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

BALACHAKRA-2 (4D5B1M1c) MICROWATERSHED

Yadgir Taluk & District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

THE WORLD BANK

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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PREFACE

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

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

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

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

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

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

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

Nagpur
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PART-A

LAND RESOURCE INVENTORY

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EXECUTIVE SUMMARY

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

The present study covers an area of 575 ha in Yadgir taluk & district, Karnataka. The climate is semiarid and categorized as drought-prone with an average annual rainfall of 866 mm, of which about 652 mm is received during south-west monsoon, 138 mm during north-east and the remaining 76 mm during the rest of the year.

An area of 555 ha in the microwatershed is covered by soils, about 21 ha by by others (Habitation water body). The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 13 soil series and 19 soil phases (management units) and 8 land management units.*
- *The length of crop growing period is about 120-150 days starting from 1st week of June to 4th week of October.*
- *From the master soil map, several interpretative and thematic maps like land capability, soil depth, surface soil texture, soil gravelliness, available water capacity, soil slope and soil erosion were generated.*
- *Soil fertility status maps for macro and micronutrients were generated based on the surface soil samples collected at every 320 m grid interval.*
- *Land suitability for growing 29 major agricultural and horticultural crops was assessed and maps showing the degree of suitability along with constraints were generated.*
- *An area of about 96 per cent is suitable for agriculture in the microwatershed.*
- *About 65 per cent area of the microwatershed has soils that are deep (100-150 cm), 16 per cent soils are moderately shallow to moderately deep (50-100), whereas 15 per cent soils are shallow to very shallow (<25-50 cm) soils in the microwatershed.*
- *About 13 per cent area in the microwatershed has sandy soils, 49 per cent area in the microwatershed has loamy soils and 35 per cent clayey soils at the surface.*
- *An area of about 68 per cent area has non-gravelly (<15% gravel) soils and 29 per cent has gravelly (15-35% gravel) soils.*
- *An area of about 35 per cent is very low to low (<50-100 mm/m), <1 per cent area is medium (101-150 mm/m) and 61 per cent area is very high (>200 mm/m) in available water capacity.*
- *About 96 per cent area of the microwatershed has very gently sloping (1-3% slope) lands and 1 per cent area is gently sloping (3-5% slope) soils.*

- *An area of about 82 per cent area is moderately (e2) eroded and 15 percent soils are severely eroded (e3).*
- *An area of about 71 per cent soils are neutral (pH 6.5-7.3) and 25 per cent soil are slightly alkaline (pH 7.3-7.8) in soil reaction.*
- *The Electrical Conductivity (EC) of the soils in the entire cultivated area of the microwatershed is dominantly <2 ds^{m-1} indicating that the soils are non-saline.*
- *An area of about 6 per cent is high (>0.75%) and 90 percent is medium (0.50-0.75%) in organic carbon content.*
- *An area of 17 percent is low (<23 kg/ha) in available phosphorus, 76 percent is medium (23-57 kg/ha) and 4 percent soils are high (>57 kg/ha) in available phosphorus.*
- *An area of about 31 percent is medium (145-337kg/ha) and 65 percent is low (<145kg/ha) in available potassium.*
- *An area of about 1 percent is medium (10-20ppm) and 95 percent area is low (<10ppm) in available sulphur.*
- *Available boron is low (<0.5 ppm) in an area of about 41 per cent and medium (0.5-1.0 ppm) in 56 per cent area of the microwatershed.*
- *Available iron content is sufficient (>4.5ppm) in an area of 96 per cent and <1 per cent is deficient (<4.5ppm) in the microwatershed.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc content is deficient (<0.6 ppm) in the entire cultivated area of the microwatershed.*
- *The land suitability for 29 major crops grown in the microwatershed were assessed and the areas that are highly suitable (S1) and moderately suitable (S2) are given below. It is however to be noted that a given soil may be suitable for various crops but what specific crop to be grown may be decided by the farmer looking to his capacity to invest on various inputs, marketing infrastructure, market price and finally the demand and supply position.*

Land suitability for various crops in the Microwatershed

Crop	Suitability Area in ha (%)		Crop	Suitability Area in ha (%)	
	Highly suitable (S1)	Moderately suitable (S2)		Highly suitable (S1)	Moderately suitable (S2)
Sorghum	16(3)	355(62)	Guava	-	9(2)
Maize	2(<1)	369(64)	Sapota	-	9(2)
Bajra	9(2)	362(63)	Pomegranate	-	23(4)
Groundnut	7(1)	27(5)	Musambi	14(2)	9(2)
Sunflower	14(2)	9(2)	Lime	14(2)	9(2)
Redgram	-	345(60)	Amla	9(2)	40(7)
Bengal gram	14(2)	10(2)	Cashew	-	7(1)
Cotton	14(2)	3(<1)	Jackfruit	-	9(2)
Chilli	2(<1)	47(8)	Jamun	-	14(2)
Tomato	2(<1)	33(6)	Custard apple	21(4)	28(5)
Brinjal	2(<1)	33(6)	Tamarind	-	14(2)
Onion	2(<1)	7(1)	Mulberry	-	9(2)
Bhendi	2(<1)	47(8)	Marigold	2(<1)	47(8)
Drumstick	-	23(4)	Chrysanthemum	2(<1)	47(8)
Mango	-	-			

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

Chapter 1

INTRODUCTION

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

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

In this critical juncture, the challenge before us is not only to increase the productivity per unit area which is steadily declining and showing a fatigue syndrome, but also to prevent or at least reduce the severity of degradation. If the situation is not reversed at the earliest, then the sustainability of the already fragile crop production system and the overall ecosystem will be badly affected in the state. The continued neglect and unscientific use of the resources for a long time has led to the situation observed at present in the state. It is a known fact and established beyond doubt by many studies in the past that the cause for all kinds of degradation is the neglect and irrational use of the land resources. Hence, there is an 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 the potential and problem areas, developing sustainable land use plans, estimation of surface run off and water harvesting potential, preparation of soil and water conservation plans, land degradation/desertification etc. The Bureau is presently engaged in developing an LRI methodology using high resolution satellite remote sensing data and Digital Elevation Model (DEM) data to prepare Landscape Ecological Units (LEU) map representing agro-ecosystem as a whole. The LEU is preferred over landform as the base map for LRI. LEU is the assemblage of landform, slope and land use. An attempt has already been made to upscale the soil resource information from 1:250000 and 1:50000 scale to the LEU map in Goa and other states.

The land resource inventory aims to provide site specific database for Balachakra-2 microwatershed in Yadgir Taluk & 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 Balachakra-2 microwatershed is located in the northern part of Karnataka in Yadgir Taluk & District, Karnataka State (Fig.2.1). It comprises parts of Yaleri, Naglapura, & Risabadha Hosalli villages. It lies between 16^0 43' and 16^0 14' North latitudes and 77^0 15' and 77^0 17' East longitudes, covering an area of about 575 ha. It is 18 km from Yadgir town and is surrounded by Yaleri village on the north, northeast and east, Risabadha Hosalli village on the west, northwest and north, and Naglapura village on the south, southwestern side of the microwatershed.

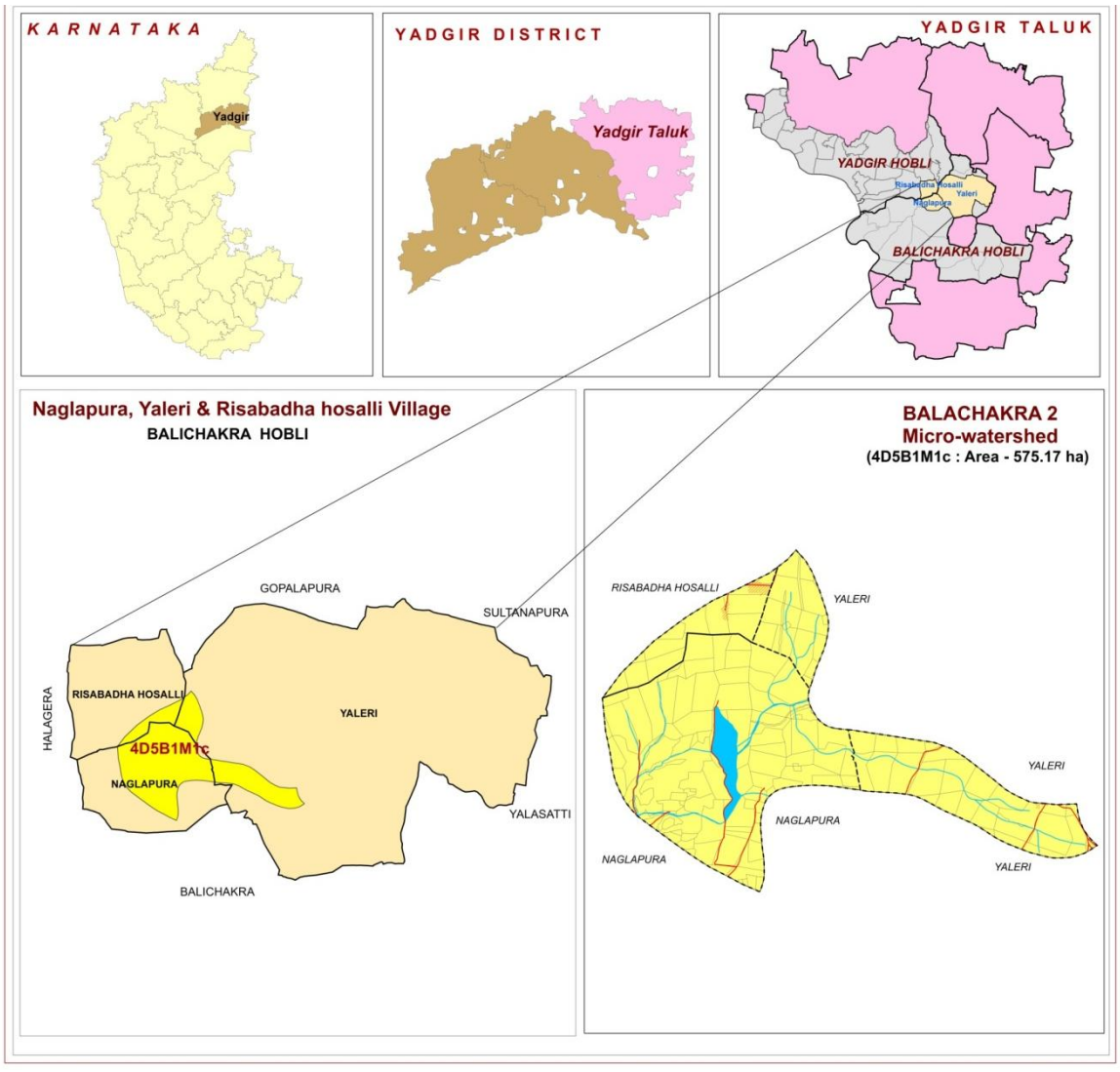

Fig.2.1 Location map of Balachakra-2 Microwatershed

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 Balachakra-2 microwatershed. The most widespread and characteristic development of alluvium in the watershed region lying between the rivers Krishna and Bhima is a wide belt, the underlying formation is gneiss and alluvial soils occur over gneiss, limestone and shale. The thickness of the alluvium generally is limited to less than a meter, except in river valleys where it is very deep extending to tens of meters. Such soils are transported and represent palaeo black soils originally formed at higher elevation, but now occupying river valleys.

Fig.2.2a Granite and granite gneiss rocks

Fig. 2.2b Alluvium

2.3 Physiography

Physiographically, the area has been identified as granite gneiss and alluvium based on geology. The area has been further subdivided into five landforms, *viz;* mounds/ridges, summits, side slopes and very gently sloping uplands, plains and valleys based on slope and its relief features. The mounds and ridges are mostly covered by rock outcrops.

2.4 Drainage

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

2.5 Climate

The Yadgir district lies in the northern plains of Karnataka and falls under semiarid tract of the state and is categorized as drought- prone with total annual rainfall of 866 mm (Table 2.1). Of the total rainfall, maximum of 652 mm is received during the south–west monsoon period from June to September; the north-east monsoon from October to early December contributes about 138 mm and the remaining 76 mm during the rest of the year. The summer season starts during the middle of February and continues up to the first week of June. The period from December to the middle of February is the coldest season. December is the coldest month with mean daily maximum and minimum temperatures being 29.5^0C and 10^0C respectively. During peak summer, temperature shoots up to 45^0C. Relative humidity varies from 26% in summer to 62% in winter. Rainfall distribution is shown in Figure 2.3. The average Potential Evapo-Transpiration (PET) is 141 mm and varies from a low of 81 mm in December to 199 mm in the month of May. The PET is always higher than precipitation in all the months except end of June to end of September. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from 1^{st} week of June to 4^{th} week of October.

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

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

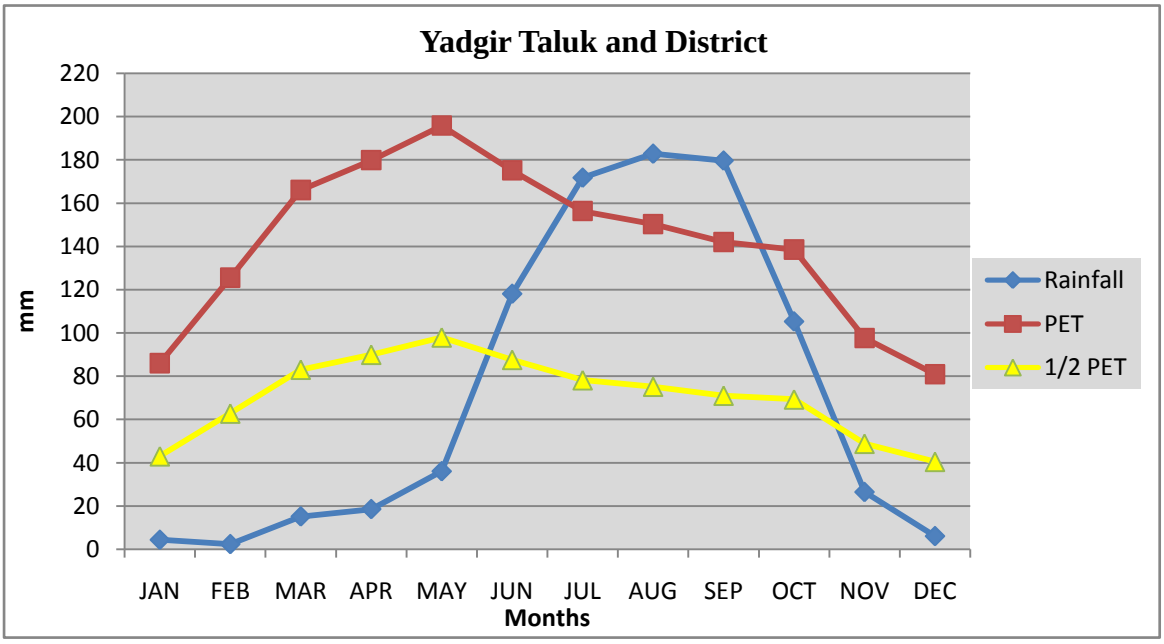

Fig 2.3 Rainfall distribution in Yadgir Taluk, Yadgir District

2.6 Natural Vegetation

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

Fig 2.4 Natural vegetation of Balachakra-2 Microwatershed

2.7 Land Utilization

About 72 per cent area (Table 2.2) in Yadgir district is cultivated at present. An area of about 2 per cent is permanently under pasture, 20 per cent under current fallows and 6 per cent under non-agricultural land and 5 per cent under currently barren. Forests occupy an area of about 7 per cent and the tree cover is in a very poor state. Most of the mounds, ridges and bouldery areas have very poor vegetative cover. Major crops grown in the area are sorghum, maize, cotton, sunflower, groundnut, red gram, mango, pomegranate, marigold and sapota. 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 Balachakra-2 microwatershed is presented in Fig.2.5. The different crops and cropping systems adopted in the microwatershed are presented in Figures 2.6 a & b.

Table 2.2 Land Utilization in Yadgir District

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

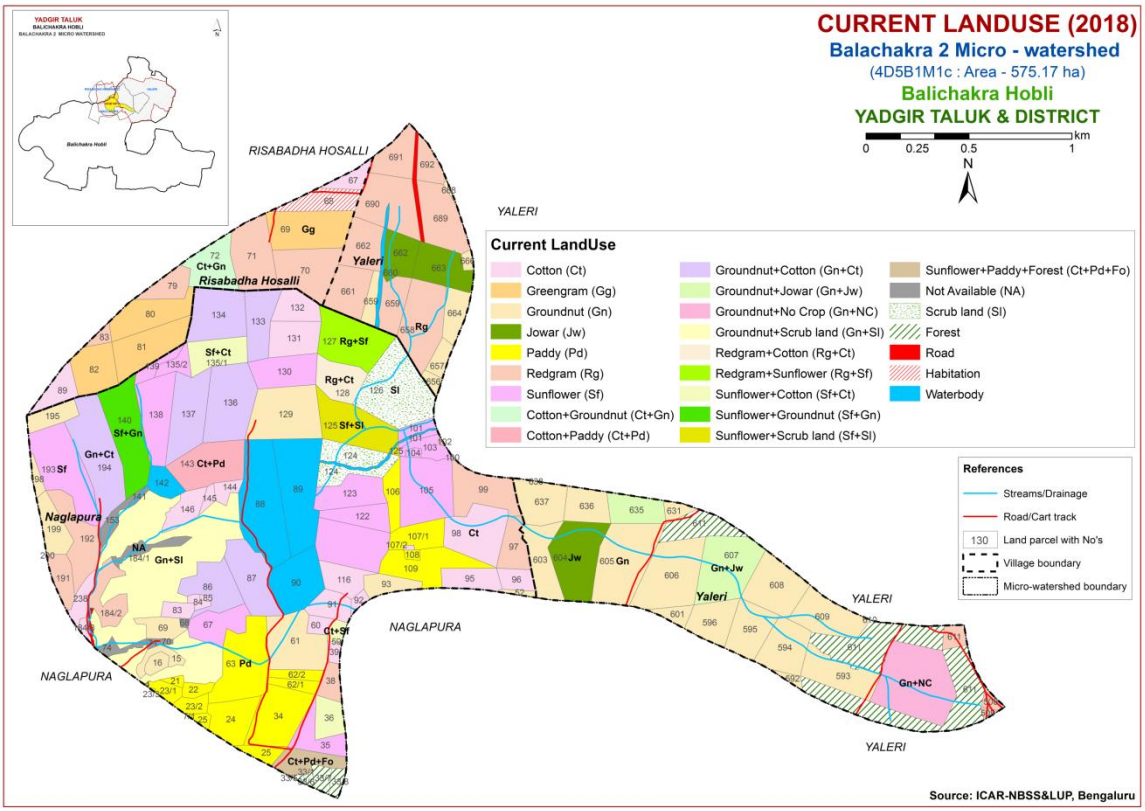

Fig.2.5 Current Land Use map of Balachakra-2 Microwatershed

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

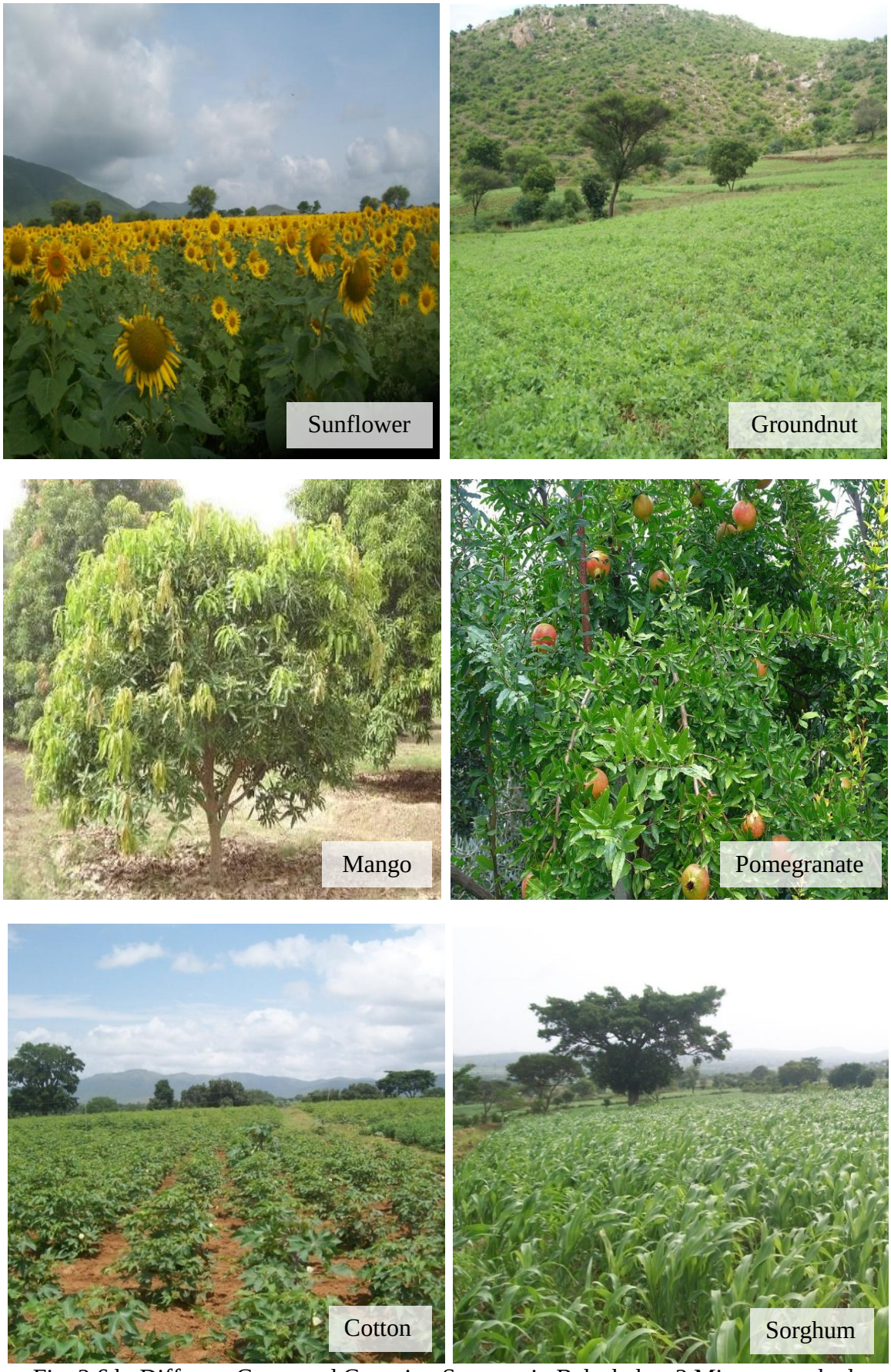

Fig. 2.6 b. Different Crops and Cropping Systems in Balachakra-2 Microwatershed

Chapter 3

SURVEY METHODOLOGY

The purpose of land resource inventory is to delineate similar areas (soil series and phases), which respond or expected to respond similarly to a given level of management. This was achieved in Balachakra-2 microwatershed by the detailed study of all the soil characteristics (depth, texture, colour, structure, consistence, coarse fragments, porosity, soil reaction, soil horizons etc.) and site characteristics (slope of the land, erosion, drainage, occurrence of rock fragments etc.) followed by grouping of similar areas based on soil-site characteristics into homogeneous (management units) units, and showing the area extent and their geographic distribution on the microwatershed cadastral map. The detailed survey at 1:7920 scale was carried out in an area of 552 ha. The methodology followed for carrying out land resource inventory was as per the guidelines given in Soil Survey Manual (IARI, 1971; Soil Survey Staff, 2006; Natarajan *et al.,* 2015) which is briefly described below.

