing chilli in the microwatershed. Maximum area of 397 ha (75%) is marginally suitable (Class S3) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture, rooting condition and calcareousness. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

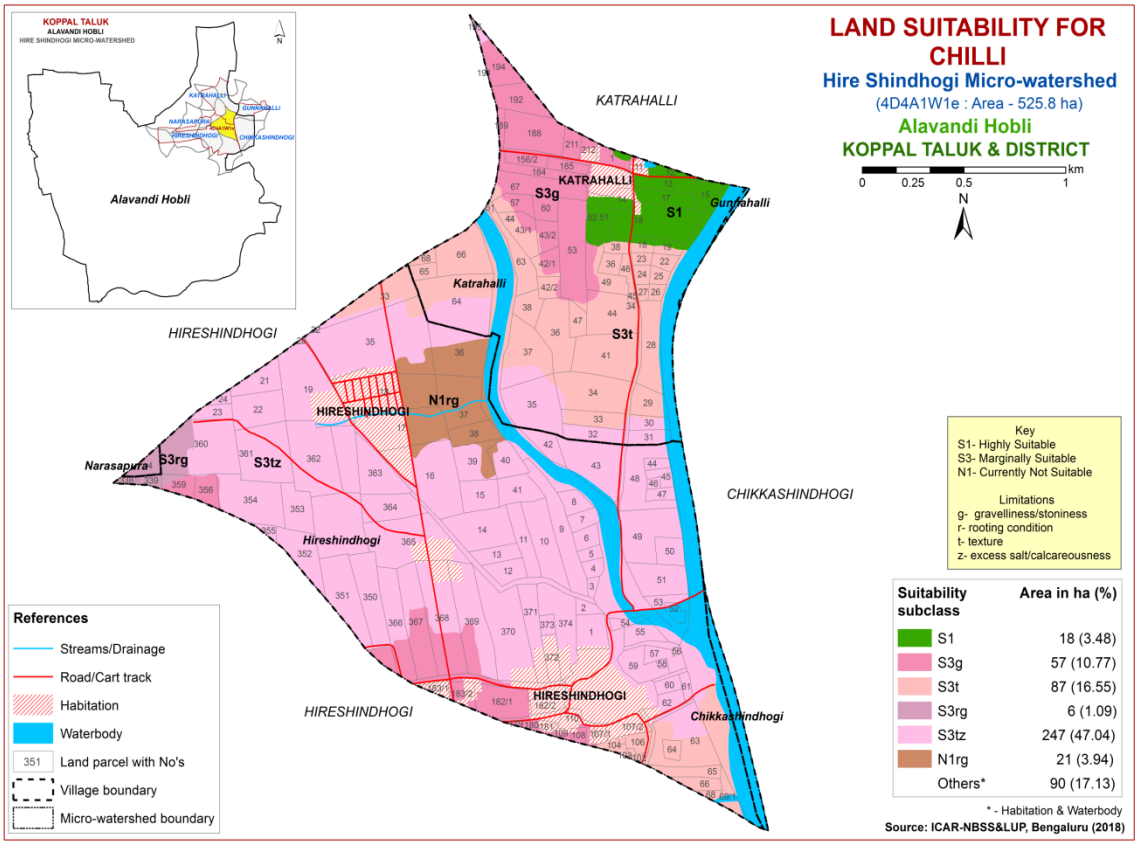


Fig. 7.9 Land Suitability map of Chilli

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 18 ha (3%) is highly (Class S1) and are distributed in the northern part of the microwatershed. There are no moderately suitable (Class S2) lands for growing tomato in the microwatershed. Marginally suitable (Class S3) lands occupy a maximum area of 397 ha (75%) and are distributed in the major part of the microwatershed with moderate limitations of gravelliness, rooting condition, texture and calcareousness. Currently not suitable (Class N1) lands occur in an area of 21 ha (4%) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

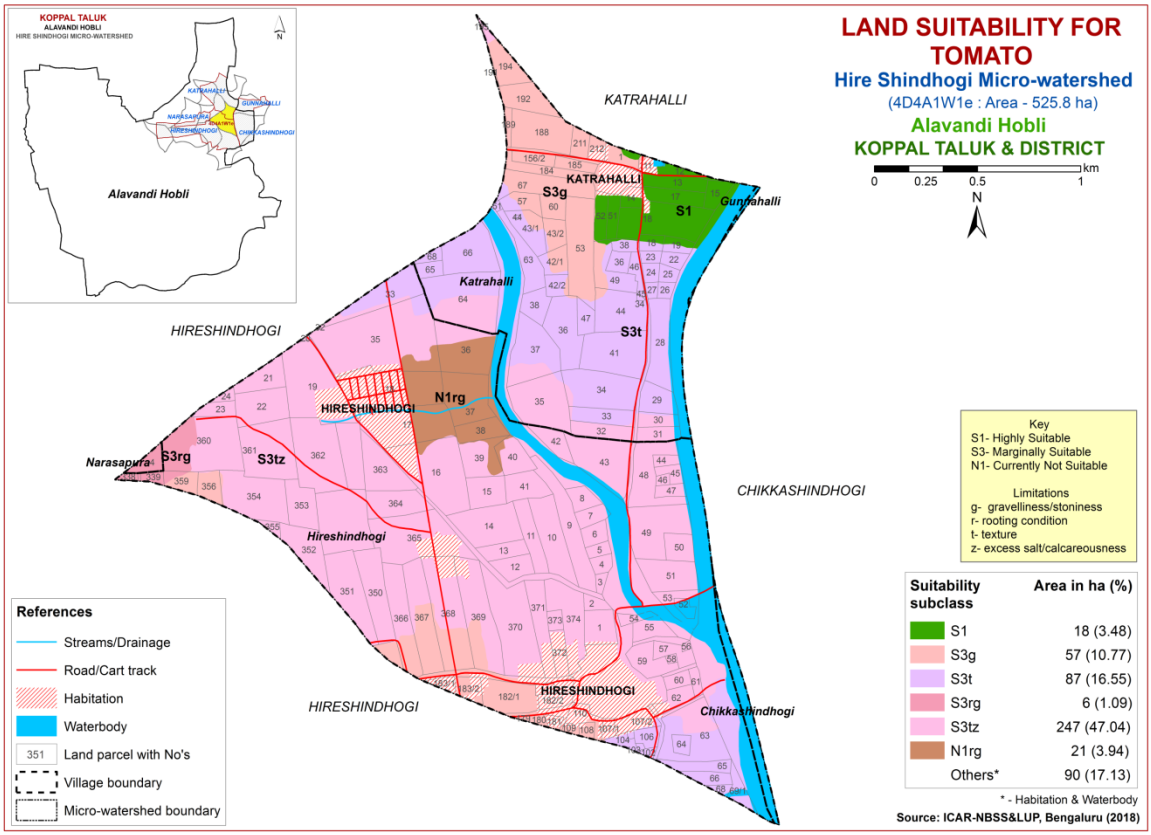


Fig. 7.10 Land Suitability map of Tomato

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.

There are no highly suitable (Class S1) lands for growing brinjal in the microwatershed. Maximum area of about 410 ha (78%) is moderately suitable (Class S2) for growing brinjal and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness and gravelliness. Marginally suitable lands (Class S3) for growing brinjal occur in an area of 6 ha (1%) and are distributed in the western part of the microwatershed with moderate limitations of rooting depth and gravelliness. Currently not suitable (Class N1) lands occur in an area of 21 ha (4%) and are distributed in the central part of the microwatershed with severe limitation of rooting condition.

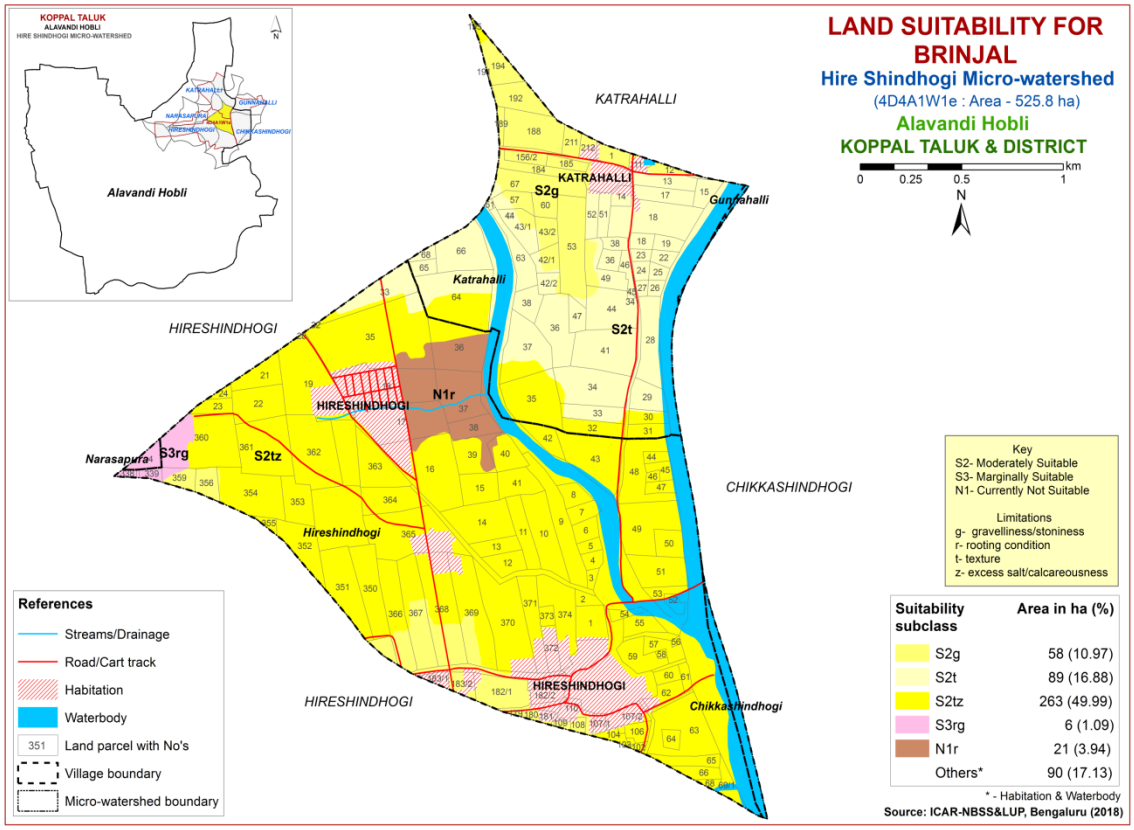


Fig. 7.11 Land Suitability map of Brinjal

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 lands for growing onion in the microwatershed. An area of 75 ha (14%) is moderately suitable (Class S2) and are distributed in the northern, western and southern part of the microwatershed. They have minor limitations of gravelliness and texture. Marginally suitable lands (Class S3) occupy a maximum area of 340 ha (65%) and are distributed in all parts of the microwatershed with moderate limitations of rooting depth, gravelliness, calcareousness and texture. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitation of rooting condition.

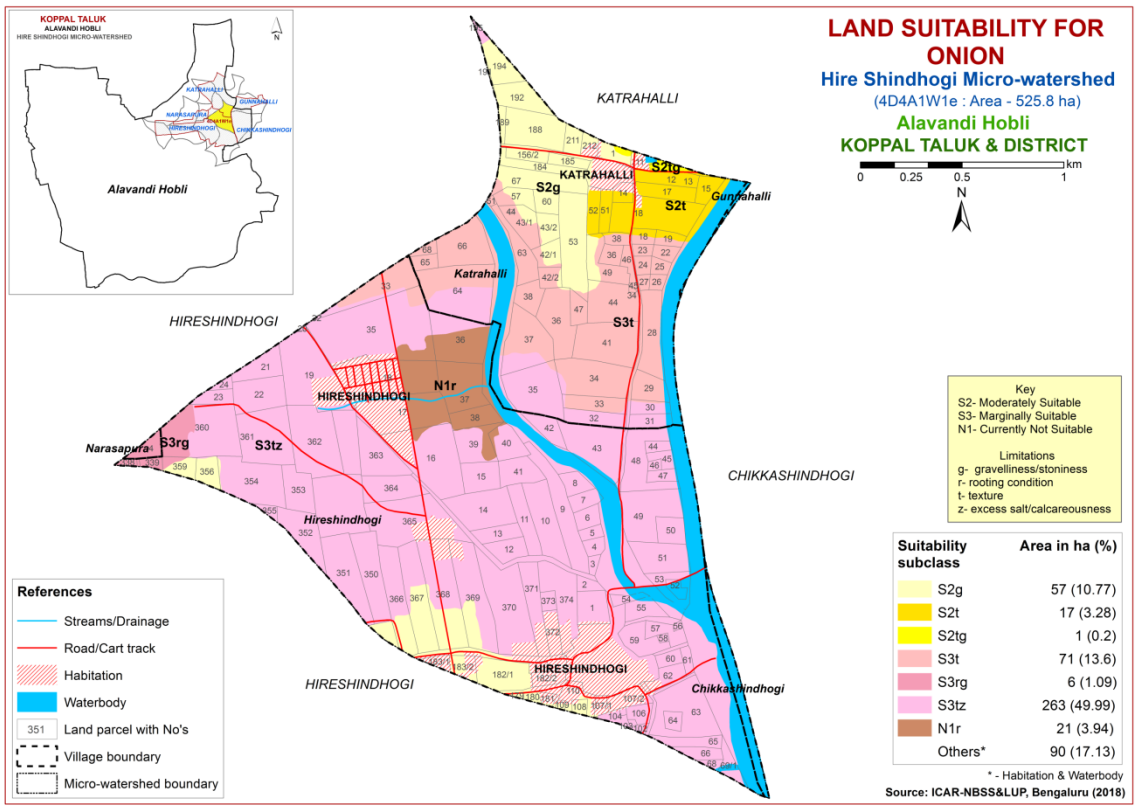


Fig. 7.12 Land Suitability map of Onion

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) lands for growing bhendi in the microwatershed. Maximum area of about 410 ha (78%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed with minor limitations of texture, calcareousness, gravelliness and rooting depth. An area of 6 ha (1%) is marginally suitable lands (Class S3) for growing bhendi and are distributed in the western part of the microwatershed with moderate limitations of rooting depth and gravelliness. An area of 21 ha (4%) is currently not suitable (Class N1) for growing bhendi and are distributed in the central part of the microwatershed with severe limitation of rooting condition.

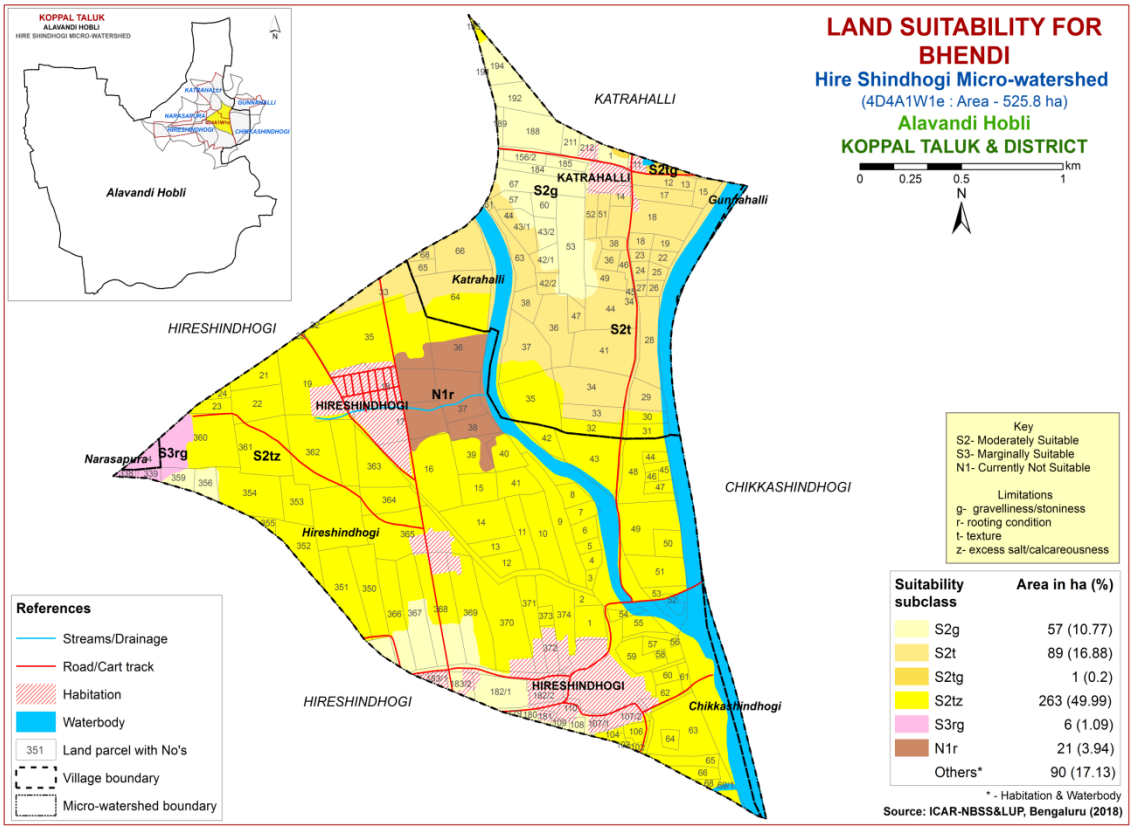


Fig. 7.13 Land Suitability map of Bhendi

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 18 ha (3%) is highly suitable (Class S1) lands for growing drumstick and are distributed in the northern part of the microwatershed. Maximum area of 392 ha (74%) is moderately suitable (Class S2) and are distributed in all parts of the microwatershed. They have minor limitations of gravelliness, texture, rooting condition and calcareousness. There are no marginally suitable (Class S3) lands for growing drumstick in of the microwatershed. Currently not suitable (Class N1) lands cover an area of 26 ha (5%) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

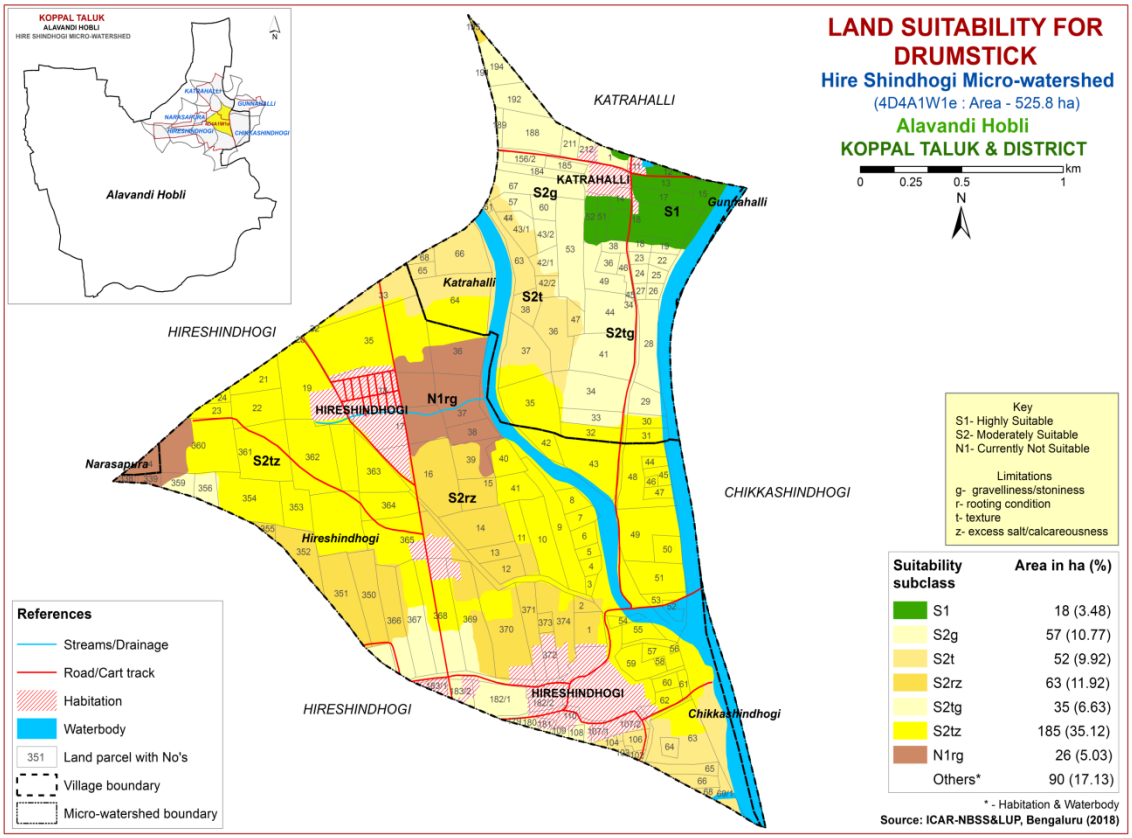


Fig. 7.14 Land Suitability map of Drumstick

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 18 ha (3%) is highly (Class S1) suitable lands for growing mango and are distributed in the northern part of the microwatershed. There are no moderately suitable (Class S2) lands in the microwatershed. Marginally suitable (Class S3) lands cover an area of 392 ha (74%) and are distributed in the major part of the microwatershed. They have moderate limitations of texture, gravelliness, rooting condition and calcareousness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing mango and occur in the central and western part of the microwatershed with severe limitations of texture and rooting condition.

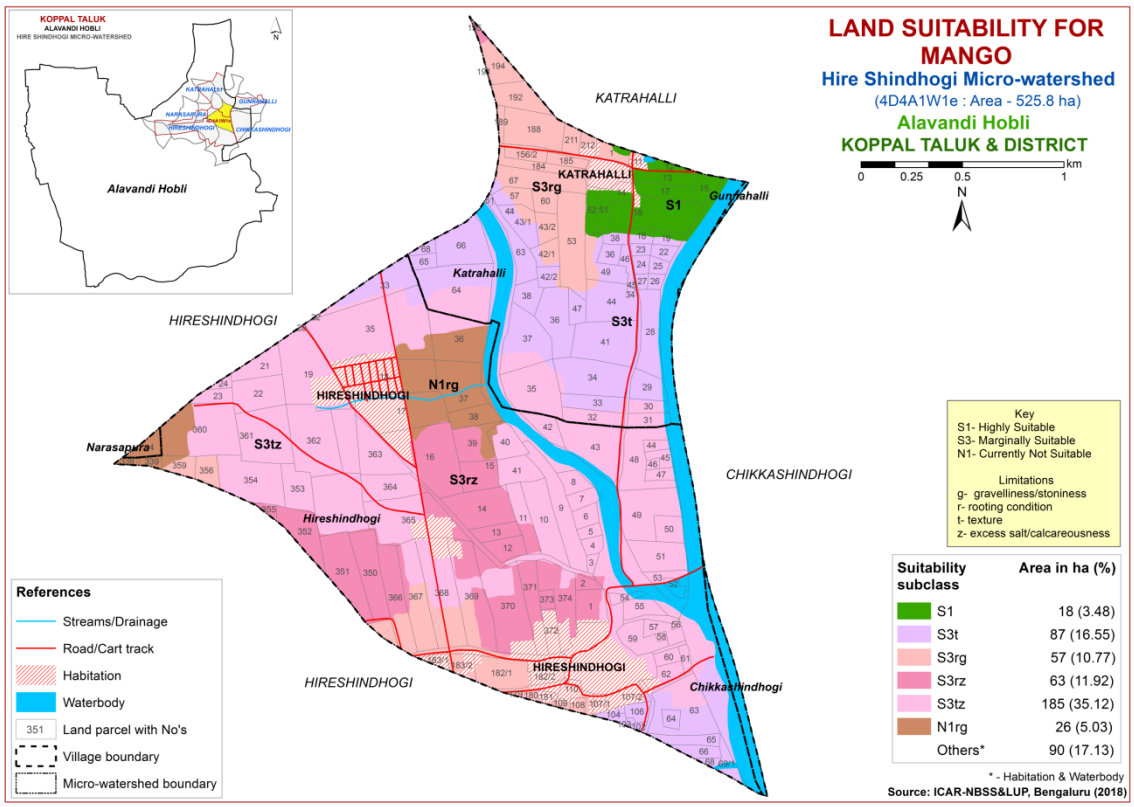


Fig. 7.15 Land Suitability map of Mango

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 17 ha (3%) is highly (Class S1) suitable for growing guava and are distributed in the northern part of the microwatershed. A minor area of 1 ha (<1%) is moderately suitable (Class S2) and are distributed in the northern part of the microwatershed with minor limitation of texture. Marginally suitable (Class S3) lands cover a maximum area of 391 ha (74%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and calcareousness. An area of about 26 ha (5%) area is currently not suitable (Class N1) for growing guava and occur in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

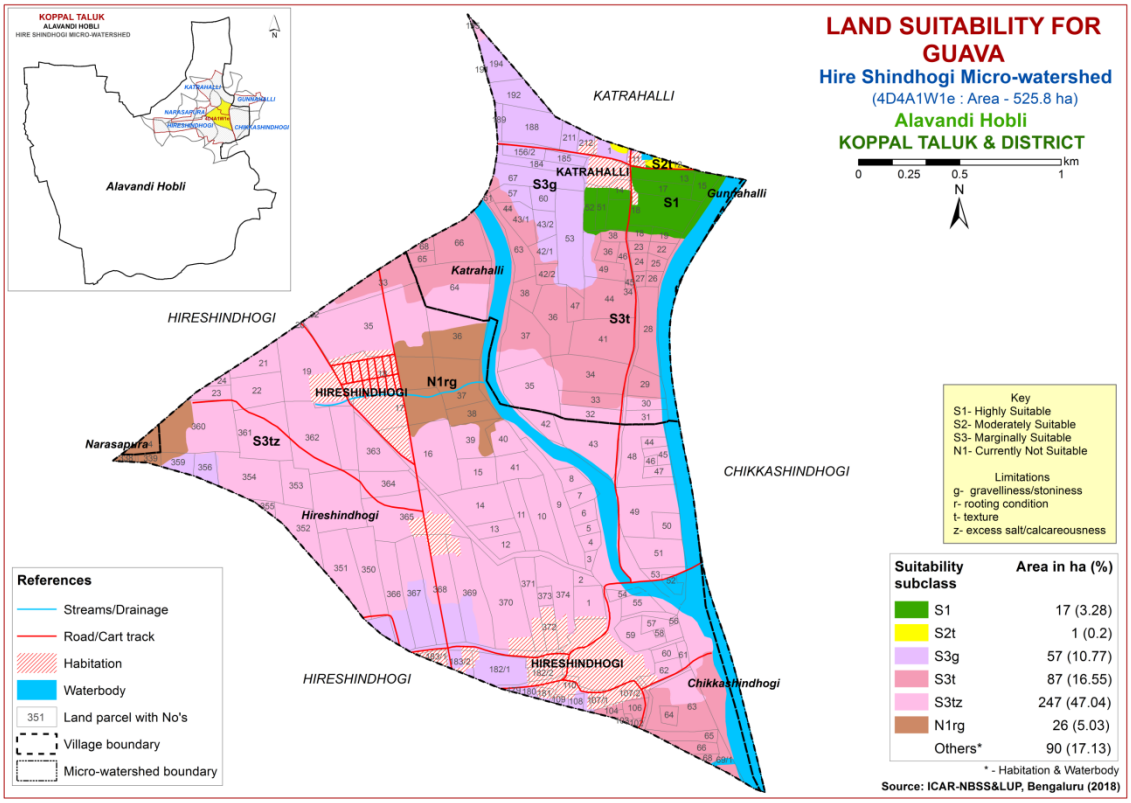


Fig. 7.16 Land Suitability map of Guava

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 18 ha (3%) is highly suitable (Class S1) and are distributed in the northern part of the microwatershed. There are no moderately suitable (Class S2) lands for growing sapota in the microwatershed. Marginally suitable (Class S3) lands cover a maximum area of 391 ha (74%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and calcareousness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing sapota and occur in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

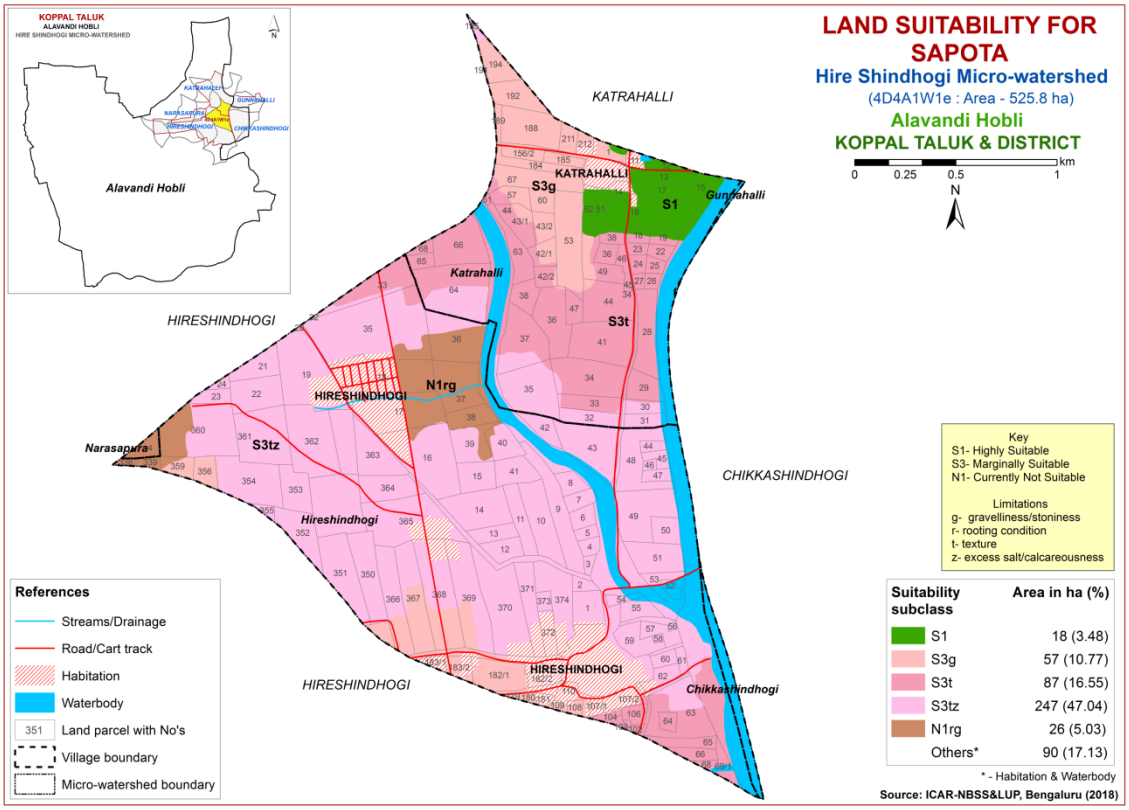


Fig. 7.17 Land Suitability map of Sapota

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 18 ha (3%) is highly suitable (Class S1) for growing pomegranate and are distributed in the northern part of the microwatershed. Moderately suitable (Class S2) lands occupy an area of 335 ha (64%) and are distributed in all parts of the microwatershed. They have minor limitations of texture, rooting condition, gravelliness and calcareousness. An area of 57 ha (11%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the northern, southern and western part of the microwatershed. They have moderate limitation of gravelliness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing pomegranate and are distributed in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

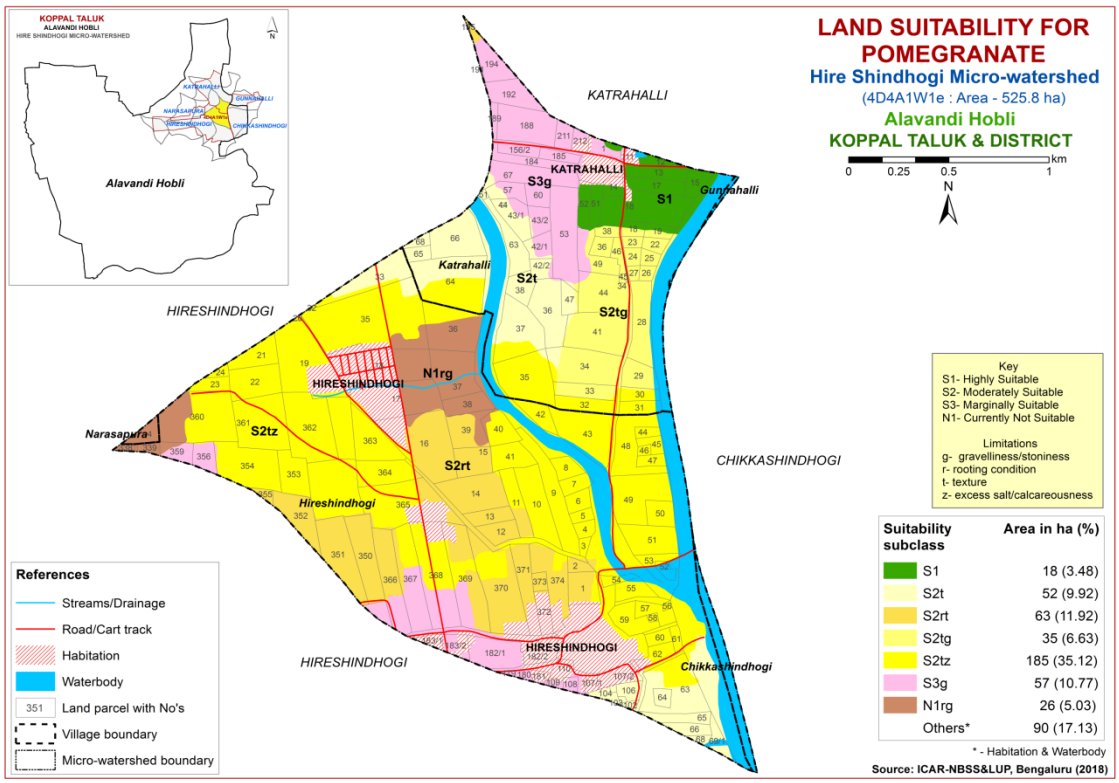


Fig. 7.18 Land Suitability map of Pomegranate

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 70 ha (13%) is highly suitable (Class S1) for growing musambi and are distributed in the northern, western and southeastern part of the microwatershed. A maximum area of 283 ha (54%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in an area of 57 ha (11%) and are distributed in the northern, southern and western part of the microwatershed with moderate limitation of gravelliness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing musambi and are distributed in the central and western part of the microwatershed. They have severe limitations of rooting condition and gravelliness.

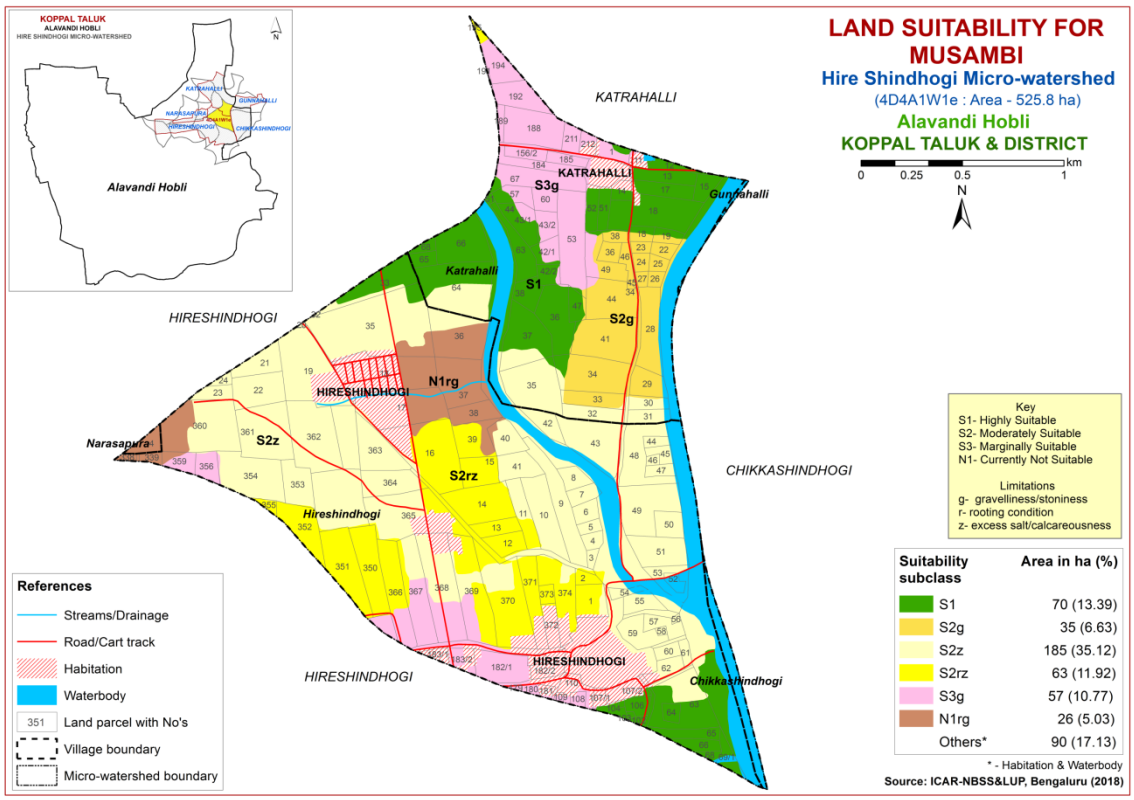


Fig. 7.19 Land Suitability map of Musambi

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 70 ha (13%) is highly suitable (Class S1) lands for growing lime and are distributed in the northern, western and southeastern part of the microwatershed. A maximum area of 283 ha (54%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, rooting condition and gravelliness. Marginally suitable (Class S3) lands occur in an area of 57 ha (11%) for growing lime and distributed in the northern, western and southern part of the microwatershed with moderate limitation of gravelliness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing lime and are distributed in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

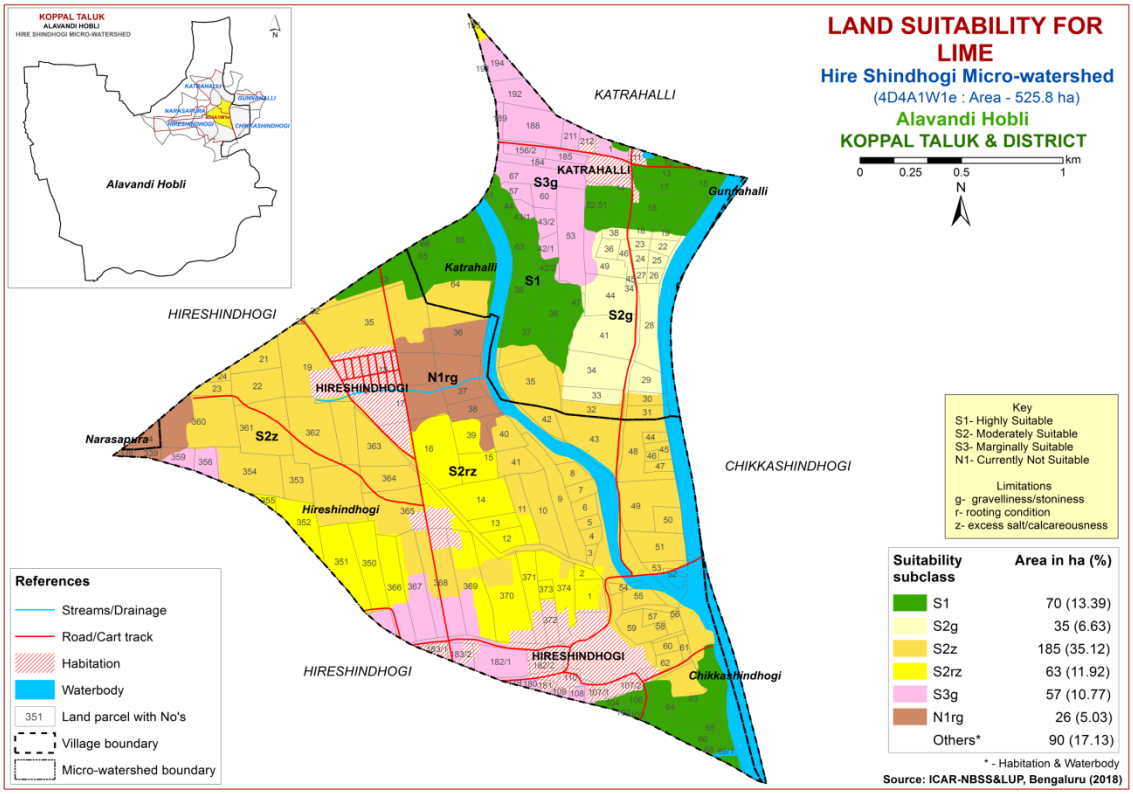


Fig. 7.20 Land Suitability map of Lime

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 18 ha (3%) is highly suitable (Class S1) lands for growing amla and are distributed in the northern part of the microwatershed. A maximum area of 391 ha (74%) 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. The marginally suitable (Class S3) lands cover an area of 6 ha (1%) and are distributed in the western part of the microwatershed with moderate limitations of rooting condition and gravelliness. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of gravelliness and rooting condition.

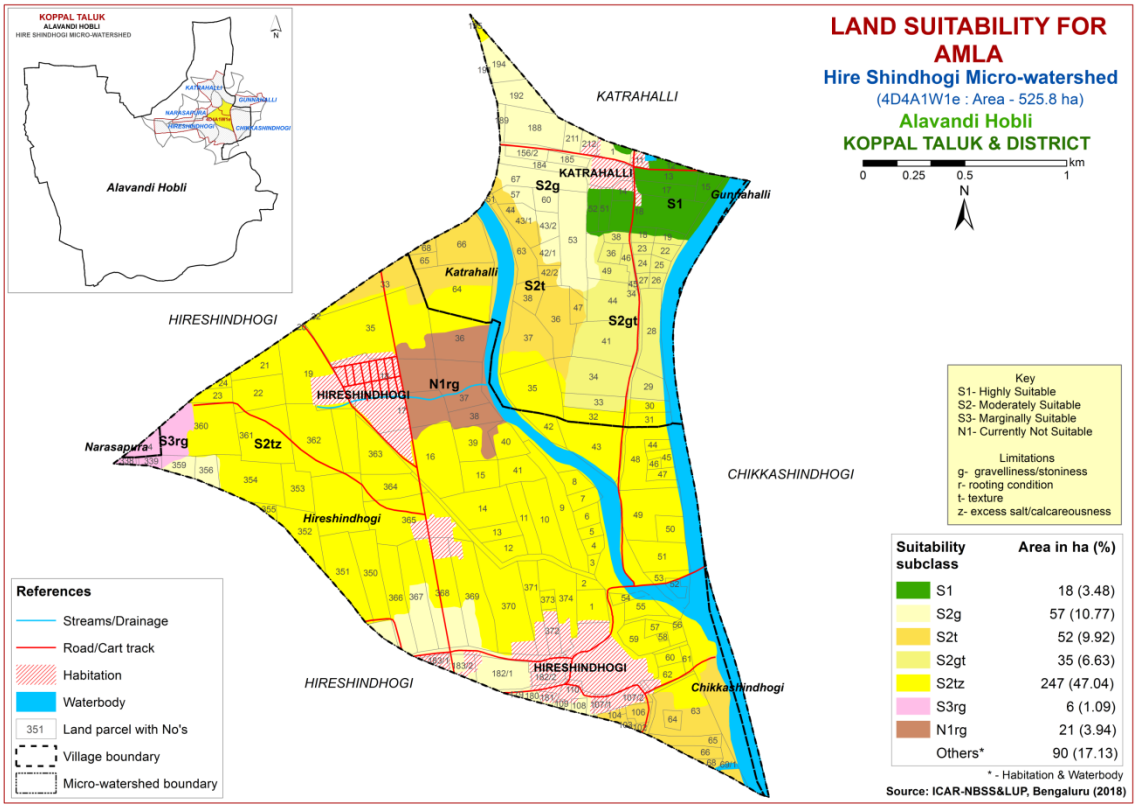


Fig. 7.21 Land Suitability map of Amla

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.

An area of 17 ha (3%) is highly (Class S1) suitable for growing cashew and are distributed in the northern part of the microwatershed. Moderately (Class S2) suitable lands occur in a minor area of 1 ha (<1%) and are distributed in the northern part of the microwatershed with minor limitation of texture. Marginally suitable (Class S3) lands occur in an area of 57 ha (11%) for growing cashew and are distributed in the northern, western and southern part of the microwatershed with moderate limitation of gravelliness. Maximum area of about 360 ha (69%) is currently not suitable (Class N1) for growing cashew and are distributed in all parts of the microwatershed with severe limitations of texture, rooting condition, gravelliness and calcareousness.

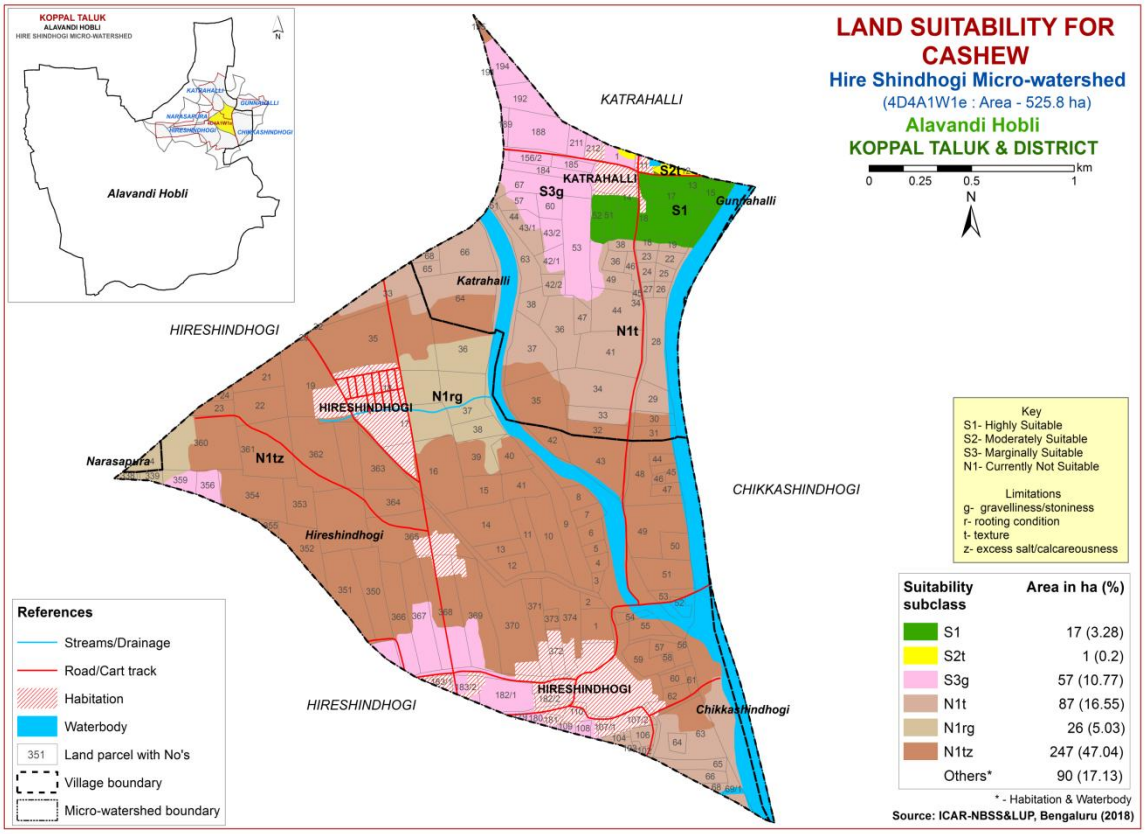


Fig. 7.22 Land Suitability map of Cashew

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 18 ha (3%) is highly (Class S1) suitable and are distributed in the northern part of the microwatershed. There are no moderately (Class S2) suitable lands for growing jackfruit in the microwatershed. Marginally suitable (Class S3) lands cover a maximum area of 391 ha (74%) and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, texture and calcareousness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing jackfruit and occur in the central and western part of the microwatershed with severe limitations of rooting condition and gravelliness.

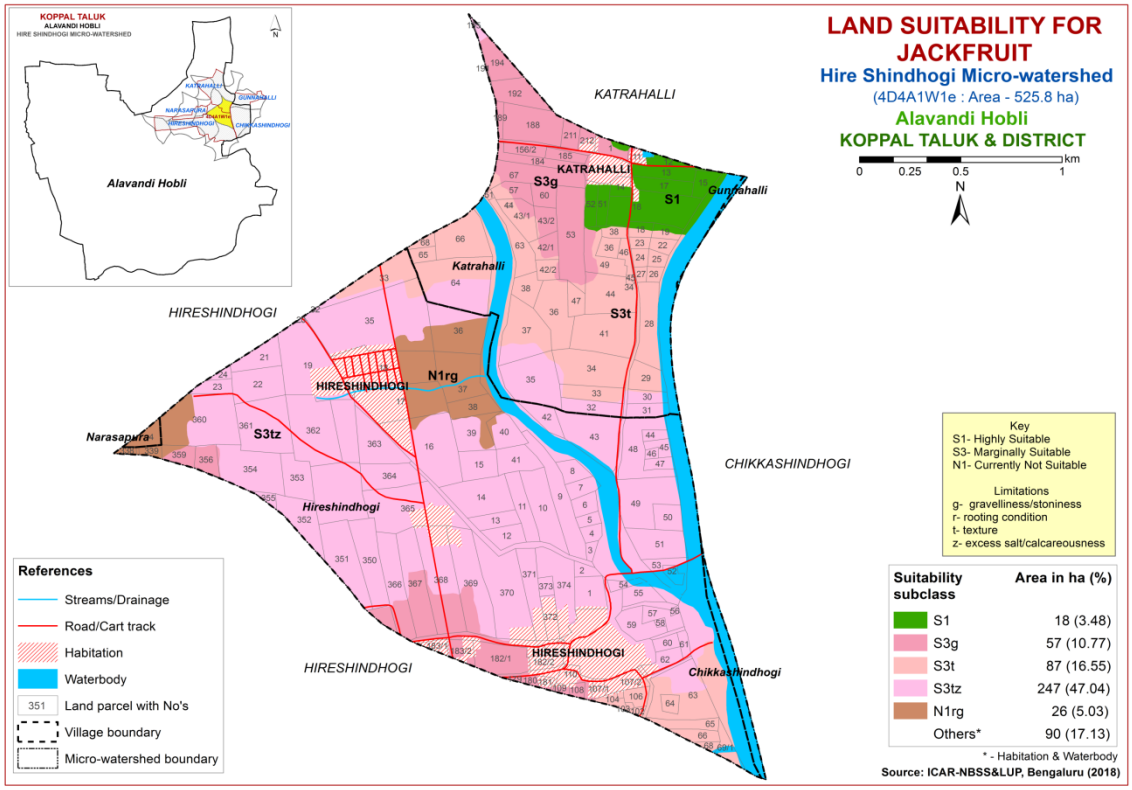


Fig. 7.23 Land Suitability map of Jackfruit

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 18 ha (3%) is highly suitable (Class S1) lands for growing jamun and are distributed in the northern part of the microwatershed. Maximum area of 272 ha (52%) is moderately suitable (Class S2) and occur in the major part of the microwatershed. They have minor limitations of rooting condition, texture and calcareousness. Marginally suitable (Class S3) lands cover an area of 120 ha (23%) and are distributed in the northern, southern, western and central part of the microwatershed with moderate limitations of rooting condition, calcareousness and gravelliness. An area of 26 ha (5%) is currently not suitable (Class N1) for growing jamun and are distributed in the western and central part of the microwatershed with severe limitations of rooting condition and gravelliness.

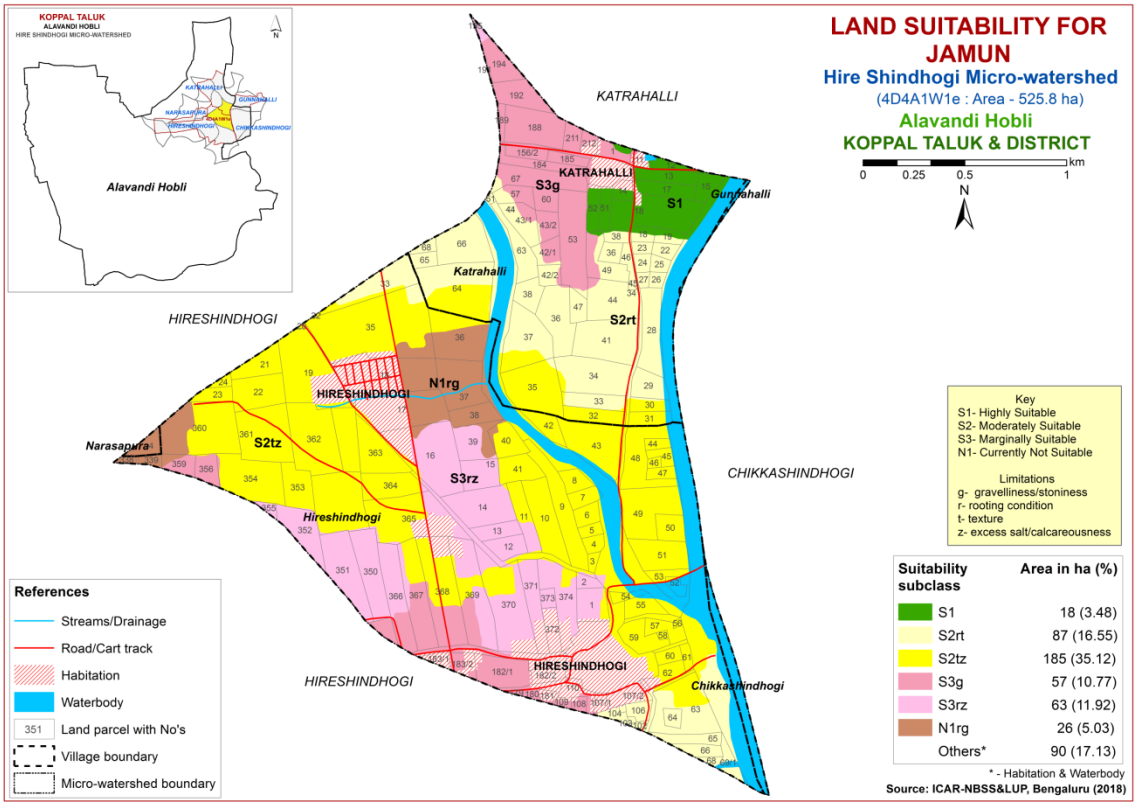


Fig. 7.24 Land Suitability map of Jamun

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 70 ha (13%) is highly (Class S1) suitable for growing custard apple and are distributed in the northern, western and southeastern part of the microwatershed. Maximum area of 338 ha (64%) is moderately suitable (Class S2) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness and calcareousness. An area of 6 ha (1%) is marginally suitable (Class S3) for growing custard apple and are distributed in the western part of the microwatershed with moderate limitations of rooting condition and gravelliness. Currently not suitable (Class N1) lands occur in an area of 21 ha (4%) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

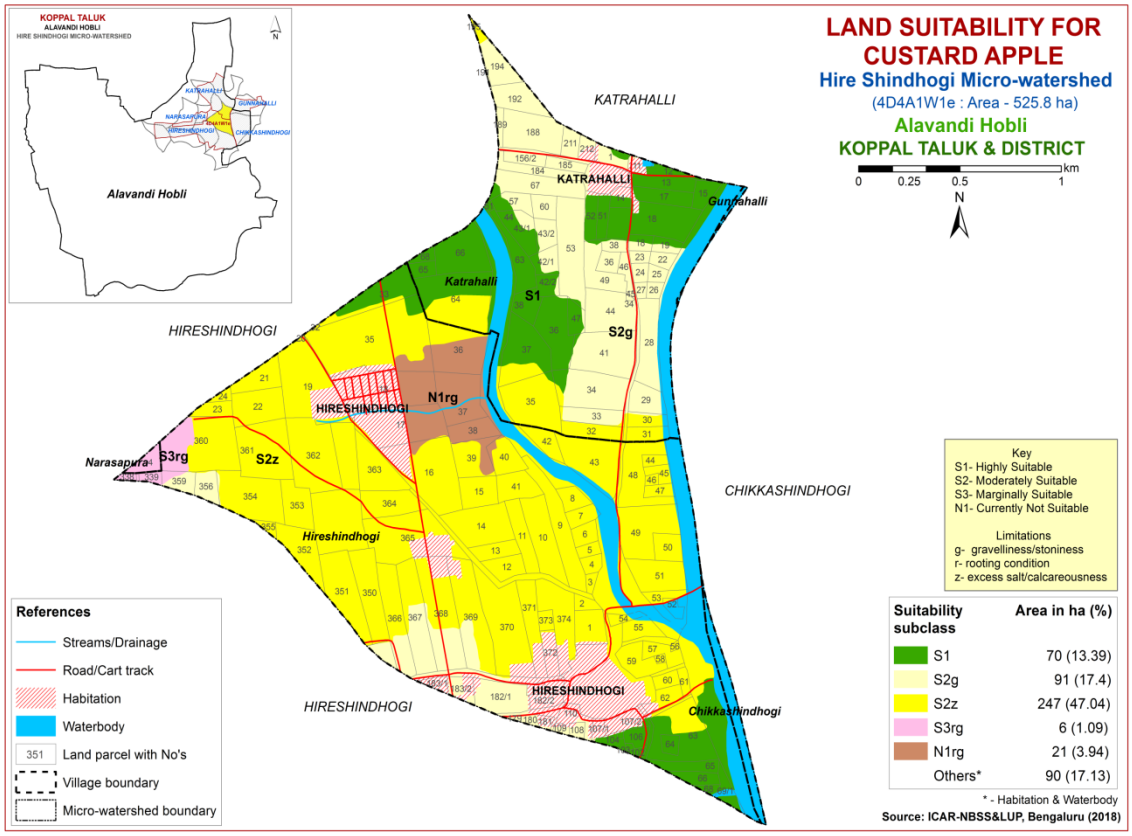


Fig. 7.25 Land Suitability map of Custard Apple

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 18 ha (3%) is highly (Class S1) suitable lands for growing tamarind in the microwatershed. Maximum area of 273 ha (52%) is moderately suitable (Class S2) and occur in the major part of the microwatershed. They have minor limitations of rooting condition, texture, gravelliness and calcareousness. An area of 120 ha (23%) is marginally suitable (Class S3) and occur in northern, southern, western and central part of the microwatershed with moderate limitations of gravelliness, calcareousness and rooting condition. An area of 26 ha (5%) is currently not suitable (Class N1) and are distributed in the western and central part of the microwatershed with severe limitations of rooting condition and gravelliness.