3.1 Base Maps

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

3.2 Image Interpretation for Physiography

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

Image Interpretation Legend for Physiography

G- Granite Gneiss Landscape

G1			**Hills/ Ridges/ Mounds**
	G11		Summits
	G12		Side slopes
		G121	Side slopes with dark grey tones
G2			**Uplands**
	G21		Summits
	G22		Gently sloping uplands
		G221	Gently sloping uplands, yellowish green (eroded)
		G222	Gently sloping uplands, yellowish white (severely eroded)
	G23		Very gently sloping uplands
		G231	Very gently sloping uplands, yellowish green
		G232	Very gently sloping uplands, medium green and pink
		G233	Very gently sloping uplands, pink and green (scrub land)
		G234	Very gently sloping uplands, medium greenish grey
		G235	Very gently sloping uplands, yellowish white (eroded)
		G236	Very gently sloping uplands, dark green
		G237	Very gently sloping uplands, medium pink (coconut garden)
		G238	Very gently sloping uplands, pink and bluish white (eroded)
G3			**Valleys/ lowlands**
	G31		Valleys, pink tones
	G32		Valleys gray mixed with pink tones

DSe – Alluvial Landscape

DSe 1 – Summit

DSe 11 –

DSe 12 –

DSe 2 – Very genetly sloping

DSe 21 – Very gently sloping, dark gray tone

DSe 22 – Very gently sloping, medium gray tone

DSe 23 – Very gently sloping, yellowish grey tone

DSe 24 – Very gently sloping, whitish grey tone

DSe 25 – Very gently sloping, whitish/ eroded/ calcareous tone

DSe 26- Very gently sloping, medium pink

DSe 3 – Valley/ Lowland

DSe 31 – Whitish gray/Calcareous

DSe 32 – Gray with pink patches

DSe 33 – Medium gray tone

DSe 34 – Lightish gray tone

DSe 35 – Dark gray tone

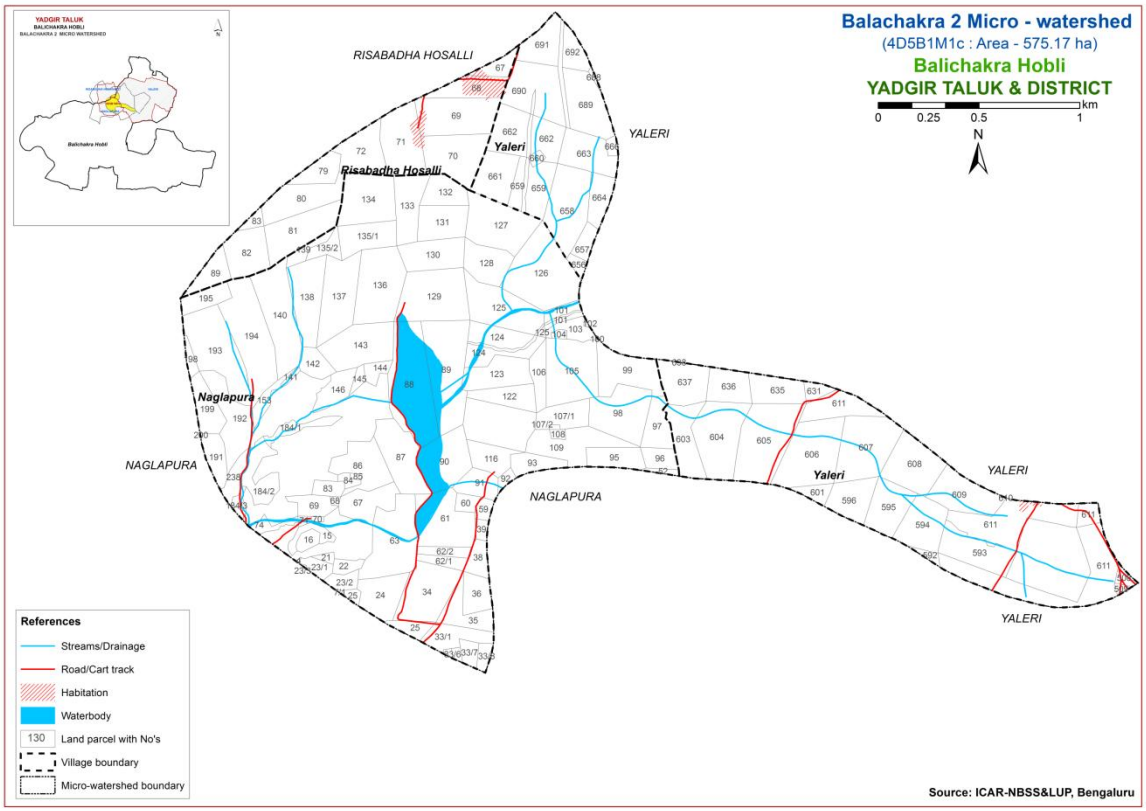

Fig 3.1 Scanned and Digitized Cadastral map of Balachakra-2 Microwatershed

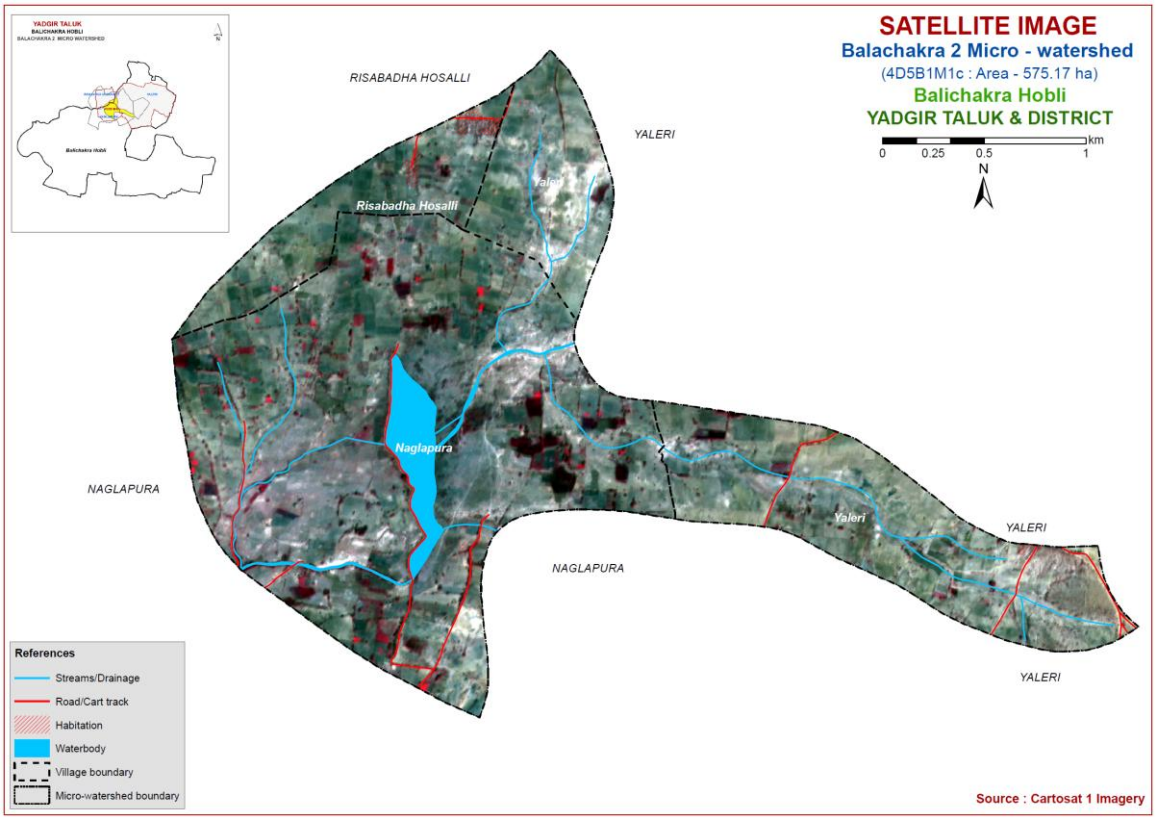

Fig.3.2 Satellite Image of Balachakra-2 Microwatershed

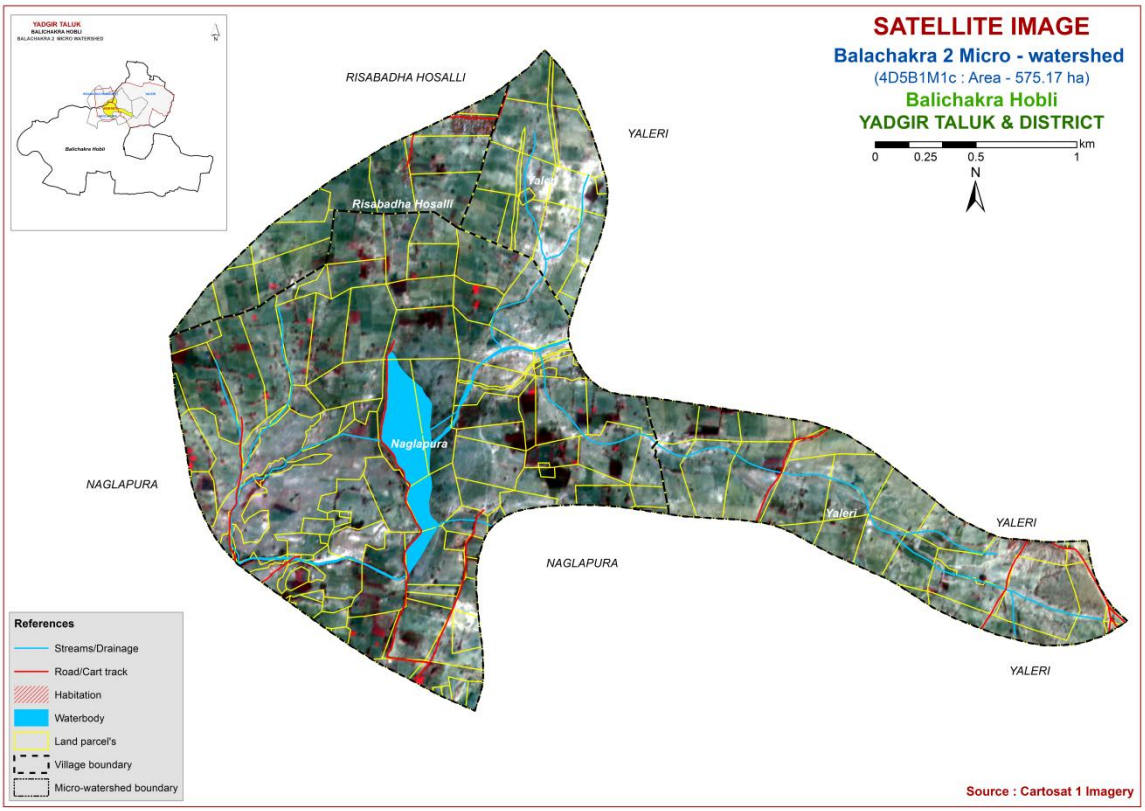

Fig.3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Balachakra-2 Microwatershed

3.3 Field Investigation

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

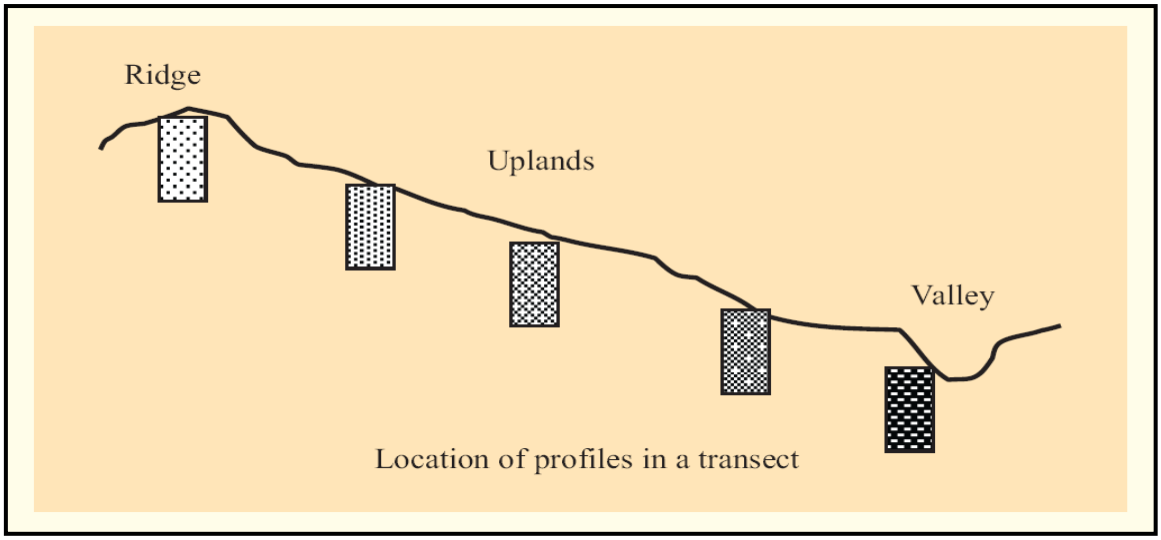

Fig: 3.4. Location of profiles in a transect

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

Based on the soil characteristics, the soils were grouped into different soil series. Soil series is the most homogeneous unit having similar horizons and properties and behaves similarly for a given level of management. Soil depth, texture, colour, kind of horizon and horizon sequence, calcareousness, amount and nature of gravel present, nature of substratum etc, were used as the major differentiating characteristics for identifying soil series occurring in the area. The differentiating characteristics used for identifying the soil series are given in Table 3.1. Based on the above characteristics, 13 soil series were identified in the Balachakra-2 microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series

(Characteristics are of Series Control Section)

SOILS OF GRANITE GNEISS LANDSCAPE							
Sl. no	**Soil Series**	**Depth (cm)**	**Colour (moist)**	**Texture**	**Gravel (%)**	**Horizon sequence**	**Calcareous-ness**
1	BDP (Baddeppalli)	<25	7.5YR 3/2,3/4 5YR 3/4	scl	<15	Ap-AC	es
2	HTK (Hattikuni)	25-50	10YR 4/6, 4/4 7.5YR 4/4, 3/3	sl	10-25	Ap-AC	-
3	VNK (Vanakanahalli)	25-50	2.5YR 3/4	sc	<15	Ap-Bt-Cr	-

4	YLR (Yalleri)	50-75	2.5YR 3/4,4/4 5YR 3/4 7.5 YR4/4	gc	15-35	Ap-Bt	-
5	SBR (Sambara)	50-75	10YR 7/1 7.5YR 7/4	ls	<15	Ap-AC	-
6	JNK (Jinkera)	50-75	10YR 3/1,3/2 7.5YR 3/4	scl	<15	Ap-Bw	e
7	HSL (Hosalli)	75-100	10YR 5/4,4/4,4/6	sc	<15	Ap-Bw	e
8	BLC (Balichakra)	75-100	2.5YR 5/3,2.5/4 5YR 4/3,3/3	scl	<15	Ap-BA-Bt	-
9	MDG (Mundargi)	100-150	10YR 4/4,3/3 7.5YR 4/4	scl	<15	Ap-Bw	-
10	ANR (Anur)	100-150	10YR 4/3,4/1	c	<15	Ap-Bw	es
11	YDR (Yadgir)	100-150	10YR4/3,4/4 2.5YR 4/3,5/3	sl	<15	Ap-A2-Bw	-
12	BGD (Belagundi)	100-150	10 YR 5/4,4/4 7.5YR 4/4	c	<15	Ap-AB-Bss	es
SOILS OF ALLUVIAL LANDSCAPE							
13	KDR (Kudlura)	100-150	10YR 3/1,3/2,4/1,5/2	c	<15	Ap-Bw	es

3.4 Soil Mapping

The area under each soil series was further separated into soil phases and their boundaries delineated on the cadastral map based on the variations observed in the texture of the surface soil, slope, erosion, presence of gravel, stoniness etc. A soil phase is a subdivision of soil series based mostly on surface features that affect its use and management. The soil mapping units are shown on the map (Fig.3.5) in the form of symbols. During the survey many 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 19 mapping units representing 13 soil series occurring in the microwatershed. The soil map unit (soil legend) description is presented in Table 3.2. The soil phase map (management units) shows the distribution of 19 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 Land Management Units

The 19 soil phases identified and mapped in the microwatershed were grouped into 8 Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases)

generated under LRI was utilized for identifying Land Management Units (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been choosen for identification and delineation of LMUs. For Balachakra-2 microwatershed, five soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The land use classes are expected to behave similarly for a given level of management.

3.6 Laboratory Characterization

Soil samples were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected from farmer's fields (53 samples) for fertility status (major and micronutrients) at 320 m grid interval in the year 2018 were analyzed in the laboratory (Katyal and Rattan, 2003). By linking the soil fertility data to the survey numbers through GIS, soil fertility maps were generated by using Kriging method for the microwatershed.

Table 3.2 Soil map unit description of Balachakra-2 Microwatershed

*Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
SOILS OF GRANITE AND GRANITE GNEISS LANDSCAPE				
	BDP	Baddeppalli soils are very shallow (<25 cm), well drained, have dark brown to dark reddish brown, calcareous, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**53(9.17)**
118		BDPcB2	Sandy loam surface, slope 1-3%, moderate erosion	16(2.77)
120		BDPhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	37(6.4)
	HTK	Hattikuni soils are shallow (25-50 cm), well drained, have dark yellowish brown, sandy loam soils occurring on very gently sloping uplands under cultivation		**21(3.59)**
161		HTKbB2g1	Loamy sand surface, slope 1-3%, moderate erosion, gravelly (15-35%)	17(2.89)
113		HTKcC2g1	Sandy loam surface, slope 3-5%, moderate erosion, gravelly (15-35%)	4(0.7)
	VNK	Vanakanahalli soils are shallow (25-50 cm), well drained, have dark reddish brown, red sandy clay soils occurring on very gently to moderately sloping uplands under cultivation		**15(2.65)**
122		VNKcB3	Sandy loam surface, slope 1-3%, severe erosion	15(2.65)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, red gravelly clay soils occurring on very gently to gently sloping		**1(0.15)**

*Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
		uplands under cultivation		
28		YLRbB3	Loamy sand surface, slope 1-3%, severe erosion	1(0.15)
	SBR	Sambara soils are moderately shallow (50-75 cm), somewhat excessively drained, have light gray to pink, loamy sand soils occurring on very gently to gently sloping uplands under cultivation		**58(10.0)**
124		SBRbB3	Loamy sand surface, slope 1-3%, severe erosion	58(10.0)
	JNK	Jinkera soils are moderately shallow (50-75 cm), well drained, have dark brown to very dark grayish brown, slightly calcareous, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**25(4.41)**
22		JNKiB2	Sandy clay surface, slope 1-3%, moderate erosion	25(4.41)
	HSL	Hosalli soils are moderately deep (75-100 cm), moderately well drained, have yellowish brown to dark yellowish brown, slightly calcareous, sandy clay soils occurring on very gently sloping uplands under cultivation		**2(0.32)**
32		HSLcB2	Sandy loam surface, slope 1-3%, moderate erosion	2(0.32)
	BLC	Balichakra soils are moderately deep (75-100 cm), well drained, have reddish brown to dark reddish brown, red sandy clay loam soils occurring on very gently sloping uplands under cultivation		**7(1.3)**
155		BLCcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	7(1.3)
	MDG	Mundargi soils are deep (100-150 cm), moderately well drained, have brown to dark yellowish brown, sandy clay loam soils occurring on very gently sloping uplands under cultivation		**311 (54.24)**
57		MDGcB2	Sandy loam surface, slope 1-3%, moderate erosion	34(5.98)
149		MDGhB2g1	Sandy clay loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	135 (23.54)
58		MDGiB2	Sandy clay surface, slope 1-3%, moderate erosion	142 (24.72)
	ANR	Anur soils are deep (100-150 cm), moderately well drained, have dark gray to brown, calcareous, sodic, cracking clay soils occurring on very gently sloping uplands under cultivation		**17(3.01)**
53		ANRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	9(1.57)
55		ANRiB2	Sandy clay surface, slope 1-3%, moderate erosion	8(1.44)

*Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha (%)
	YDR	Yadgir soils are deep (100-150 cm), well drained, have brown to dark yellowish brown and olive brown, sodic, sandy loam soils occurring on very gently sloping uplands under cultivation		**19(3.33)**
42		YDRcB2	Sandy loam surface, slope 1-3%, moderate erosion	18(3.18)
154		YDRcB2g1	Sandy loam surface, slope 1-3%, moderate erosion, gravelly (15-35%)	1(0.15)
	BGD	Belagundi soils are deep (100-150 cm) well drained, have brown to dark yellowish brown, calcareous, clayey soils occurring on very gently sloping uplands under cultivation		**14(2.42)**
115		BGDmB2	Clay surface, slope 1-3%, moderate erosion	14(2.42)
SOILS OF ALLUVIAL LANDSCAPE				
	KDR	Kudlura soils are deep (100-150 cm), moderately well drained, have very dark gray to grayish brown, calcareous, cracking clay soils occurring on very gently sloping plains under cultivation		**10(1.79)**
88		KDRiB3	Sandy clay surface, slope 1-3%, severe erosion	10(1.79)
1000	Others	Habitation and water body		**21(3.62)**

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

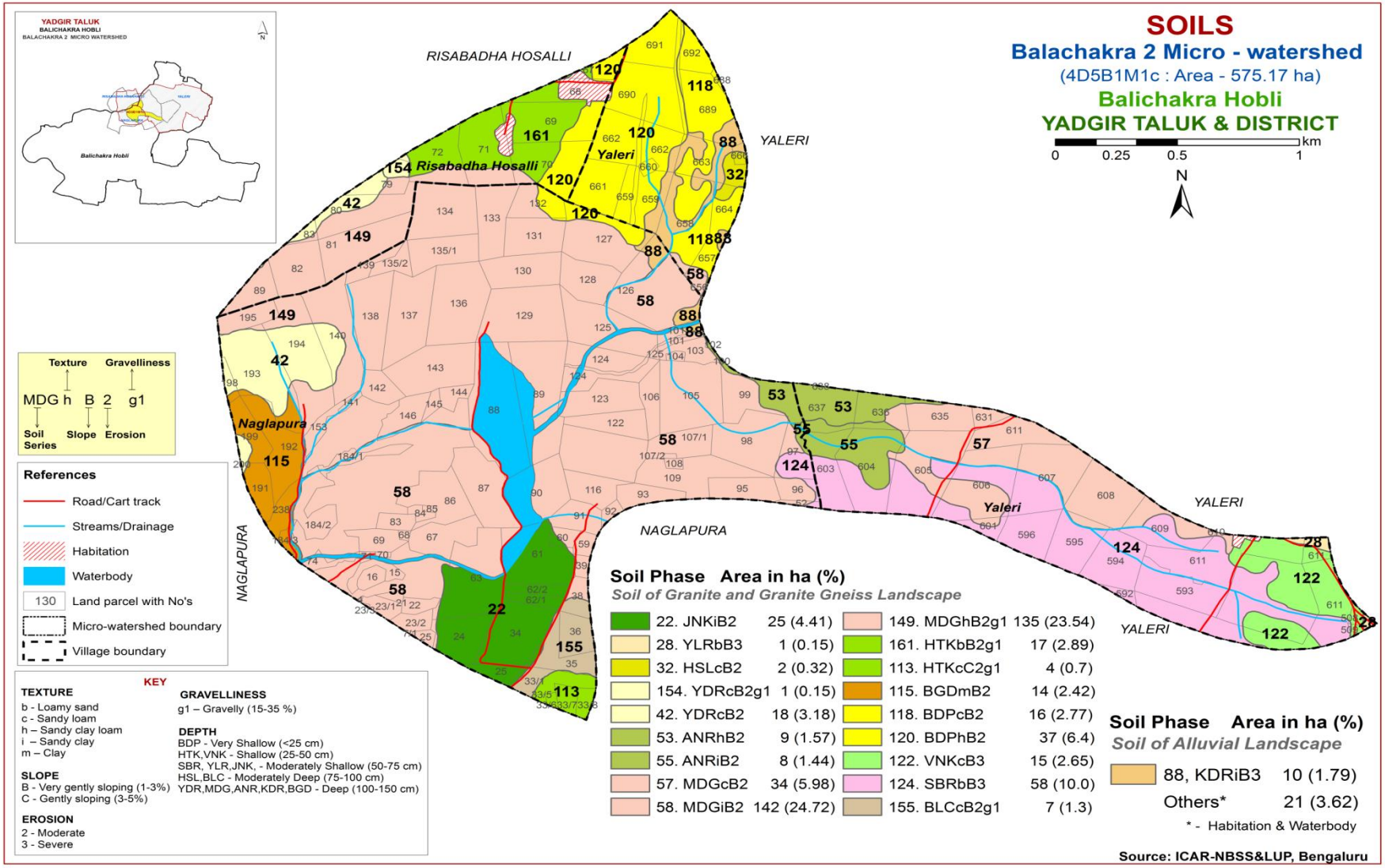

Fig 3.5 Soil Phase or Management Units - Balachakra-2 Microwatershed

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Balachakra-2 microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 13 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. In the granite gneiss landscape, it is by parent material, relief and climate.

A brief description of each of the 13 soil series identified followed by 19 soil phases (management units) mapped under each series are furnished below. The physical and chemical characteristics of soil series identified in Balachakra-2 microwatershed are given in Table 4.1 along with soil classification. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss landscape

In this landscape, 12 soil series are identified and mapped. MDG series occupies maximum area of 311 ha (54%) followed by SBR 58 ha (10%), BDP 53 ha (9%), JNK 25 ha (4%), HTK 21 ha (4%), YDR 19 ha (3%), ANR 17 ha (3%), VNK 15 ha (3%), BGD 14 ha (2%), BLC 7 ha (1%), HSL 2 ha (<1%) and YLR 1 ha (<1%). Brief description of each series identified and number of soil phases mapped is given below.

4.1.1 Baddeppalli (BDP) Series: Baddeppalli soils are very shallow (<25cm), well drained, have dark brown to dark reddish brown, calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Baddeppalli series has been classified as a member of the loamy, mixed (calcareous), isohyperthermic family of Lithic Ustorthents.

The thickness of the soil is less than 25 cm. Its colour is in 7.5 YR and 5 YR hue with value 3 and chroma 2 to 4. The texture varies from sandy clay loam to sandy clay and is calcareous. The available water capacity is very low (<50 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Baddeppalli (BDP) Series

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

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

Landscape and Soil Profile characteristics of Hattikuni (HTK) Series

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

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

Landscape and Soil Profile characteristics of Vanakanahalli (VNK) Series

4.1.4 Yalleri (YLR) Series: Yalleri soils are moderately shallow (50-75 cm), well drained, have very dark reddish brown to dark brown, gravelly clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Yalleri series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Paleustalfs.

The thickness of the solum ranges from 50 to 74 cm. The thickness of A horizon ranges from 10 to 13 cm. Its colour is in 7.5 YR and 5 YR hue with value and chroma 2 to 4. The texture is sandy loam, loamy sand, and sandy clay loam. The thickness of B horizon ranges from 45 to 64 cm. Its colour is in 10 YR, 7.5 YR and 5 YR hue with value 2 to 4 and chroma 2 to 4. Its texture is clay with gravel content of 15-35 per cent. The available water capacity is low (51-100 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Yalleri (YLR) Series

4.1.5 Sambara (SBR) Series: Sambara soils are moderately shallow (50-75 cm), somewhat excessively drained, have light grey to reddish yellow, loamy sand soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Sambara series has been classified as a member of the mixed, isohyperthermic family of Typic Ustipsamments.

The thickness of the soil ranges from 52-75 cm. Thickness of A horizon ranges from 8 to 23 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 and chroma 1 to 4. The texture varies from loamy sand to sandy loam. The thickness of subsurface horizons ranges from 41 to 66 cm. Its colour is in 10 YR and 7.5 YR hue with value 3 to 5 and chroma 1 to 4. The texture is loamy sand. The available water capacity is very low (<50 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Sambara (SBR) Series

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

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

Landscape and Soil Profile characteristics of Jinkera (JNK) Series

4.1.7 Hosalli (HSL) Series: Hosalli soils are moderately deep (75-100 cm), moderately well drained, have dark yellowish brown to yellowish brown, slightly calcareous sandy clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Hosalli series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 76 to 100 cm. The thickness of A-horizon ranges from 6 to 15 cm. Its colour is in hue 10 YR and 7.5 YR with value 3 to 5 and chroma 2 to 4. Its texture varies from loamy sand to sandy loam and sandy clay loam. The thickness of B horizon ranges from 62 to 93 cm. Its colour is in hue 10 YR with value 3 to 4 and chroma 2 to 4. Its texture varies from sandy clay loam to sandy clay and clay and is slightly calcareous. The available water capacity is medium (101-150 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Hosalli (HSL) Series

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

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

Landscape and Soil Profile characteristics of Balichakra (BLC) Series

4.1.9 Mundargi (MDG) Series: Mundargi soils are deep (100-150 cm), moderately well drained, have dark brown to dark yellowish brown, sandy clay loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Mundargi series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum ranges from 100 to 149 cm. The thickness of A horizon ranges from 8 to 20 cm. Its colour is in 10 YR hue with value 3 and chroma 1 to 4. The texture ranges from sandy loam to sandy clay loam and sandy clay. The thickness of B horizon ranges from 105 to 140 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture varies from sandy loam to sandy clay loam and sandy clay. The available water capacity is very high (>200 mm/m). Three soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Mundargi (MDG) Series

4.1.10 Anur (ANR) Series: Anur soils are deep (100-150 cm), moderately well drained, have dark gray to dark brown, calcareous sodic clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Anur series has been classified as a member of the fine, mixed (calcareous), isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 102 to 148 cm. The thickness of A-horizon ranges from 9 to 17 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 2 to 4. The texture ranges from loamy sand to sandy clay loam and sandy clay and are calcareous. The thickness of B horizon ranges from 102 to 135 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 6. Texture is sandy clay loam to sandy clay and clay and is calcareous sodic soils. The available water capacity is very high (>200 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Anur (ANR) Series

4.1.11 Yadgir (YDR) Series: Yadgir soils are deep (100-150 cm), well drained, have very dark yellowish brown to light olive brown, sodic sandy loam soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Yadgir series has been classified as a member of the coarse-loamy, isohyperthermic family of Fluventic Haplustepts.

The thickness of the soil ranges from 105 to 145 cm. The thickness of A horizon ranges from 6 to 10 cm. Its colour is in 10 YR hue with value 4 and chroma 3. The texture is loamy sand. The thickness of subsurface horizons ranges from 95 to 130 cm. Its colour is in 10 YR and 2.5 Y hue with value 4 to 5 and chroma 3 to 4. Texture is loamy sand to sandy loam and sandy clay loam and is sodic soils. The available water capacity is low (51-100 mm/m). Two soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Yadgir (YDR) Series

4.1.12 Belagundi (BGD) Series: Belagundi soils are deep (100-150 cm), moderately well drained, have dark yellowish brown to yellowish brown and dark brown, calcareous, cracking clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping uplands under cultivation. The Belagundi 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 100 to 145 cm. The thickness of A-horizon ranges from 5 to 12 cm. Its colour is in 10 YR and 5 YR hue with value 5 and chroma 2 to 4. The texture varies from sandy to loamy sand. The thickness of B horizon ranges from 95 to 135 cm. Its colour is in 10 YR and 7.5 YR hue with value 4 to 5 and chroma 4. Texture is sandy clay to clay. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Belagundi (BGD) Series

4.2 Soils of Alluvial Landscape

In this landscape, only one soil series is identified and mapped. Of that KDR series occupies an area of 10 ha (2%). Brief description of this series identified and number of soil phases mapped is given below.

4.2.1 Kudlura (KDR) Series: Kudlura soils are deep (100-150 cm), moderately well drained, have very dark gray to grayish brown, calcareous cracking clay soils. They have developed from alluvium and occur on nearly level to very gently sloping plains under cultivation. The Kudlura series has been classified as a member of the fine, mixed (calcareous), isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum ranges from 110 to 149 cm. The thickness of A-horizon ranges from 6 to 22 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. The texture ranges from sandy loam, sandy clay loam, sandy clay and clay. The thickness of B horizon ranges from 115 to 143 cm. Its colour is in 10 YR hue with value 3

to 4 and chroma 1 to 3. Texture is sandy clay loam, sandy clay to clay and is calcareous soils. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.

Landscape and Soil Profile characteristics of Kudlura (KDR) Series

Table: 4.1 Physical and Chemical Characteristics of Soil Series identified in Balachakra-2 microwatershed

Soil Series: Baddeppalli **(**BDP) **Pedon:** R-11

Location: $16^0$43'84.4"N $77^0$14'06.4"E, Halagera village, Yadgir hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Loamy, mixed (calcareous), 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
0-16	Ap	58.67	17.02	24.31	19.03	13.74	9.62	10.57	5.71	<15	scl	16.19	8.18

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	8.58	-	-	0.262	1.60	7.67	-	-	0.24	0.06	-	18.10	0.74	100	0.35

Contd…

Soil Series: Hattikuni (HTK), Pedon: R-7

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

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-12	Ap	90.89	5.62	3.49	8.50	13.46	29.86	29.55	9.51	20	s	7.73	3.16
12-22	A1	89.97	6.53	3.50	7.19	13.48	29.48	29.79	10.03	20	s	8.00	3.05
22-45	A2	87.20	6.43	6.38	11.09	14.42	31.55	7.16	22.98	40	ls	7.67	3.96

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

Contd…

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

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

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Loamy, mixed, isohyperthermic (Paralithic) Haplustalfs

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	82.61	8.09	9.30	6.77	8.59	21.13	34.58	11.53	-	ls	8.85	3.53
18-50	Bt	54.51	8.73	36.77	4.93	6.18	14.15	20.75	8.49	-	sc	18.88	11.63

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-18	5.37	-	-	0.11	0.60	0.00	2.96	1.45	0.13	0.14	4.68	6.27	0.67	75	2.22
18-50	4.71	-	-	0.05	0.81	0.00	5.56	2.24	0.10	0.05	7.95	13.31	0.36	60	0.38

Contd…

Soil Series: Yalleri (YLR) **Pedon:** R-16

Location: $16^0$32'54.3"N $77^0$22'71.2"E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-5	Ap	81.69	5.44	12.87	6.10	8.65	33.88	21.57	11.50	-	sl	8.60	3.37
5-34	Bt1	38.78	6.73	54.49	3.38	9.91	12.42	8.93	4.14	-	c	25.33	15.82
34-75	Bt2	40.35	2.90	56.75	12.91	6.83	10.30	7.48	2.82	35-60	c	24.49	16.20

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-5	6.91	-	-	0.069	0.70	0.00	5.29	1.37	0.28	0.03	6.96	6.90	0.54	100	0.45
5-34	7.05	-	-	0.053	0.62	0.00	16.43	3.89	0.26	0.09	20.67	21.60	0.40	96	0.42
34-75	7.25	-	-	0.058	0.59	0.00	15.22	3.46	0.25	0.14	19.06	19.90	0.35	96	0.69

Contd…

Soil Series: Sambara (SBR) **Pedon:** R-10

Location: $16^0$42'04.5"N $77^0$14'35.3"E, Jinatera village, Balichakra hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-9	Ap	81.90	8.22	9.88	23.76	14.05	23.76	10.62	9.71	-	ls	9.45	2.69
9-17	C1	84.08	6.59	9.33	21.30	20.69	17.65	17.65	6.80	-	ls	7.84	2.65
17-60	C2	86.86	6.17	6.98	11.53	21.54	25.08	23.46	5.26	-	ls	5.48	2.62
60-78	C3	87.27	6.92	5.81	15.05	20.91	26.36	19.29	5.66	-	ls	5.19	2.81

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-9	8.24	-	-	0.145	0.61	0.91	-	-	0.12	0.09	-	7.50	0.76	100	1.15
9-17	8.21	-	-	0.068	0.57	0.39	-	-	0.06	0.12	-	6.70	0.72	100	1.82
17-60	8.47	-	-	0.080	0.38	0.48	-	-	0.03	0.17	-	2.70	0.39	100	6.34
60-78	8.50	-	-	0.081	0.30	0.52	-	-	0.03	0.17	-	2.70	0.46	100	6.43

Contd…

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

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

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

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

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

Contd…

Soil Series: Hosalli (HSL) **Pedon:** R-3

Location: $16^0$46'60.3"N $77^0$05'47.6"E, Mudhanala village, Yadgir hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-10	Ap	88.43	5.15	6.42	5.69	6.40	36.04	27.31	12.99	-	s	7.40	2.74
10-30	Bw1	58.47	7.24	34.29	4.26	9.37	19.91	19.28	5.64	-	scl	19.07	11.57
30-50	Bw2	51.43	12.67	35.90	3.49	8.89	16.72	15.87	6.46	<15	sc	21.64	12.44
50-90	Bw3	49.89	13.64	36.47	2.43	2.96	20.61	16.17	7.72	<15	sc	21.12	12.95

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-10	7.16	-	-	0.117	0.48	0.00	2.83	1.50	0.15	0.29	4.76	4.90	0.76	97	5.94
10-30	6.91	-	-	0.040	0.36	0.00	10.64	5.43	0.10	0.26	16.43	17.80	0.52	92	1.47
30-50	8.17	-	-	0.182	0.24	1.43	-	-	0.12	0.22	-	19.90	0.55	100	1.08
50-90	8.60	-	-	0.148	0.20	4.29	-	-	0.13	0.16	-	19.70	0.54	100	0.81

Contd…

Soil Series: Balichakra (BLC) **Pedon:** T1/P2

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

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	65.46	8.38	26.16	12.51	18.72	18.82	10.44	4.96	-	scl	15.15	8.63
8-19	Bt1	63.48	8.16	28.36	12.80	15.84	17.21	12.49	5.14	-	scl	16.45	8.81
19-40	Bt2	52.64	11.58	35.79	13.19	13.19	14.35	8.23	3.69	-	sc	21.49	10.36
40-75	BC	55.14	10.71	34.15	14.10	14.42	14.63	7.53	4.45	-	scl	17.77	8.99

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

Contd…

Soil Series: Mundargi **(**MDG) **Pedon:** R-2

Location: $16^0$46'82.4"N $77^0$04'85.2"E, Thumakura village, Yadgir hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-9	Ap	81.23	12.97	5.80	4.84	10.19	14.83	37.94	13.42	<15	ls	11.75	3.31
9-20	A2	76.82	16.19	6.98	4.96	10.12	20.75	27.53	13.46	-	ls	14.52	3.99
20-46	Bw1	42.43	17.43	40.15	2.26	5.59	11.49	14.93	8.16	-	c	34.90	21.14
46-90	Bw2	54.51	16.56	28.93	4.72	5.03	19.92	16.67	8.18	-	scl	36.73	18.88
90-110	Bw3	53.69	11.00	35.30	9.57	9.89	16.23	13.01	4.99	-	sc	38.72	20.53

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-9	8.2	-	-	0.399	0.44	0.78	-	-	0.16	0.38	-	4.90	0.84	100	3.08
9-20	8.44	-	-	0.075	0.29	1.82	-	-	0.05	0.35	-	4.90	0.70	100	2.88
20-46	9.39	-	-	0.451	0.32	2.73	-	-	0.12	5.22	-	20.77	0.52	100	10.06
46-90	9.75	-	-	0.616	0.24	3.25	-	-	0.12	5.72	-	16.56	0.57	100	13.82
90-110	9.72	-	-	0.725	0.24	3.64	-	-	0.14	6.84	-	19.76	0.56	100	13.836