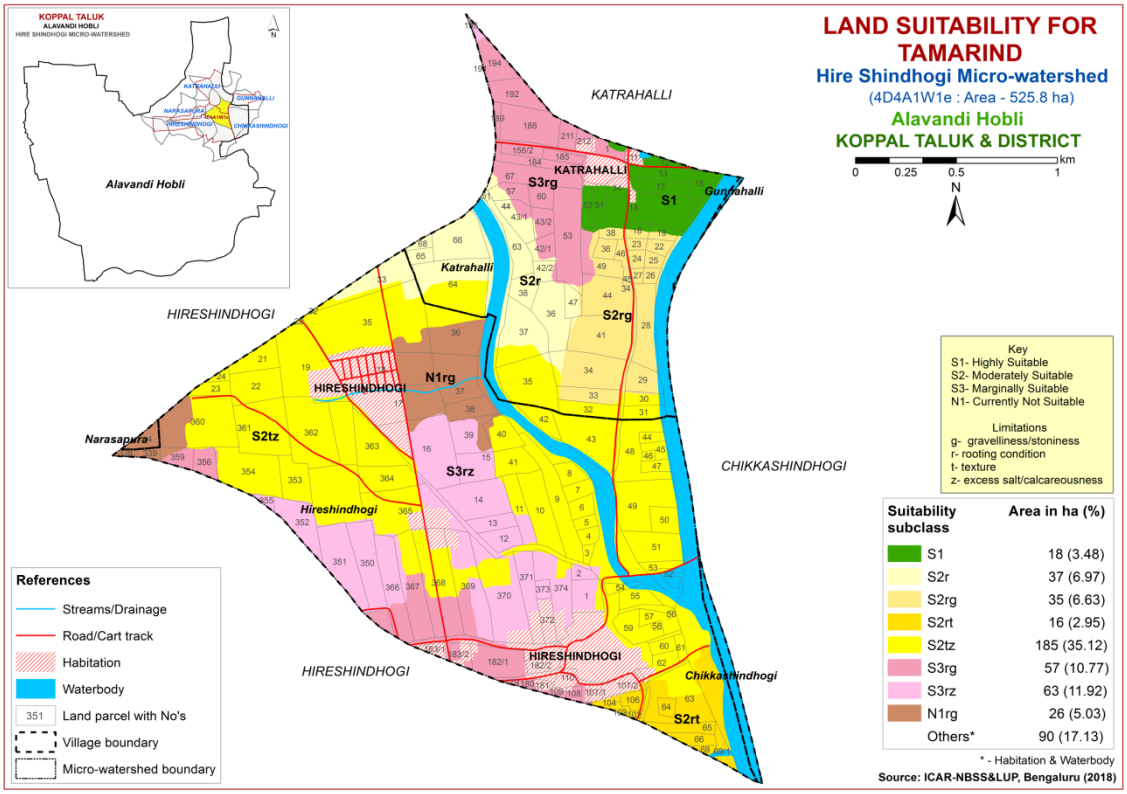


Fig. 7.26 Land Suitability map of Tamarind

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 18 ha (3%) is highly suitable (Class S1) for growing mulberry and are distributed in the northern part of the microwatershed. Moderately suitable (Class S2) lands occupy a maximum area of 207 ha (39%) and are distributed in the major part of the microwatershed. They have minor limitations of gravelliness, calcareousness and texture. Marginally suitable (Class S3) lands cover an area of 185 ha (35%) and are distributed in the western, central and eastern part of the microwatershed. They have moderate limitations of texture and calcareousness. An area of 26 ha (5%) is currently not suitable (Class N1) and are distributed in the western and central part of the microwatershed with severe limitations of rooting depth and gravelliness.

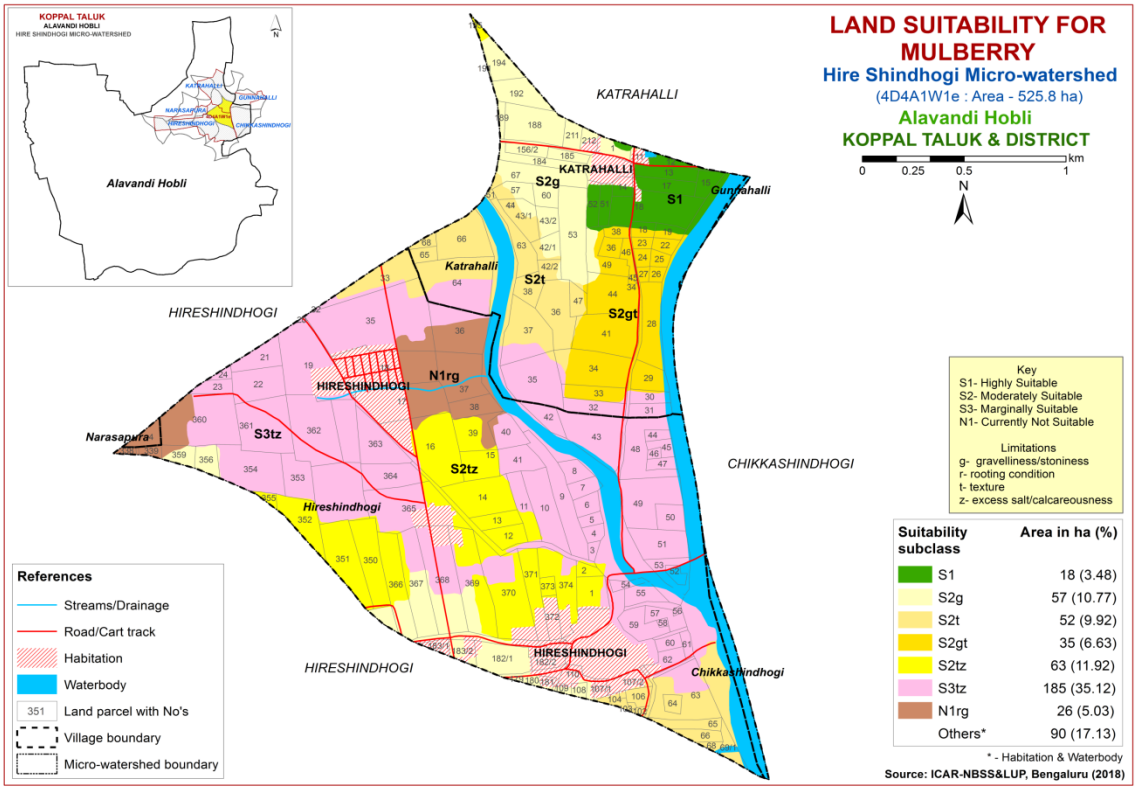


Fig. 7.27 Land Suitability map of Mulberry

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 18 ha (3%) is highly suitable (Class S1) lands for growing marigold and are distributed in the northern part of the microwatershed. Maximum area of 334 ha (64%) is moderately suitable (Class S2) for growing marigold and are distributed in the major part of the microwatershed. They have minor limitations of texture, gravelliness and calcareousness. An area of 63 ha (12%) is marginally suitable (Class S3) for growing marigold and are distributed in the northern, southern and western part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

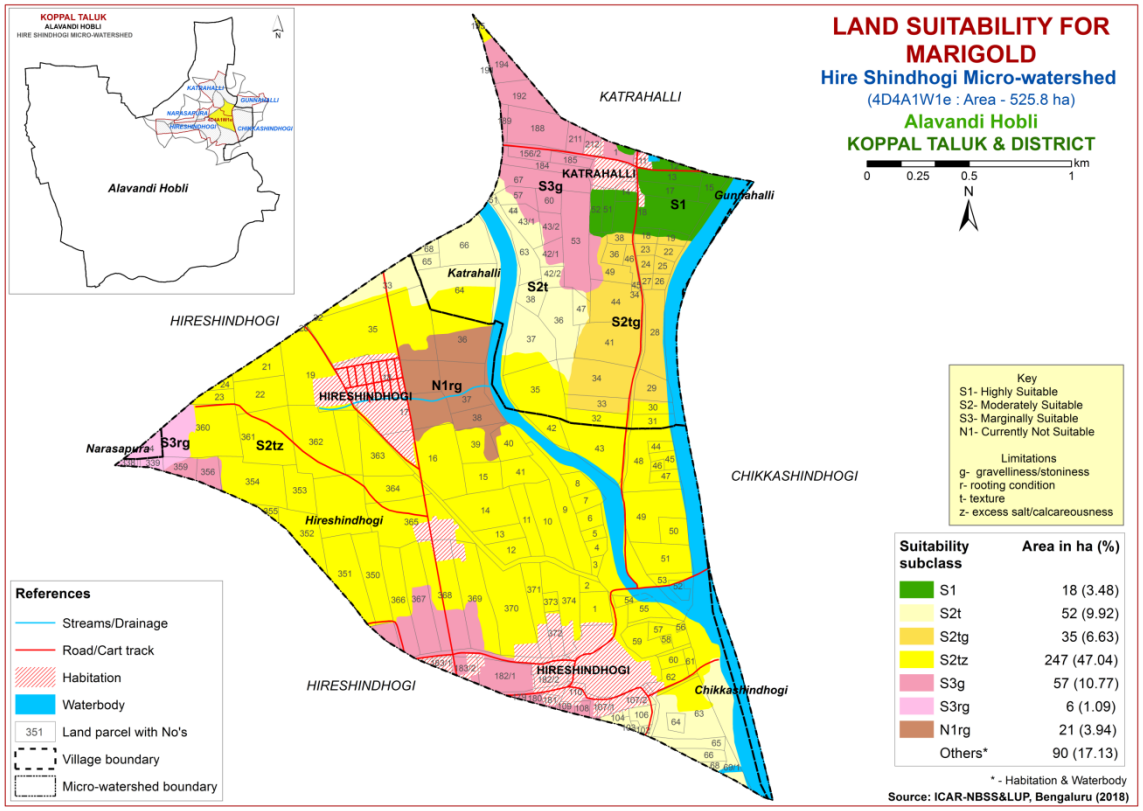


Fig. 7.28 Land Suitability map of Marigold

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 18 ha (3%) is highly suitable (Class S1) lands for growing chrysanthemum and are distributed in the northern part of the microwatershed. Maximum area of 334 ha (64%) is moderately suitable (Class S2) for growing chrysanthemum and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, gravelliness and texture. An area of 63 ha (12%) is marginally suitable (Class S3) for growing chrysanthemum and occur in the northern, southern and western part of the microwatershed. They have moderate limitations of gravelliness and rooting condition. Currently not suitable (Class N1) occur in an area of 21 ha (4%) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

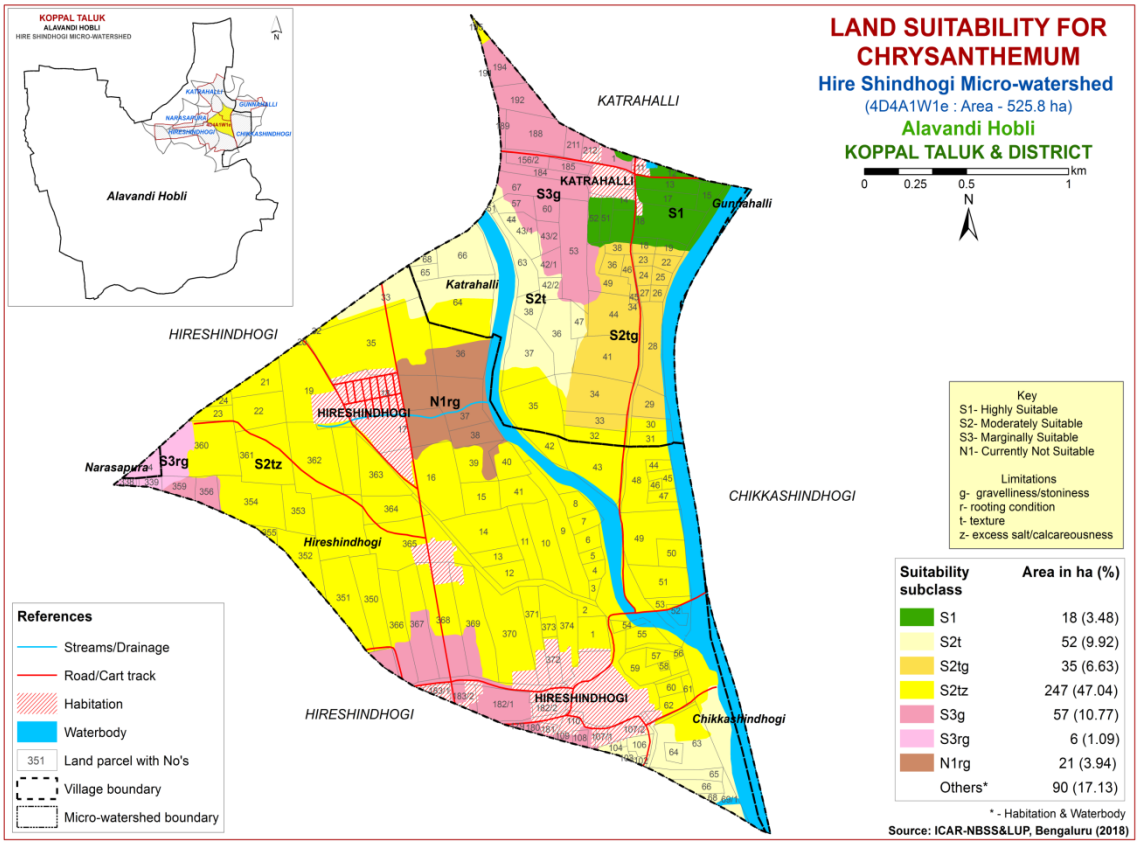


Fig. 7.29 Land Suitability map of Chrysanthemum

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.

Area of 18 ha (3%) is highly suitable lands (Class S1) for growing jasmine and are distributed in the northern part of the microwatershed. There are no moderately suitable (Class S2) for growing jasmine in the microwatershed. Maximum area of 397 ha (75%) is marginally suitable (Class S3) for growing jasmine and are distributed in all parts of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture and calcareousness. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

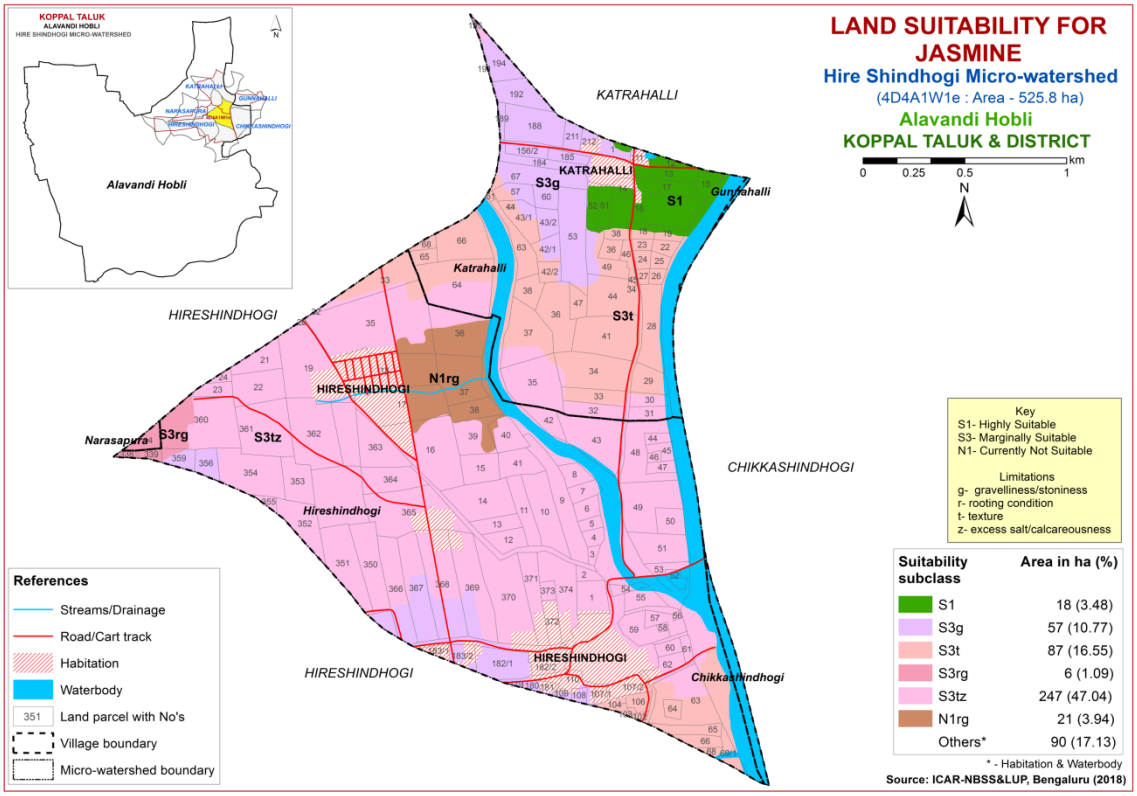


Fig. 7.30 Land Suitability map of Jasmine

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 18 ha (3%) is highly suitable lands (Class S1) for growing crossandra and are distributed in the northern part of the microwatershed. An area of 79 ha (15%) is moderately suitable (Class S2) for growing crossandra and occur in the southern, southeastern and central part of the microwatershed. They have minor limitations of calcareousness and texture. Maximum area of 319 ha (61%) is marginally suitable (Class S3) for growing jasmine and are distributed in the major part of the microwatershed. They have moderate limitations of gravelliness, rooting condition, texture and calcareousness. An area of 21 ha (4%) is currently not suitable (Class N1) and are distributed in the central part of the microwatershed with severe limitations of rooting condition and gravelliness.

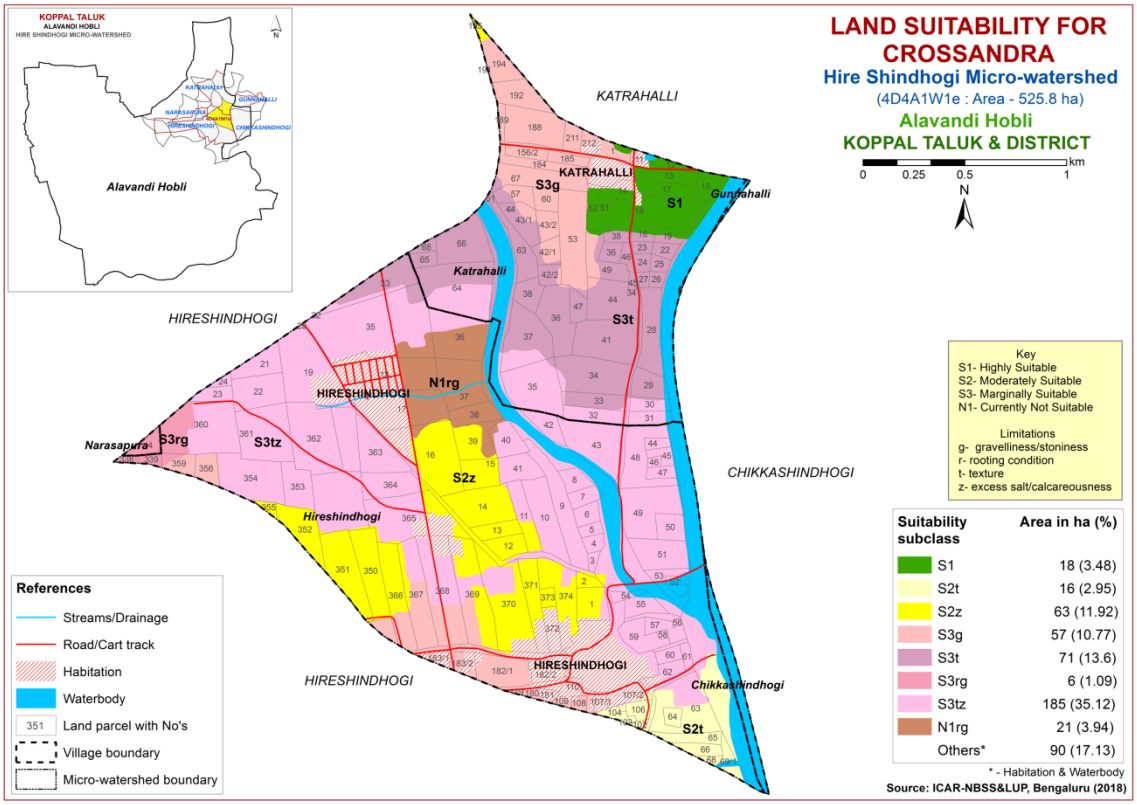


Fig. 7.31 Land Suitability map of Crossandra

Table 7.1 Soil-Site Characteristics of Hire Shindhogi 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								
BGTiB2g1	662	90	WD	<25	sc	gc	15-35	>35	<50	1-3	Moderate	8.4	0.15	1.11	44.84	-
HRViB1g2	662	90	WD	25-50	sc	gscl	35-60	>35	50-100	1-3	Slight	6.05	0.21	0.73	11.24	100
GDPcB2	662	90	WD	100-150	sl	gsc-gc	-	>35 after 60 cm		1-3	Moderate	7.88	0.10	2.87	7.8	97
BPRcA1	662	90	WD	100-150	sl	gsc-gc	-	>35	100-150	0-1	Slight	6.64	0.03	0.51	5.45	63.48
BPRhB1	662	90	WD	100-150	scl	gsc-gc	-	>35	100-150	1-3	Slight	6.64	0.03	0.51	5.45	63.48
BPRiB2	662	90	WD	100-150	sc	gsc-gc	-	>35	100-150	1-3	Moderate	6.64	0.03	0.51	5.45	63.48
RTRcB1	662	90	WD	>150	sl	c	-	-	150-200	1-3	Slight	5.08	0.03	2.06	9.21	50.50
DRLmB1	662	90	MWD	75-100	c	c	-	<15	151-200	1-3	Slight	8.78	0.42	5.62	49.70	100
DRLmB2	662	90	MWD	75-100	c	c	-	<15	151-200	1-3	Moderate	8.78	0.42	5.62	49.70	100
HDLmB1	662	90	MWD	100-150	c	c	-	-	>200	1-3	Slight	9.06	0.37	5.09	62.63	-
GRHmB1	662	90	MWD	100-150	c	c	-	<15	.200	1-3	Slight	8.08	0.23	7.11	63.21	100
GRHmB2	662	90	MWD	100-150	c	c		<15	>200	1-3	Moderate	8.08	0.23	7.11	63.21	100
GRHmB2g1	662	90	MWD	100-150	c	c	15-35	<15	>200	1-3	Moderate	8.08	0.23	7.11	63.21	100
MLRmA1	662	90	MWD	>150	c	c	-	10-20	>200	0-1	Slight	9.19	0.31	5.39	42.08	-
MLRmB1	662	90	MWD	>150	c	c	-	10-20	>200	1-3	Slight	9.19	0.31	5.39	42.08	-
MLRmB2	662	90	MWD	>150	c	c	-	10-20	>200	1-3	Moderate	9.19	0.31	5.39	42.08	-

*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 16 soil map units identified in Hire Shindhogi 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	411, 415, 418, 371, 373, 374,380, 348, 350	MLRmA1, MLRmB1, MLRmB2, GRHmB1, GRHmB2, GRHmB2g1, HDLmB1, DRLmB1, DRLmB2	Moderately deep to very deep, very dark grayish brown to very dark gray, calcareous black cracking clay
2	284	RTRcB1	Very deep, dark reddish brown to dark red clay soils
3	220,228,239, 267	BPRcA1, BPRhB1, BPRiB2, GDPcB2	Deep, dark reddish brown to dark red gravelly sandy clay to clay soils
4	30	HRViB1g2	Shallow, dark red to dark reddish brown, red gravelly sandy clay loamy soils
5	6	BGTiB2g1	Very shallow, very dark gray to very dark grayish brown, calcareous gravelly clay black soils

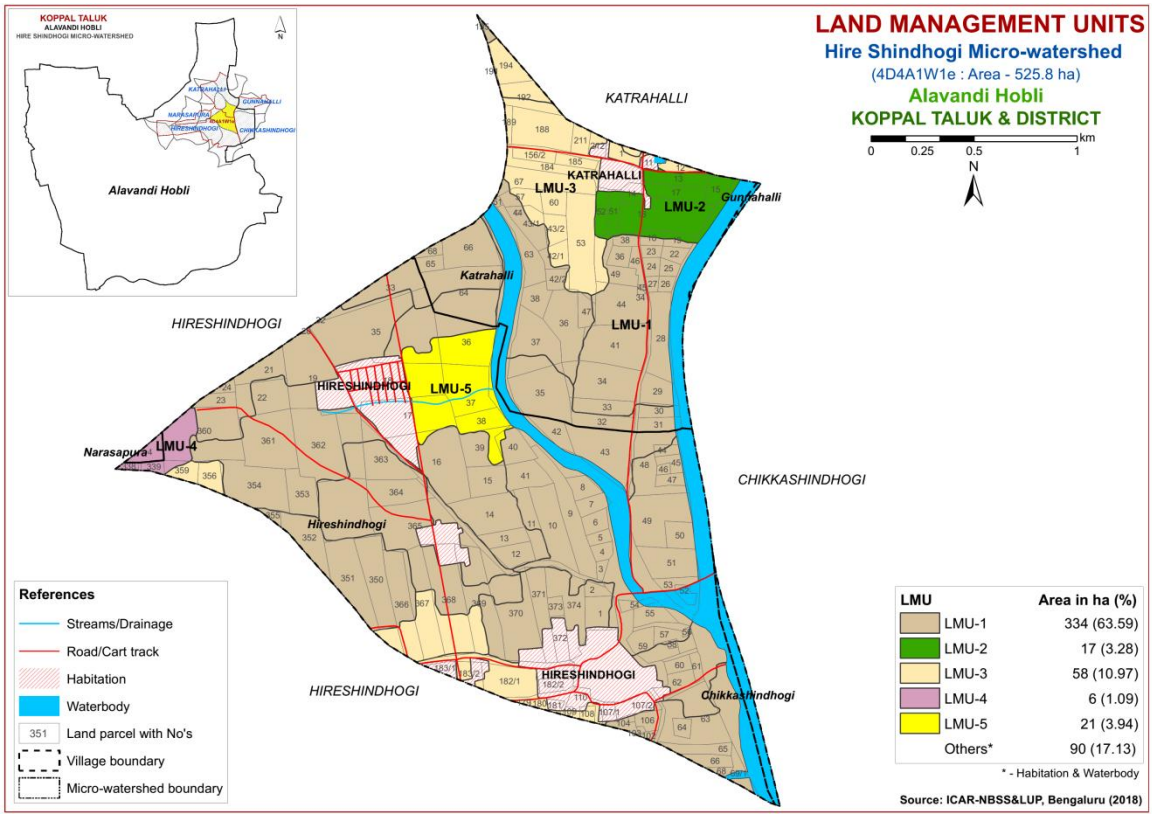


Fig 7.32 Land Management Units map of Hire Shindhogi Microwatershed

7.33 Proposed Crop Plan for Hire Shindhogi 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 Hire Shindhogi Microwatershed

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 1 334 ha (63%)	411.MLRmA1 415.MLRmB1 418.MLRmB2 371.GRHmB1 373.GRHmB2 374.GRHmB2g1 380.HDLmB1 348.DRLmB1 350.DRLmB2	**Hireshindhogi:**1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,19,20,21,22,23,24,32,33,35,39,40,41,42,43,44,45,46,47,48,4950,51,54,55,56,57,58,59,60,61,62,63,64,65,66,68,69/1,102,103,104,105,106,350,351,352,353,354,355,360,361,362,363,364,365,366,368,369, 370,371,373,374 **Katrahalli:**22,23,24,25,2627,28,29,30,31,32,33,34,35,36,37,38,41,42/2,43/1,44,4546,47,49,63,64,65,66,68,195	Moderately deep to very deep, black calcareous to non calcareous clay soils	Maize, Sorghum, Sunflower, Cotton, Bengal gram, Safflower, Linseed, Bajra , Soyabean	**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 17 ha (3%)	284.RTRcB1	**Katrahalli:**13,14,15,17,18, 19,51,52	Very deep, red clay soils	Maize, Sorghum, Sunflower, Bajra, Finger millet, Groundnut, Red gram, Cowpea, Field bean, Castor, Mulberry	**Fruit crops:** Pomegranate, Guava, Sapota, Jackfruit, Tamarind, Lime, Musambi, Amla, Custard apple **Vegetable crops:** Drumstick, Tomato, Bhendi, Chilli, Brinjal, Onion, Curry leaves **Flower crops:** Marigold, Chrysanthemum, Jasmine, Crossandra	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)

LMU	Soil Map Units	Survey Number	Soil characters	Field Crops	Horticulture Crops	Suitable Interventions
LMU 3 58 ha (11%)	220.BPRcA1 228.BPRhB1 239.BPRiB2 267.GDPcB2	**Hireshindhogi:**108,109,179,180,182/1,183/2,356,359,367 **Katrahalli :** 1,12,,42/1,43/2, 53,57,60,67,156/2,184,185,188,189,191,192,194,211	Deep, red 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 4 6 ha (1%)	30.HRViB1g2	**Hireshindhogi :**338,339 **Narasapura:**4	Shallow, red gravelly loamy soils	Horse gram	**Agri-Silvi-Pasture:** Custard apple, Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *Styloxanthes scabra*	Use of short duration varieties, sowing across the slope and split application of nitrogen fertilizers
LMU 5 21 ha (4%)	6.BGTiB2g1	**Hireshindhogi :**36,37,38	Very shallow, red calcareous gravelly clay soils	-	**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 Hire Shindhogi Microwatershed

- The soil phases with sizeable area identified in the microwatershed belonged to the soil series of Murlapur (MLR) 185 ha (35%), Gatareddihal (GRH) 71 ha (14%), Dambarahalli (DRL) 62 ha (12%) , Balapur (BPR) 57 (11%), Belagatti (BGT) 21 (4%), Ranatur (RTR) 17 ha (3%), Handrala (HDL) 16 ha (3%), Harve (HRV) 6 ha (1%) and Giddadapalya (GDP) occupy minor area of about 1 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, an area of 2 ha (<1%) is slightly alkaline (pH 7.3-7.8), 41 ha (8%) is moderately alkaline (pH 7.8-8.4), 391 ha (74%) is strongly alkaline (pH 8.4-9.0) and about 1 ha (<1%) is very strongly alkaline (pH >9.0) in the microwatershed. Entire area in the microwatershed is alkaline in reaction.