Contd…

Soil Series: Anur (ANR) **Pedon:** R-15

Location: $16^0$32'45.0"N $77^0$23'57.4"E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-18	Ap	64.60	13.44	21.96	7.33	10.42	18.68	20.12	8.05	<15	scl	16.59	7.96
18-49	Bw1	56.66	12.19	31.15	4.73	9.80	18.66	17.02	6.45	-	scl	33.38	13.51
49-95	Bw2	39.94	17.81	42.25	3.09	3.30	15.44	10.65	7.45	<15	c	44.68	25.23
95-123	Bw3	30.65	17.58	51.77	1.50	5.57	10.18	9.65	3.75	<15	c	54.94	32.07

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	10.17	-	-	0.365	0.48	6.11	-	-	0.25	3.52	-	19.90	0.91	100	7.08
18-49	10.32	-	-	1.38	0.30	6.76	-	-	0.21	16.03	-	24.60	0.79	100	26.07
49-95	10.08	-	-	2.55	0.17	6.11	-	-	0.33	21.49	-	32.60	0.77	100	26.36
95-123	9.92	-	-	2.56	0.12	7.93	-	-	0.51	26.03	-	36.00	0.70	100	28.92

Contd…

Soil Series: Yadgir **(**YDR) **Pedon:** R-5

Location: $16^0$35'43.6"N $77^0$17'06.4"E, Kanikal village, Balichakra hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-14	Ap	86.59	8.77	4.64	23.19	26.92	14.11	15.22	7.16	-	ls	6.97	2.68
14-43	C1	73.39	11.31	15.30	6.76	20.27	24.87	15.66	5.83	-	sl	12.14	7.22
43-89	C2	80.41	3.75	15.84	8.06	13.47	36.73	15.71	6.43	-	sl	22.84	10.18
89-110	C3	63.55	5.40	31.05	8.10	23.05	19.00	9.87	3.53	15-35	scl	38.46	17.70

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-14	7.25	-	-	0.114	0.56	0.00	2.29	0.86	0.07	0.03	3.25	3.40	0.73	96	0.31
14-43	9.47	-	-	0.371	0.32	1.30	14.71	4.28	0.38	1.54	20.91	12.70	0.83	165	4.86
43-89	10.30	-	-	0.820	0.16	0.52	1.70	0.98	0.15	6.62	9.45	8.61	0.54	110	30.77
89-110	10.80	-	-	1.440	0.12	0.91	1.02	2.00	0.29	14.43	17.74	16.17	0.52	110	35.688

Contd…

Soil Series: Belagundi **(**BGD) **Pedon:** T_1/P_2

Location: $16^0$31'65.3"N $77^0$20'84.9"E, Kadechoora village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Very-fine, smectitic (calcareous), 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
0-13	Ap	14.90	17.83	67.27	0.77	2.10	2.65	5.96	3.42	-	c	43.97	29.27
13-40	Bw1	13.07	18.32	68.61	0.80	2.05	2.61	4.20	3.41	-	c	41.23	30.48
40-80	Bw2	11.68	17.18	71.13	0.80	2.06	2.29	3.32	3.21	-	c	46.72	32.41
80-113	Bw3	12.17	16.53	71.30	1.95	1.61	3.21	2.41	2.99	-	c	46.87	35.13

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}							%	%
0-13	7.85	-	-	0.253	0.87	5.20	-	-	0.67	0.17	-	65.90	0.98	100	0.26
13-40	8.11	-	-	0.172	0.74	4.29	-	-	0.31	0.16	-	66.70	0.97	100	0.23
40-80	8.44	-	-	0.205	0.58	5.59	-	-	0.20	0.27	-	66.30	0.93	100	0.40
80-113	8.82	-	-	0.201	0.39	10.14	-	-	0.19	0.17	-	63.80	0.89	100	0.27

Contd…

Soil Series: Kudlura (KDR) **Pedon:** T_1/P_2

Location: $16^0$34'03.1"N $77^0$14'71.7"E, Kyathanala village, Sydhapura Hobli, Yadgir taluk and district

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

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-6	Ap	49.52	14.58	35.90	5.71	7.41	14.81	15.66	5.93	-	sc	26.86	12.10
6-26	BA	50.79	13.31	35.90	7.41	9.10	15.56	13.12	5.61	-	sc	25.65	12.24
26-67	Bw1	43.49	15.97	40.54	5.86	7.38	13.56	10.85	5.86	-	c	31.22	16.48
67-115	Bw2	37.42	18.93	43.66	6.51	6.83	10.95	8.68	4.45	-	c	36.13	22.34
115-144	Bw3	39.74	18.88	41.38	8.16	7.84	10.63	8.70	4.40	-	c	35.83	20.57

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}							%	%
0-6	8.34	-	-	0.15	0.72	3.55	-	-	0.42	0.07	-	33.20	0.92	100	0.09
6-26	8.55	-	-	0.11	0.85	4.90	-	-	0.33	0.25	-	32.70	0.91	100	0.30
26-67	9.08	-	-	0.17	0.60	5.02	-	-	0.18	1.34	-	36.20	0.89	100	1.48
67-115	9.44	-	-	0.37	0.52	6.61	-	-	0.25	6.72	-	39.30	0.90	100	6.836
115-144	9.53	-	-	0.43	0.56	6.10	-	-	0.26	7.85	-	33.70	0.81	100	9.316

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

5.1 Land Capability Classification

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

Soil Characteristics: Depth, texture, gravelliness, calcareousness.

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

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

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

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

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

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

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

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

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

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

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

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

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

The 19 soil map units identified in the Balachakra-2 microwatershed are grouped under 3 land capability classes and 3 subclasses. An area about 555 ha (96%) in the microwatershed is suitable for agriculture and about 21 ha (4%) covered by others (Habitation and settlements) in the microwatershed (Fig. 5.1).

Good lands (Class II) cover a major area of about 361 ha (63%) and distributed in the major part of the microwatershed. They have minor limitations of soil and erosion. An area of about 47 ha (8%) are moderately good cultivable lands (Class III) and distributed in the northern, southern and eastern part of the microwatershed with moderate limitations of soil and erosion. Fairly good lands (Class IV) cover an area of about 147 ha (26%) and distributed in the western, northwestern, northern and eastern part of the microwatershed. They have moderate limitations of soil and erosion.

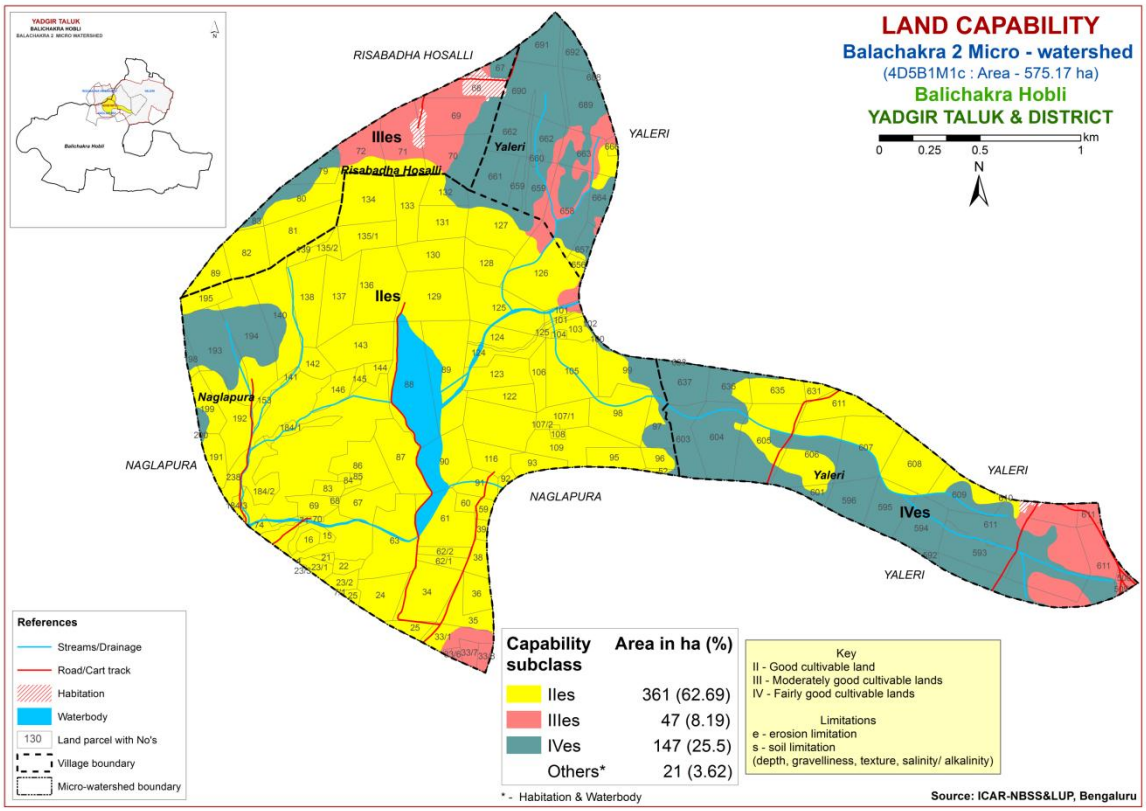

Fig. 5.1 Land Capability map of Balachakra-2 Microwatershed

5.2 Soil Depth

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

An area of about 53 ha (9%) are very shallow soils (<25 cm) and occur in the northern part of the microwatershed. Shallow soils (25-50 cm) cover an area of about 36 ha (6%) and distributed in the northern, southern and eastern part of the microwatershed. Moderately shallow (50-75 cm) soils cover an area of about 84 ha (15%) and distributed in the southern and eastern part of the microwatershed. Moderately deep (75-100 cm) soils cover an area of about 9 ha (2%) and distributed in the southern and northern part of the microwatershed. Deep (100-150 cm) soils cover a major area of about 373 ha (65%) and distributed in the major part of the microwatershed.

The most productive lands 373 ha (65%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are deep (100-150 cm)

soils. The problem soils cover about 89 ha (15%) area where only short duration crops can be grown and the probability of crop failure is high.

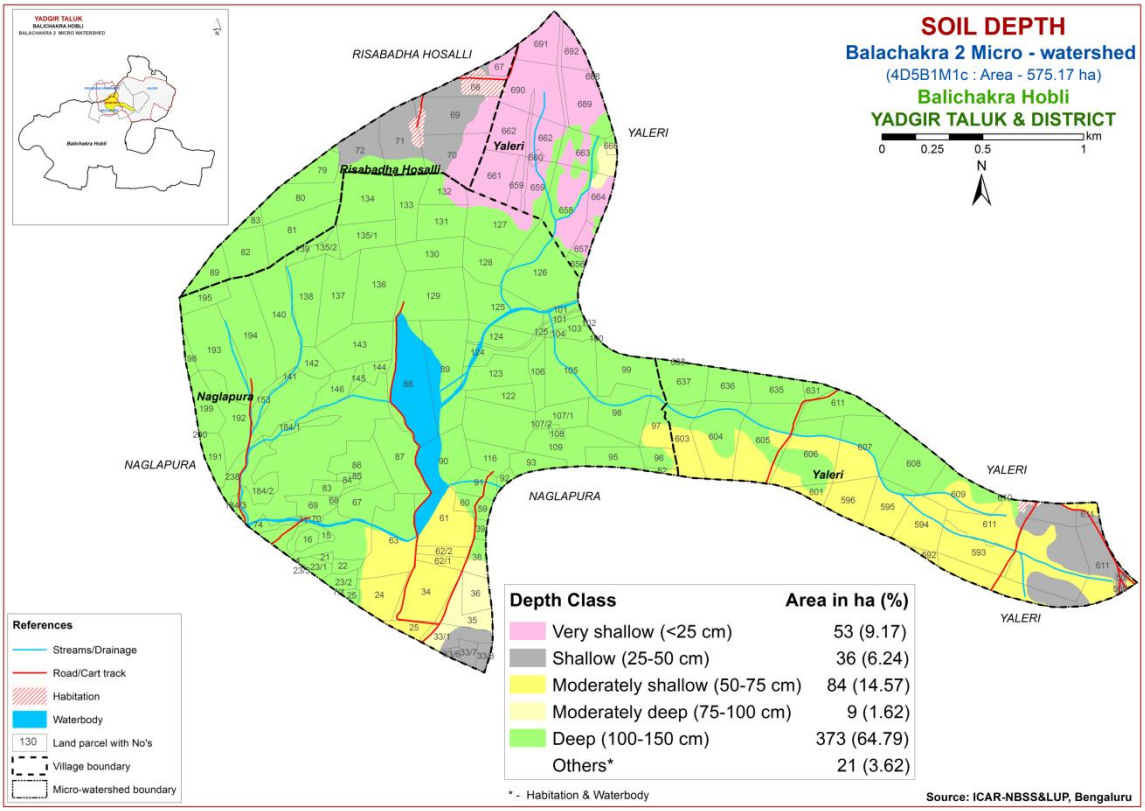

Fig. 5.2 Soil Depth map of Balachakra-2 Microwatershed

5.3 Surface Soil Texture

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

An area of about 75 ha (13%) has soils that are sandy at the surface and distributed in the northern and eastern part of the microwatershed. Maximum area of about 279 ha (49%) has soils that are loamy at the surface and occur in the major part of the microwatershed. An area of 200 ha (35%) has soils that are clayey at the surface and occur in the central, northern, southern, western, southwestern and eastern part of the microwatershed.

Entire area has most productive lands with respect to surface soil texture except 13 per cent area where they are sandy soils. The clayey soils (35%) have high potential

for soil-water retention and availability, and nutrient retention and availability, but have more problems of drainage, infiltration, workability and other physical problems. The other productive lands are loamy soils (49%) which also have high potential for soil-water retention and nutrient availability but have no drainage or other physical problems. The sandy soils (13%) are also productive for root and tuber crops, but these soils have the major limitations of moisture and nutrient retention capacity, hence frequent and shallow irrigation with balanced fertilizer application is to be followed in order to get better crop yields.

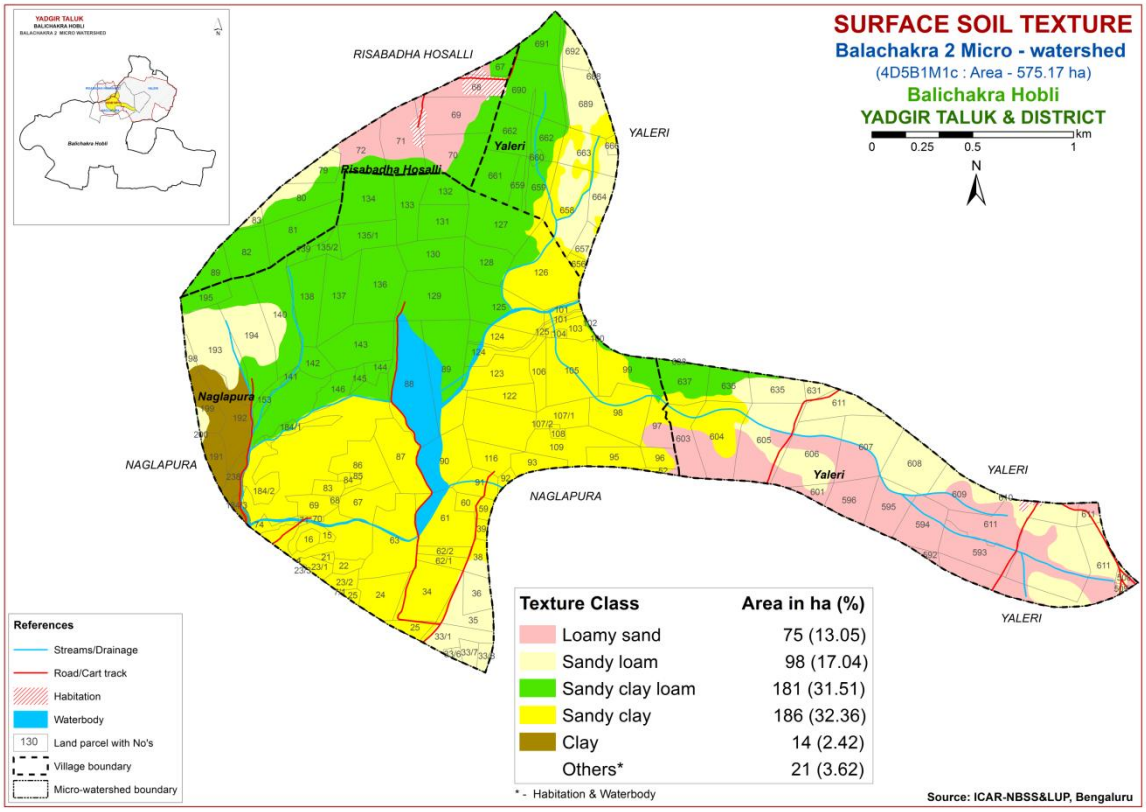

Fig. 5.3 Surface Soil Texture map of Balachakra-2 Microwatershed

5.4 Soil Gravelliness

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

Maximum area of about 390 ha (68%) has non gravelly (<15%) soils and occur in the major part of the microwatershed. An area of about 164 ha (29%) has gravelly (15-

35%) soils and distributed in the central, northern, southern, western and northwestern part of the microwatershed.

An area of about 390 ha (68%) are most productive lands with respect to gravelliness. They are non-gravelly with less than 15 per cent gravel and have potential for growing both annual and perennial crops. The problem lands cover about 164 ha (29%) that are gravelly where only medium or short duration crops can be grown.

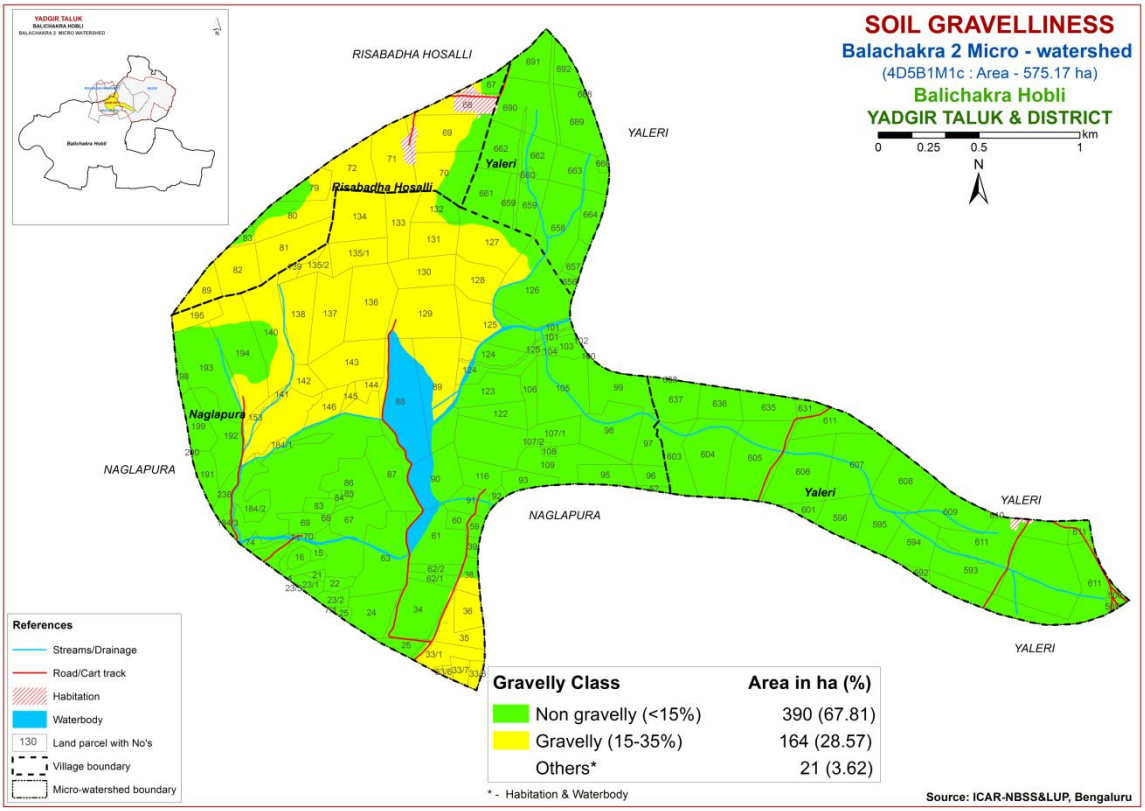

Fig. 5.4 Soil Gravelliness map of Balachakra-2 Microwatershed

5.5 Available Water Capacity

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

An area of about 146 ha (25%) has soils that are very low (<50 mm/m) in available water capacity and distributed in the northern, southern and eastern part of the microwatershed. Low (51-100 mm/m) in available water capacity cover an area of about 53 ha (9%) and occur in the southern, western, northwestern and eastern part of the

microwatershed. An area of about 2 ha (<1%) is medium (101-150 mm/m) in available water capacity and occur in the northern part of the microwatershed. Maximum area of about 354 ha (61%) is very high (>200 mm/m) in available water capacity and occur in the major part of the microwatershed.

An area of 199 ha (35%) in the microwatershed is problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of 354 ha (61%) potential, where all climatically adapted long duration crops can be grown.

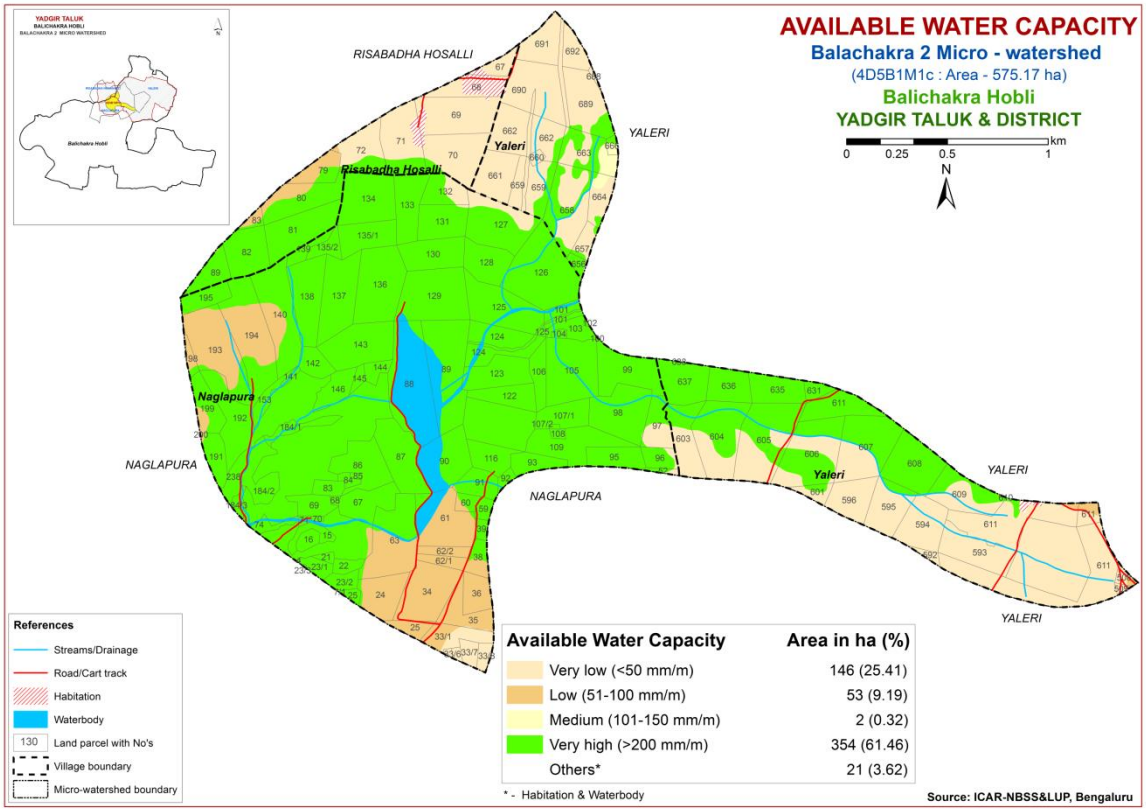

Fig. 5.5 Soil Available Water Capacity map of Balachakra-2 Microwatershed

5.6 Soil Slope

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

Maximum area of about 550 ha (96%) falls under very gently sloping (1-3% slope) lands and distributed in the major part of the microwatershed. An area of about 4 ha (1%) falls under gently sloping (3-5% slope) lands and distributed in the southern part of the microwatershed.

An area of about 550 ha (96%) in the microwatershed has soils that have high potential in respect of soil slopes. In these areas, all climatically adapted annual and perennial crops can be grown without much soil and water conservation and other land development measures. An area of about 4 ha (1%) in the microwatershed are problematic and require soil and water conservation measures in order to increase the productivity of soils.

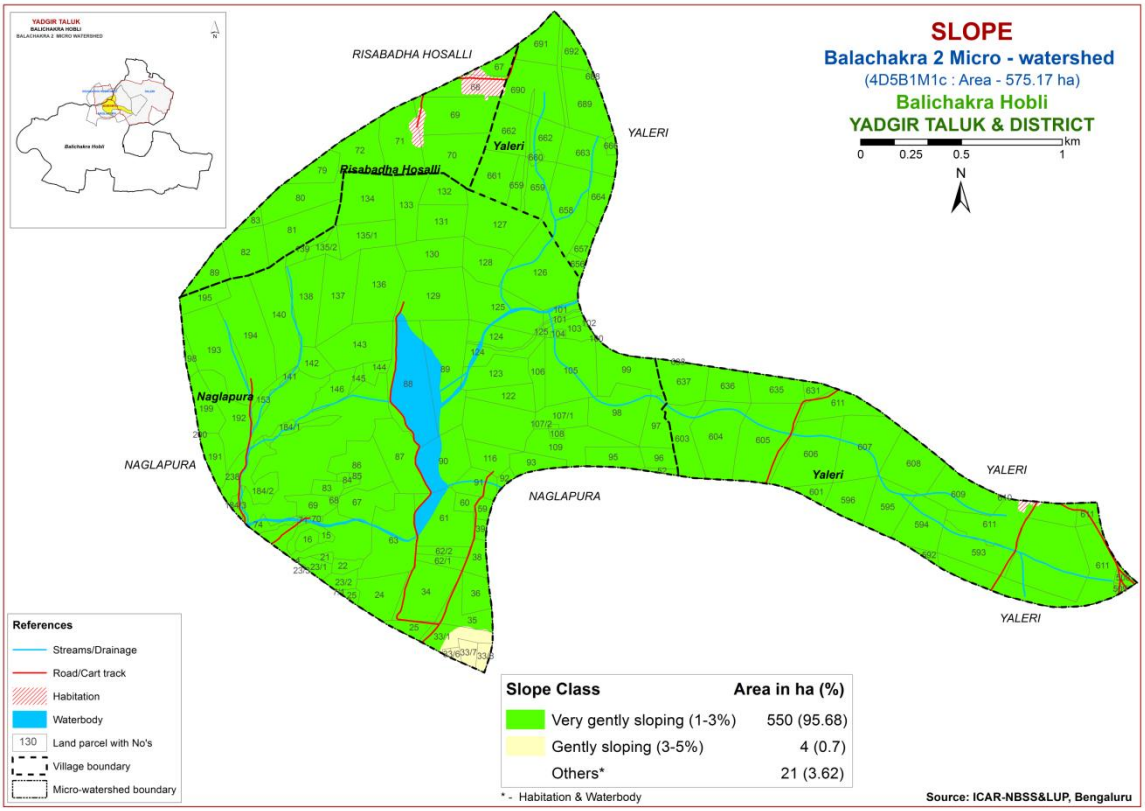

Fig. 5.6 Soil Slope map of Balachakra-2 Microwatershed

5.7 Soil Erosion

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

Soils that are severely eroded (e3 class) cover an area of about 84 ha (15%) and distributed in the northern and eastern part of the microwatershed. Soils that are

moderately eroded (e2 class) cover a maximum area of 470 ha (82%) and are distributed in the major part of the microwatershed.

Entire cultivated area of the microwatershed is problematic because of moderate to severe erosion. For these areas, taking up soil and water conservation and other land development measures are needed.

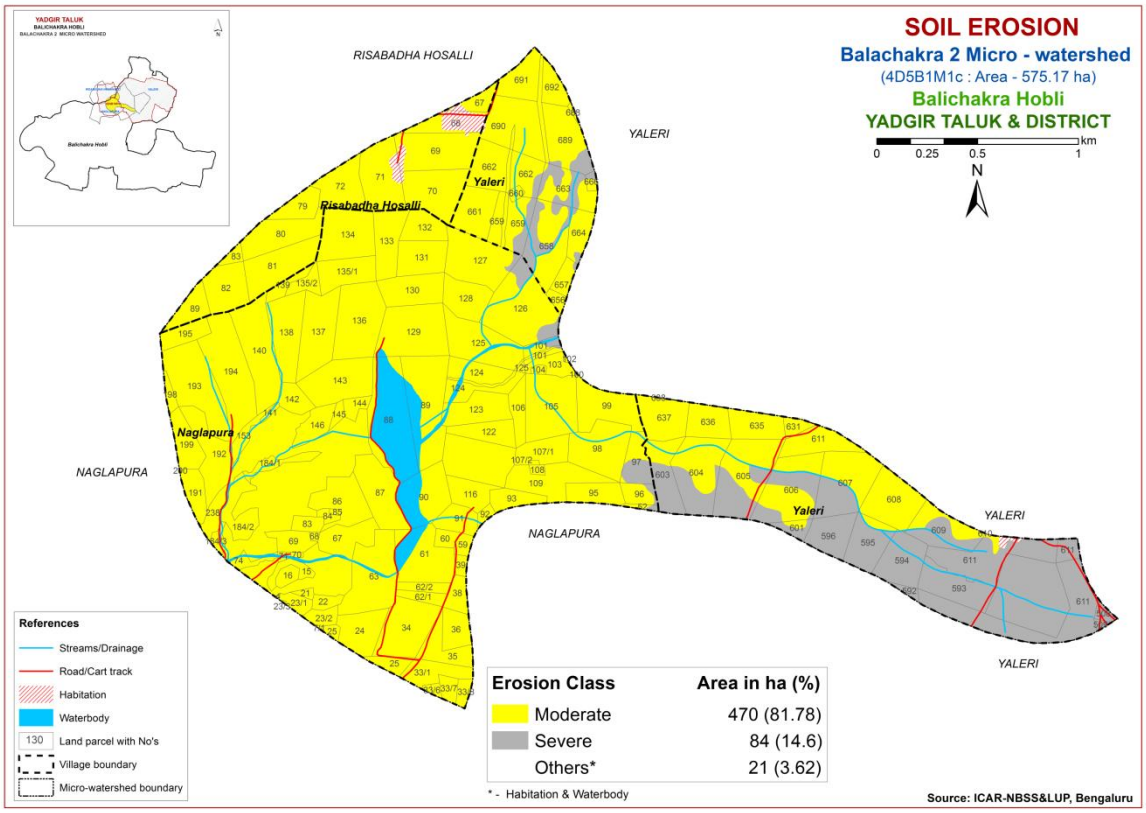

Fig. 5.7 Soil Erosion map of Balachakra-2 Microwatershed

Chapter 6

FERTILITY STATUS

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

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

6.1 Soil Reaction (pH)

The soil analysis of the Balachakra-2 microwatershed for soil reaction (pH) showed that a major area of about 411 ha (71%) is under neutral (pH 6.5-7.3) in soil reaction and distributed in the major part of the microwatershed. An area of about 143 ha (25%) is under slightly alkaline (pH 7.3-7.8) in soil reaction and occur in the central, northern and eastern part of the microwatershed (Fig.6.1). Thus, major soils covering 411 ha (71%) area under neutral and 143 ha (25%) is under alkaline condition.

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is medium (0.5-0.75%) in organic carbon in a major area of about 520 ha (90%) and distributed in the major part of the microwatershed. An area of about 34 ha (6%) is high (>0.75%) in organic carbon and distributed in the eastern part of the microwatershed (Fig. 6.3).

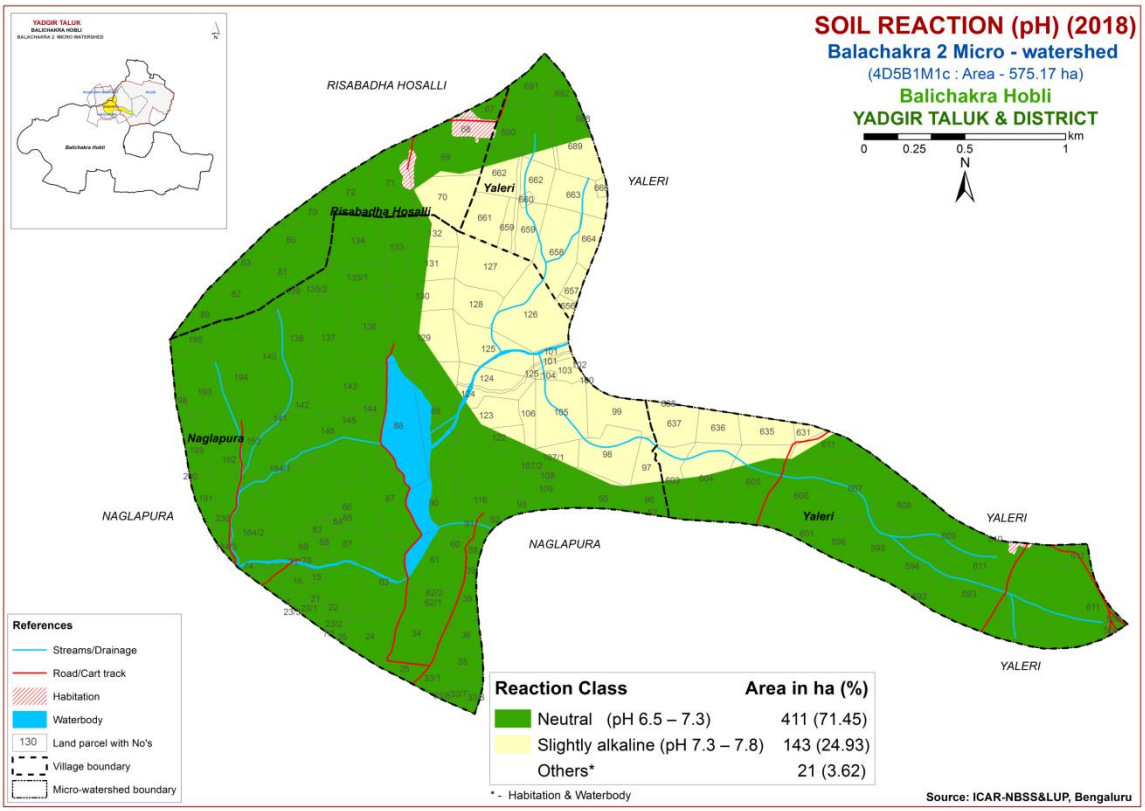

Fig.6.1 Soil Reaction (pH) map of Balachakra-2 Microwatershed

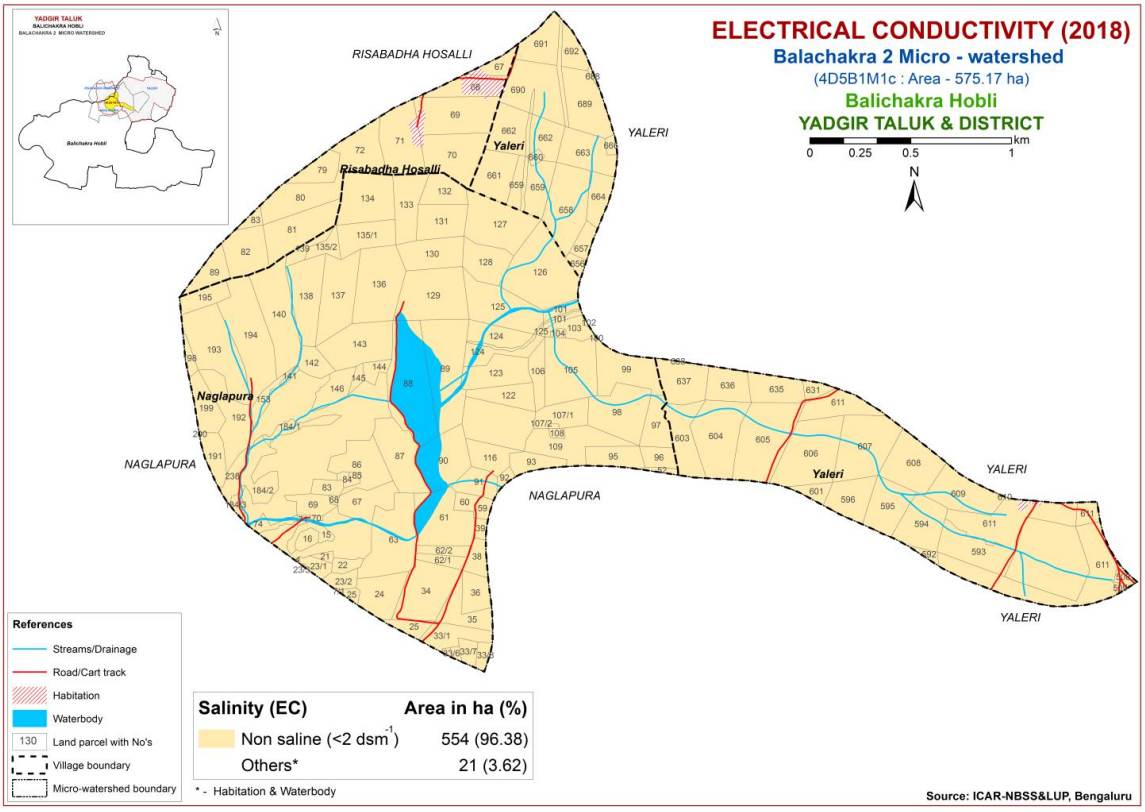

Fig.6.2 Electrical Conductivity (EC) map of Balachakra-2 Microwatershed

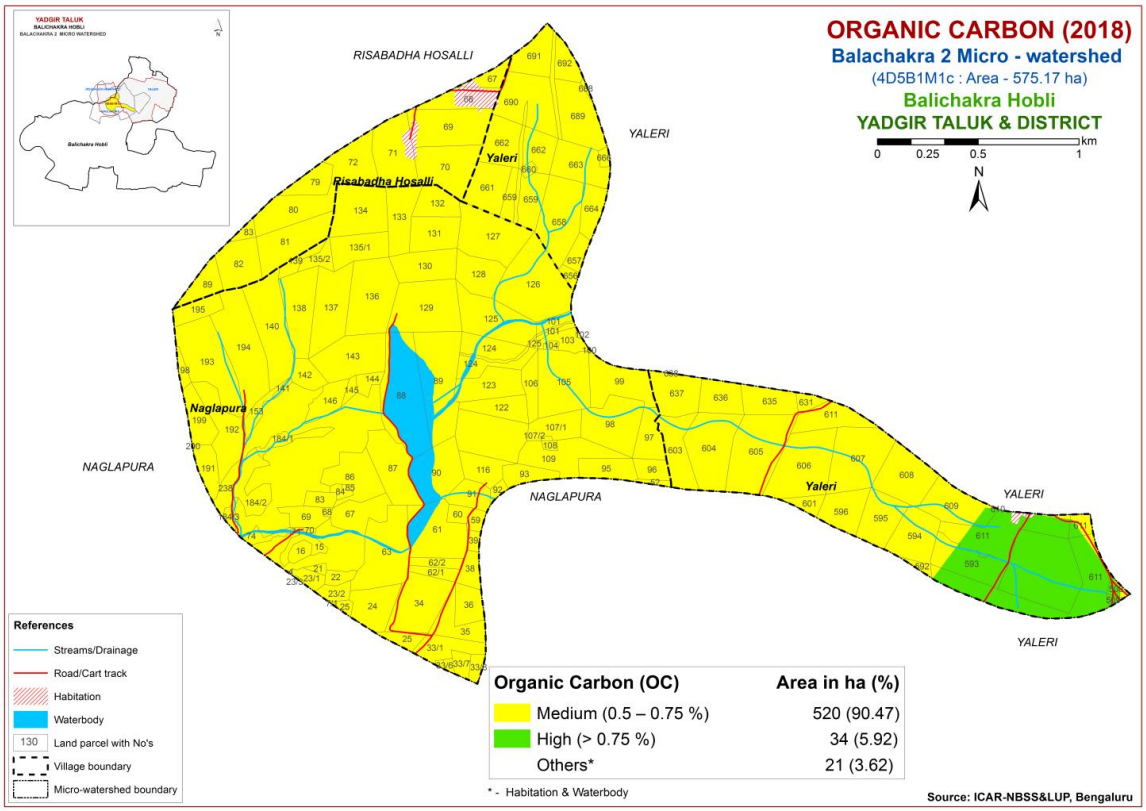

Fig.6.3 Soil Organic Carbon map of Balachakra-2 Microwatershed

6.4 Available Phosphorus

Available phosphorus content is high (>57 kg/ha) covering an area of about 23 ha (4%) and occur in the central and northern part of the microwatershed. Medium (23-57 kg/ha) covering a major area of about 435 ha (76%) and occur in the major part of the microwatershed. Low (<23 kg/ha) in available phosphorus covering an area of about 97 ha (17%) and occur in the northern, southern and eastern part of the microwatershed (Fig. 6.4).

6.5 Available Potassium

Available potassium content is low (<145 kg/ha) covering a major area of about 376 ha (65%) and occur in the major part of the microwatershed. Medium (145-337 kg/ha) in available potassium covering an area of about 178 ha (31%) and occur in the northern, southern, western, northwestern and southwestern part of the microwatershed (Fig.6.5).

6.6 Available Sulphur

Available sulphur is medium (10-20 ppm) in a major area of about 8 ha (1%) and occur in the southern part of the microwatershed. Low (<10 ppm) in available sulphur covering an area of about 546 ha (95%) and occur in the major part of the microwatershed (Fig. 6.6).