Soil Health Management

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

Alkaline soils

Slightly to very strongly alkaline soils cover an entire cultivated area of 435 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).

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. Out of total 526 ha area in the microwatershed, an area of about 232 ha (44%) is suffering from slight erosion and 203 ha (39%) 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 Hire Shindhogi Microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is low (<0.5%) in 0.2 ha (<1%), medium (0.5-0.75%) in 265 ha (50%) and high (>0.75%) in 170 ha (32%). 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 entire area of about 436 ha (83%) is medium (23-57 kg/ha) in available phosphorus. Hence for all the crops, 25% additional P-needs to be applied where it is medium.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) in 9 ha (2%) and high (>337 kg/ha) in 427 (81%) 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 high (>20 ppm) is about 436 ha (83%) 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.
- **Available Boron:** An area of about 252 ha (48%) is low (<0.5 ppm) and 183 ha (35%) 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.
- **Available iron:** An area of 10 ha (2%) is deficient (<4.5 ppm) and 426 ha (81%) is sufficient (>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.
- **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:** Entire area is deficient (<0.6 ppm) in an entire 121 ha (23%) 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 314 ha (60%) in the microwatershed.
- **Soil alkalinity:** Entire area of the microwatershed has 435 ha (83%) soils that are moderately to very strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.

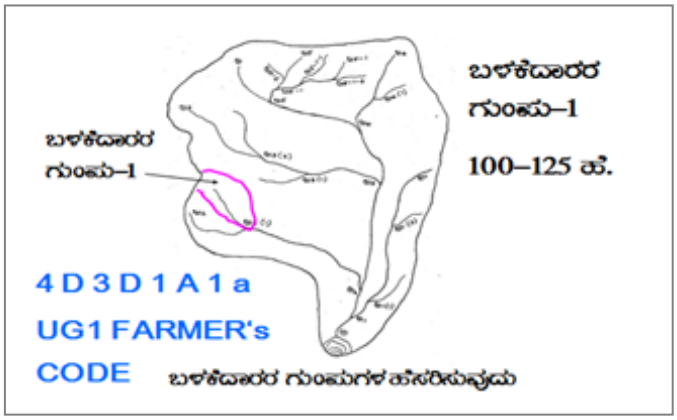
Land suitability for various crops: Areas that are highly, moderately and marginally suitable and not suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content,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

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

For preparing soil and water conservation treatment plan for Hire Shindhogi 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.

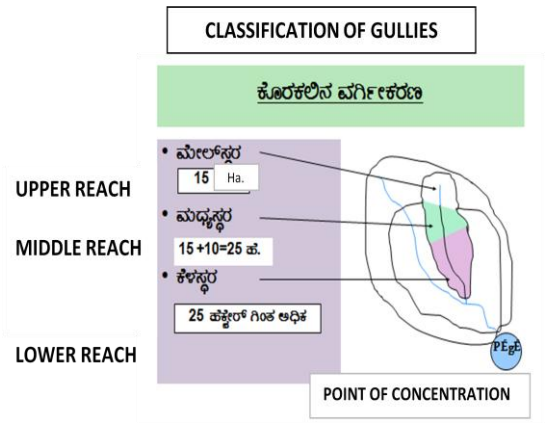
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

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

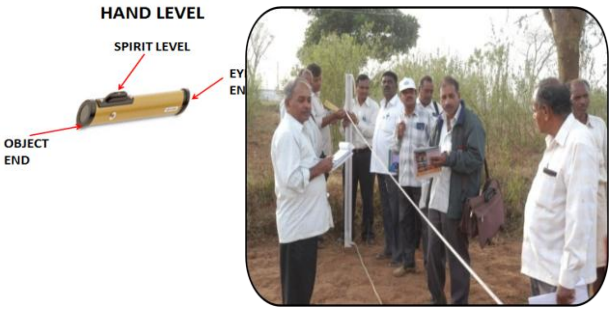
9.1.1 Arable Land Treatment

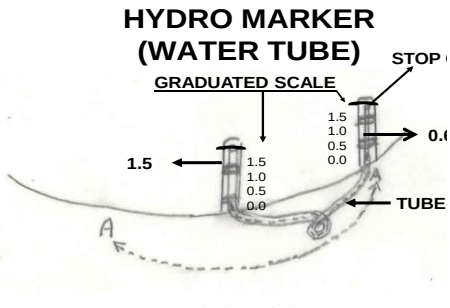
A. BUNDING

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.

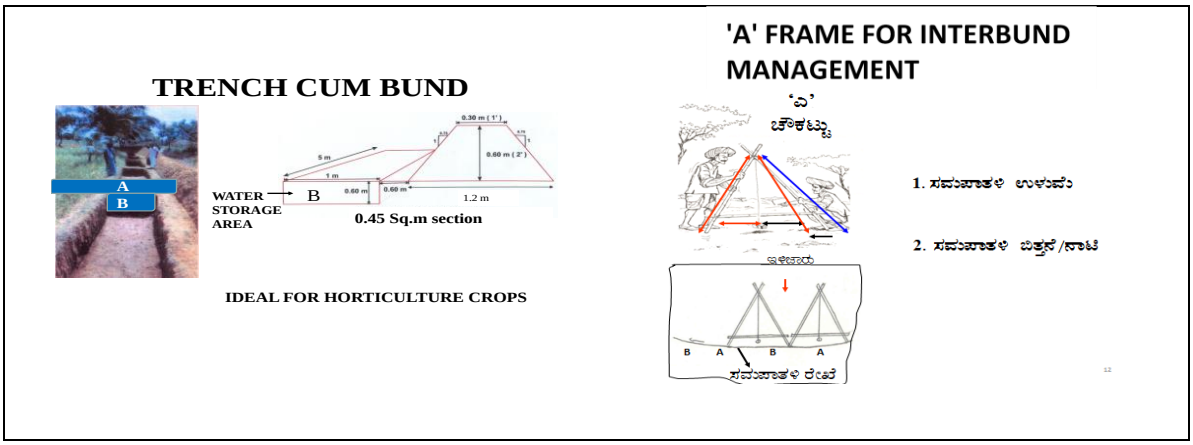
Recommended Bund Section

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 49 ha (9%) requires Trench cum Bunding, maximum area of about 292 ha (55%) area requires Graded Bunding and 95 ha (18%) requires Strengthening of existing bunds 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.

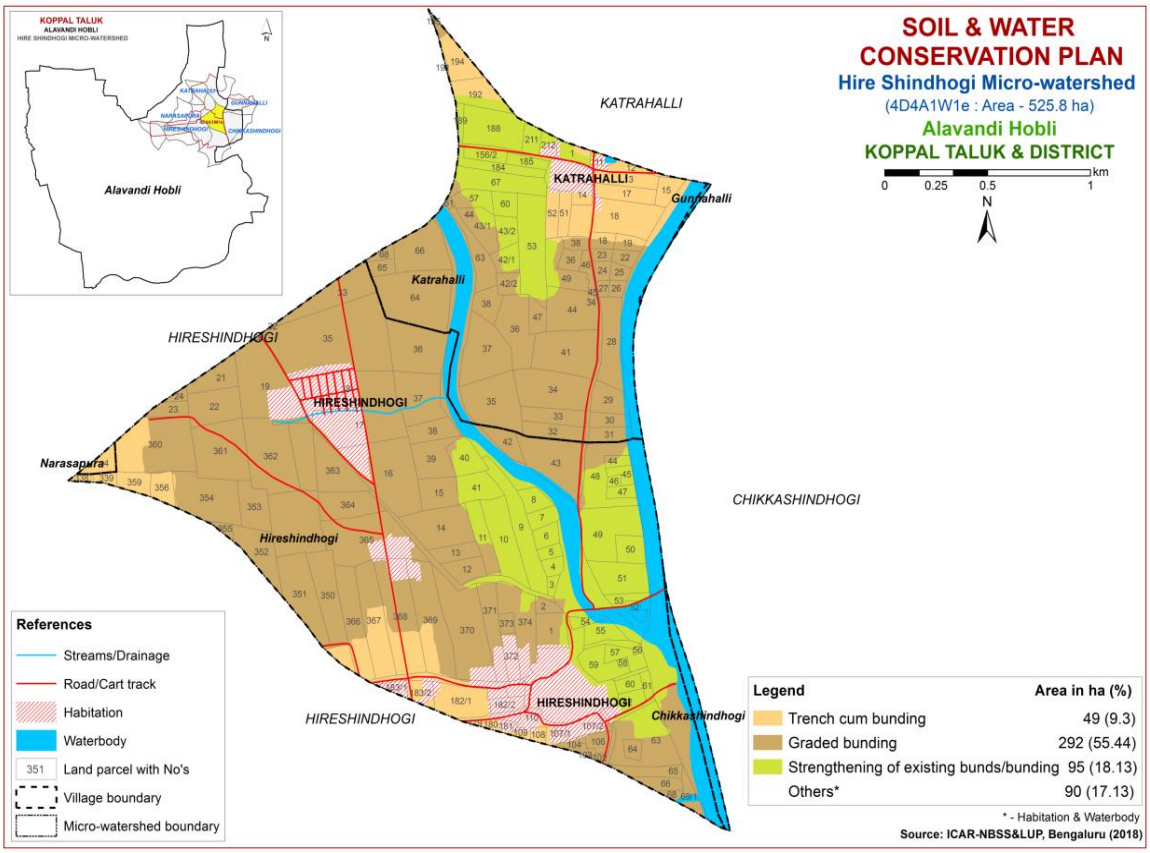


Fig. 9.1 Soil and Water Conservation Plan map of Hire Shindhogi Microwatershed

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

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Appendix-I

Hireshindoge (1W1e) 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
Chikkashindhogi	RIVER	4.64	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Gunnahalli	RIVER	0.28	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Hireshindhogi	1	2.45	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	2	0.73	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	3	0.43	MLRmA1	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	
Hireshindhogi	4	0.79	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Groundnut (Gn)	Not Available	IIs	Graded bunding
Hireshindhogi	5	0.67	MLRmA1	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
Hireshindhogi	6	1.18	MLRmA1	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
Hireshindhogi	7	1.21	MLRmA1	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
Hireshindhogi	8	1.3	MLRmA1	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
Hireshindhogi	9	5.07	MLRmA1	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
Hireshindhogi	10	4.75	MLRmA1	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
Hireshindhogi	11	2.59	MLRmA1	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
Hireshindhogi	12	1.79	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	13	1.64	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	14	5.23	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Hireshindhogi	15	2.59	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	16	9.02	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Fallowland+Maize+Redgram (Fl+Mz+Rg)	Not Available	IIes	Graded bunding
Hireshindhogi	17	7.3	Habitation	Others	Others	Others	Others	Others	Others	Others	Fallow land+Habitation (Fl+Hb)	Not Available	Others	Others
Hireshindhogi	18	8.48	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Hireshindhogi	19	9.22	MLRmB1	LMU-1	Very deep (>150 cm)	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
Hireshindhogi	20	0.08	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	21	2.46	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	22	3.94	MLRmB2	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
Hireshindhogi	23	1.24	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Eucalyptus (Eu)	Not Available	IIs	Graded bunding
Hireshindhogi	24	0.45	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Eucalyptus (Eu)	Not Available	IIs	Graded bunding
Hireshindhogi	32	0.06	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land+Maize (Fl+Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	33	4.56	GRHmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	35	16.27	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Graded bunding
Hireshindhogi	36	5.93	BGTiB2g1	LMU-5	Very shallow (<25 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Hireshindhogi	37	4.96	BGTiB2g1	LMU-5	Very shallow (<25 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IVes	Graded bunding
Hireshindhogi	38	2.12	BGTiB2g1	LMU-5	Very shallow (<25 cm)	Sandy clay	Gravelly (15-35%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IVes	Graded bunding
Hireshindhogi	39	3.23	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	40	2.32	MLRmA1	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
Hireshindhogi	41	2.46	MLRmA1	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
Hireshindhogi	42	1.73	MLRmB2	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
Hireshindhogi	43	6.14	MLRmB2	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
Hireshindhogi	44	0.65	MLRmA1	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
Hireshindhogi	45	0.85	MLRmA1	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
Hireshindhogi	46	0.33	MLRmA1	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
Hireshindhogi	47	0.84	MLRmA1	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
Hireshindhogi	48	4.72	MLRmA1	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
Hireshindhogi	49	5.95	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Banana (Ba)	Not Available	IIs	Graded bunding
Hireshindhogi	50	1.77	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Banana (Ba)	Not Available	IIs	Graded bunding
Hireshindhogi	51	3.78	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Banana (Ba)	4 Borewell	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
Hireshindhogi	52	0.67	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Hireshindhogi	53	1.88	Waterbody	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Hireshindhogi	54	0.67	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	55	1.64	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	56	0.16	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	57	1.45	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	58	0.21	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	59	2.4	MLRmA1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Nearly level (0-1%)	Slight	Not Available (NA)	Not Available	IIs	Graded bunding
Hireshindhogi	60	0.85	MLRmA1	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
Hireshindhogi	61	0.62	MLRmA1	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
Hireshindhogi	62	1.43	MLRmA1	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
Hireshindhogi	63	6.53	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	64	0.76	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Cotton+Maize (Ct+Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	65	1.58	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	66	1.23	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	1 Borewell	IIs	Graded bunding
Hireshindhogi	68	0.4	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	69/1	1.28	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	102	0.3	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	103	0.11	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	104	0.72	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	105	0.12	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	106	1.02	HDLmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	107/1	0.57	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Hireshindhogi	107/2	1.67	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others

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
Hireshindhogi	108	0.53	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	109	0.19	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	110	1.65	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Hireshindhogi	179	0.14	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	180	0.35	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	181	0.46	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Hireshindhogi	182/1	3.78	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIIs	Trench cum bunding
Hireshindhogi	182/2	1.07	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Hireshindhogi	183/1	0.67	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Hireshindhogi	183/2	1.39	BPRhB1	LMU-3	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIIs	Trench cum bunding
Hireshindhogi	338	0.32	HRViB1g2	LMU-4	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Groundnut (Gn)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	339	0.58	HRViB1g2	LMU-4	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIIs	Trench cum bunding
Hireshindhogi	350	4.71	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	351	5.54	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	352	3.61	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	353	2.96	MLRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Hireshindhogi	354	6.26	MLRmB2	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
Hireshindhogi	355	0.49	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	356	1.57	BPRiB2	LMU-3	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
Hireshindhogi	359	1.49	BPRiB2	LMU-3	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
Hireshindhogi	360	8.94	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	361	6.77	MLRmB2	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
Hireshindhogi	362	7.5	MLRmB2	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	IIes	Graded bunding
Hireshindhogi	363	4.09	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	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
Hireshindhogi	364	3.44	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Graded bunding
Hireshindhogi	365	8.75	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land+Maize (Fl+Mz)	1 Borewell	IIs	Graded bunding
Hireshindhogi	366	4.96	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Hireshindhogi	367	5.67	BPRiB2	LMU-3	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
Hireshindhogi	368	8.22	MLRmB1	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Drumstick+Maize (Ds+Mz)	1 Borewell	IIs	Graded bunding
Hireshindhogi	369	7.31	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Drumstick (Ds)	1 Borewell	IIs	Graded bunding
Hireshindhogi	370	8.63	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	371	3.36	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	372	1.48	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Hireshindhogi	373	0.68	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Hireshindhogi	374	4.9	DRLmB1	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Katrahalli	1	1.35	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize+Coconut (Mz+Cn)	Not Available	IIIs	Graded bunding
Katrahalli	11	0.66	Habitation	Others	Others	Others	Others	Others	Others	Others	Jowar (Jw)	Not Available	Others	Others
Katrahalli	12	0.95	GDPcB2	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Banana (Ba)	Not Available	IIIes	Trench cum bunding
Katrahalli	13	2.12	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Habitation	Not Available	IIs	Trench cum bunding
Katrahalli	14	0.92	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Not Available (NA)	Not Available	IIs	Trench cum bunding
Katrahalli	15	1.31	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Trench cum bunding
Katrahalli	17	2.13	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Papaya (Ppy)	Not Available	IIs	Trench cum bunding
Katrahalli	18	8.78	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Chilli+Grazing land (Ch+Gl)	Not Available	IIs	Trench cum bunding
Katrahalli	19	0.98	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Trench cum bunding
Katrahalli	22	0.84	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	23	0.57	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Katrahalli	24	0.71	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Katrahalli	25	0.7	GRHmB2g1	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	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
Katrahalli	26	0.58	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	27	0.43	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	1 Borewell	IIes	Graded bunding
Katrahalli	28	4.31	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy+Maize (Pd+Mz)	2 Borewell	IIes	Graded bunding
Katrahalli	29	2.2	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	30	1.27	MLRmB2	LMU-1	Very deep (>150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIes	Graded bunding
Katrahalli	31	1.44	MLRmB2	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
Katrahalli	32	2.16	MLRmB2	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
Katrahalli	33	2.3	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	34	6.13	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra+Redgram (Bj+Rg)	Not Available	IIes	Graded bunding
Katrahalli	35	6.15	MLRmB2	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
Katrahalli	36	5.58	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	37	5.78	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	38	2.52	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	41	6.25	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	2 Borewell	IIes	Graded bunding
Katrahalli	42/1	1.51	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	42/2	1.13	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Bajra (Bj)	Not Available	IIes	Graded bunding
Katrahalli	43/1	2.46	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	43/2	1.46	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	44	4.78	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	45	0.09	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Katrahalli	46	0.76	GRHmB2g1	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	IIes	Graded bunding
Katrahalli	47	1.22	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	49	2.87	GRHmB2g1	LMU-1	Deep (100-150 cm)	Clay	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	1 Borewell	IIes	Graded bunding
Katrahalli	51	1.36	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Trench cum bunding

Village	Survey No	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Soil Gravelliness	Available Water Capacity	Slope	Soil Erosion	Current Land Use	Wells	Land Capability	Conservation Plan
Katrahalli	52	1.43	RTRcB1	LMU-2	Very deep (>150 cm)	Sandy loam	Non gravelly (<15%)	High (151-200 mm/m)	Very gently sloping (1-3%)	Slight	Fallow land (Fl)	Not Available	IIs	Trench cum bunding
Katrahalli	53	6.47	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	57	1.63	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	60	1.37	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	63	2.64	GRHmB2	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Maize (Mz)	Not Available	IIes	Graded bunding
Katrahalli	64	8.64	MLRmB2	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
Katrahalli	65	0.93	GRHmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Katrahalli	66	4.87	GRHmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Katrahalli	67	4.25	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	68	0.59	GRHmB1	LMU-1	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Slight	Maize (Mz)	Not Available	IIs	Graded bunding
Katrahalli	156/2	1.17	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	1 Borewell	IIIs	Graded bunding
Katrahalli	184	1.93	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	Not Available	IIIs	Graded bunding
Katrahalli	185	1.02	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	1 Borewell	IIIs	Graded bunding
Katrahalli	188	5	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Maize (Mz)	1Borewell, 1 Openwell	IIIs	Graded bunding
Katrahalli	189	0.57	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Habitation	Not Available	IIIs	Graded bunding
Katrahalli	191	0.12	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Drumstick+Bajra (Ds+Bj)	Not Available	IIIes	Trench cum bunding
Katrahalli	192	2.88	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Custard apple (Ca)	Not Available	IIIes	Trench cum bunding
Katrahalli	194	2.67	BPRiB2	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Fallow land (Mz+Fl)	Not Available	IIIes	Trench cum bunding
Katrahalli	195	0.08	DRLmB2	LMU-1	Moderately deep (75-100 cm)	Clay	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Maize+Fallow land (Mz+Fl)	Not Available	IIes	Graded bunding
Katrahalli	211	1.13	BPRcA1	LMU-3	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Nearly level (0-1%)	Slight	Bajra (Bj)	Not Available	IIIs	Graded bunding
Katrahalli	212	0.85	Habitation	Others	Others	Others	Others	Others	Others	Others	Maize (Mz)	Not Available	Others	Others
Narasapura	4	1.32	HRViB1g2	LMU-4	Shallow (25-50 cm)	Sandy clay	Very gravelly (35-60%)	Very Low (<50 mm/m)	Very gently sloping (1-3%)	Slight	Maize+Redgram (Mz+Rg)	Not Available	IIIs	Trench cum bunding

Appendix II

Hireshindoge (1W1e) 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
Chikkashindhogi	RIVER	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gunnahalli	RIVER	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	2	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	3	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	4	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	5	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)	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)
Hireshindhogi	6	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	7	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	8	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	9	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	10	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	11	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	12	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	13	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	14	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	15	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	16	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	17	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	18	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	19	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	20	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	21	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	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
Hireshindhogi	22	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	23	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	24	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	32	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)	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)
Hireshindhogi	33	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)	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)
Hireshindhogi	35	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)	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)
Hireshindhogi	36	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	37	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	38	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	39	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	40	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	41	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	42	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	43	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	44	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	45	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	46	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	47	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)	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)
Hireshindhogi	48	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	49	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	50	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	51	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	52	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	53	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	54	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	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
Hireshindhogi	55	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	56	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)	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)
Hireshindhogi	57	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)	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)
Hireshindhogi	58	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)	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)
Hireshindhogi	59	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	60	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	61	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	62	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)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	63	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	64	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	65	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	66	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	68	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	69/1	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	102	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	103	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	104	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	105	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	106	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	107/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	107/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	108	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	109	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	110	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	179	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	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
Hireshindhogi	180	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	181	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	182/1	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	182/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	183/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	183/2	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	338	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	339	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	350	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	351	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	352	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	353	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	354	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	355	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)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	356	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	359	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	360	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	361	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	362	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	363	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	364	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	365	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	366	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	367	Moderately alkaline (pH 7.8 – 8.4)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	368	Strongly alkaline (pH 8.4 – 9.0)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Hireshindhogi	369	Strongly alkaline (pH 8.4 – 9.0)	Low (2 – 4 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	370	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	371	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Hireshindhogi	372	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	373	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Hireshindhogi	374	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Katrahalli	1	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)	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)
Katrahalli	11	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Katrahalli	12	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	13	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	14	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)	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)
Katrahalli	15	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	17	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	18	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	19	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	22	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	23	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	24	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	25	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	26	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	27	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	28	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	29	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	30	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	31	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>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
Katrahalli	32	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	33	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	34	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	35	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	36	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	37	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	38	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)	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)
Katrahalli	41	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	42/1	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)	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)
Katrahalli	42/2	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)	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)
Katrahalli	43/1	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)	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)
Katrahalli	43/2	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)	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)
Katrahalli	44	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	45	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	46	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	47	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	49	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	51	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)	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)
Katrahalli	52	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)	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)
Katrahalli	53	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)	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)
Katrahalli	57	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)	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)
Katrahalli	60	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)	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)
Katrahalli	63	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)	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)
Katrahalli	64	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)	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)

Village	Survey NO	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Katrahalli	65	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)	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)
Katrahalli	66	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)	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)
Katrahalli	67	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)	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)
Katrahalli	68	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)	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)
Katrahalli	156/2	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)	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)
Katrahalli	184	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)	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)
Katrahalli	185	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)	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)
Katrahalli	188	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)	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)
Katrahalli	189	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)	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)
Katrahalli	191	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	192	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)	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)
Katrahalli	194	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)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Sufficient (> 0.6 ppm)
Katrahalli	195	Very strongly alkaline (pH > 9.0)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Katrahalli	211	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)	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)
Katrahalli	212	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Narasapura	4	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	High (> 337 kg/ha)	High (> 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Hireshindoge (1W1e) 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
Chikkashindhogi	RIVER	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gunnahalli	RIVER	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	1	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	2	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	3	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
Hireshindhogi	4	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
Hireshindhogi	5	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
Hireshindhogi	6	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
Hireshindhogi	7	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
Hireshindhogi	8	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
Hireshindhogi	9	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
Hireshindhogi	10	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
Hireshindhogi	11	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
Hireshindhogi	12	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	13	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	14	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	15	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	16	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	17	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	18	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	19	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
Hireshindhogi	20	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
Hireshindhogi	21	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