6.7 Available Boron

Available boron content is medium (0.5-1.0 ppm) in a major area of about 321 ha (56%) and distributed in the major part of the microwatershed. An area of about 233 ha (41%) is low (<0.5 ppm) in available boron and distributed in the central, northern, southern, southwestern and northwestern part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Available iron content is sufficient (>4.5 ppm) in a major area of about 554 ha (96%) and distributed in the major part of the microwatershed. Deficient (<4.5 ppm) in available iron cover an area of about <1 ha (<1%) and distributed in the minor part of the microwatershed (Fig 6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

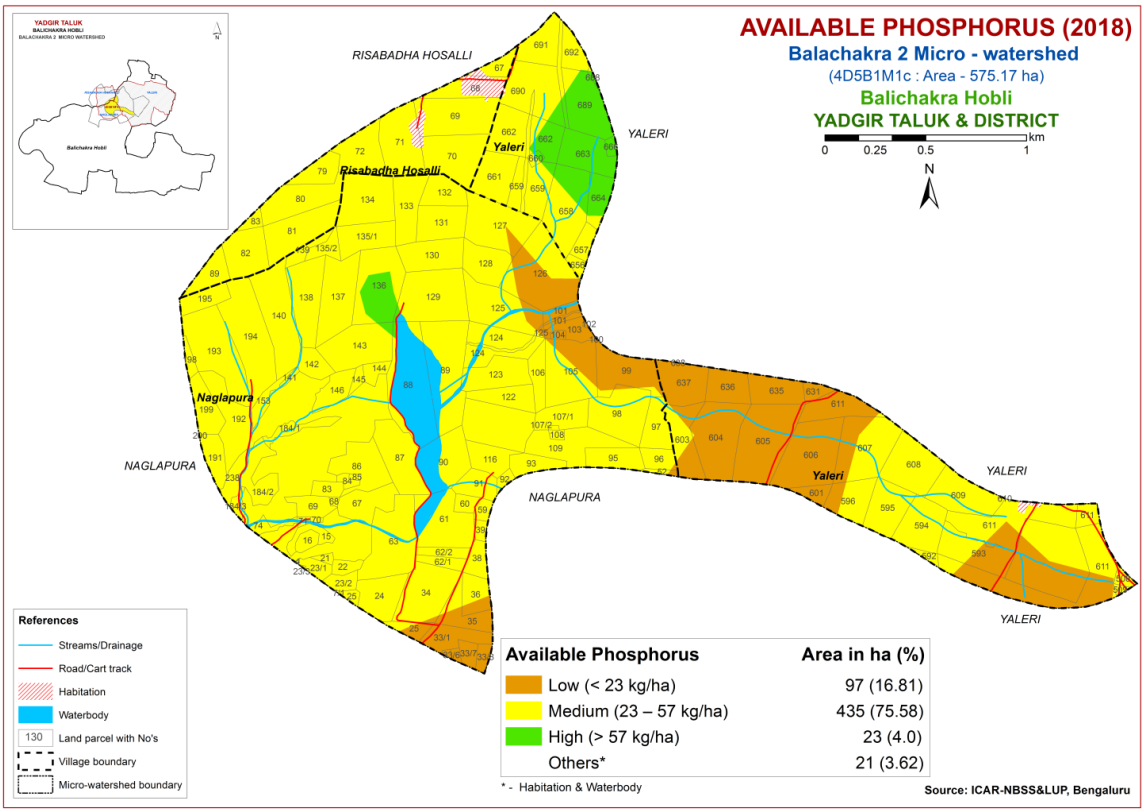

Fig.6.4 Soil Available Phosphorus map of Balachakra-2 Microwatershed

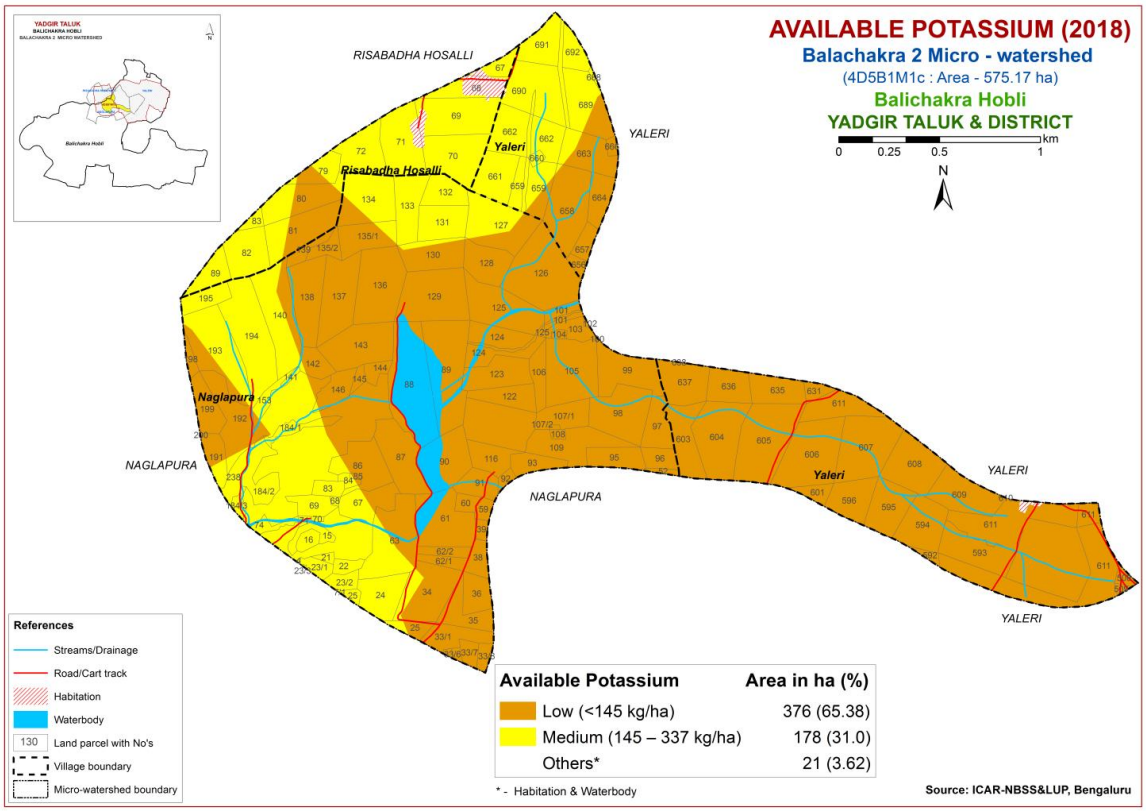

Fig.6.5 Soil Available Potassium map of Balachakra-2 Microwatershed

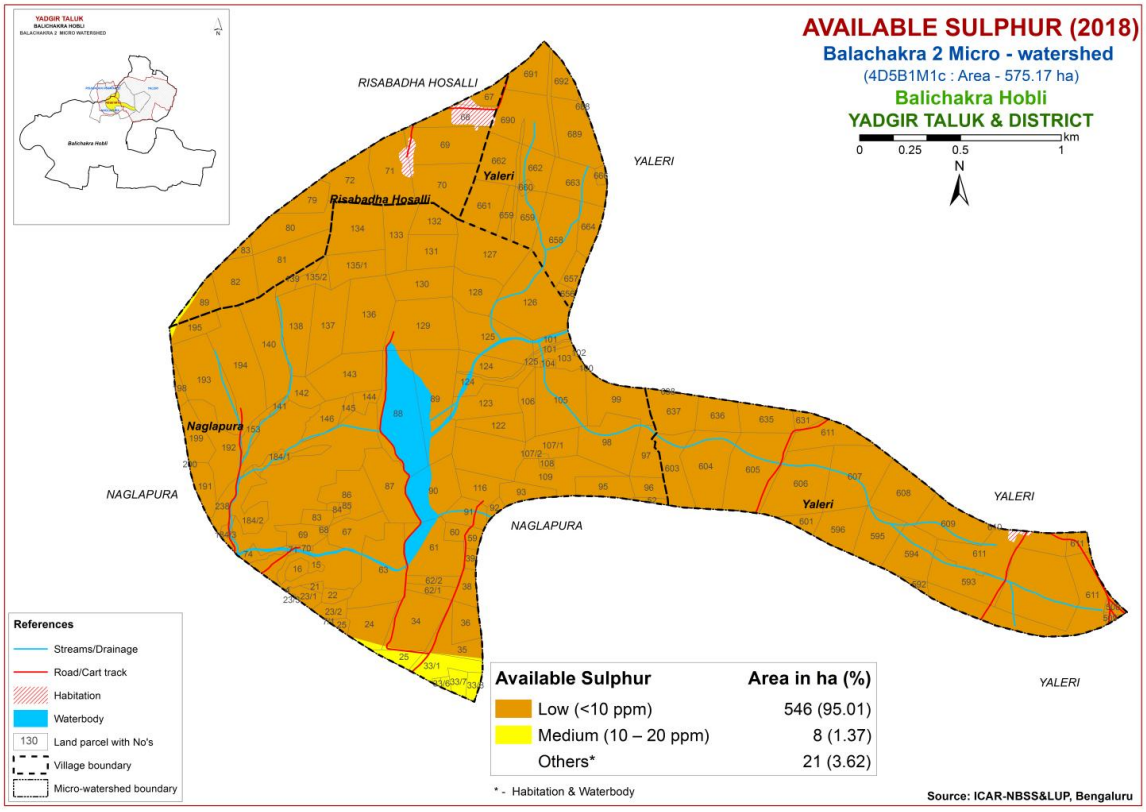

Fig.6.6 Soil Available Sulphur map of Balachakra-2 Microwatershed

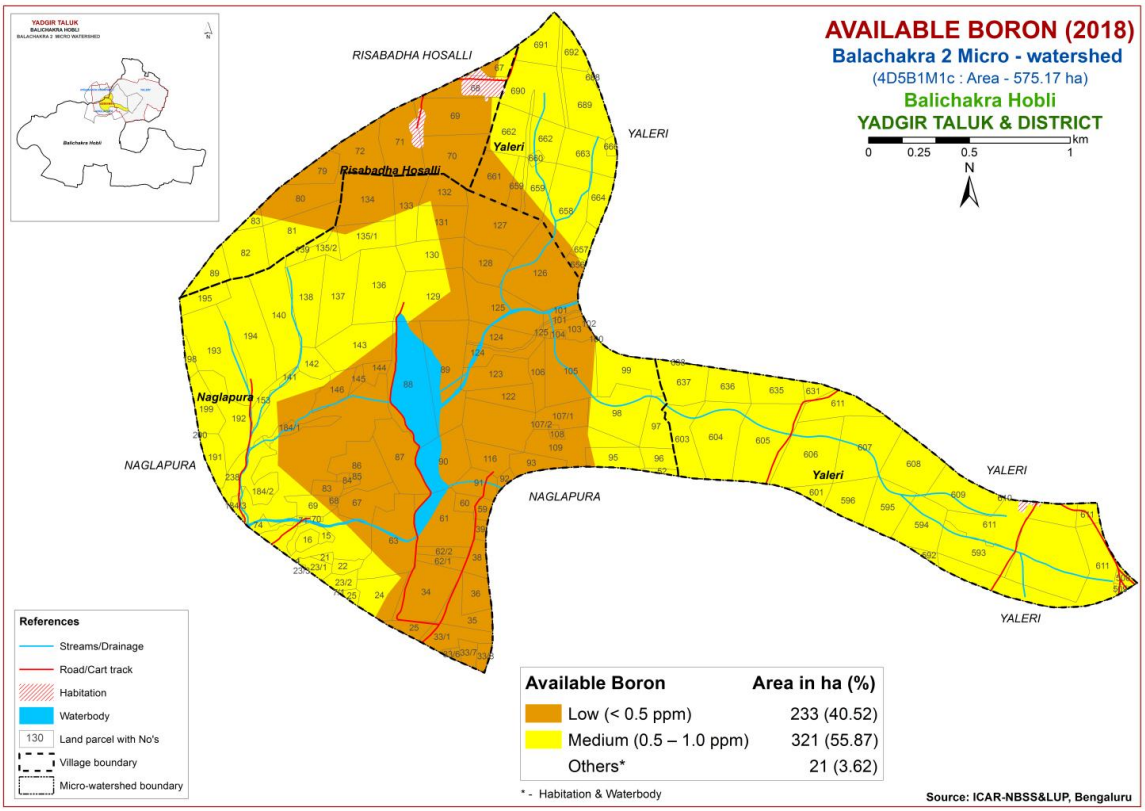

Fig.6.7 Soil Available Boron map of Balachakra-2 Microwatershed

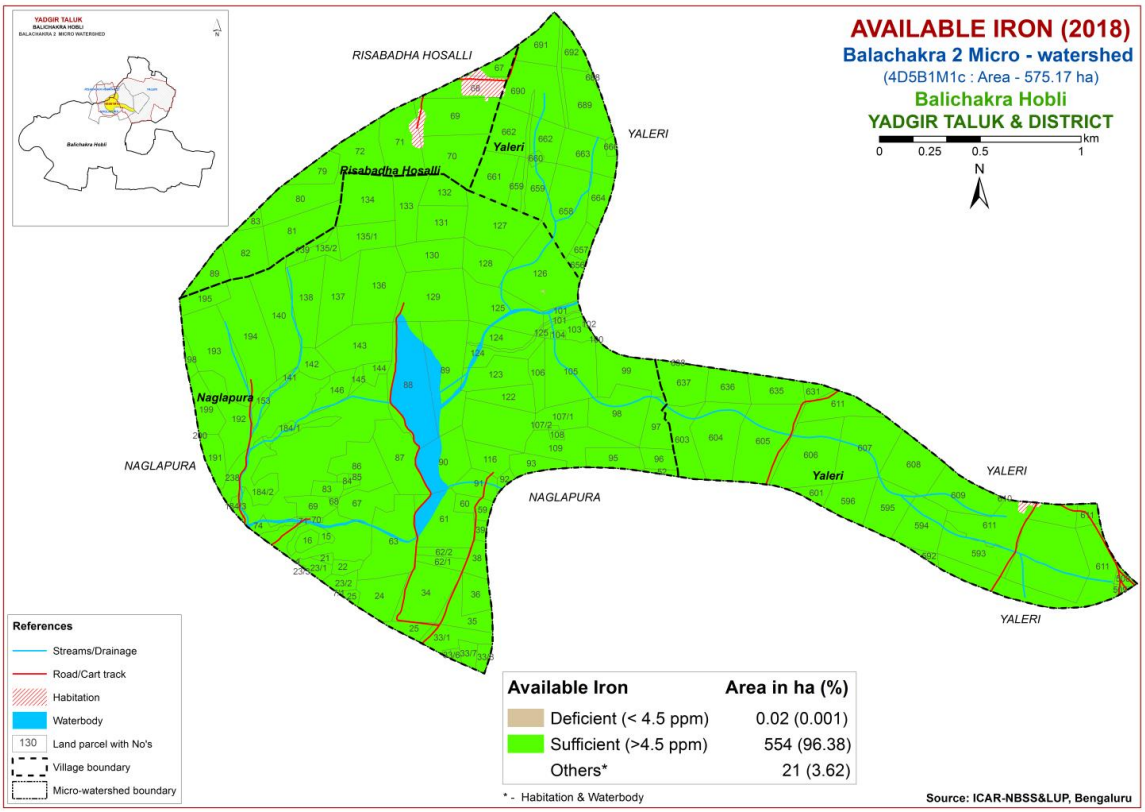

Fig.6.8 Soil Available Iron map of Balachakra-2 Microwatershed

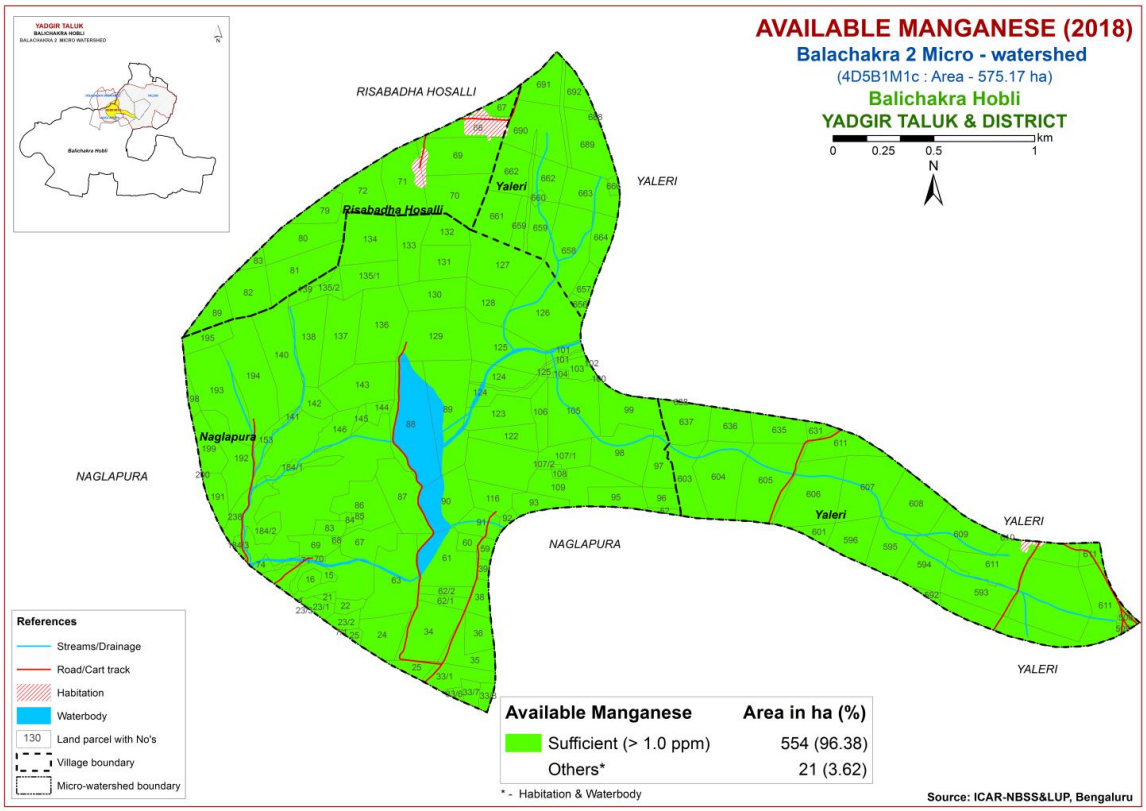

Fig.6.9 Soil Available Manganese map of Balachakra-2 Microwatershed

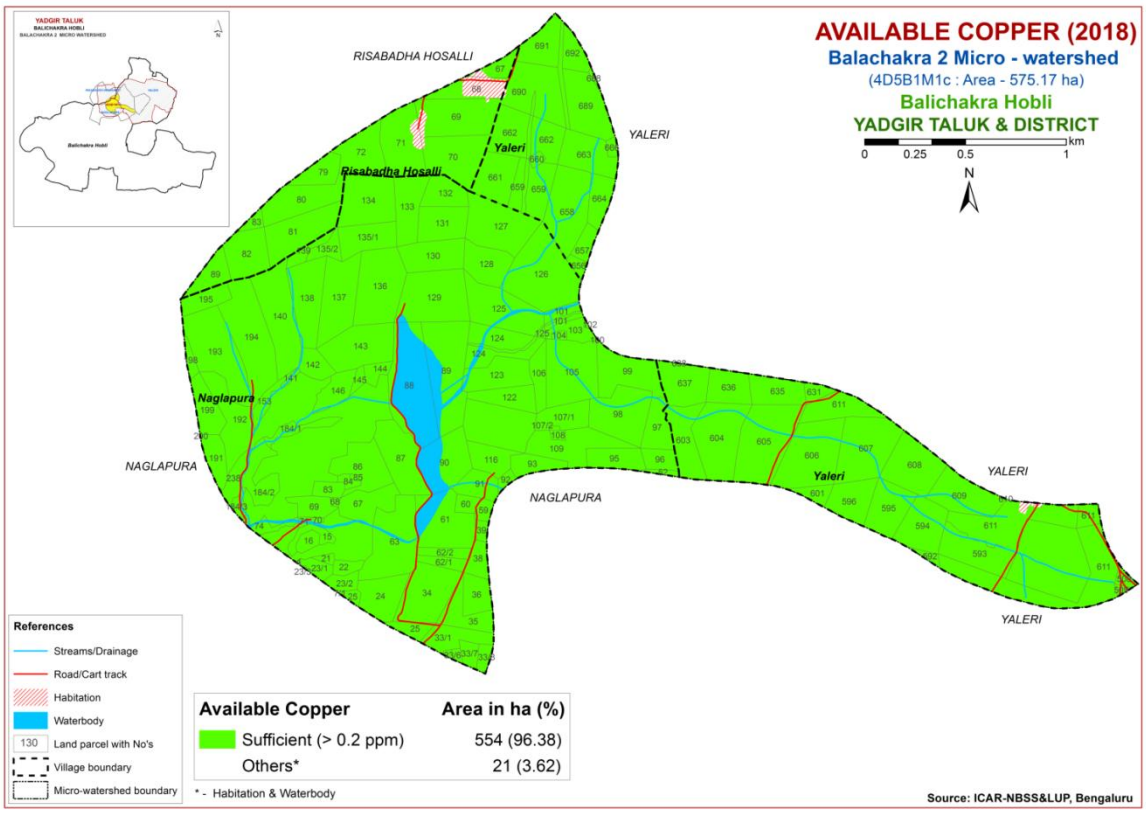

Fig.6.10 Soil Available Copper map of Balachakra-2 Microwatershed

6.11 Available Zinc

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

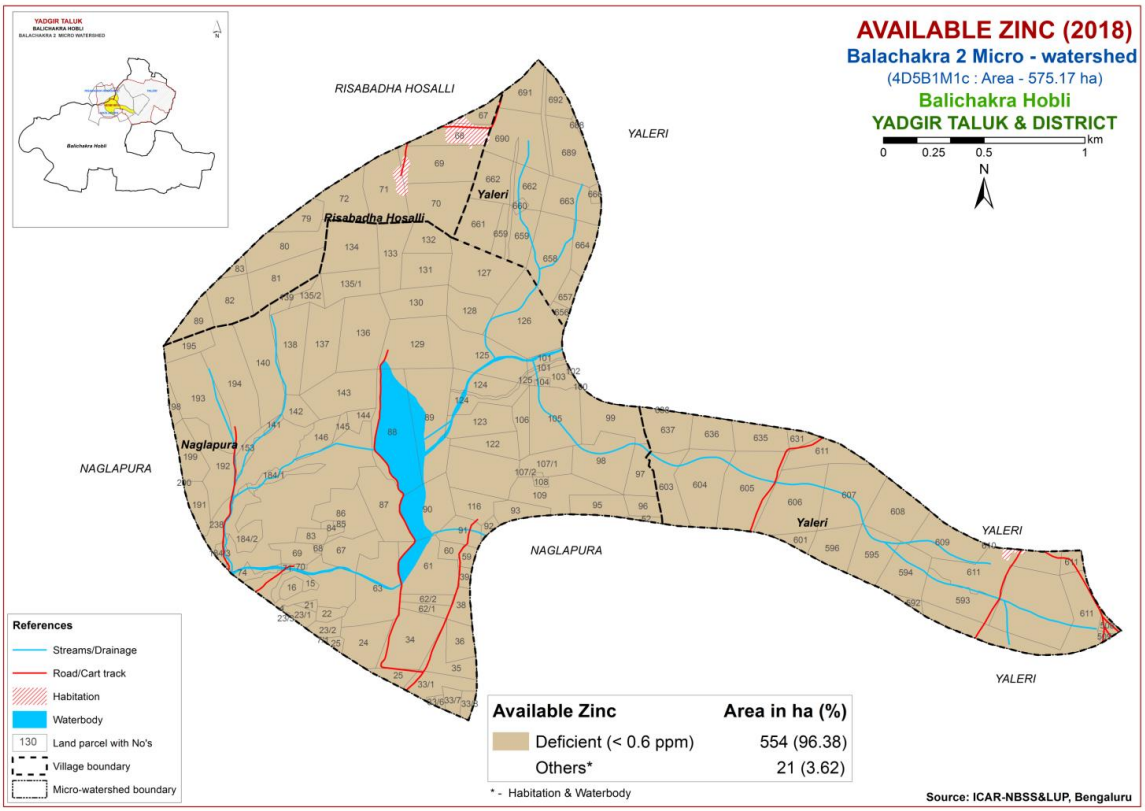

Fig.6.11 Soil Available Zinc map of Balachakra-2 Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Balachakra-2 microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The soil and land characteristics were matched with the crop requirement to arrive at the crop suitability. The soil and land characteristics (Table 7.1) and crop requirement (Table 7.2 to 7.30) are given at the end of the chapter. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1-Currently not Suitable and N2-Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 'l' for topography, 'm' for moisture availability, 'w' for drainage and 'z' for calcareousness. These limitations are indicated as lower case letters to the Class symbol. For example, moderately suitable lands with the limitations of soil depth and erosion are designated as S2re. For the microwatershed, the soil mapping units were evaluated and classified up to subclass level.