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
Hireshindhogi	22	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
Hireshindhogi	23	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
Hireshindhogi	24	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
Hireshindhogi	32	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
Hireshindhogi	33	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Hireshindhogi	35	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
Hireshindhogi	36	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
Hireshindhogi	37	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
Hireshindhogi	38	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
Hireshindhogi	39	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	40	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
Hireshindhogi	41	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
Hireshindhogi	42	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
Hireshindhogi	43	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
Hireshindhogi	44	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
Hireshindhogi	45	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
Hireshindhogi	46	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
Hireshindhogi	47	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
Hireshindhogi	48	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
Hireshindhogi	49	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
Hireshindhogi	50	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
Hireshindhogi	51	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
Hireshindhogi	52	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	53	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	54	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
Hireshindhogi	55	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

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
Hireshindhogi	56	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
Hireshindhogi	57	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
Hireshindhogi	58	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
Hireshindhogi	59	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
Hireshindhogi	60	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
Hireshindhogi	61	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
Hireshindhogi	62	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
Hireshindhogi	63	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	64	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	65	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	66	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	68	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	69/1	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	102	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	103	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	104	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	105	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	106	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2tz	S2tz	S2t	S2t	S2t	S3tz
Hireshindhogi	107/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	107/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	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
Hireshindhogi	109	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
Hireshindhogi	110	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	179	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
Hireshindhogi	180	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
Hireshindhogi	181	Othe	Othe	Othe	Othe	Oth	Othe	Othe	Othe	Othe	Oth	Othe	Othe	Othe	Othe	Othe	Oth	Othe	Othe	Othe	Othe	Oth	Othe	Othe	Othe	Othe	Oth	Othe	Othe	Othe	Othe	Othe

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
		rs	rs	rs	rs	ers	rs	rs	rs	rs	ers	rs	rs	rs	rs	rs	ers	rs	rs	rs	rs	ers	rs	rs	rs	rs	ers	rs	rs	rs	rs	rs
Hireshindhogi	182/1	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
Hireshindhogi	182/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	183/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	183/2	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
Hireshindhogi	338	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	N1rg	S3rg
Hireshindhogi	339	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	N1rg	S3rg
Hireshindhogi	350	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	351	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	352	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	353	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
Hireshindhogi	354	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
Hireshindhogi	355	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	356	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
Hireshindhogi	359	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
Hireshindhogi	360	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
Hireshindhogi	361	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
Hireshindhogi	362	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
Hireshindhogi	363	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
Hireshindhogi	364	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
Hireshindhogi	365	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
Hireshindhogi	366	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	367	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
Hireshindhogi	368	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
Hireshindhogi	369	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	370	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz

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
Hireshindhogi	371	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	372	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Hireshindhogi	373	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Hireshindhogi	374	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Katrahalli	1	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
Katrahalli	11	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Katrahalli	12	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
Katrahalli	13	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	14	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	15	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	17	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	18	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	19	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	22	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	23	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	24	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	25	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	26	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	27	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	28	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	29	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	30	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
Katrahalli	31	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
Katrahalli	32	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
Katrahalli	33	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	34	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	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
Katrahalli	35	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
Katrahalli	36	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	37	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	38	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	41	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	42/1	S3rg	S3g	S3g	S3g	S3g	S3g	S3rg	S3g	S3g	S3g	S3g	S2g	S3g	S2g	S3g	S3g	S3g	S2g	S3g	S3g	S3g	S3g	S3g	S3g	S2g	S2g	S3g	S2g	S2g	S2g	S2g
Katrahalli	42/2	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	43/1	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	43/2	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
Katrahalli	44	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	45	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	46	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	47	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	49	S3t	S2t	S3t	S2g	S3t	S2g	S2rg	S2g	S2g	S2g	S2gt	S2gt	S3t	S2g	N1t	S2rt	S2g	S3t	S3t	S3t	S2tg	S2tg	S2tg	S2t	S3t	S2t	S2t	S3t	S2tg	S2gt	S3t
Katrahalli	51	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	52	S1	S2t	S1	S1	S1	S1	S1	S1	S2t	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S2t	S2t	S1	S1	S1	S2t
Katrahalli	53	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
Katrahalli	57	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
Katrahalli	60	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
Katrahalli	63	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	64	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
Katrahalli	65	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	66	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	S3t
Katrahalli	67	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
Katrahalli	68	S3t	S2t	S3t	S1	S3t	S1	S2r	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t	S2t	S2t	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
Katrahalli	156/2	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
Katrahalli	184	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
Katrahalli	185	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
Katrahalli	188	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
Katrahalli	189	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
Katrahalli	191	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
Katrahalli	192	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
Katrahalli	194	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
Katrahalli	195	S3rz	S2tz	S3tz	S2nz	S3tz	S2rz	S3rz	S2rz	S2rz	S2rz	S3rz	S2tz	S3tz	S2z	N1tz	S3rz	S2rz	S3tz	S3tz	S3tz	S2tz	S2tz	S2rt	S2tz	S3tz	S2tz	S2tz	S2z	S2rz	S2tz	S3tz
Katrahalli	211	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
Katrahalli	212	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Narasapura	4	N1rg	S3rg	N1rg	S3rg	N1rg	S3rt	N1rg	N1rg	S3rt	N1rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	N1rg	S3rg

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FEATURES OF THE SURVEY

- The results indicated that 38 farmers were sampled in Hire Shindhogi micro watershed among them 7 (18.42 %) were marginal farmers, 10 (26.32%) were small farmers, 11 (28.95 %) were semi medium farmers and 5 (13.16%) were medium farmers. Apart from these 5 (13.16%) landless farmers were also interviewed for the survey.
- The data indicated that there were 96 (51.06%) men and 92 (48.94%) were women among the sampled households. The average family size of marginal farmers was 5, small farmer was 5, semi medium farmer was 5, medium farmers were 6 and for landless farmers it was 4.
- The data indicated that 43 (22.87%) people were in 0-15 years of age, 73 (38.83%) were in 16-35 years of age, 55 (29.26 %) were in 36-60 years of age and 17 (9.04%) were above 61 years of age.
- The results indicated that the Hire Shindhogi had 31.38 per cent illiterates, 1.06 per cent functional literates, 33.51 per cent of them had primary school education, 5.32 per cent of them had middle school education, 13.30 per cent of them had high school education, 7.45 per cent of them had PUC education, 0.53 per cent of them had ITI, 1.60 per cent of them had degree education and 5.32 per cent of them had other education.
- The results indicate that, 84.21 per cent of households practicing agriculture, 5.26 per cent of the household heads were agricultural labourers and 2.63 per cent of the household heads were doing private service.
- The results indicate that agriculture was the major occupation for 45.21 per cent of the household members, 21.28 per cent were agricultural labourers, 0.53 percent were in government service, 2.13 per cent of them were in private sector, 22.34 per cent of them were students and 0.53 per cent were housewives. In case of landless households 30 per cent were agricultural labourers, 5 per cent were private services and 40 per cent were students. In case of marginal farmers 50 per cent were agriculturist, 21.88 percent were agricultural labour and 25 per cent were students. In case of small farmers, 54.35 per cent of the household members were practicing agriculture and 17.39 per cent of them were students. In case of semi medium farmers 45.61 per cent of the household members were practicing agriculture and 19.30 per cent of them were students. In case of medium farmers, 48.48 per cent of the household members were performing agriculture, 18.18 per cent of them were agricultural labour and 21.21 per cent of them were students.
- The results showed that 1.06 per cent of them participated in Sthree Shakthi Sangha, 0.53 per cent of them participated in user group and 98.40 per cent of them have not participated in any local institutions. Landless, small and medium farmers were found to have no participation in any local institutions. Marginal and semi medium farmers were found to participate in one or the other local institutions.

- The results indicated that 73.68 per cent of the households possess Katcha house, 7.89 per cent of them possess Pucca house and 21.05 per cent of them possess Semi Pacca house. 100 percent of the landless farmers possess Katcha house.
- The results showed that 5.26 per cent of the households possess radio, 76.32 per cent of the households possess TV, 7.89 per cent of the households possess DVD, 42.11 per cent of the households possess Mixer grinder, 44.74 per cent of the households possess bicycle, 26.32 per cent of the households possess motor cycle, 5.26 per cent of the households possess auto, 2.63 per cent of the households possess car and 78.95 per cent of the households possess mobile phones.
- The results showed that the average value of radio was Rs.400, average value of television was Rs.4968, the average value of DVD/VCD Player was Rs.2333, mixer grinder was Rs.2381, Auto was Rs.42500, bicycle Rs.1323, motor cycle was Rs.33150, Car was Rs. 250000 and mobile phone was Rs.1266.
- The results showed that about 23.68 per cent of the households possess plough, 28.95 per cent of them possess bullock cart, 2.63 cent of the households possess seed/fertilizer drill, 10.53 cent of the households possess tractor, 23.68 per cent of the households possess sprayer, 36.84 per cent of them possess weeder, 5.26 per cent of them were possess chaff cutter and 2.63 per cent of the households possess JCB/Hitachi.
- The results showed that the average value of plough was Rs.1655, the average value of bullock cart was Rs. 21072, the average value of seed/Fertilizer drill Rs. 15000, the average value of tractor Rs. 375000, the average value of sprayer was Rs.2655, the average value of weeder Rs. 69, the average value of chaff cutter Rs.1800, the average value of JCB Rs.1000000 and the average value of duster was Rs. 8000.
- The results indicated that, 31.58 per cent of the households possess bullocks, 26.32 per cent of the households possess local cow and 2.63 per cent of the households possess crossbred cow and buffalo respectively.
- The data showed that, in case of marginal farmers, 33.33 per cent of the households possess bullock and 50 per cent of the households possess local cow. In case of small farmers, 20 per cent of households possess bullock and local cow and 10 per cent possess buffalo. In case of semi medium farmers, 54.55 per cent of the households possess bullock, 18.18 per cent possess local cow and 9.09 per cent possess buffalo. In medium farmers, 20 per cent of the households possess bullock and 60 per cent possess local cow.
- The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.64, average hired labour (men) available was 5.03 and average hired labour (women) available was 5.36.
- The results indicated that, in case of marginal farmers, average own labour men available was 1.71, average own labour (women) was 1.29, average hired labour (men) was 4.57 and average hired labour (women) available was 5.43. In case of

small farmers, average own labour men available was 1.90, average own labour (women) was 1.80, average hired labour (men) was 4.50 and average hired labour (women) available was 4. In case of semi medium farmers, average own labour men available was 1.82, average own labour (women) was 1.55, average hired labour (men) was 6.27 and average hired labour (women) available was 7.09. In medium farmers average own labour men available was 3, average own labour (women) was 2, average hired labour (men) was 4 and average hired labour (women) available was 4.20.

- ❖ The results indicated that, 65.79 per cent of the household opined that hired labour was adequate and 21.05 per cent of the household opined that hired labour was inadequate. About 71.43 per cent of the marginal farmers, 80 per cent of small, 63.64 per cent of semi medium and 100 per cent of the medium have opined that the hired labour was adequate and 28.57 per cent marginal farmers, 20 per cent of small farmers and 36.36 per cent of semi medium farmers were opined that hired labour was inadequate.
- ❖ The results indicated that, 1 person was migrated from micro watershed that belonged to medium farmer category. Total migration in the micro watershed was only 0.53 per cent.
- ❖ The results indicated that, people have migrated on an average of 390 Kms and average duration was 12 months. I.e. medium farmers have migrated 390 kms and on an average for 12 months.
- ❖ The results indicated that, job/work was the only reason for migration for all the migrants.
- ❖ The results indicated that, improved quality of the life and construction of house were the positive consequences of migration.
- ❖ The results indicated that, households of the Hire Shindhogi micro watershed possess 36.16 ha (64.11%) of dry land and 20.24 ha (35.89%) of irrigated land. Marginal farmers possess 4.21 ha (90.43 %) of dry land and 0.45 ha (9.57%) of irrigated land. Small farmers possess 9.25 ha (84.04%) of dry land and 1.76 ha (15.96 %) of irrigated land. Semi medium farmers possess 15.01 ha (63.53%) of dry land and 8.62 ha (36.47 %) of irrigated land. Medium farmers possess 7.69 ha (44.93%) of dry land and 9.43 ha (55.07 %) of irrigated land.
- ❖ The results indicated that, the average value of dry land was Rs. 343378.10 and average value of irrigated was Rs. 409856.06. In case of marginal famers, the average land value was Rs. 510625 for dry land and 1122727.25 for irrigated land. In case of small famers, the average land value was Rs. 434,356.96 for dry land Rs. 512,211.99 for irrigated land. In case of semi medium famers, the average land value was Rs. 246,467.10for dry land and Rs. 406,059.19 for irrigated land. In case of medium famers, the average land value was Rs. 331500 for dry land and the average land value was Rs. 360,583.94 for irrigated land.

- The results indicated that, there were 11 functioning and 10 defunctioning bore wells in the micro watershed.
- The results indicated that, bore well was the major irrigation source for 28.95 per cent of the farmers.
- The results indicated that on an average the depth of the bore well was 31.25 meters.
- The results indicated that, in case of marginal farmers there was 0. 45 ha of irrigated land, in case of small farmers there was 1.85 ha of irrigated land, semi medium farmers were having 7.81 ha of irrigated land and medium farmers were having 15.62 ha of irrigated land. On an average there were 25.72 ha of irrigated land.
- The results indicated that, farmers have grown Bajra (6.89 ha), Banana (0.71 ha), Bengal gram (2.85 ha), Chilly (0.45 ha), Cotton (1.01 ha), Green gram (0.83 ha), Sorghum (1.62 ha), Maize (8.12 ha), Onion (0.93 ha), Red gram (4.45 ha), Sugandaraja (0.40 ha) and Sunflower (9.51 ha) in kharif season and Bajra (0.81 ha), Bengal gram (3.29 ha), Cotton (1.21 ha), Maize (5.09 ha), Sunflower (1.23 ha) and Sorghum (16.28 ha) in Rabi season.
- Data showed that, marginal farmers have grown Bengal Gram, chilly, bajra, cotton, Maize and Sorghum. Small farmers have grown Bajra, Green gram, Maize, Red Gram, Sunflower, Sorghum and Bengal Gram. Semi medium farmers have grown Bajra, Banana, Cotton, Bengalgram, Maize, Redgram, Sugandaraja, Sunflower and Sorghum. Medium farmers have grown Bajra, Bengal gram, Sorghum, Maize, onion, Red gram and Sunflower.
- The results indicated that, the cropping intensity in Hire Shindhogi micro watershed was found to be 76.82 per cent. In case of Marginal farmers it was 87.10 per cent, for small farmers it was 100 per cent, in case of semi medium farmers it was 78.94 per cent and medium farmers had cropping intensity of 61.78 per cent.
- The results indicated that, only 10.53 per cent of the households have bank account and savings respectively. Among marginal farmers 28.57 percent of them possess both bank account and savings respectively. Small farmers possess 9.09 per cent of both bank account and savings correspondingly and medium farmers possess 20 of bank account and savings in that order.
- The results indicated that 28.57 per cent marginal farmers, 9.09 per cent of semi medium farmers and 20 per cent of medium farmers have borrowed credit from different sources.
- The results indicated that, 50 per cent of the households have availed loan from Grameena bank and Commercial bank respectively.
- The results indicated that marginal farmers have availed Rs. 27500, semi medium farmers have availed Rs. 55000 and medium farmers have availed Rs.100000. Overall average credit amount availed by households in the micro watershed is 52500.

- The results indicated that, 100 per cent of the households have borrowed loan for agriculture production from institutional source.
- The results indicated that, agriculture production was the main purpose for which semi medium farmers have borrowed loan from private credit.
- The results indicated that 100 per cent of the households have unpaid their institutional loan.
- Results indicated 50 percent of the households have unpaid their loan and 50 percent of the households have fully paid their private credit.
- The results indicated that 25 per cent of the households were opined that they were forced to sell the produce at low price to repay loan in time and 75 per cent of households were not given any opinion on institutional source of credit.
- The results indicated that 50 per cent of the households were opined that the rate of interest was high in non-institutional credit and 50 per cent of households were not given any opinion on non-institutional source of credit.
- The results indicated that, the total cost of cultivation for bajra was Rs. 23881.74. The gross income realized by the farmers was Rs. 22503.93. The net income from bajra cultivation was Rs. -1377.81, thus the benefit cost ratio was found to be 1:0.94.
- The results indicated that, the total cost of cultivation for maize was Rs. 30364.35. The gross income realized by the farmers was Rs. 32931.72. The net income from maize cultivation was Rs.6626.43, thus the benefit cost ratio was found to be 1:1.08.
- The results indicated that, the total cost of cultivation for sorghum was Rs. 18449.10. The gross income realized by the farmers was Rs. 27728.81. The net income from sorghum cultivation was Rs. 9279.71. Thus the benefit cost ratio was found to be 1:1.5.
- The results indicated that, the total cost of cultivation for bengalgram was Rs. 29334.18. The gross income realized by the farmers was Rs. 48503.01. The net income from bengalgram cultivation was Rs. 19168.83. Thus the benefit cost ratio was found to be 1:1.65.
- The results indicated that, the total cost of cultivation for redgram was Rs. 32495.55. The gross income realized by the farmers was Rs. 30698.57. The net income from redgram cultivation was Rs. -1796.98. Thus the benefit cost ratio was found to be 1:0.94.
- The results indicated that, the total cost of cultivation for cotton was Rs. 63323.50. The gross income realized by the farmers was Rs. 50427.06. The net income from cotton cultivation was Rs. -12896.44. Thus the benefit cost ratio was found to be 1:0.8.

- The results indicated that, the total cost of cultivation for Onion was Rs. 34570.60. The gross income realized by the farmers was Rs. 34515.28. The net income from Onion cultivation was Rs. 55.32. Thus the benefit cost ratio was found to be 1:1.0.
- The results indicated that, the total cost of cultivation for Sunflower was Rs. 28043.53. The gross income realized by the farmers was Rs. 73693.85. The net income from Sunflower cultivation was Rs. 45650.32. Thus the benefit cost ratio was found to be 1:2.63.
- The results indicated that, the total cost of cultivation for Banana was Rs. 25564.87. The gross income realized by the farmers was Rs. 105858.The net income from Banana cultivation was Rs. 80293.13. Thus the benefit cost ratio was found to be 1:3.41.
- The results indicated that, the total cost of cultivation for Chilly was Rs. 69680.27. The gross income realized by the farmers was Rs. 75447.27. The net income from Chilly cultivation was Rs. 5767. Thus the benefit cost ratio was found to be 1:1.08.
- The results indicated that, the total cost of cultivation for Green gram was Rs. 26706.19. The gross income realized by the farmers was Rs. 72900.97. The net income from Green gram cultivation was Rs. 46194.78. Thus the benefit cost ratio was found to be 1:2.73.
- The results indicated that, 39.47 per cent of the households opined that dry fodder was adequate and 7.89 per cent of the households opined that dry fodder was inadequate also the data revealed that 39.47 per cent of the farmers opined that green fodder is adequate and 7.89 per cent of the farmers opined that green fodder is inadequate.
- The results indicated that the average income from service/salary was Rs. 8578.95, business Rs. 5157.89, wage Rs. 4368.42, agriculture Rs. 53161.32 and non farm income Rs. 6842.11and dairy farm Rs. 5018.42.
- The results indicated that the average expenditure from service/salary was Rs. 2289.47, business Rs. 2631.58, wage Rs. 1552.63, agriculture Rs. 31,815.79 and dairy farm Rs. 1921.05.
- The results indicated that, sampled households have grown 53 coconut trees, 20 lemon trees and 1 mango tree in their field and also grown 1 coconut tree in back yard.
- The results indicated that, 2.63 per cent of the households are interested in growing horticultural crops which include 14.29 per cent marginal farmers.
- The results indicated that, households have planted 90 Neem, 8 Banyan trees and 2 people trees in their field and also grown 27 Neem tree in the backyard.
- The results indicated that for 2.63 per cent of the households were dependent on government subsidy for irrigation facility and 5.26 percent of the households were have their own fund for additional investment.

- The results indicated that, Bajra, Chilly, Green gram Cotton and Onion were sold to the extent of 100 per cent. Banana, Bengal gram, Sorghum, Maize, Red gram and Sunflower were sold to the extent of 72 per cent, 96.30 per cent, 98.36 per cent, 85.30 per cent, 91.67 per cent and 95.19 per cent respectively.
- The results indicated that, 65.79 percent of the households have sold their produce to agents/ traders, 34.21 percent of the households sold their produce in local/village merchant, 31.58 percent of the households sold their produce to regulated market and 7.89 percent of the households sold their produce to cooperative marketing society and contract marketing arrangement respectively.
- The results indicated that 57.89 per cent of the households have used cart as a mode of transport, 71.05 per cent have used tractor and 2.63 per cent have used Bus and Truck respectively. 5.26 households have used head load as a mode of transport.
- The results indicated that, 5.26 per cent of the households have experienced the soil and water erosion problems i.e. 14.29 percent of marginal farmers and 9.09 percent of semi medium farmers.
- The results indicated that only 5.26 per cent of the households have showed interest in soil testing i.e. 14.29 per cent of marginal farmers and 9.09 per cent of semi medium farmers have showed interest in soil testing.
- The results indicated that, 5.26 per cent of the households have adopted field bunding which includes 14.29 per cent of marginal and 9.09 per cent of semi medium farmers. Farm pond was adopted by 2.63 per cent of the households i.e. 9.09 per cent of the semi medium farmers.
- The results indicated that, 100 per cent of the households who adopted farm pond opined that farm ponds are good, 50 per cent opined that field bunds are good and another 50 per cent of the households have opined that field bunds are slightly damaged.
- The results indicated that 5.26 per cent of soil conservation structure is constructed by farmers on their own and 2.63 per cent of the soil conservation structures are constructed by the farmer's organization.
- The results indicated that, 84.21 percent used fire wood, 10.53 percent of the households used LPG and 2.63 percent of the households used Biogas as a source of fuel.
- The results indicated that, piped supply was the major source for drinking water for 50 per cent, 31.58 per cent of households used bore well water and 15.79 per cent of households used bore well water.
- The results indicated that, electricity was the major source of light for 97.37 per cent of the households in micro watershed.
- The results indicated that, 34.21 per cent of the households possess sanitary toilet i.e. 60 per cent of landless, 14.29 per cent of marginal, 50 per cent of small, 18.18 per cent of semi medium and 40 per cent of medium had sanitary toilet facility.

- The results indicated that, 81.58 per cent of the sampled households possessed BPL card, 7.89 per cent of the sample households possess APL card and 7.89 per cent of the households have not possessed BPL card.
- The results indicated that, 34.21 per cent of the households participated in NREGA programme which included 100 per cent of the landless, 28.57 percent of the marginal, 30 per cent of the small, 9.09 per cent of the semi medium and 40 percent of the medium farmers.
- The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, Egg and meat were adequate for 89.47 percent, 39.47 percent, 18.42 percent, 47.37 percent, 42.11 percent, 55.26 percent, 31.58 percent, and 13.16 percent of the households respectively.
- The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 7.89 per cent, 57.89 per cent, 50 per cent, 28.95 per cent, 34.21 per cent, 28.95 per cent, 44.74 per cent and 52.63 per cent of the households respectively.
- The results indicated that, Lower fertility status of the soil was the constraint experienced by 15.79 per cent of the households, wild animal menace on farm field (39.47%), frequent incidence of pest and diseases (34.21%), inadequacy of irrigation water (18.42%), high cost of Fertilizers and plant protection chemicals (36.84%), high rate of interest on credit (47.37%), low price for the agricultural commodities (18.42%), lack of marketing facilities in the area (31.58%), inadequate extension services (5.26%), lack of transport for safe transport of the agricultural produce to the market (60.53%), less rainfall (89.47%) and Source of Agri-technology information(Newspaper/TV/Mobile) (57.89).

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

Description of the study area

Koppal district is an administrative district in the state of Karnataka in India. In the past Koppal was referred to as 'Kopana Nagara'. Koppal, now a district headquarters is ancient Kopana a major holy place of the Jainas. The district occupies an area of 7,190 km² and has a population of 1,196,089, which 16.58% were urban as of 2001.[2] The Koppal district was formed after split of Raichur district.

Geographers are very particular about the physiography or relief of a region. It plays a very important role in the spatial analysis of agricultural situation of the study area. The undulating topography with black cotton soil shrips, cut across by numerous nalas or streams is the major characteristic feature of the study region. Three physiographic divisions have made considering the local conditions of landforms and crops grown in the district. On the basis of physiography, Koppal district can be divided into three major divisions.3 They are (a) Koppal & Yelburga plateau, (b) Maidan division, (c) Tungabhadra valley. The district is part of Krishna basin the main streams draining the area are Maskinala, Ilkal-nadi and Hirenala. These are Ephemaral in nature, these come under Tungabhadra sub-basin. The drainage exhibit dentritic to subdentric with drainage density varies from 1.4 to7.0kms/sq.km.

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

Description of the micro watershed

Hire shindhogi micro-watershed (Hire shindhogi sub-watershed, Koppal Taluk and District) is located at North latitude 15^0 19’ 30.07” and 15^0 17’ 32.528” and East longitude 76^0 6’ 15.447” and 76^0 4’ 25.036” covering an area of 526.03 ha and spread across Chikkashindhogi, Narasapura, Katrahallai and Hireshindhogi 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 38 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 Hire Shindhogi micro watershed is presented in Table 1 and it indicated that 38 farmers were sampled in Hire Shindhogi micro watershed among them 7 (18.42 %) were marginal farmers, 10 (26.32%) were small farmers, 11 (28.95 %) were semi medium farmers and 5 (13.16%) were medium farmers. Apart from these 5 (13.16%) landless farmers were also interviewed for the survey.

Table 1: Households sampled for socio economic survey in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF(11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	13.16	7	18.42	10	26.32	11	28.95	5	13.16	38	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Hire Shindhogi micro watershed is presented in Table 2. The data indicated that there were 96 (51.06%) men and 92 (48.94%) were women among the sampled households. The average family size of marginal farmers was 5, small farmer was 5, semi medium farmer was 5 and medium farmers were 6 and for landless farmers it was 4.

Table 2: Population characteristics of Hire Shindhogi micro-watershed

Sl. No.	Particulars	LL (20)		MF (32)		SF (46)		SMF (57)		MDF (33)		All (188)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Male	8	40	19	59.38	21	45.65	30	52.63	18	54.55	96	51.06
2	Female	12	60	13	40.63	25	54.35	27	47.37	15	45.45	92	48.94
Total		20	100	32	100	46	100	57	100	33	100	188	100
Average size		4		5		5		5		6		5	

Age wise classification of population: The age wise classification of household members in Hire Shindhogi micro watershed is presented in Table 3. The data indicated that 43 (22.87%) people were in 0-15 years of age, 73 (38.83%) were in 16-35 years of age, 55 (29.26 %) were in 36-60 years of age and 17 (9.04%) were above 61 years of age.

Table 3: Age wise classification of household members in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (20)		MF (26)		SF (46)		SMF (57)		MDF (33)		All (188)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years	7	35	7	21.88	9	19.57	15	26.32	5	15.15	43	22.87
2	16-35 years	5	25	11	34.38	21	45.65	21	36.84	15	45.45	73	38.83
3	36-60 years	6	30	12	37.50	11	23.91	16	28.07	10	30.30	55	29.26
4	> 61 years	2	10	2	6.25	5	10.87	5	8.77	3	9.09	17	9.04
Total		20	100	32	100	46	100	57	100	33	100	188	100

Education level of household members: Education level of household members in Hire Shindhogi micro watershed is presented in Table 4. The results indicated that the Hire Shindhogi had 31.38 per cent illiterates, 1.06 per cent functional literates, 33.51 per cent

of them had primary school education, 5.32 per cent of them had middle school education, 13.30 per cent of them had high school education, 7.45 per cent of them had PUC education, 0.53 per cent of them had ITI, 1.60 per cent of them had degree education and 5.32 per cent of them had other education.

Table 4: Education level of household members in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (20)		MF (26)		SF (46)		SMF (57)		MDF (33)		All (188)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	5	25	13	40.63	17	36.96	17	29.82	7	21.21	59	31.38
2	Functional Literate	0	0	0	0	1	2.17	1	1.75	0	0	2	1.06
3	Primary School	8	40	8	25	17	36.96	22	38.60	8	24.24	63	33.51
4	Middle School	0	0	1	3.13	1	2.17	5	8.77	3	9.09	10	5.32
5	High School	2	10	6	18.75	7	15.22	5	8.77	5	15.15	25	13.30
6	PUC	1	5.00	3	9.38	0	0	1	1.75	9	27.27	14	7.45
7	ITI	0	0	1	3.13	0	0	0	0	0	0	1	0.53
8	Degree	1	5	0	0	1	2.17	1	1.75	0	0	3	1.60
9	Masters	1	5	0	0	0	0.00	0	0.00	0	0	1	0.53
10	Others	2	10	0	0	2	4.35	5	8.77	1	3.03	10	5.32
Total		20	100	32	100	46	100	57	100	33	100	188	100

Occupation of household heads: The data regarding the occupation of the household heads in Hire Shindhogi micro watershed is presented in Table 5. The results indicated that, 84.21 per cent of households practicing agriculture, 5.26 per cent of the household heads were agricultural labourers and 2.63 per cent of the household heads were doing private service.

Table 5: Occupation of household heads in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	20	6	85.71	9	90.	11	100	5	100	32	84.21
2	Agricultural Labour	2	40	0	0	0	0	0	0	0	0	2	5.26
3	Private Service	1	20	0	0	0	0	0	0	0	0	1	2.63
4	Others	1	20	1	14.29	1	10	0	0	0	0	2	5.26
Total		5	100	7	100	10	100	11	100	5	100	37	100

Occupation of the household members: The data regarding the occupation of the household members in Hire Shindhogi micro watershed is presented in Table 6. The results indicated that agriculture was the major occupation for 45.21 per cent of the household members, 21.28 per cent were agricultural labourers, 0.53 percent were in government service, 2.13 per cent of them were in private sector, 22.34 per cent of them were students and 0.53 per cent were housewives. In case of landless households 30 per cent were agricultural labourers, 5 per cent were private services and 40 per cent were students. In case of marginal farmers 50 per cent were agriculturist, 21.88 percent were agricultural labour and 25 per cent were students. In case of small farmers, 54.35 per cent of the household members were practicing agriculture and 17.39 per cent of them were students. In case of semi medium farmers 45.61 per cent of the household members were practicing agriculture and 19.30 per cent of them were students. In case of medium

farmers, 48.48 per cent of the household members were performing agriculture, 18.18 per cent of them were agricultural labour and 21.21 per cent of them were students.

Table 6: Occupation of family members in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (20)		MF (32)		SF (46)		SMF (57)		MDF (33)		All (188)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	2	10	16	50	25	54.35	26	45.61	16	48.48	85	45.21
2	Agricultural Labour	6	30	7	21.88	7	15.22	14	24.56	6	18.18	40	21.28
3	Government Service	0	0	0	0	0	0	0	0	1	3.03	1	0.53
4	Private Service	1	5	0	0	1	2.17	0	0	2	6.06	4	2.13
5	Retired	0	0	1	3.13	0	0	0	0	0	0.00	1	0.53
6	Student	8	40	8	25	8	17.39	11	19.30	7	21.21	42	22.34
7	Others	2	10	0	0	2	4.35	1	1.75	0	0	5	2.66
8	Housewife	0	0	0	0	1	2.17	0	0	0	0	1	0.53
9	Children	1	5	0	0	2	4.35	5	8.77	1	3.03	9	4.79
Total		20	100	32	100	46	100	57	100	33	100	188	100

Institutional participation of the household members: The data regarding the institutional participation of the household members in Hire Shindhogi micro watershed is presented in Table 7. The results showed that 1.06 per cent of them participated in Sthree Shakthi Sangha, 0.53 per cent of them participated in user group and 98.40 per cent of them have not participated in any local institutions. Landless, small and medium farmers were found to have no participation in any local institutions. Marginal and semi medium farmers were found to participate in one or the other local institutions.

Table 7: Institutional Participation of household members in Hire Shindhogi micro watershed

S. N.	Particulars	LL (20)		MF (32)		SF (46)		SMF (57)		MDF (33)		All (188)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sthree Shakthi Sangha	0	0	1	3.13	0	0	1	1.75	0	0	2	1.06
2	User Group	0	0	0	0	0	0	1	1.75	0	0	1	0.53
3	No Participation	20	100	31	96.88	46	100	55	96.49	33	100	185	98.40
Total		20	100	32	100	46	100	57	100.	33	100	188	100

Type of house owned: The data regarding the type of house owned by the households in Hire Shindhogi micro watershed is presented in Table 8. The results indicated that 73.68 per cent of the households possess Katcha house, 7.89 per cent of them possess Pucca house and 21.05 per cent of them possess Semi Pacca house. 100 percent of the landless possess Katcha house.

Table 8: Type of house owned by households in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Katcha	5	100	5	71.43	7	70	8	72.73	3	60	28	73.68
2	Pucca/RCC	0	0	1	14.29	1	10	0	0	1	20	3	7.89
3	Semi pacca	0	0	1	14.29	3	30	3	27.27	1	20	8	21.05
Total		5	100	7	100	11	100	11	100	5	100	39	100

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Hire Shindhogi micro watershed is presented in Table 9. The results showed that 5.26 per cent of the households possess radio, 76.32 per cent of the households possess TV, 7.89 per cent of the households possess DVD, 42.11 per cent of the households possess Mixer grinder, 44.74 per cent of the households possess bicycle, 26.32 per cent of the households possess motor cycle, 5.26 per cent of the households possess auto, 2.63 per cent of the households possess car and 78.95 per cent of the households possess mobile phones.

Table 9: Durable Assets owned by households in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (11)		MDF (5)		LF (1)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Radio	0	0	0	0	1	10	0	0	1	20	0	0	2	5.26
2	Television	3	60	4	57.14	7	70	10	90.91	5	100	0	0	29	76.32
3	DVD/VCD Playe	0	0	0	0	0	0	0	0	3	60	0	0	3	7.89
4	Mixer/Grinder	2	40	2	28.57	6	60	4	36.36	2	40	0	0	16	42.11
5	Bicycle	3	60	3	42.86	5	50	4	36.36	2	40	1	100	17	44.74
6	Motor Cycle	0	0	2	28.57	0	0	5	45.45	3	60	0	0	10	26.32
7	Auto	0	0	0	0	2	20	0	0	0	0	0	0	2	5.26
8	Car/Four Wheeler	0	0	0	0	0	0	0	0	1	20	0	0	1	2.63
9	Mobile Phone	3	60	6	85.71	9	90	9	81.82	3	60	1	100	30	78.95
10	Blank	1	20	2	28.57	1	10	1	9.09	0	0	0	0	5	13.16

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Hire Shindhogi micro watershed is presented in Table 10. The results showed that the average value of radio was Rs.400, average value of television was Rs.4968, the average value of DVD/VCD Player was Rs.2333, mixer grinder was Rs.2381, Auto was Rs.42500, bicycle Rs.1323, motor cycle was Rs.33150, Car was Rs. 250000 and mobile phone was Rs.1266.

Table 10: Average value of durable assets owned by households in Hire Shindhogi micro watershed

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
1	Radio	0	0	300	0	500	400
2	Television	3666	4500	5585	4700	5800	4968
3	DVD/VCD Player	0	0	0	0	2333	2333
4	Mixer/Grinder	2000	1800	2750	2250	2500	2381
5	Bicycle	866	1062	1600	1425	1500	1323
6	Motor Cycle	0	33500	0	35200	29500	33150
7	Auto	0	0	42500	0	0	42500
8	Car/Four Wheeler	0	0	0	0	250000	250000
9	Mobile Phone	1250	1822	947	1863	772	1266

Farm Implements owned: The data regarding the farm implements owned by the households in Hire Shindhogi micro watershed is presented in Table 11. About 23.68 per cent of the households possess plough, 28.95 per cent of them possess bullock cart, 2.63 cent of the households possess seed/fertilizer drill, 10.53 cent of the households possess

tractor, 23.68 per cent of the households possess sprayer, 36.84 per cent of them possess weeder, 5.26 per cent of them were possess chaff cutter and 2.63 per cent of the households possess JCB/Hitachi.

Table 11: Farm Implements owned by households in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	1	14.29	1	10	5	45.45	4	80	11	28.95
2	Plough	3	42.86	1	10	4	36.36	1	20	9	23.68
3	Seed/Fertilizer Drill	0	0	0	0	1	9.09	0	0	1	2.63
4	Tractor	1	14.29	0	0	0	0	3	60	4	10.53
5	Sprayer	2	28.57	0	0	6	54.55	1	20	9	23.68
6	Weeder	4	57.14	6	60	3	27.27	1	20	14	36.84
7	Chaff Cutter	0	0	0	0	2	18.18	0	0	2	5.26
8	JCB/Hitachi	0	0	0	0	0	0.00	1	20	1	2.63
9	Blank	2	28.57	3	30	3	27.27	1	20	14	36.84
10	Duster	1	14.29	0	0	0	0	1	20	2	5.26

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Hire Shindhogi micro watershed is presented in Table 12. The results showed that the average value of plough was Rs.1655, the average value of bullock cart was Rs. 21072, the average value of seed/Fertilizer drill Rs. 15000, the average value of tractor Rs. 375000, the average value of sprayer was Rs.2655, the average value of weeder Rs. 69, the average value of chaff cutter Rs.1800, the average value of JCB Rs.1000000 and the average value of duster was Rs. 8000.

Table 12: Average value of farm implements owned by households in Hire Shindhogi micro watershed (Avg value in Rs)

Sl.No.	Particulars	MF (7)	SF (10)	SMF(11)	MDF(5)	LF (1)	All (38)
1	Bullock Cart	25000	25000	16360	25000	-	21072
2	Plough	2000	200	1800	1500	2500	1655
3	Seed/Fertilizer Drill	-	-	15000	-	-	15000
4	Tractor	250000	-	-	416666	-	375000
5	Sprayer	3550	-	2466	2000	-	2,655
6	Weeder	54	83	51	100	15	69
7	Chaff Cutter	-	-	1,800	-	-	1800
8	JCB/Hitachi	-	-	-	1000000	-	1000000
10	Earth remover/Duster	14000	-	-	2000	-	8000

Livestock possession by the households: The data regarding the Livestock possession by the households in Hire Shindhogi micro watershed is presented in Table 13. The results indicated that, 31.58 per cent of the households possess bullocks, 26.32 per cent of the households possess local cow and 2.63 per cent of the households possess crossbred cow and buffalo respectively.

In case of marginal farmers, 33.33 per cent of the households possess bullock and 50 per cent of the households possess local cow. In case of small farmers, 20 per cent of households possess bullock and local cow and 10 per cent possess buffalo. In case of semi medium farmers, 54.55 per cent of the households possess bullock, 18.18 per cent possess local cow and 9.09 per cent possess buffalo. In medium farmers, 20 per cent of the households possess bullock and 60 per cent possess local cow.

Table 13: Livestock possession by households in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF(10)		SMF (11)		MDF(5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Bullock	3	42.86	2	20	6	54.55	1	20	12	31.58
2	Local cow	3	42.86	2	20	2	18.18	3	60	10	26.32
3	Crossbred cow	0	0	1	10	0	0	0	0	1	2.63
4	Buffalo	0	0	0	0	1	9.09	0	0	1	2.63
5	blank	3	42.86	5	50	5	45.45	2	40	20	52.63

Average Labour availability: The data regarding the average labour availability in Hire Shindhogi micro watershed is presented in Table 14. The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.64, average hired labour (men) available was 5.03 and average hired labour (women) available was 5.36.

Table 14: Average Labour availability in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		N	N	N	N	N
1	Own labour Male	1.71	1.90	1.82	3.00	2.00
2	Own Labour Female	1.29	1.80	1.55	2.00	1.64
3	Hired labour Male	4.57	4.50	6.27	4.00	5.03
4	Hired labour Female	5.43	4.00	7.09	4.20	5.36

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Hire Shindhogi micro watershed is presented in Table 15. The results indicated that, 65.79 per cent of the household opined that hired labour was adequate and 21.05 per cent of the household opined that hired labour was inadequate. About 71.43 per cent of the marginal farmers, 80 per cent of small, 63.64 per cent of semi medium and 100 per cent of the medium have opined that the hired labour was adequate and 28.57 per cent marginal farmers, 20 per cent of small farmers and 36.36 per cent of semi medium farmers were opined that hired labour was inadequate.

Table 15: Adequacy of Hired Labour in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF(5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate	5	71.43	8	80	7	63.64	5	100	25	65.79
2	Inadequate	2	28.57	2	20	4	36.36	0	0	8	21.05

Migration among the households: The data regarding the migration among the households in Hire Shindhogi micro watershed is presented in Table 16. The results

indicated that, 1 person was migrated from micro watershed that belonged to medium farmer category. Total migration in the micro watershed was only 0.53 per cent.

Table 16: Migration among the households in Hire Shindhogi micro watershed

Sl.No.	Particulars	MDF (33)		All (188)	
		N	%	N	%
1	Migration	1	3.03	1	0.53

Average distance and duration of migration: The data regarding the average distance and duration of migration in Hire Shindhogi micro watershed is presented in Table 17. The results indicated that, people have migrated on an average of 390 Kms and average duration was 12 months. I.e. medium farmers have migrated 390 kms and on an average for 12 months.

Table 17: Average distance and duration of migration in Hire Shindhogi micro watershed

Sl.No.	Particulars	MDF (1)	All (1)
		N	N
1	Avg. Distance (kms)	390.00	390.00
2	Avg. Duration (months)	12.00	12.00

Purpose of migration: The data regarding the average distance and duration of migration in Hire Shindhogi micro watershed is presented in Table 18. The results indicated that, job/work was the only reason for migration for all the migrants.

Table 18: Purpose of migration by household members in Hire Shindhogi micro watershed

Sl.No.	Particulars	MDF (1)		All (1)	
		N	%	N	%
1	Job/wage/work	1	100.00	1	100.00
Total		1	100.00	1	100.00

Positive consequences of migration: The data regarding the positive consequences of migration in Hire Shindhogi micro watershed is presented in Table 19. The results indicated that, improved quality of the life and construction of house were the positive consequences of migration.

Table 19: Positive consequences of migration by household members in Hire Shindhogi micro watershed

Sl. No.	Particulars	MDF (1)		All (1)	
		N	%	N	%
1	Construction of house	2	100	2	100
2	Improved quality of life	1	100	1	100

Distribution of land (ha): The data regarding the distribution of land (ha) in Hire Shindhogi micro watershed is presented in Table 20. The results indicated that, households of the Hire Shindhogi micro watershed possess 36.16 ha (64.11%) of dry land and 20.24 ha (35.89%) of irrigated land. Marginal farmers possess 4.21 ha (90.43 %) of dry land and 0.45 ha (9.57%) of irrigated land. Small farmers possess 9.25 ha (84.04%) of

dry land and 1.76 ha (15.96 %) of irrigated land. Semi medium farmers possess 15.01 ha (63.53%) of dry land and 8.62 ha (36.47 %) of irrigated land. Medium farmers possess 7.69 ha (44.93%) of dry land and 9.43 ha (55.07 %) of irrigated land.

Table 20: Distribution of land (Ha) in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	4.21	90.43	9.25	84.04	15.01	63.53	7.69	44.93	36.16	64.11
2	Irrigated	0.45	9.57	1.76	15.96	8.62	36.47	9.43	55.07	20.24	35.89
Total		4.65	100	11.01	100	23.62	100	17.11	100	56.40	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Hire Shindhogi micro watershed is presented in Table 21. The results indicated that, the average value of dry land was Rs. 343378.10 and average value of irrigated was Rs. 409856.06. In case of marginal famers, the average land value was Rs. 510625 for dry land and 1122727.25 for irrigated land. In case of small famers, the average land value was Rs. 434,356.96 for dry land Rs. 512,211.99 for irrigated land. In case of semi medium famers, the average land value was Rs. 246,467.10for dry land and Rs. 406,059.19 for irrigated land. In case of medium famers, the average land value was Rs. 331500 for dry land and the average land value was Rs. 360,583.94 for irrigated land.

Table 21: Average land value (Rs. /ha) in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		N	N	N	N	N
1	Dry	510,625.00	434,356.96	246,467.10	331,500.00	343,378.10
2	Irrigated	1,122,727.25	512,211.99	406,059.19	360,583.94	409,856.06

Status of bore wells: The data regarding the status of bore wells in Hire Shindhogi micro watershed is presented in Table 22. The results indicated that, there were 11 functioning and 10 defunctioning bore wells in the micro watershed.

Table 22: Status of bore wells in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		N	N	N	N	N
1	De-functioning	2	0	6	2	10
2	Functioning	1	1	6	3	11

Source of irrigation: The data regarding the source of irrigation in Hire Shindhogi micro watershed is presented in Table 23. The results indicated that, bore well was the major irrigation source for 28.95 per cent of the farmers.

Table 23: Source of irrigation in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Bore Well	1	14.29	1	10	6	54.55	3	60	11	28.95

Depth of water: The data regarding the depth of water in Hire Shindhogi micro watershed is presented in Table 24.The results indicated that on an average the depth of the bore well was 31.25 meters.

Table 24: Depth of water in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		N	N	N	N	N
1	Bore Well	28.30	10.67	52.31	61.45	31.25

Irrigated Area (ha): The data regarding the irrigated area (ha) in Hire Shindhogi micro watershed is presented in Table 25. The results indicated that, in case of marginal farmers there was 0. 45 ha of irrigated land, in case of small farmers there was 1.85 ha of irrigated land, semi medium farmers were having 7.81 ha of irrigated land and medium farmers were having 15.62 ha of irrigated land. On an average there were 25.72 ha of irrigated land.

Table 25: Irrigated Area (ha) in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		Area (ha)	Area (ha)	Area (ha)	Area (ha)	Area (ha)
1	Kharif	0.45	0.92	7.40	8.62	17.39
2	Rabi	0.00	0.92	0.40	7.00	8.33
Total		0.45	1.85	7.81	15.62	25.72

Table 26: Cropping pattern in Hire Shindhogi micro watershed Area (ha)

Sl.No.	Particulars	MF (7)	SF (10)	SMF(11)	MDF (5)	All (38)
1	Kharif - Bajra	0.00	0.81	5.28	0.81	6.89
2	Kharif - Banana	0.00	0.00	0.71	0.00	0.71
3	Kharif - Bengal gram	0.40	0.00	1.23	1.21	2.85
4	Kharif - Chilly	0.45	0.00	0.00	0.00	0.45
5	Kharif - Cotton	1.01	0.00	0.00	0.00	1.01
6	Kharif - Greengram	0.00	0.83	0.00	0.00	0.83
7	Kharif - Sorghum	0.81	0.00	0.00	0.81	1.62
8	Kharif - Maize	1.01	2.55	1.32	3.24	8.12
9	Kharif - Onion	0.00	0.00	0.00	0.93	0.93
10	Kharif - Red gram	0.00	0.40	2.83	1.21	4.45
11	Kharif - Sugandaraja	0.00	0.00	0.40	0.00	0.40
12	Kharif - Sunflower	0.00	0.92	3.73	4.86	9.51
13	Rabi - Bajra	0.81	0.00	0.00	0.00	0.81
14	Rabi - Bengal gram	0.00	3.29	0.00	0.00	3.29
15	Rabi - Cotton	0.00	0.00	1.21	0.00	1.21
16	Rabi - Sorghum	0.97	3.96	8.92	2.43	16.28
17	Rabi - Maize	0.00	0.00	2.54	2.55	5.09
18	Rabi - Sunflower	0.00	0.00	1.23	0.00	1.23
Total		5.47	12.77	29.41	18.05	65.68

Cropping pattern: The data regarding the cropping pattern in Hire Shindhogi micro watershed is presented in Table 26. The results indicated that, farmers have grown Bajra (6.89 ha), Banana (0.71 ha), Bengal gram (2.85 ha), Chilly (0.45 ha), Cotton (1.01 ha), Green gram (0.83 ha), Sorghum (1.62 ha), Maize (8.12 ha), Onion (0.93 ha), Red gram (4.45 ha), Sugandaraja (0.40 ha) and Sunflower (9.51 ha) in kharif season and Bajra (0.81 ha), Bengal gram (3.29 ha), Cotton (1.21 ha), Maize (5.09 ha), Sunflower (1.23 ha) and Sorghum (16.28 ha) in Rabi season. Marginal farmers have grown Bengal Gram,

chilly, bajra, cotton, Maize and Sorghum. Small farmers have grown Bajra, Green gram, Maize, Red Gram, Sunflower, Sorghum and Bengal Gram. Semi medium farmers have grown Bajra, Banana, Cotton, Bengalgram, Maize, Redgram, Sugandaraja, Sunflower and Sorghum. Medium farmers have grown Bajra, Bengal gram, Sorghum, Maize, Onion, Red gram and Sunflower.

Cropping intensity: The data regarding the cropping intensity in Hire Shindhogi micro watershed is presented in Table 27. The results indicated that, the cropping intensity in Hire Shindhogi micro watershed was found to be 76.82 per cent. In case of Marginal farmers it was 87.10 per cent, for small farmers it was 100 per cent, in case of semi medium farmers it was 78.94 per cent and medium farmers had cropping intensity of 61.78 per cent.

Table 27: Cropping intensity (%) in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)	SF (10)	SMF(11)	MDF (5)	All (38)
1	Cropping Intensity	87.10	100.00	78.94	61.78	76.82

Possession of Bank account: The data regarding the possession of Bank account and savings in Hire Shindhogi micro watershed is presented in Table 28. The results indicated that, only 10.53 per cent of the households have bank account and savings respectively. Among marginal farmers 28.57 percent of them possess both bank account and savings respectively. Small farmers possess 9.09 per cent of both bank account and savings correspondingly and medium farmers possess 20 of bank account and savings in that order.

Table 28: Possession of Bank account and savings in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%
1	Account	2	28.57	1	9.09	1	20.00	4	10.53
2	Savings	2	28.57	1	9.09	1	20.00	4	10.53

Borrowing status: The data regarding the possession of borrowing status in Hire Shindhogi micro watershed is presented in Table 29. The results indicated that 28.57 per cent marginal farmers, 9.09 per cent of semi medium farmers and 20 per cent of medium farmers have borrowed credit from different sources.

Table 29: Borrowing status in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%
1	Credit Availed	2	28.57	1	9.09	1	20.00	4	10.53

Source of credit: The data regarding the source of credit availed by households in Hire Shindhogi micro watershed is presented in Table 30. The results indicated that, 50 per cent of the households have availed loan from Grameena bank and Commercial bank respectively.

Table 30: Source of credit availed by households in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (2)		SMF (1)		MDF (1)		All (4)	
		N	%	N	%	N	%	N	%
1	Commercial Bank	1	50	1	100	0	0	2	50
2	Grameena Bank	1	50	0	0	1	100	2	50

Average credit amount: The data regarding the average credit amount availed by households in Hire Shindhogi micro watershed is presented in Table 31. The results indicated that marginal farmers have availed Rs. 27500, semi medium farmers have availed Rs. 55000 and medium farmers have availed Rs.100000. Overall average credit amount availed by households in the micro watershed is 52500.

Table 31: Average Credit amount availed by households in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (2)	SMF (1)	MDF (1)	All (4)
		N	N	N	N
1	Average Credit	27,500	55,000	100,000	52,500

Purpose of credit borrowed (institutional Source): The data regarding the purpose of credit borrowed from institutional sources by households in Hire Shindhogi micro watershed is presented in Table 32. The results indicated that, 100 per cent of the households have borrowed loan for agriculture production.

Table 32: Purpose of credit borrowed (institutional Source) by households in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (2)		SMF (1)		MDF (1)		All (4)	
		N	%	N	%	N	%	N	%
1	Agriculture production	2	100	1	100	1	100	4	100

Purpose of credit borrowed (Private Credit): The data regarding the purpose of credit borrowed from private sources by households in Hire Shindhogi micro watershed is presented in Table 33. The results indicated that, agriculture production was the main purpose for which semi medium farmers have borrowed loan.

Table 33: Purpose of credit borrowed (Private Credit) by households in Hire Shindhogi micro watershed

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

Table 34: Repayment status of households (Institutional) in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (2)		SMF (1)		MDF (1)		All (4)	
		N	%	N	%	N	%	N	%
1	Un paid	2	100.00	1	100.00	1	100.00	4	100.00

Repayment status of households (Institutional): The data regarding the repayment status of credit borrowed from institutional sources by households in Hire Shindhogi

micro watershed is presented in Table 34. The results indicated that 100 per cent of the households have unpaid their institutional loan.

Repayment status of households (Private): The data regarding the repayment status of credit borrowed from private sources by households in Hire Shindhogi micro watershed is presented in Table 35. Results indicated 50 percent of the households have unpaid their loan and 50 percent of the households have fully paid their private credit.

Table 35: Repayment status of households (Private) in Hire Shindhogi micro watershed

Sl.No.	Particulars	SMF (2)		All (2)	
		N	%	N	%
1	Un paid	1	50.00	1	50.00
2	Fully paid	1	50.00	1	50.00

Opinion on institutional sources of credit: The data regarding opinion on institutional sources of credit by households in Hire Shindhogi micro watershed is presented in Table 36. The results indicated that 25 per cent of the households were opined that they were forced to sell the produce at low price to repay loan in time and 75 per cent of households were not given any opinion on institutional source of credit.

Table 36: Opinion on institutional sources of credit in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (2)		SMF (1)		MDF (1)		All (4)	
		N	%	N	%	N	%	N	%
1	None	1	50	1	100	1	100	3	75
2	Forced to sell the produce at low price to repay loan in time	1	50	0	0	0	0	1	25

Opinion on non-institutional sources of credit: The data regarding opinion on non-institutional sources of credit by households in Hire Shindhogi micro watershed is presented in Table 37. The results indicated that 50 per cent of the households were opined that the rate of interest was high in non-institutional credit and 50 per cent of households were not given any opinion on non-institutional source of credit.

Table 37: Opinion on non-institutional sources of credit in Hire Shindhogi micro watershed

Sl.No.	Particulars	SMF (2)		All (2)	
		N	%	N	%
1	Higher rate of interest	1	50.00	1	50.00
2	None	1	50.00	1	50.00

Cost of Cultivation of Bajra: The data regarding the cost of cultivation of groundnut in Hire Shindhogi micro watershed is presented in Table 38. The results indicated that, the total cost of cultivation for bajra was Rs. 23881.74. The gross income realized by the farmers was Rs. 22503.93. The net income from bajra cultivation was Rs. -1377.81, thus the benefit cost ratio was found to be 1:0.94.

Table 38: Cost of Cultivation of Bajra in Hire Shindhogi micro watershed

Sl. No	Particulars		Units	Phy Units	Value (Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	23.66	4582.68	19.19
2	Bullock		Pairs/day	1.27	729.18	3.05
3	Tractor		Hours	3.37	3308.58	13.85
4	Machinery		Hours	0.25	247.00	1.03
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	12.94	1479.55	6.20
6	FYM		Quintal	15.75	2470.00	10.34
7	Fertilizer + micronutrients		Quintal	3.37	3753.50	15.72
8	Pesticides (PPC)		Kgs / ltrs	0.82	759.55	3.18
9	Irrigation		Number	5.13	0.00	0.00
10	Depreciation charges			0.00	204.75	0.86
11	Land revenue and Taxes			0.00	3.62	0.02
II	**Cost B1**					
12	Interest on working capital				1016.11	4.25
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				18554.53	77.69
III	**Cost B2**					
14	Rental Value of Land				393.33	1.65
15	**Cost B2 = (Cost B1 + Rental value)**				18947.86	79.34
IV	**Cost C1**					
16	Family Human Labour			13.93	2757.81	11.55
17	**Cost C1 = (Cost B2 + Family Labour)**				21705.67	90.89
V	**Cost C2**					
18	Risk Premium				5.00	0.02
19	**Cost C2 = (Cost C1 + Risk Premium)**				21710.67	90.91
VI	**Cost C3**					
20	Managerial Cost				2171.07	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				23881.74	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		16.99	21916.07	
		b) Main Crop Sales Price (Rs.)			1290.00	
	By Product	e) Main Product (q)		2.10	587.86	
		f) Main Crop Sales Price (Rs.)			280.00	
b.	Gross Income (Rs.)				22503.93	
c.	Net Income (Rs.)				-1377.81	
d.	Cost per Quintal (Rs./q.)				1405.70	
e.	Benefit Cost Ratio (BC Ratio)				1:0.94	

Cost of Cultivation of Maize: The data regarding the cost of cultivation of maize in Hire Shindhogi micro watershed is presented in Table 39. The results indicated that, the total cost of cultivation for maize was Rs. 30364.35. The gross income realized by the farmers was Rs. 32931.72. The net income from maize cultivation was Rs. 2567.36, thus the benefit cost ratio was found to be 1:1.08.