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

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

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

An area of about 16 ha (3%) is highly suitable (Class S1) for growing sorghum and distributed in the northern, western and southwestern part of the microwatershed. Maximum area of about 355 ha (62%) is moderately suitable (Class S2) for growing

sorghum and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, calcareousness, nutrient availability, gravelliness and texture. An area of about 130 ha (23%) is marginally suitable (Class S3) for growing sorghum and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with moderate limitations of nutrient availability, texture and rooting depth. Currently not suitable (Class N1) lands for growing sorghum cover an area of about 53 ha (9%) and distributed in the northern part of the microwatershed with severe limitation of rooting depth.

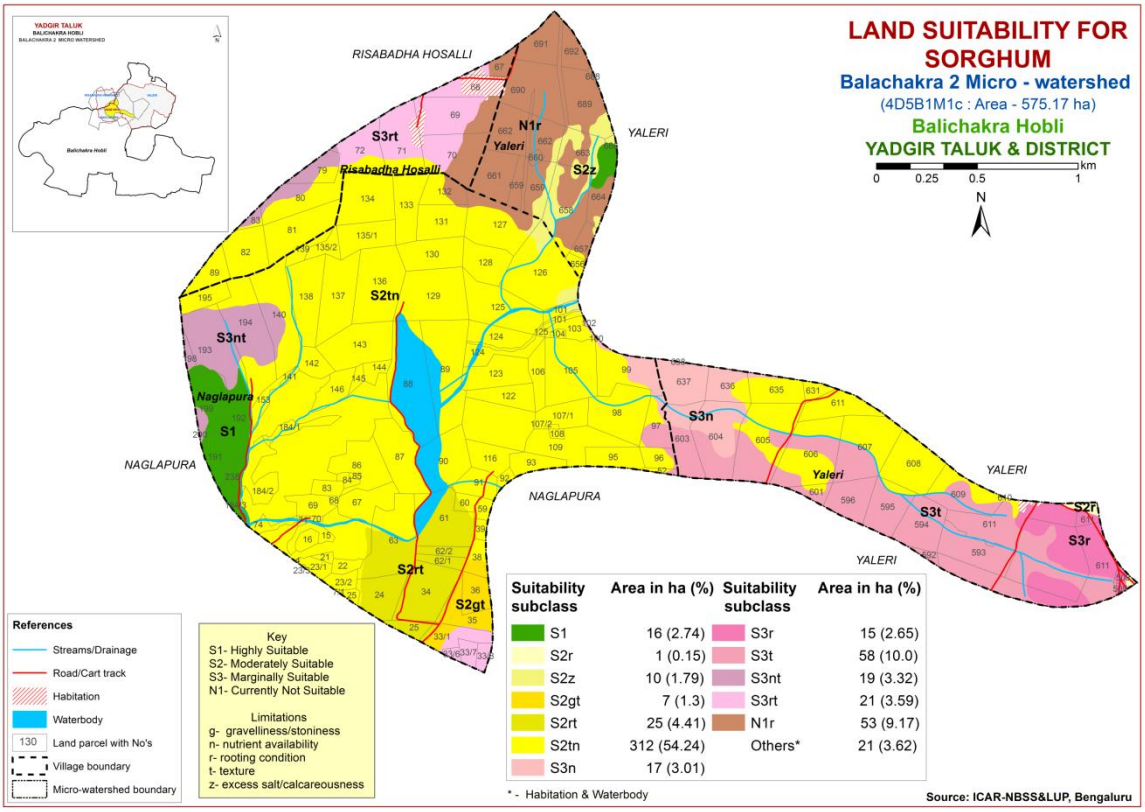

Fig. 7.1 Land Suitability map of Sorghum

7.2 Land Suitability for Maize (*Zea mays*)

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing maize and distributed in the northern part of the microwatershed. Maximum area of about 369 ha (64%) is moderately suitable (Class S2) for growing maize and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, calcareousness, nutrient availability, gravelliness and texture. An area of about 130 ha (23%) is marginally suitable (Class S3) for growing maize and distributed in the southern, western,

northwestern, northern and eastern part of the microwatershed with moderate limitation of nutrient availability, texture and rooting depth. Currently not suitable (Class N1) lands for growing maize cover an area of about 53 ha (9%) and distributed in the northern part of the microwatershed with severe limitation of rooting depth.

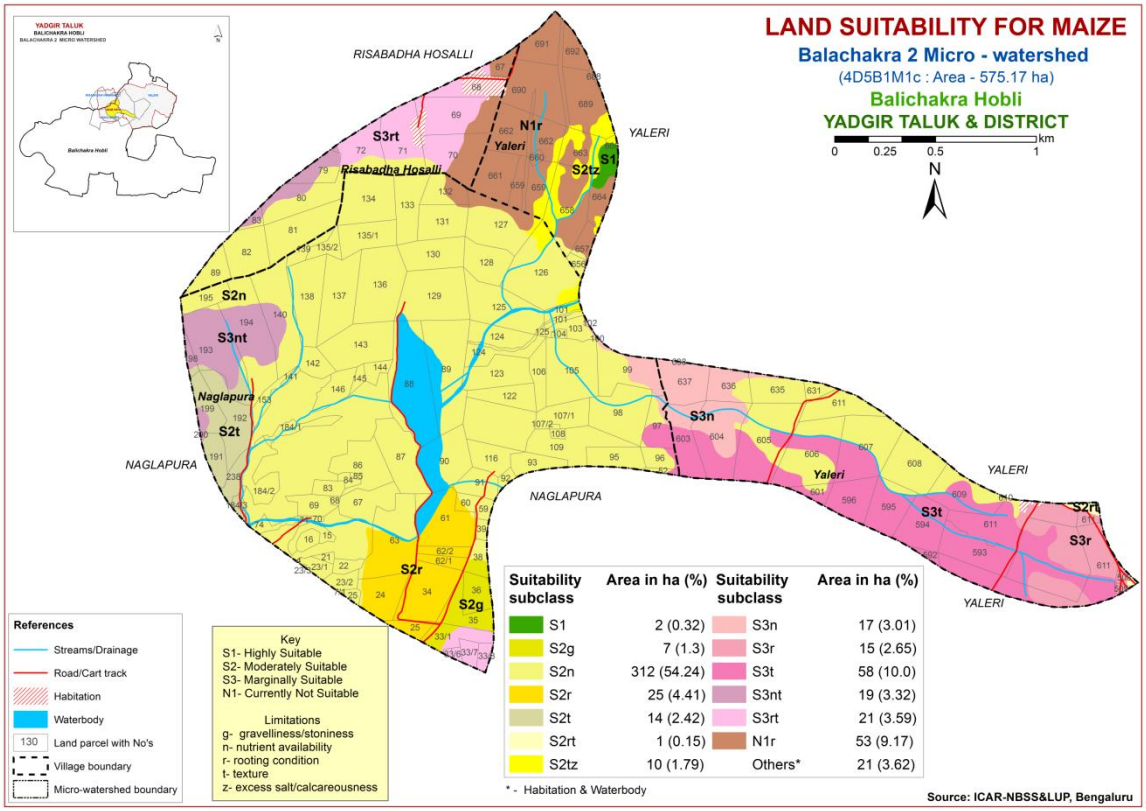

Fig. 7.2 Land Suitability map of Maize

7.3 Land Suitability for Bajra (*Pennisetum glaucum)*

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

An area of about 9 ha (2%) is highly suitable (Class S1) for growing bajra and distributed in the southern and northern part of the microwatershed. Maximum area of about 362 ha (63%) is moderately suitable (Class S2) for growing bajra and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, calcareousness, nutrient availability and texture. An area of about 130 ha (23%) is marginally suitable (Class S3) for growing bajra and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with moderate limitation of nutrient availability, rooting depth and texture. Currently not suitable (Class N1) lands for growing bajra cover an area of about 53 ha (9%) and distributed in the northern part of the microwatershed with severe limitation of rooting depth.

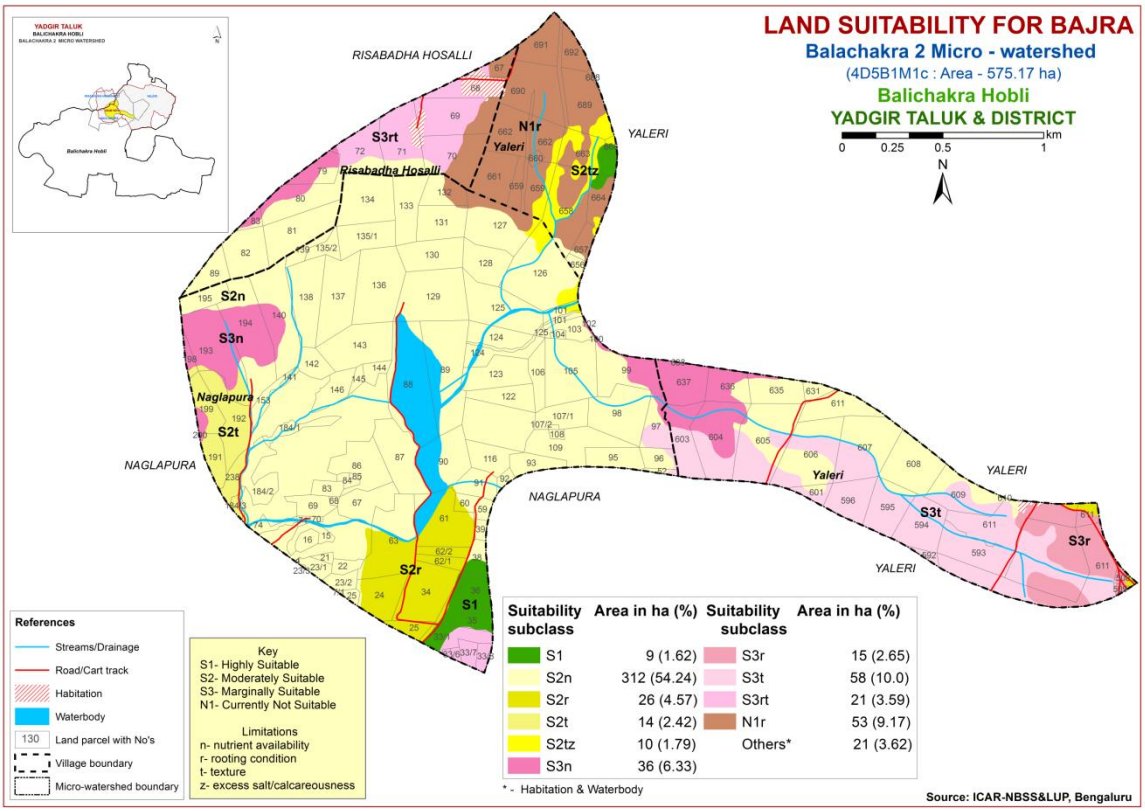

Fig. 7.3 Land Suitability map of Bajra

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 about 7 ha (1%) is highly suitable (Class S1) for growing groundnut and distributed in the southern part of the microwatershed. An area of about 27 ha (5%) is moderately suitable (Class S2) for growing groundnut and distributed in the southern and northern part of the microwatershed. They have minor limitations of rooting depth and texture. Maximum area of about 430 ha (75%) is marginally suitable (Class S3) for growing groundnut and distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, nutrient availability and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) for growing groundnut and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

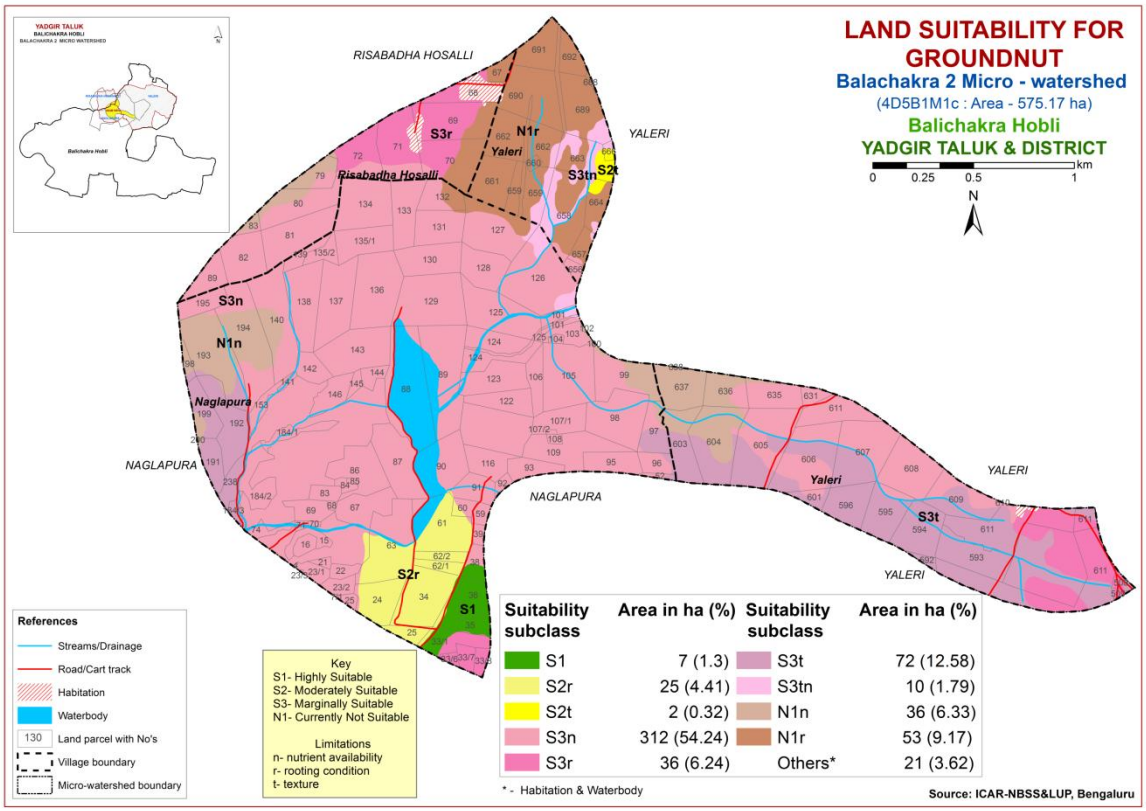

Fig. 7.4 Land Suitability map of Groundnut

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 about 14 ha (2%) is highly suitable (Class S1) for growing sunflower and distributed in the southwestern part of the microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for growing sunflower and distributed in the northern and southern part of the microwatershed. They have minor limitations of rooting depth and texture. Maximum area of about 406 ha (71%) is marginally suitable (Class S3) for growing sunflower and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and nutrient availability. An area of about 125 ha (22%) is currently not suitable (Class N1) for growing sunflower and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with severe limitation of nutrient availability and rooting depth.

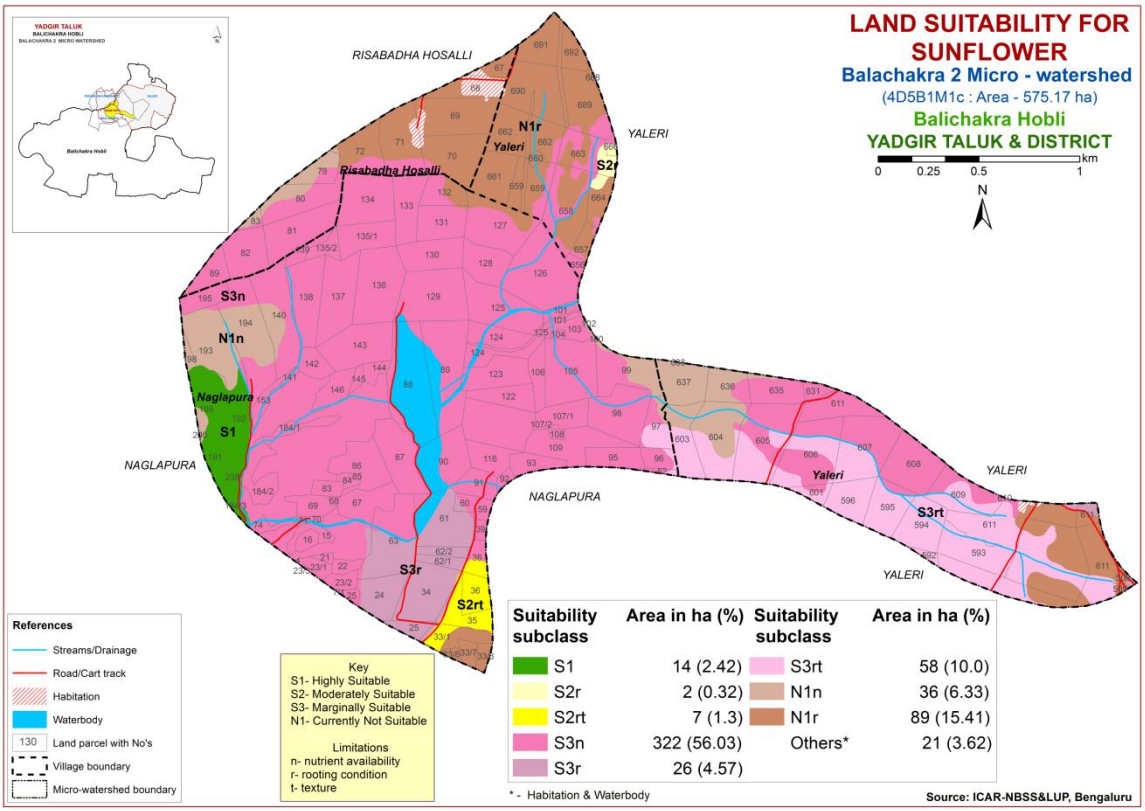

Fig. 7.5 Land Suitability map of Sunflower

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 red gram (Table 7.7) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing redgram was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.6.

Highly suitable (Class S1) lands for growing red gram are not available in this microwatershed. Maximum area of about 345 ha (60%) is moderately suitable (Class S2) for growing redgram and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture, nutrient availability and calcareousness. An area of about 120 ha (21%) is marginally suitable (Class S3) for growing redgram and distributed in the southern, western, northwestern and eastern part of the microwatershed. They have moderate limitations of rooting depth, texture and nutrient availability. An area of about 89 ha (15%) is currently not suitable (Class N1) for growing red gram and occur in the northern, southern and eastern part of the microwatershed with severe limitation of rooting depth.