Table 39: Cost of Cultivation of Maize in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value (Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	34.97	6326.92	20.84
2	Bullock		Pairs/day	4.36	2473.01	8.14
3	Tractor		Hours	1.20	857.74	2.82
4	Machinery		Hours	0.39	343.06	1.13
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	13.93	2449.01	8.07
6	FYM		Quintal	21.32	2576.30	8.48
7	Fertilizer + micronutrients		Quintal	3.58	3376.66	11.12
8	Pesticides (PPC)		Kgs / ltrs	1.52	1356.65	4.47
9	Irrigation		Number	3.51	0.00	0.00
10	Depreciation charges			0.00	2344.77	7.72
11	Land revenue and Taxes			0.00	3.74	0.01
II	**Cost B1**					
12	Interest on working capital				1171.15	3.86
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				23279.00	76.67
III	**Cost B2**					
14	Rental Value of Land				346.15	1.14
15	**Cost B2 = (Cost B1 + Rental value)**				23625.16	77.81
IV	**Cost C1**					
16	Family Human Labour			19.31	3977.80	13.10
17	**Cost C1 = (Cost B2 + Family Labour)**				27602.96	90.91
V	**Cost C2**					
18	Risk Premium				1.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				27603.96	90.91
VI	**Cost C3**					
20	Managerial Cost				2760.40	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				30364.35	100.0
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		20.84	27251.15	
		b) Main Crop Sales Price (Rs.)			1307.69	
	By Product	e) Main Product (q)		18.98	5680.57	
		f) Main Crop Sales Price (Rs.)			299.23	
b.	Gross Income (Rs.)				32931.72	
c.	Net Income (Rs.)				2567.36	
d.	Cost per Quintal (Rs./q.)				1457.08	
e.	Benefit Cost Ratio (BC Ratio)				1:1.08	

Cost of cultivation of Sorghum: The data regarding the cost of cultivation of sorghum in Hire Shindhogi micro watershed is presented in Table 40. The results indicated that, the total cost of cultivation for sorghum was Rs. 18449.10. The gross income realized by the farmers was Rs. 27728.81. The net income from sorghum cultivation was Rs. 9279.71. Thus the benefit cost ratio was found to be 1:1.5.

Table 40: Cost of Cultivation of Sorghum in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	27.24	4173.65	22.62
2	Bullock		Pairs/day	0.58	345.80	1.87
3	Tractor		Hours	2.04	1351.26	7.32
4	Machinery		Hours	0.10	69.16	0.37
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	7.21	847.78	4.60
6	FYM		Quintal	7.82	1663.13	9.01
7	Fertilizer + micronutrients		Quintal	2.46	2151.35	11.66
8	Pesticides (PPC)		Kgs / ltrs	0.72	632.96	3.43
9	Irrigation		Number	3.94	0.00	0.00
10	Depreciation charges			0.00	2129.65	11.54
11	Land revenue and Taxes			0.00	3.54	0.02
II	**Cost B1**					
12	Interest on working capital				635.52	3.44
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				14003.80	75.91
III	**Cost B2**					
14	Rental Value of Land				341.67	1.85
15	**Cost B2 = (Cost B1 + Rental value)**				14345.47	77.76
IV	**Cost C1**					
16	Family Human Labour			13.45	2425.64	13.15
17	**Cost C1 = (Cost B2 + Family Labour)**				16771.11	90.90
V	**Cost C2**					
18	Risk Premium				0.80	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				16771.91	90.91
VI	**Cost C3**					
20	Managerial Cost				1677.19	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				18449.10	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		13.63	25070.15	
		b) Main Crop Sales Price (Rs.)			1840.00	
	By Product	e) Main Product (q)		11.87	2658.66	
		f) Main Crop Sales Price (Rs.)			224.00	
b.	Gross Income (Rs.)				27728.81	
c.	Net Income (Rs.)				9279.71	
d.	Cost per Quintal (Rs./q.)				1354.05	
e.	Benefit Cost Ratio (BC Ratio)				1:1.5	

Cost of cultivation of Bengalgram: The data regarding the cost of cultivation of bengalgram in Hire Shindhogi micro watershed is presented in Table 41. The results indicated that, the total cost of cultivation for bengalgram was Rs. 29334.18. The gross income realized by the farmers was Rs. 48503.01. The net income from bengalgram cultivation was Rs. 19168.83. Thus the benefit cost ratio was found to be 1:1.65.

Table 41: Cost of Cultivation of Bengalgram in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	33.16	5929.12	20.21
2	Bullock		Pairs/day	1.48	802.29	2.74
3	Tractor		Hours	1.36	969.54	3.31
4	Machinery		Hours	0.13	94.17	0.32
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	43.03	4540.55	15.48
6	FYM		Quintal	20.34	4068.24	13.87
7	Fertilizer + micronutrients		Quintal	3.66	3761.18	12.82
8	Pesticides (PPC)		Kgs / ltrs	0.91	828.99	2.83
9	Irrigation		Number	4.88	0.00	0.00
10	Depreciation charges			0.00	226.81	0.77
11	Land revenue and Taxes			0.00	2.61	0.01
II	**Cost B1**					
12	Interest on working capital				1584.31	5.40
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				22807.82	77.75
III	**Cost B2**					
14	Rental Value of Land				272.22	0.93
15	**Cost B2 = (Cost B1 + Rental value)**				23080.04	78.68
IV	**Cost C1**					
16	Family Human Labour			16.89	3583.73	12.22
17	**Cost C1 = (Cost B2 + Family Labour)**				26663.77	90.90
V	**Cost C2**					
18	Risk Premium				3.67	0.01
19	**Cost C2 = (Cost C1 + Risk Premium)**				26667.43	90.91
VI	**Cost C3**					
20	Managerial Cost				2666.74	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				29334.18	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		13.05	48503.01	
		b) Main Crop Sales Price (Rs.)			3716.67	
b.	Gross Income (Rs.)				48503.01	
c.	Net Income (Rs.)				19168.83	
d.	Cost per Quintal (Rs./q.)				2247.81	
e.	Benefit Cost Ratio (BC Ratio)				1:1.65	

Cost of cultivation of Redgram: The data regarding the cost of cultivation of redgram in Hire Shindhogi micro watershed is presented in Table 42. The results indicated that, the total cost of cultivation for redgram was Rs. 32495.55. The gross income realized by the farmers was Rs. 30698.57. The net income from redgram cultivation was Rs. -1796.98. Thus the benefit cost ratio was found to be 1:0.94.

Table 42: Cost of Cultivation of Redgram in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	41.36	9070.19	27.91
2	Bullock		Pairs/day	2.04	1605.50	4.94
3	Tractor		Hours	0.59	617.50	1.90
4	Machinery		Hours	0.82	741.00	2.28
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	25.52	2840.50	8.74
6	FYM		Quintal	0.35	1235.00	3.80
7	Fertilizer + micronutrients		Quintal	8.12	6907.18	21.26
8	Pesticides (PPC)		Kgs / ltrs	0.35	352.86	1.09
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	734.10	2.26
11	Land revenue and Taxes			0.00	5.76	0.02
II	**Cost B1**					
12	Interest on working capital				1360.30	4.19
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				25469.90	78.38
III	**Cost B2**					
14	Rental Value of Land				244.44	0.75
15	**Cost B2 = (Cost B1 + Rental value)**				25714.34	79.13
IV	**Cost C1**					
16	Family Human Labour			14.51	3826.74	11.78
17	**Cost C1 = (Cost B2 + Family Labour)**				29541.08	90.91
V	**Cost C2**					
18	**Cost C2 = (Cost C1 + Risk Premium)**				29541.41	90.91
VI	**Cost C3**					
19	Managerial Cost				2954.14	9.09
20	**Cost C3 = (Cost C2 + Managerial Cost)**				32495.55	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		8.47	30698.57	
		b) Main Crop Sales Price (Rs.)			3625.00	
b.	Gross Income (Rs.)				30698.57	
c.	Net Income (Rs.)				-1796.98	
d.	Cost per Quintal (Rs./q.)				3837.19	
e.	Benefit Cost Ratio (BC Ratio)				1:0.94	

Cost of cultivation of Cotton: The data regarding the cost of cultivation of cotton in Hire Shindhogi micro watershed is presented in Table 43. The results indicated that, the total cost of cultivation for cotton was Rs. 63323.50. The gross income realized by the farmers was Rs. 50427.06. The net income from cotton cultivation was Rs. -12896.44. Thus the benefit cost ratio was found to be 1:0.8.

Table 43: Cost of Cultivation of Cotton in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value (Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	71.18	10001.18	15.79
2	Bullock		Pairs/day	0.82	617.50	0.98
3	Tractor		Hours	5.14	4359.44	6.88
4	Machinery		Hours	3.32	1995.00	3.15
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	9.32	7155.61	11.30
6	FYM		Quintal	1.98	7916.67	12.50
7	Fertilizer + micronutrients		Quintal	13.66	12133.72	19.16
8	Pesticides (PPC)		Kgs/liters	1.73	1936.94	3.06
9	Irrigation		Number	7.41	0.00	0.00
10	Depreciation charges			0.00	122.68	0.19
11	Land revenue and Taxes			0.00	4.94	0.01
II	**Cost B1**					
12	Interest on working capital				3497.71	5.52
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				49741.39	78.55
III	**Cost B2**					
14	Rental Value of Land				355.56	0.56
15	**Cost B2 = (Cost B1 + Rental value)**				50096.94	79.11
IV	**Cost C1**					
16	Family Human Labour			33.86	7465.21	11.79
17	**Cost C1 = (Cost B2 + Family Labour)**				57562.15	90.90
V	**Cost C2**					
18	Risk Premium				4.67	0.01
19	**Cost C2 = (Cost C1 + Risk Premium)**				57566.82	90.91
VI	**Cost C3**					
20	Managerial Cost				5756.68	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				63323.50	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.98	50427.06	
		b) Main Crop Sales Price (Rs.)			3366.67	
b.	Gross Income (Rs.)				50427.06	
c.	Net Income (Rs.)				-12896.44	
d.	Cost per Quintal (Rs./q.)				4227.67	
e.	Benefit Cost Ratio (BC Ratio)				1:0.8	

Cost of cultivation of Onion: The data regarding the cost of cultivation of Onion in Hire Shindhogi micro watershed is presented in Table 44. The results indicated that, the total cost of cultivation for Onion was Rs. 34570.60. The gross income realized by the farmers was Rs. 34515.28. The net income from Onion cultivation was Rs. 55.32. Thus the benefit cost ratio was found to be 1:1.0.

Table 44: Cost of Cultivation of Onion in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	80.90	8143.45	23.56
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	3.24	2265.07	6.55
4	Machinery		Hours	3.24	2265.07	6.55
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	5.39	647.16	1.87
6	FYM		Quintal	10.79	2157.21	6.24
7	Fertilizer + micronutrients		Quintal	4.31	4120.26	11.92
8	Pesticides (PPC)		Kgs / ltrs	1.08	862.88	2.50
9	Irrigation		Number	6.47	0.00	0.00
10	Depreciation charges			0.00	5487.93	15.87
11	Land revenue and Taxes			0.00	3.29	0.01
II	**Cost B1**					
12	Interest on working capital				934.62	2.70
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				26886.94	77.77
III	**Cost B2**					
14	Rental Value of Land				333.33	0.96
15	**Cost B2 = (Cost B1 + Rental value)**				27220.27	78.74
IV	**Cost C1**					
16	Family Human Labour			31.28	4206.55	12.17
17	**Cost C1 = (Cost B2 + Family Labour)**				31426.82	90.91
V	**Cost C2**					
18	Risk Premium				1.00	0.00
19	**Cost C2 = (Cost C1 + Risk Premium)**				31427.82	90.91
VI	**Cost C3**					
20	Managerial Cost				3142.78	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				34570.60	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		43.14	34515.28	
		b) Main Crop Sales Price (Rs.)			800.00	
b.	Gross Income (Rs.)				34515.28	
c.	Net Income (Rs.)				-55.32	
d.	Cost per Quintal (Rs./q.)				801.28	
e.	Benefit Cost Ratio (BC Ratio)				1:1.0	

Cost of cultivation of Sunflower: The data regarding the cost of cultivation of Sunflower in Hire Shindhogi micro watershed is presented in Table 45. The results indicated that, the total cost of cultivation for Sunflower was Rs. 28043.53. The gross income realized by the farmers was Rs. 73693.85. The net income from Sunflower cultivation was Rs. 45650.32. Thus the benefit cost ratio was found to be 1:2.63.

Table 45: Cost of Cultivation of Sunflower in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	33.56	5532.67	19.73
2	Bullock		Pairs/day	1.68	912.58	3.25
3	Tractor		Hours	2.06	1553.18	5.54
4	Machinery		Hours	0.15	154.38	0.55
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	5.55	3747.52	13.36
6	FYM		Quintal	21.66	3569.89	12.73
7	Fertilizer + micronutrients		Quintal	3.56	3524.31	12.57
8	Pesticides (PPC)		Kgs / ltrs	1.10	1132.58	4.04
9	Irrigation		Number	4.21	0.00	0.00
10	Depreciation charges			0.00	1152.36	4.11
11	Land revenue and Taxes			0.00	6.07	0.02
II	**Cost B1**					
12	Interest on working capital				1437.43	5.13
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				22722.97	81.03
III	**Cost B2**					
14	Rental Value of Land				454.17	1.62
15	**Cost B2 = (Cost B1 + Rental value)**				23177.13	82.65
IV	**Cost C1**					
16	Family Human Labour			12.24	2312.73	8.25
17	**Cost C1 = (Cost B2 + Family Labour)**				25489.87	90.89
V	**Cost C2**					
18	Risk Premium				4.25	0.02
19	**Cost C2 = (Cost C1 + Risk Premium)**				25494.12	90.91
VI	**Cost C3**					
20	Managerial Cost				2549.41	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				28043.53	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		9.73	73693.85	
		b) Main Crop Sales Price (Rs.)			7575.00	
b.	Gross Income (Rs.)				73693.85	
c.	Net Income (Rs.)				45650.32	
d.	Cost per Quintal (Rs./q.)				2882.60	
e.	Benefit Cost Ratio (BC Ratio)				1:2.63	

Cost of cultivation of Banana: The data regarding the cost of cultivation of Banana in Hire Shindhogi micro watershed is presented in Table 46. The results indicated that, the total cost of cultivation for Banana was Rs. 25564.87. The gross income realized by the farmers was Rs. 105858.The net income from Banana cultivation was Rs. 80293.13. Thus the benefit cost ratio was found to be 1:3.41.

Table 46: Cost of Cultivation of Banana in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	33.87	6492.57	25.40
2	Bullock		Pairs/day	0.00	0.00	0.00
3	Tractor		Hours	2.82	1693.71	6.63
4	Machinery		Hours	2.82	2822.86	11.04
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	211.71	1058.57	4.14
6	FYM		Quintal	28.23	2822.86	11.04
7	Fertilizer + micronutrients		Quintal	2.82	2258.29	8.83
8	Pesticides (PPC)		Kgs / ltrs	1.41	1129.14	4.42
9	Irrigation		Number	1.41	0.00	0.00
10	Depreciation charges			0.00	0.03	0.00
11	Land revenue and Taxes			0.00	4.12	0.02
II	**Cost B1**					
12	Interest on working capital				872.26	3.41
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				19154.41	74.92
III	**Cost B2**					
14	Rental Value of Land				416.67	1.63
15	**Cost B2 = (Cost B1 + Rental value)**				19571.07	76.55
IV	**Cost C1**					
16	Family Human Labour			16.94	3669.71	14.35
17	**Cost C1 = (Cost B2 + Family Labour)**				23240.79	90.91
V	**Cost C2**					
18	**Cost C2 = (Cost C1 + Risk Premium)**				23240.79	90.91
VI	**Cost C3**					
19	Managerial Cost				2324.08	9.09
20	**Cost C3 = (Cost C2 + Managerial Cost)**				25564.87	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		352.86	1058571.43	
		b) Main Crop Sales Price (Rs.)			300.00	
b.	Gross Income (Rs.)				105858	
c.	Net Income (Rs.)				80293.13	
d.	Cost per Quintal (Rs./q.)				720.45	
e.	Benefit Cost Ratio (BC Ratio)				1:3.14	

Cost of cultivation of Chilly: The data regarding the cost of cultivation of Chilly in Hire Shindhogi micro watershed is presented in Table 47. The results indicated that, the total cost of cultivation for Chilly was Rs. 69680.27. The gross income realized by the farmers was Rs. 75447.27. The net income from Chilly cultivation was Rs. 5767. Thus the benefit cost ratio was found to be 1:1.08.

Table 47: Cost of Cultivation of Chilly in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	51.65	11002.73	15.79
2	Bullock		Pairs/day	4.49	2470.00	3.54
3	Tractor		Hours	2.25	1684.09	2.42
4	Machinery		Hours	2.25	1347.27	1.93
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	2.25	898.18	1.29
6	FYM		Quintal	22.45	4490.91	6.45
7	Fertilizer + micronutrients		Quintal	4.49	6287.27	9.02
8	Pesticides (PPC)		Kgs / ltrs	2.25	2245.45	3.22
9	Irrigation		Number	13.47	0.00	0.00
10	Depreciation charges			0.00	12042.82	17.28
II	**Cost B1**					
11	Interest on working capital				1671.82	2.40
12	**Cost B1 = (Cost A1 + sum of 15 and 16)**				44140.55	63.35
III	**Cost B2**					
13	Rental Value of Land				333.33	0.48
14	**Cost B2 = (Cost B1 + Rental value)**				44473.88	63.83
IV	**Cost C1**					
15	Family Human Labour			65.12	18861.82	27.07
16	**Cost C1 = (Cost B2 + Family Labour)**				63335.70	90.89
V	**Cost C2**					
17	Risk Premium				10.00	0.01
18	**Cost C2 = (Cost C1 + Risk Premium)**				63345.70	90.91
VI	**Cost C3**					
19	Managerial Cost				6334.57	9.09
20	**Cost C3 = (Cost C2 + Managerial Cost)**				69680.27	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		15.72	75447.27	
		b) Main Crop Sales Price (Rs.)			4800.00	
b.	Gross Income (Rs.)				75447.27	
c.	Net Income (Rs.)				5767.00	
d.	Cost per Quintal (Rs./q.)				4433.10	
e.	Benefit Cost Ratio (BC Ratio)				1:1.08	

Cost of cultivation of Green gram: The data regarding the cost of cultivation of Green gram in Hire Shindhogi micro watershed is presented in Table 48. The results indicated that, the total cost of cultivation for Green gram was Rs. 26706.19. The gross income realized by the farmers was Rs. 72900.97. The net income from Green gram cultivation was Rs. 46194.78. Thus the benefit cost ratio was found to be 1:2.73.

Table 48: Cost of Cultivation of Green gram in Hire Shindhogi micro watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	31.17	5035.92	18.86
2	Bullock		Pairs/day	4.80	2637.86	9.88
3	Tractor		Hours	0.00	0.00	0.00
4	Machinery		Hours	0.00	0.00	0.00
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	7.19	647.48	2.42
6	FYM		Quintal	11.99	2398.06	8.98
7	Fertilizer + micronutrients		Quintal	2.40	4796.12	17.96
8	Pesticides (PPC)		Kgs / ltrs	1.20	1199.03	4.49
9	Irrigation		Number	0.00	0.00	0.00
10	Depreciation charges			0.00	6.23	0.02
11	Land revenue and Taxes			0.00	0.00	0.00
II	**Cost B1**					
12	Interest on working capital				1086.08	4.07
13	**Cost B1 = (Cost A1 + sum of 15 and 16)**				17806.78	66.68
III	**Cost B2**					
14	Rental Value of Land				166.67	0.62
15	**Cost B2 = (Cost B1 + Rental value)**				17973.45	67.30
IV	**Cost C1**					
16	Family Human Labour			27.58	6294.90	23.57
17	**Cost C1 = (Cost B2 + Family Labour)**				24268.35	90.87
V	**Cost C2**					
18	Risk Premium				10.00	0.04
19	**Cost C2 = (Cost C1 + Risk Premium)**				24278.35	90.91
VI	**Cost C3**					
20	Managerial Cost				2427.84	9.09
21	**Cost C3 = (Cost C2 + Managerial Cost)**				26706.19	100.00
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		19.18	72900.97	
		b) Main Crop Sales Price (Rs.)			3800.00	
b.	Gross Income (Rs.)				72900.97	
c.	Net Income (Rs.)				46194.78	
d.	Cost per Quintal (Rs./q.)				1392.07	
e.	Benefit Cost Ratio (BC Ratio)				1:2.73	

Adequacy of fodder: The data regarding the adequacy of fodder in Hire Shindhogi micro watershed is presented in Table 49. The results indicated that, 39.47 per cent of the households opined that dry fodder was adequate and 7.89 per cent of the households opined that dry fodder was inadequate also the data revealed that 39.47 per cent of the farmers opined that green fodder is adequate and 7.89 per cent of the farmers opined that green fodder is inadequate.

Table 49: Adequacy of fodder in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	2	28.57	4	40	7	63.64	2	40	15	39.47
2	Inadequate-Dry Fodder	2	28.57	1	10	0	0	0	0	3	7.89
3	Adequate-Green Fodder	2	28.57	5	50	6	54.55	2	40	15	39.47
4	Inadequate-Green Fodder	2	28.57	0	0	1	9.09	0	0	3	7.89

Average Annual gross income of households: The results of the overall average annual gross income of the household in Hire Shindhogi were presented in Table 50. The results indicated that the average income from service/salary was Rs. 8578.95, business Rs. 5157.89, wage Rs. 4368.42, agriculture Rs. 53161.32 and non farm income Rs. 6842.11and dairy farm Rs. 5018.42.

Table 50: Average Annual gross income of households in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL(5)	MF (7)	SF (10)	SMF (11)	MDF (5)	All (38)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Service/salary	0	0	3600	10000	36000	8578.95
2	Business	0	5000	10100	5454.55	0	5157.89
3	Wage	3000	8571.43	1200	7181.82	0	4368.42
4	Agriculture	0	32504.29	56010	77954.55	75000	53161.32
5	Non Farm income	0	28571.43	6000	0.00	0	6842.11
6	Dairy Farm	0	1234.29	0	12832.73	8180	5018.42
Income(Rs.)		3,000	75881.43	76910	113423.64	119180	83127.11

Table 51: Average Annual expenditure of households in Hire Shindhogi micro watershed

Sl.No.	Particulars	LL (5)	MF (7)	SF(10)	SMF (11)	MDF(5)	All (38)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Service/salary	0	0	15000	6000	60000	2289.47
2	Business	0	20000	22500	35000	0	2631.58
3	Wage	10000	13333.33	2000	1400	0	1552.63
4	Agriculture	0	18714.29	29000	47090.91	67500	31,815.79
5	Dairy Farm	0	3000	0	15666.67	11500	1921.05
Total		10000	55047.62	68500	105157.58	139000	377705.19
Average		2000	7863.95	6850	9559.78	27800	9939.61

Average Annual expenditure of households: The results of the overall average annual expenditure of the household in Hire Shindhogi were presented in Table 51. The results

indicated that the average expenditure from service/salary was Rs. 2289.47, business Rs. 2631.58, wage Rs. 1552.63, agriculture Rs. 31,815.79 and dairy farm Rs. 1921.05.

Horticulture species grown: The data regarding horticulture species grown in Hire Shindhogi micro watershed is presented in Table 52. The results indicated that, sampled households have grown 53 coconut trees, 20 lemon trees and 1 mango tree in their field and also grown 1 coconut tree in back yard.

Table 52: Horticulture species grown in Hire Shindhogi micro watershed

Sl.No.	Particulars	SF (10)		SMF (11)		MDF (5)		All (38)	
		F	B	F	B	F	B	F	B
1	Coconut	1	0	30	0	22	1	53	1
2	Lemon	0	0	20	0	0	0	20	0
3	Mango	1	0	0	0	0	0	1	0

Interest towards cultivation of horticulture crops: The data regarding horticulture species grown in Hire Shindhogi micro watershed is presented in Table 53. The results indicated that, 2.63 per cent of the households are interested in growing horticultural crops which include 14.29 per cent marginal farmers.

Table 53: Interest towards cultivation of horticulture crops in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		All (38)	
		N	%	N	%
1	Interested towards cultivation of horticulture crops	1	14.29	1	2.63

Forest species grown: The data regarding horticulture species grown in Hire Shindhogi micro watershed is presented in Table 54. The results indicated that, households have planted 90 Neem, 8 Banyan trees and 2 people trees in their field and also grown 27 Neem tree in the backyard.

Table 54: Forest species grown in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		F	B	F	B	F	B	F	B	F	B
1	Neem	5	1	5	0	71	26	9	0	90	27
2	Banyan	1	0	1	0	6	0	0	0	8	0
3	People Tree	1	0	0	0	1	0	0	0	2	0

Table 55: Source of funds for additional investment capacity in Hire Shindhogi micro watershed

Sl.No	Item	Land development		Irrigation facility	
		N	%	N	%
1	Government subsidy	0	0.0	1	2.63
2	Own funds	2	5.26	0	0.0

Source of funds for additional investment: The data regarding source of funds for additional investment in Hire Shindhogi micro watershed is presented in Table 55. The results indicated that for 2.63 per cent of the households were dependent on government

subsidy for irrigation facility and 5.26 percent of the households were have their own fund for additional investment.

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Hire Shindhogi micro watershed is presented in Table 56. The results indicated that, Bajra, Chilly, Green gram Cotton and Onion were sold to the extent of 100 per cent. Banana, Bengal gram, Sorghum, Maize, Red gram and Sunflower were sold to the extent of 72 per cent, 96.30 per cent, 98.36 per cent, 85.30 per cent, 91.67 per cent and 95.19 per cent respectively.

Table 56: Marketing of the agricultural produce in Hire Shindhogi micro watershed

Sl. No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	100	100	100	100	1075
2	Banana	250	70	180	72	3000
3	Bengal Gram	81	3	78	96.30	3716.67
4	Chilly	7	0	7	100	4800
5	Cotton	25	0	25	100	3366.67
6	Green Gram	16	0	16	100	3800
7	Sorghum	244	40	204	98.36	1773.33
8	Maize	279	41	238	85.3	1545.45
9	Onion	40	0	40	100	800
10	Red Gram	24	2	22	91.67	3625
11	Sunflower	104	5	99	95.19	7575

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Hire Shindhogi micro watershed is presented in Table 57. The results indicated that, 65.79 percent of the households have sold their produce to agents/ traders, 34.21 percent of the households sold their produce in local/village merchant, 31.58 percent of the households sold their produce to regulated market and 7.89 percent of the households sold their produce to cooperative marketing society and contract marketing arrangement respectively.

Table 57: Marketing Channels used for sale of agricultural produce in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Agent/Traders	5	71.43	9	90	7	63.64	4	80	25	65.79
2	Local/village Merchant	2	28.57	2	20	4	36.36	5	100	13	34.21
3	Regulated Market	2	28.57	2	20	6	54.55	2	40	12	31.58
4	Cooperative marketing Society	0	0	0	0	3	27.27	0	0	3	7.89

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Hire Shindhogi micro watershed is presented in Table 58. The results indicated that 57.89 per cent of the households have used cart as a mode of

transport, 71.05 per cent have used tractor and 2.63 per cent have used Bus and Truck respectively. 5.26 households have used head load as a mode of transport.

Table 58: Mode of transport of agricultural produce in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Head Load	2	28.57	0	0.00	0	0.00	0	0.00	2	5.26
2	Cart	5	71.43	9	90.00	4	36.36	4	80.00	22	57.89
3	Tractor	1	14.29	4	40.00	15	136.36	7	140.00	27	71.05
4	Bus	0	0.00	0	0.00	1	9.09	0	0.00	1	2.63
5	Truck	1	14.29	0	0.00	0	0.00	0	0.00	1	2.63

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Hire Shindhogi micro watershed is presented in Table 59. The results indicated that, 5.26 per cent of the households have experienced the soil and water erosion problems i.e. 14.29 percent of marginal farmers and 9.09 percent of semi medium farmers.

Table 59: Incidence of soil and water erosion problems in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		All (38)	
		N	%	N	%	N	%
1	Soil and water erosion problems in the farm	1	14.29	1	9.09	2	5.26

Interest towards soil testing: The data regarding interest showed towards soil testing in Hire Shindhogi micro watershed is presented in Table 60. The results indicated that only 5.26 per cent of the households have showed interest in soil testing i.e. 14.29 per cent of marginal farmers and 9.09 per cent of semi medium farmers have showed interest in soil testing.

Table 60: Interest showed towards soil testing in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		All (38)	
		N	%	N	%	N	%
1	Interest in soil test	1	14.29	1	9.09	2	5.26

Soil and water conservation practices and structures adopted: The data regarding soil and water conservation practices and structures adopted in Hire Shindhogi micro watershed is presented in Table 61. The results indicated that, 5.26 per cent of the households have adopted field bunding which includes 14.29 per cent of marginal and 9.09 per cent of semi medium farmers. Farm pond was adopted by 2.63 per cent of the households i.e. 9.09 per cent of the semi medium farmers.

Table 61: Soil and water conservation practices and structures adopted in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		All (38)	
		N	%	N	%	N	%
1	Field Bunding	1	14.29	1	9.09	2	5.26
2	Farm Pond	0	0.00	1	9.09	1	2.63

Status of soil and water conservation structures adopted: The data regarding status of soil and water conservation structures adopted in Hire Shindhogi micro watershed is presented in Table 62. The results indicated that, 100 per cent of the households who adopted farm pond opined that farm ponds are good, 50 per cent opined that field bunds are good and another 50 per cent of the households have opined that field bunds are slightly damaged.

Table 62: Status of soil and water conservation structures adopted in Hire Shindhogi micro watershed

Sl.No	Item	Good		Slightly Damaged	
		N	%	N	%
1	Farm Pond	1	100.0	0	0.0
2	Field Bunding	1	50.0	1	50.0

Agencies involved in soil conservation structures: The data regarding agencies involved in soil conservation structures in Hire Shindhogi micro watershed is presented in Table 63. The results indicated that 5.26 per cent of soil conservation structure is constructed by farmers on their own and 2.63 per cent of the soil conservation structures are constructed by the farmer's organization.

Table 63: Agencies involved in soil conservation structures in Hire Shindhogi micro watershed

Sl.No.	Particulars	MF (7)		SMF (11)		All (38)	
		N	%	N	%	N	%
1	Own	1	14.29	1	9.09	2	5.26
2	Farmer organization	0	0.00	1	9.09	1	2.63

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Hire Shindhogi micro watershed is presented in Table 64. The results indicated that, 84.21 percent used fire wood, 10.53 percent of the households used LPG and 2.63 percent of the households used Biogas as a source of fuel.

Table 64: Usage pattern of fuel for domestic use in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	5	71.43	10	100	11	100	1	20	32	84.21
2	Biogas	0	0	1	14.29	0	0	0	0	0	0	1	2.63
3	LPG	0	0	1	14.29	0	0	0	0	3	60	4	10.53

Table 65: Source of drinking water in Hire Shindhogi micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	0	0	4	57.14	7	70	5	45.45	3	60	19	50
2	Bore Well	4	80	2	28.57	1	10	4	36.36	1	20	12	31.58
3	Open well	1	20	1	14.29	2	20	2	18.18	0	0	6	15.79

Source of drinking water: The data regarding source of drinking water in Hire Shindhogi micro watershed is presented in Table 65. The results indicated that, piped

supply was the major source for drinking water for 50 per cent, 31.58 per cent of households used bore well water and 15.79 per cent of households used open well water.

Source of light: The data regarding source of light in Hire Shindhogi micro watershed is presented in Table 66. The results indicated that, electricity was the major source of light for 97.37 per cent of the households in micro watershed.

Table 66: Source of light in Hire Shindhogi micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	7	100	10	100	11	100	4	80	37	97.37

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facilit**y** in Hire Shindhogi micro watershed is presented in Table 67. The results indicated that, 34.21 per cent of the households possess sanitary toilet i.e. 60 per cent of landless, 14.29 per cent of marginal, 50 per cent of small, 18.18 per cent of semi medium and 40 per cent of medium had sanitary toilet facility.

Table 67: Existence of Sanitary toilet facility in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF(11)		MDF(5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	3	60	1	14.29	5	50	2	18.18	2	40	13	34.21

Possession of PDS card: The data regarding possession of PDS card in Hire Shindhogi micro watershed is presented in Table 68. The results indicated that, 81.58 per cent of the sampled households possessed BPL card, 7.89 per cent of the sample households possess APL card and 7.89 per cent of the households have not possessed BPL card.

Table 68: Possession of PDS card in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	APL	0	0	0	0	0	0	2	18.18	1	20	3	7.89
2	BPL	3	60	6	85.71	10	100	9	81.82	3	60	31	81.58
3	Not Possessed	2	40	1	14.29	0	0	0	0	0	0	3	7.89

Participation in NREGA programme: The data regarding participation in NREGA programme in Hire Shindhogi micro watershed is presented in Table 69. The results indicated that, 34.21 per cent of the households participated in NREGA programme which included 100 per cent of the landless, 28.57 percent of the marginal, 30 per cent of the small, 9.09 per cent of the semi medium and 40 percent of the medium farmers.

Table 69: Participation in NREGA programme in Hire Shindhogi micro watershed

Sl. No.	Particulars	LL(5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	5	100	2	28.57	3	30	1	9.09	2	40	13	34.21

Adequacy of food items: The data regarding adequacy of food items in Hire Shindhogi micro watershed is presented in Table 70. The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, Egg and meat were adequate for 89.47 percent, 39.47 percent, 18.42 percent, 47.37 percent, 42.11 percent, 55.26 percent, 31.58 percent, and 13.16 percent of the households respectively.

Table 70: Adequacy of food items in Hire Shindhogi micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	2	40	7	100	10	100	11	100	4	80	34	89.47
2	Pulses	2	40	5	71.43	2	20	3	27.27	3	60	15	39.47
3	Oilseed	0	0	4	57.14	2	20	0	0.00	1	20	7	18.42
4	Vegetables	0	0	3	42.86	7	70	5	45.45	3	60	18	47.37
5	Fruits	0	0	3	42.86	6	60	4	36.36	3	60	16	42.11
6	Milk	0	0	7	100	6	60	6	54.55	2	40	21	55.26
7	Egg	0	0	2	28.57	6	60	3	27.27	1	20	12	31.58
8	Meat	0	0	1	14.29	2	20	2	18.18	0	0	5	13.16

Response on Inadequacy of food items: The data regarding inadequacy of food items in Hire Shindhogi micro watershed is presented in Table 71. The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 7.89 per cent, 57.89 per cent, 50 per cent, 28.95 per cent, 34.21 per cent, 28.95 per cent, 44.74 per cent and 52.63 per cent of the households respectively.

Table 71: Response on Inadequacy of food items in Hire Shindhogi micro watershed

Sl.No.	Particulars	LL (5)		MF (7)		SF (10)		SMF(11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	3	60	0	0	0	0	0	0	0	0	3	7.89
2	Pulses	3	60	2	28.57	9	90	7	63.64	1	20	22	57.89
3	Oilseed	2	40	2	28.57	6	60	6	54.55	3	60	19	50.00
4	Vegetables	2	40	3	42.86	2	20	3	27.27	1	20	11	28.95
5	Fruits	3	60	3	42.86	2	20	4	36.36	1	20	13	34.21
6	Milk	3	60	0	0.00	3	30	4	36.36	1	20	11	28.95
7	Egg	2	40	3	42.86	2	20	7	63.64	3	60	17	44.74
8	Meat	2	40	3	42.86	7	70	4	36.36	4	80	20	52.63

Farming constraints: The data regarding farming constraints experienced by households in Hire Shindhogi micro watershed is presented in Table 72. The results indicated that, Lower fertility status of the soil was the constraint experienced by 15.79 per cent of the households, wild animal menace on farm field (39.47%), frequent incidence of pest and diseases (34.21%), inadequacy of irrigation water (18.42%), high cost of Fertilizers and plant protection chemicals (36.84%), high rate of interest on credit (47.37%), low price for the agricultural commodities (18.42%), lack of marketing facilities in the area (31.58%), inadequate extension services (5.26%), lack of transport for safe transport of the agricultural produce to the market (60.53%), less rainfall (89.47%) and Source of Agri-technology information(Newspaper/TV/Mobile) (57.89).

Table 72: Farming constraints Experienced in Hire Shindhogi micro watershed

Sl. No.	Particulars	MF (7)		SF (10)		SMF (11)		MDF (5)		All (38)	
		N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	2	28.57	1	10	2	18.18	0	0	6	15.79
2	Wild animal menace on farm field	2	28.57	5	50	4	36.36	3	60	15	39.47
3	Frequent incidence of pest and diseases	3	42.86	2	20	6	54.55	1	20	13	34.21
4	Inadequacy of irrigation water	1	14.29	0	0	4	36.36	1	20	7	18.42
5	High cost of Fertilizers and plant protection chemicals	1	14.29	4	40	7	63.64	2	40	14	36.84
6	High rate of interest on credit	4	57.14	7	70	5	45.45	2	40	18	47.37
7	Low price for the agricultural commodities	2	28.57	3	30	2	18.18	0	0	7	18.42
8	Lack of marketing facilities in the area	1	14.29	4	40	4	36.36	2	40	12	31.58
9	Inadequate extension services	2	28.57	0	0	0	0	0	0	2	5.26
10	Lack of transport for safe transport of the Agril produce to the market.	4	57.14	7	70	8	72.73	2	40	23	60.53
11	Less rainfall	7	100	10	100	11	100	4	80	34	89.47
12	Source of Agri-technology information(Newspaper/TV/Mobile)	4	57.14	7	70	8	72.73	3	60	22	57.89

Chapter 5

SUMMARY

The results indicated that 38 farmers were sampled in Hire Shindhogi micro watershed among them 7 (18.42 %) were marginal farmers, 10 (26.32%) were small farmers, 11 (28.95 %) were semi medium farmers and 5 (13.16%) were medium farmers. Apart from these 5 (13.16%) landless farmers were also interviewed for the survey. The data indicated that there were 96 (51.06%) men and 92 (48.94%) were women among the sampled households. The average family size of marginal farmers was 5, small farmer was 5, semi medium farmer was 5, medium farmers were 6 and for landless farmers it was 4.

The data indicated that 43 (22.87%) people were in 0-15 years of age, 73 (38.83%) were in 16-35 years of age, 55 (29.26 %) were in 36-60 years of age and 17 (9.04%) were above 61 years of age. The results indicated that the Hire Shindhogi had 31.38 per cent illiterates, 1.06 per cent functional literates, 33.51 per cent of them had primary school education, 5.32 per cent of them had middle school education, 13.30 per cent of them had high school education, 7.45 per cent of them had PUC education, 0.53 per cent of them had ITI, 1.60 per cent of them had degree education and 5.32 per cent of them had other education.

The results indicate that, 84.21 per cent of households practicing agriculture, 5.26 per cent of the household heads were agricultural labourers and 2.63 per cent of the household heads were doing private service. The results indicate that agriculture was the major occupation for 45.21 per cent of the household members, 21.28 per cent were agricultural labourers, 0.53 percent were in government service, 2.13 per cent of them were in private sector, 22.34 per cent of them were students and 0.53 per cent were housewives. In case of landless households 30 per cent were agricultural labourers, 5 per cent were private services and 40 per cent were students. In case of marginal farmers 50 per cent were agriculturist, 21.88 percent were agricultural labour and 25 per cent were students. In case of small farmers, 54.35 per cent of the household members were practicing agriculture and 17.39 per cent of them were students. In case of semi medium farmers 45.61 per cent of the household members were practicing agriculture and 19.30 per cent of them were students. In case of medium farmers, 48.48 per cent of the household members were performing agriculture, 18.18 per cent of them were agricultural labour and 21.21 per cent of them were students.

The results showed that 1.06 per cent of them participated in Sthree Shakthi Sangha, 0.53 per cent of them participated in user group and 98.40 per cent of them have not participated in any local institutions. Landless, small and medium farmers were found to have no participation in any local institutions. Marginal and semi medium farmers were found to participate in one or the other local institutions. The results indicated that 73.68 per cent of the households possess Katcha house, 7.89 per cent of them possess Pucca

house and 21.05 per cent of them possess Semi Pacca house. 100 percent of the landless farmers possess Katcha house.

The results showed that 5.26 per cent of the households possess radio, 76.32 per cent of the households possess TV, 7.89 per cent of the households possess DVD, 42.11 per cent of the households possess Mixer grinder, 44.74 per cent of the households possess bicycle, 26.32 per cent of the households possess motor cycle, 5.26 per cent of the households possess auto, 2.63 per cent of the households possess car and 78.95 per cent of the households possess mobile phones.

The results showed that the average value of radio was Rs.400, average value of television was Rs.4968, the average value of DVD/VCD Player was Rs.2333, mixer grinder was Rs.2381, Auto was Rs.42500, bicycle Rs.1323, motor cycle was Rs.33150, Car was Rs. 250000 and mobile phone was Rs.1266. The results showed that about 23.68 per cent of the households possess plough, 28.95 per cent of them possess bullock cart, 2.63 cent of the households possess seed/fertilizer drill, 10.53 cent of the households possess tractor, 23.68 per cent of the households possess sprayer, 36.84 per cent of them possess weeder, 5.26 per cent of them were possess chaff cutter and 2.63 per cent of the households possess JCB/Hitachi.

The results showed that the average value of plough was Rs.1655, the average value of bullock cart was Rs. 21072, the average value of seed/Fertilizer drill Rs. 15000, the average value of tractor Rs. 375000, the average value of sprayer was Rs.2655, the average value of weeder Rs. 69, the average value of chaff cutter Rs.1800, the average value of JCB Rs.1000000 and the average value of duster was Rs. 8000. The results indicated that, 31.58 per cent of the households possess bullocks, 26.32 per cent of the households possess local cow and 2.63 per cent of the households possess crossbred cow and buffalo respectively.

The data showed that, in case of marginal farmers, 33.33 per cent of the households possess bullock and 50 per cent of the households possess local cow. In case of small farmers, 20 per cent of households possess bullock and local cow and 10 per cent possess buffalo. In case of semi medium farmers, 54.55 per cent of the households possess bullock, 18.18 per cent possess local cow and 9.09 per cent possess buffalo. In medium farmers, 20 per cent of the households possess bullock and 60 per cent possess local cow.

The results indicated that, average own labour men available in the micro watershed was 2, average own labour (women) available was 1.64, average hired labour (men) available was 5.03 and average hired labour (women) available was 5.36. The results indicated that, in case of marginal farmers, average own labour men available was 1.71, average own labour (women) was 1.29, average hired labour (men) was 4.57 and average hired labour (women) available was 5.43. In case of small farmers, average own labour men available was 1.90, average own labour (women) was 1.80, average hired

labour (men) was 4.50 and average hired labour (women) available was 4. In case of semi medium farmers, average own labour men available was 1.82, average own labour (women) was 1.55, average hired labour (men) was 6.27 and average hired labour (women) available was 7.09. In medium farmers average own labour men available was 3, average own labour (women) was 2, average hired labour (men) was 4 and average hired labour (women) available was 4.20.

The results indicated that, 65.79 per cent of the household opined that hired labour was adequate and 21.05 per cent of the household opined that hired labour was inadequate. About 71.43 per cent of the marginal farmers, 80 per cent of small, 63.64 per cent of semi medium and 100 per cent of the medium have opined that the hired labour was adequate and 28.57 per cent marginal farmers, 20 per cent of small farmers and 36.36 per cent of semi medium farmers were opined that hired labour was inadequate. The results indicated that, 1 person was migrated from micro watershed that belonged to medium farmer category. Total migration in the micro watershed was only 0.53 per cent.

The results indicated that, people have migrated on an average of 390 Kms and average duration was 12 months. I.e. medium farmers have migrated 390 kms and on an average for 12 months. The results indicated that, job/work was the only reason for migration for all the migrants. The results indicated that, improved quality of the life and construction of house were the positive consequences of migration. The results indicated that, households of the Hire Shindhogi micro watershed possess 36.16 ha (64.11%) of dry land and 20.24 ha (35.89%) of irrigated land. Marginal farmers possess 4.21 ha (90.43 %) of dry land and 0.45 ha (9.57%) of irrigated land. Small farmers possess 9.25 ha (84.04%) of dry land and 1.76 ha (15.96 %) of irrigated land. Semi medium farmers possess 15.01 ha (63.53%) of dry land and 8.62 ha (36.47 %) of irrigated land. Medium farmers possess 7.69 ha (44.93%) of dry land and 9.43 ha (55.07 %) of irrigated land.

The results indicated that, the average value of dry land was Rs. 343378.10 and average value of irrigated was Rs. 409856.06. In case of marginal famers, the average land value was Rs. 510625 for dry land and 1122727.25 for irrigated land. In case of small famers, the average land value was Rs. 434,356.96 for dry land Rs. 512,211.99 for irrigated land. In case of semi medium famers, the average land value was Rs. 246,467.10for dry land and Rs. 406,059.19 for irrigated land. In case of medium famers, the average land value was Rs. 331500 for dry land and the average land value was Rs. 360,583.94 for irrigated land.

The results indicated that, there were 11 functioning and 10 defunctioning bore wells in the micro watershed. The results indicated that, bore well was the major irrigation source for 28.95 per cent of the farmers. The results indicated that on an average the depth of the bore well was 31.25 meters. The results indicated that, in case of marginal farmers there was 0. 45 ha of irrigated land, in case of small farmers there was 1.85 ha of irrigated land, semi medium farmers were having 7.81 ha of irrigated land and

medium farmers were having 15.62 ha of irrigated land. On an average there were 25.72 ha of irrigated land.

The results indicated that, farmers have grown Bajra (6.89 ha), Banana (0.71 ha), Bengal gram (2.85 ha), Chilly (0.45 ha), Cotton (1.01 ha), Green gram (0.83 ha), Sorghum (1.62 ha), Maize (8.12 ha), Onion (0.93 ha), Red gram (4.45 ha), Sugandaraja (0.40 ha) and Sunflower (9.51 ha) in kharif season and Bajra (0.81 ha), Bengal gram (3.29 ha), Cotton (1.21 ha), Maize (5.09 ha), Sunflower (1.23 ha) and Sorghum (16.28 ha) in Rabi season.

Data showed that, marginal farmers have grown Bengal Gram, chilly, bajra, cotton, Maize and Sorghum. Small farmers have grown Bajra, Green gram, Maize, Red Gram, Sunflower, Sorghum and Bengal Gram. Semi medium farmers have grown Bajra, Banana, Cotton, Bengalgram, Maize, Redgram, Sugandaraja, Sunflower and Sorghum. Medium farmers have grown Bajra, Bengal gram, Sorghum, Maize, onion, Red gram and Sunflower.

The results indicated that, the cropping intensity in Hire Shindhogi micro watershed was found to be 76.82 per cent. In case of Marginal farmers it was 87.10 per cent, for small farmers it was 100 per cent, in case of semi medium farmers it was 78.94 per cent and medium farmers had cropping intensity of 61.78 per cent.

The results indicated that, only 10.53 per cent of the households have bank account and savings respectively. Among marginal farmers 28.57 percent of them possess both bank account and savings respectively. Small farmers possess 9.09 per cent of both bank account and savings correspondingly and medium farmers possess 20 of bank account and savings in that order. The results indicated that 28.57 per cent marginal farmers, 9.09 per cent of semi medium farmers and 20 per cent of medium farmers have borrowed credit from different sources. The results indicated that, 50 per cent of the households have availed loan from Grameena bank and Commercial bank respectively.

The results indicated that marginal farmers have availed Rs. 27500, semi medium farmers have availed Rs. 55000 and medium farmers have availed Rs.100000. Overall average credit amount availed by households in the micro watershed is 52500.

The results indicated that, 100 per cent of the households have borrowed loan for agriculture production from institutional source. The results indicated that, agriculture production was the main purpose for which semi medium farmers have borrowed loan from private credit. The results indicated that 100 per cent of the households have unpaid their institutional loan. Results indicated 50 percent of the households have unpaid their loan and 50 percent of the households have fully paid their private credit. The results indicated that 25 per cent of the households were opined that they were forced to sell the produce at low price to repay loan in time and 75 per cent of households were not given any opinion on institutional source of credit.

The results indicated that 50 per cent of the households were opined that the rate of interest was high in non-institutional credit and 50 per cent of households were not given any opinion on non-institutional source of credit. The results indicated that, the total cost of cultivation for bajra was Rs. 23881.74. The gross income realized by the farmers was Rs. 22503.93. The net income from bajra cultivation was Rs. -1377.81, thus the benefit cost ratio was found to be 1:0.94.

The results indicated that, the total cost of cultivation for maize was Rs. 30364.35. The gross income realized by the farmers was Rs. 32931.72. The net income from maize cultivation was Rs.6626.43, thus the benefit cost ratio was found to be 1:1.08. The results indicated that, the total cost of cultivation for sorghum was Rs. 18449.10. The gross income realized by the farmers was Rs. 27728.81. The net income from sorghum cultivation was Rs. 9279.71. Thus the benefit cost ratio was found to be 1:1.5.

The results indicated that, the total cost of cultivation for bengalgram was Rs. 29334.18. The gross income realized by the farmers was Rs. 48503.01. The net income from bengalgram cultivation was Rs. 19168.83. Thus the benefit cost ratio was found to be 1:1.65.

The results indicated that, the total cost of cultivation for redgram was Rs. 32495.55. The gross income realized by the farmers was Rs. 30698.57. The net income from redgram cultivation was Rs. -1796.98. Thus the benefit cost ratio was found to be 1:0.94.

The results indicated that, the total cost of cultivation for cotton was Rs. 63323.50. The gross income realized by the farmers was Rs. 50427.06. The net income from cotton cultivation was Rs. -12896.44. Thus the benefit cost ratio was found to be 1:0.8. The results indicated that, the total cost of cultivation for Onion was Rs. 34570.60. The gross income realized by the farmers was Rs. 34515.28. The net income from Onion cultivation was Rs. 55.32. Thus the benefit cost ratio was found to be 1:1.0.

The results indicated that, the total cost of cultivation for Sunflower was Rs. 28043.53. The gross income realized by the farmers was Rs. 73693.85. The net income from Sunflower cultivation was Rs. 45650.32. Thus the benefit cost ratio was found to be 1:2.63. The results indicated that, the total cost of cultivation for Banana was Rs. 25564.87. The gross income realized by the farmers was Rs. 105858.The net income from Banana cultivation was Rs. 80293.13. Thus the benefit cost ratio was found to be 1:3.41.

The results indicated that, the total cost of cultivation for Chilly was Rs. 69680.27. The gross income realized by the farmers was Rs. 75447.27. The net income from Chilly cultivation was Rs. 5767. Thus the benefit cost ratio was found to be 1:1.08. The results indicated that, the total cost of cultivation for Green gram was Rs. 26706.19. The gross income realized by the farmers was Rs. 72900.97. The net income from Green gram cultivation was Rs. 46194.78. Thus the benefit cost ratio was found to be 1:2.73.

The results indicated that, 39.47 per cent of the households opined that dry fodder was adequate and 7.89 per cent of the households opined that dry fodder was inadequate also the data revealed that 39.47 per cent of the farmers opined that green fodder is adequate and 7.89 per cent of the farmers opined that green fodder is inadequate. The results indicated that the average income from service/salary was Rs. 8578.95, business Rs. 5157.89, wage Rs. 4368.42, agriculture Rs. 53161.32 and non farm income Rs. 6842.11and dairy farm Rs. 5018.42.

The results indicated that the average expenditure from service/salary was Rs. 2289.47, business Rs. 2631.58, wage Rs. 1552.63, agriculture Rs. 31,815.79 and dairy farm Rs. 1921.05. The results indicated that, sampled households have grown 53 coconut trees, 20 lemon trees and 1 mango tree in their field and also grown 1 coconut tree in back yard. The results indicated that, 2.63 per cent of the households are interested in growing horticultural crops which include 14.29 per cent marginal farmers.

The results indicated that, households have planted 90 Neem, 8 Banyan trees and 2 people trees in their field and also grown 27 Neem tree in the backyard. The results indicated that for 2.63 per cent of the households were dependent on government subsidy for irrigation facility and 5.26 percent of the households were have their own fund for additional investment. The results indicated that, Bajra, Chilly, Green gram Cotton and Onion were sold to the extent of 100 per cent. Banana, Bengal gram, Sorghum, Maize, Red gram and Sunflower were sold to the extent of 72 per cent, 96.30 per cent, 98.36 per cent, 85.30 per cent, 91.67 per cent and 95.19 per cent respectively.

The results indicated that, 65.79 percent of the households have sold their produce to agents/ traders, 34.21 percent of the households sold their produce in local/village merchant, 31.58 percent of the households sold their produce to regulated market and 7.89 percent of the households sold their produce to cooperative marketing society and contract marketing arrangement respectively. The results indicated that 57.89 per cent of the households have used cart as a mode of transport, 71.05 per cent have used tractor and 2.63 per cent have used Bus and Truck respectively. 5.26 households have used head load as a mode of transport.

The results indicated that, 5.26 per cent of the households have experienced the soil and water erosion problems i.e. 14.29 percent of marginal farmers and 9.09 percent of semi medium farmers. The results indicated that only 5.26 per cent of the households have showed interest in soil testing i.e. 14.29 per cent of marginal farmers and 9.09 per cent of semi medium farmers have showed interest in soil testing.

The results indicated that, 5.26 per cent of the households have adopted field bunding which includes 14.29 per cent of marginal and 9.09 per cent of semi medium farmers. Farm pond was adopted by 2.63 per cent of the households i.e. 9.09 per cent of the semi medium farmers. The results indicated that, 100 per cent of the households who adopted farm pond opined that farm ponds are good, 50 per cent opined that field bunds

are good and another 50 per cent of the households have opined that field bunds are slightly damaged.

The results indicated that 5.26 per cent of soil conservation structure is constructed by farmers on their own and 2.63 per cent of the soil conservation structures are constructed by the farmer's organization. The results indicated that, 84.21 percent used fire wood, 10.53 percent of the households used LPG and 2.63 percent of the households used Biogas as a source of fuel. The results indicated that, piped supply was the major source for drinking water for 50 per cent, 31.58 per cent of households used bore well water and 15.79 per cent of households used bore well water. The results indicated that, electricity was the major source of light for 97.37 per cent of the households in micro watershed.

The results indicated that, 34.21 per cent of the households possess sanitary toilet i.e. 60 per cent of landless, 14.29 per cent of marginal, 50 per cent of small, 18.18 per cent of semi medium and 40 per cent of medium had sanitary toilet facility. The results indicated that, 81.58 per cent of the sampled households possessed BPL card, 7.89 per cent of the sample households possess APL card and 7.89 per cent of the households have not possessed BPL card.

The results indicated that, 34.21 per cent of the households participated in NREGA programme which included 100 per cent of the landless, 28.57 percent of the marginal, 30 per cent of the small, 9.09 per cent of the semi medium and 40 percent of the medium farmers.

The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, Egg and meat were adequate for 89.47 percent, 39.47 percent, 18.42 percent, 47.37 percent, 42.11 percent, 55.26 percent, 31.58 percent, and 13.16 percent of the households respectively.

The results indicated that, cereals, pulses, oilseeds, vegetables, fruits, milk, egg and meat were inadequate for 7.89 per cent, 57.89 per cent, 50 per cent, 28.95 per cent, 34.21 per cent, 28.95 per cent, 44.74 per cent and 52.63 per cent of the households respectively. The results indicated that, Lower fertility status of the soil was the constraint experienced by 15.79 per cent of the households, wild animal menace on farm field (39.47%), frequent incidence of pest and diseases (34.21%), inadequacy of irrigation water (18.42%), high cost of Fertilizers and plant protection chemicals (36.84%), high rate of interest on credit (47.37%), low price for the agricultural commodities (18.42%), lack of marketing facilities in the area (31.58%), inadequate extension services (5.26%), lack of transport for safe transport of the agricultural produce to the market (60.53%), less rainfall (89.47%) and Source of Agri-technology information(Newspaper/TV/Mobile) (57.89).