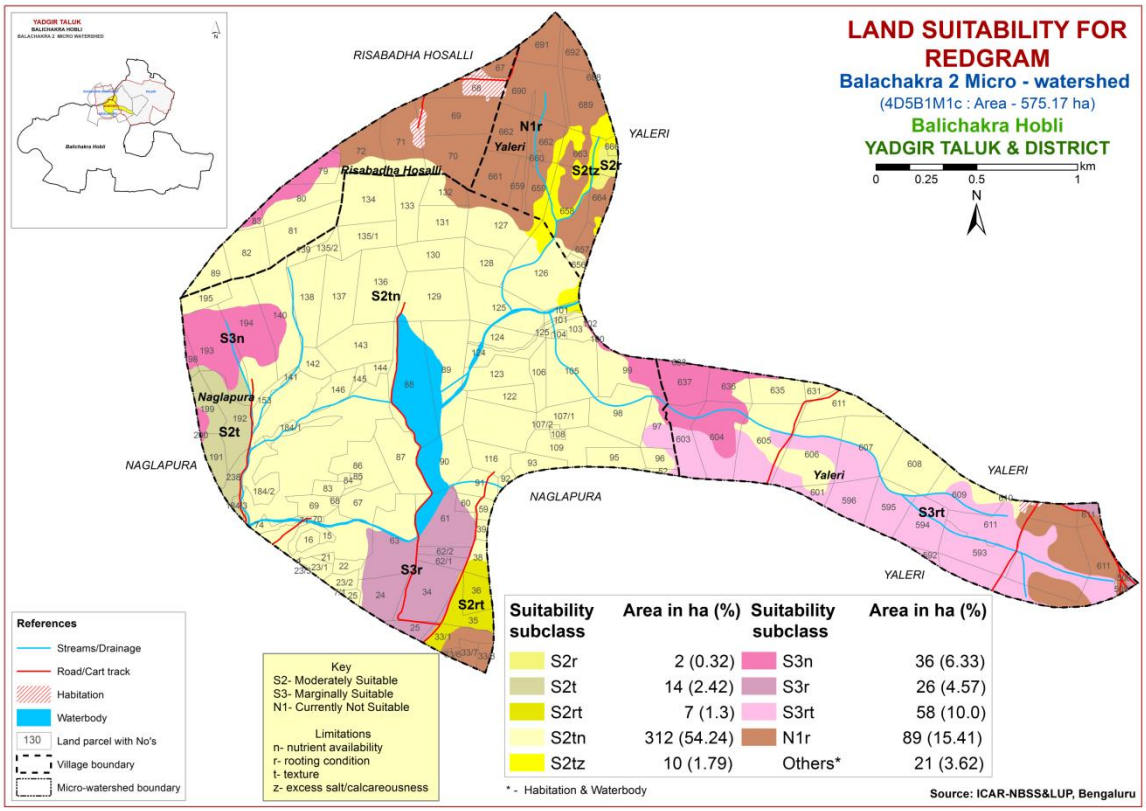

Fig. 7.6 Land Suitability map of Redgram

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

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

Highly suitable (Class S1) lands for growing Bengal gram occur in an area of about 14 ha (2%) and distributed in the western and southwestern part of the microwatershed. An area of about 10 ha (2%) is moderately suitable (Class S2) for Bengal gram and distributed in the northern part of the microwatershed. They have minor limitation of calcareousness. Marginally suitable lands (Class S3) for growing Bengal gram occupy a major area of about 380 ha (66%) and occur in the major part of the microwatershed. They have moderate limitations of texture, rooting depth and nutrient availability. An area of about 150 ha (26%) is currently not suitable (Class N1) for growing Bengal gram and occur in the northern, western, northwestern, southern and eastern part of the microwatershed with severe limitations of rooting depth and texture.

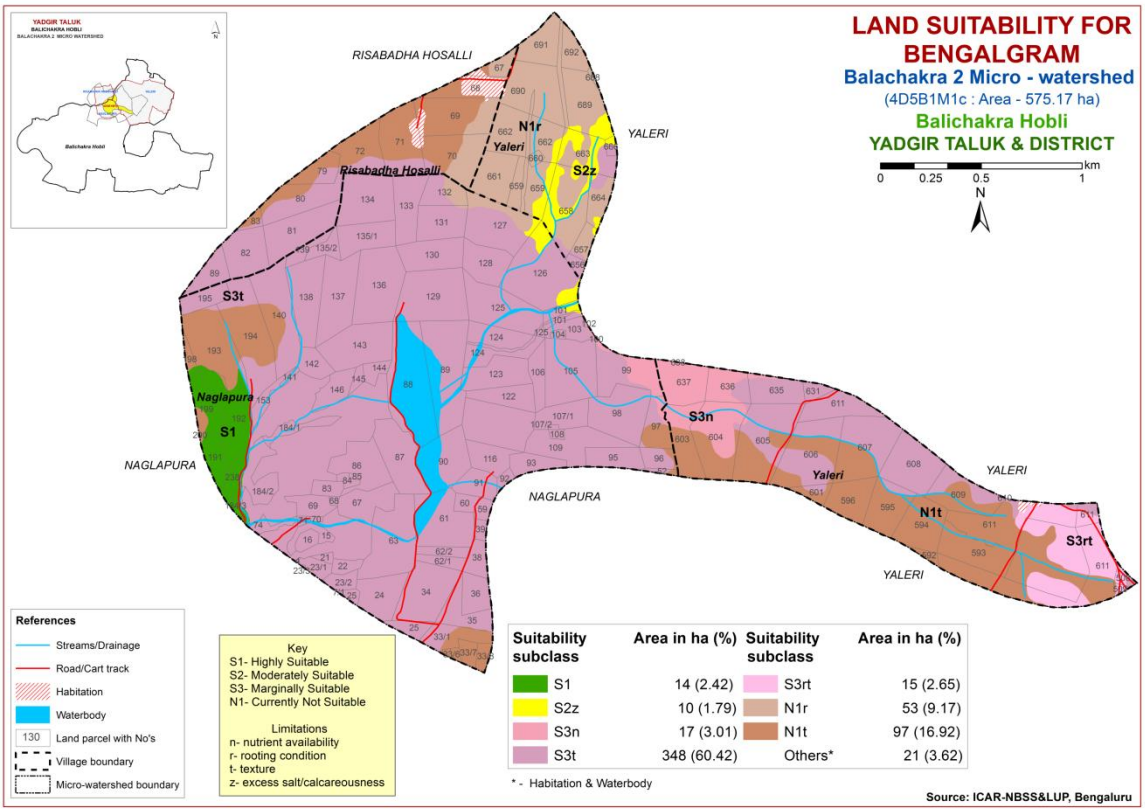

Fig. 7.7 Land Suitability map of Bengal gram.

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

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

Highly suitable (Class S1) lands for growing cotton occur in an area of about 14 ha (2%) and distributed in the western and southwestern part of the microwatershed. An area of about 3 ha (<1%) is moderately suitable (Class S2) for growing cotton and distributed in the northern part of the microwatershed. They have minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing cotton occupy a major area of about 388 ha (67%) and occur in the major part of the microwatershed. They have moderate limitations of texture, rooting depth and nutrient availability. An area of about 150 ha (26%) is currently not suitable (Class N1) for growing cotton and occur in the northern, western, northwestern, southern and eastern part of the microwatershed with severe limitations of rooting depth and texture.

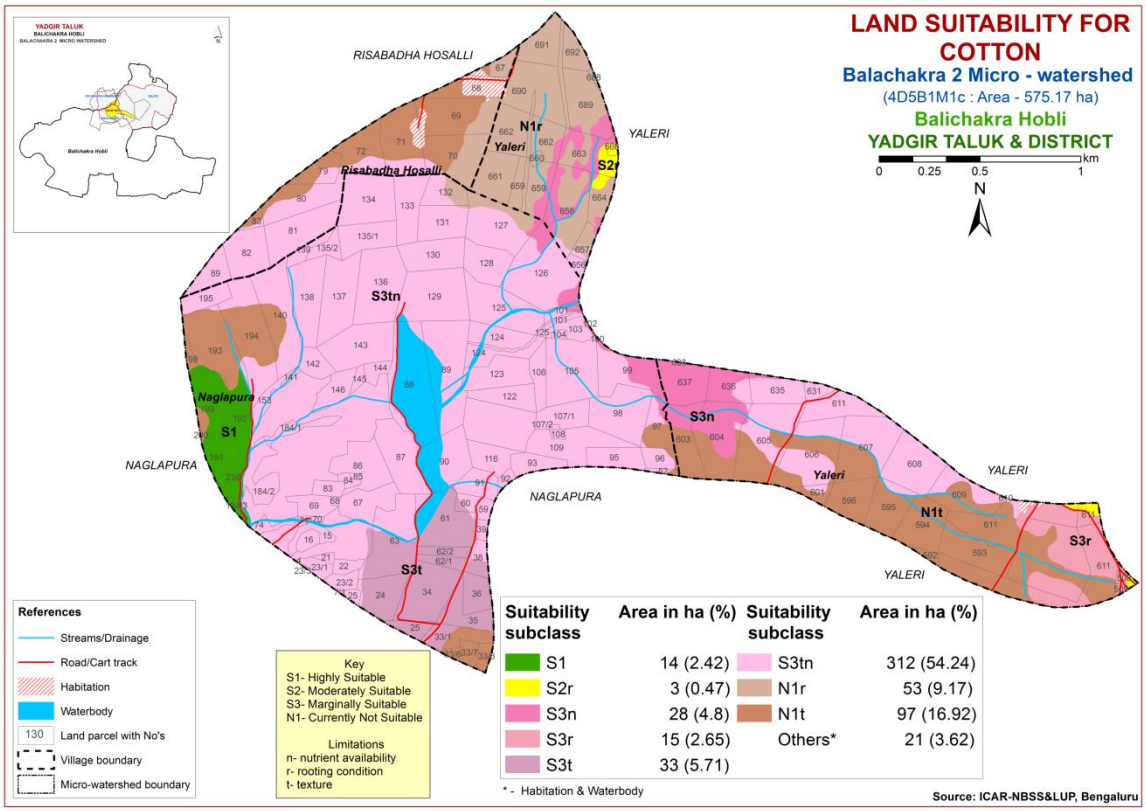

Fig. 7.8 Land Suitability map of Cotton

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important spice crop grown in about 0.42 lakh ha in Karnataka State. The crop requirements for growing chilli (Table 7.10) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chilli was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.9.

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing chilli and distributed in the northern part of the microwatershed. An area of about 47 ha (8%) is moderately suitable (Class S2) for growing chilli and distributed in the southern, southwestern and western part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 416 ha (72%) is marginally suitable (Class S3) for growing chilli and distributed in the major part of the microwatershed with moderate limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) for growing chilli and distributed in the western, northwestern, northern and eastern part of the microwatershed with moderate limitations of nutrient availability and rooting depth.

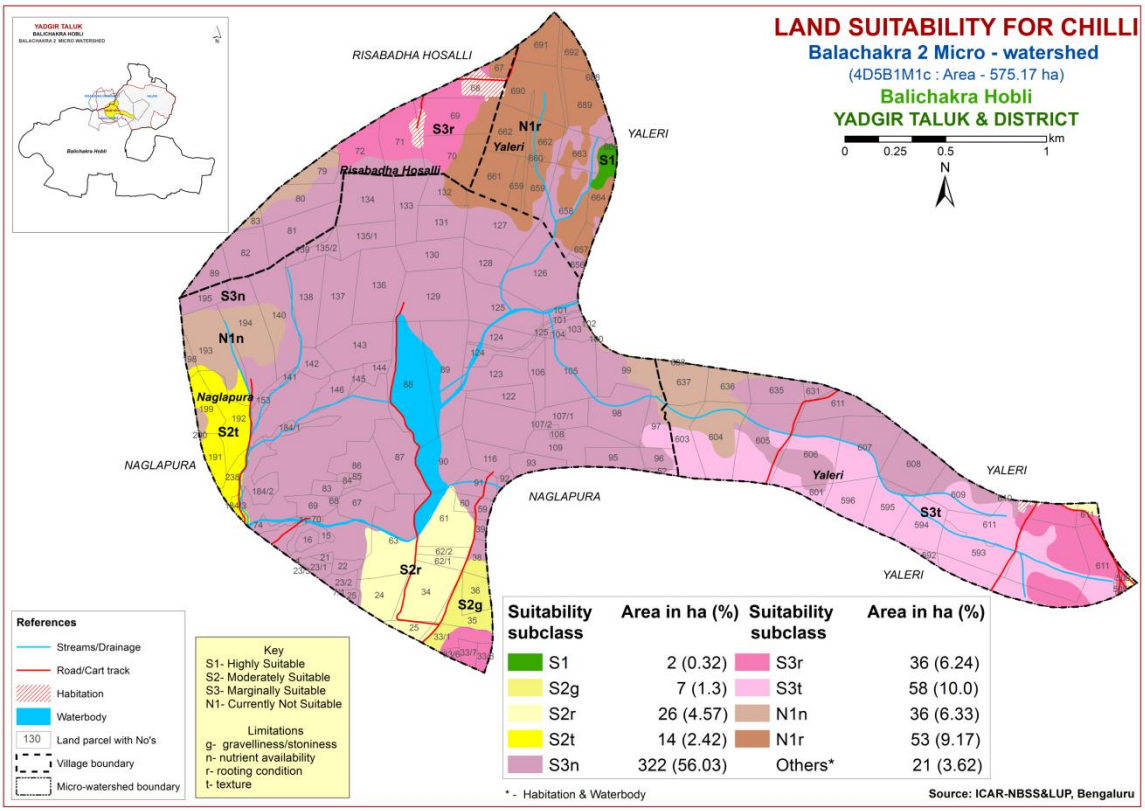

Fig 7.9 Land Suitability map of Chilli

7.10 Land Suitability for Tomato *(Lycopersicon esculentum)*

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing tomato and distributed in the northern part of the microwatershed. An area of about 33 ha (6%) is moderately suitable (Class S2) for growing tomato and distributed in the southern and eastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Maximum area of about 429 ha (75%) is marginally suitable (Class S3) for growing tomato and distributed in the major part of the microwatershed. They have minor limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) for growing tomato and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

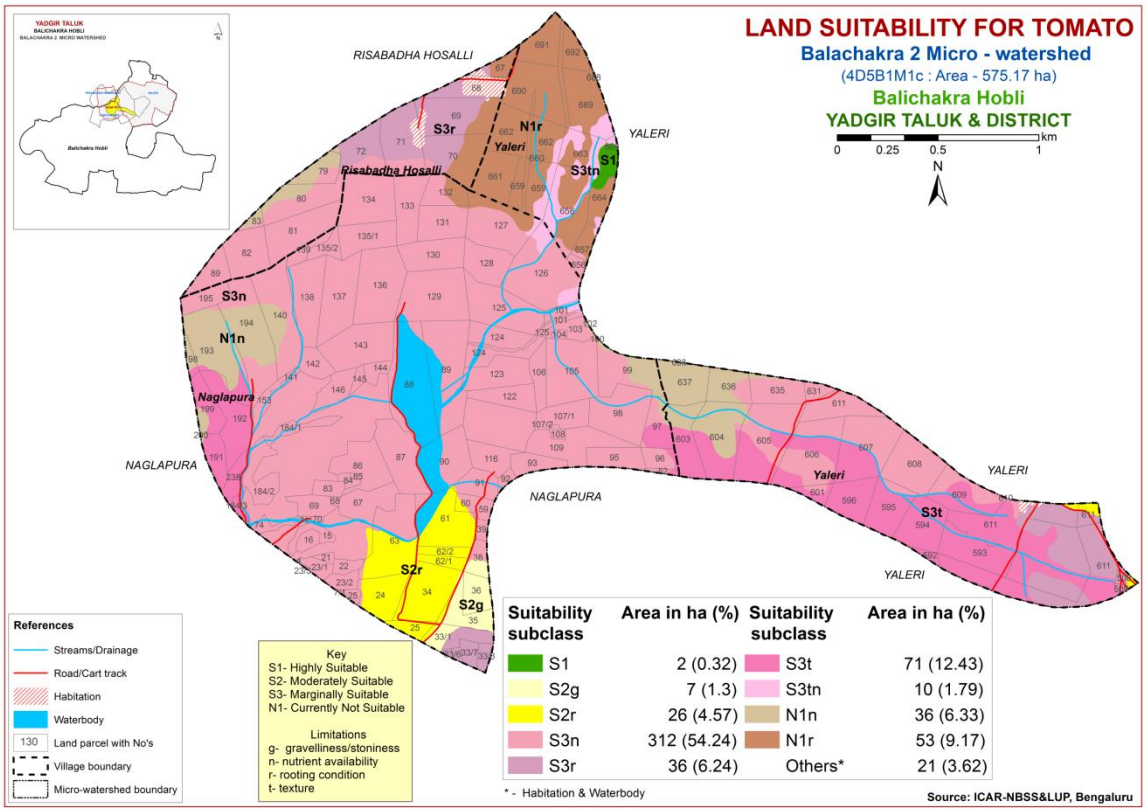

Fig 7.10 Land Suitability map of Tomato

7.11 Land Suitability for Brinjal (*Solanum melongena*)

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing brinjal and distributed in the northern part of the microwatershed. An area of about 33 ha (6%) is moderately suitable (Class S2) for growing brinjal and distributed in the southern and eastern part of the microwatershed. They have minor limitations of gravelliness and rooting depth. Maximum area of about 429 ha (75%) is marginally suitable (Class S3) for growing brinjal and distributed in the major part of the microwatershed. They have moderate limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) for growing brinjal and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

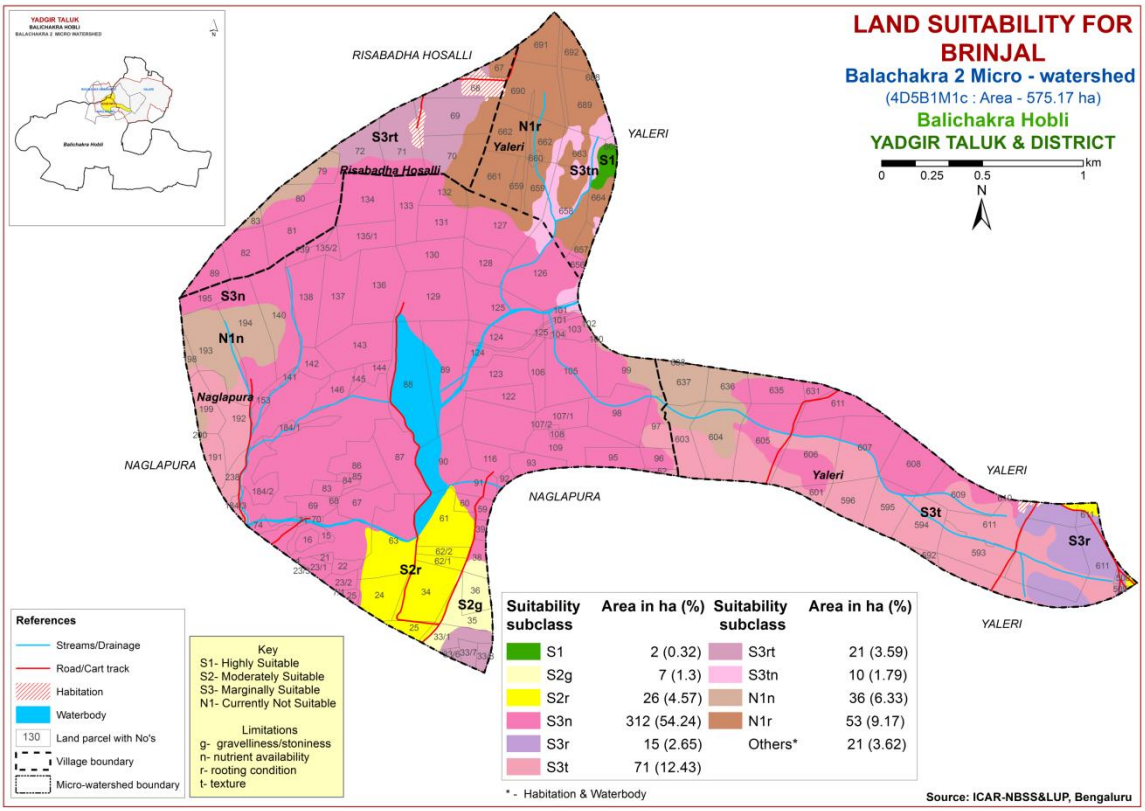

Fig 7.11 Land Suitability map of Brinjal

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

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing onion and distributed in the northern part of the microwatershed. An area of about 7 ha (1%) is moderately suitable (Class S2) for growing onion and distributed in the southern part of the microwatershed. They have minor limitation of gravelliness. An area of about 133 ha (23%) is marginally suitable (Class S3) for growing onion and distributed in the southern, southwestern, western, northern and eastern part of the microwatershed with moderate limitations of texture and rooting depth. Maximum area of about 412 ha (72%) is currently not suitable (Class N1) for growing onion and distributed in the major part of the microwatershed with severe limitations of nutrient availability and rooting depth.

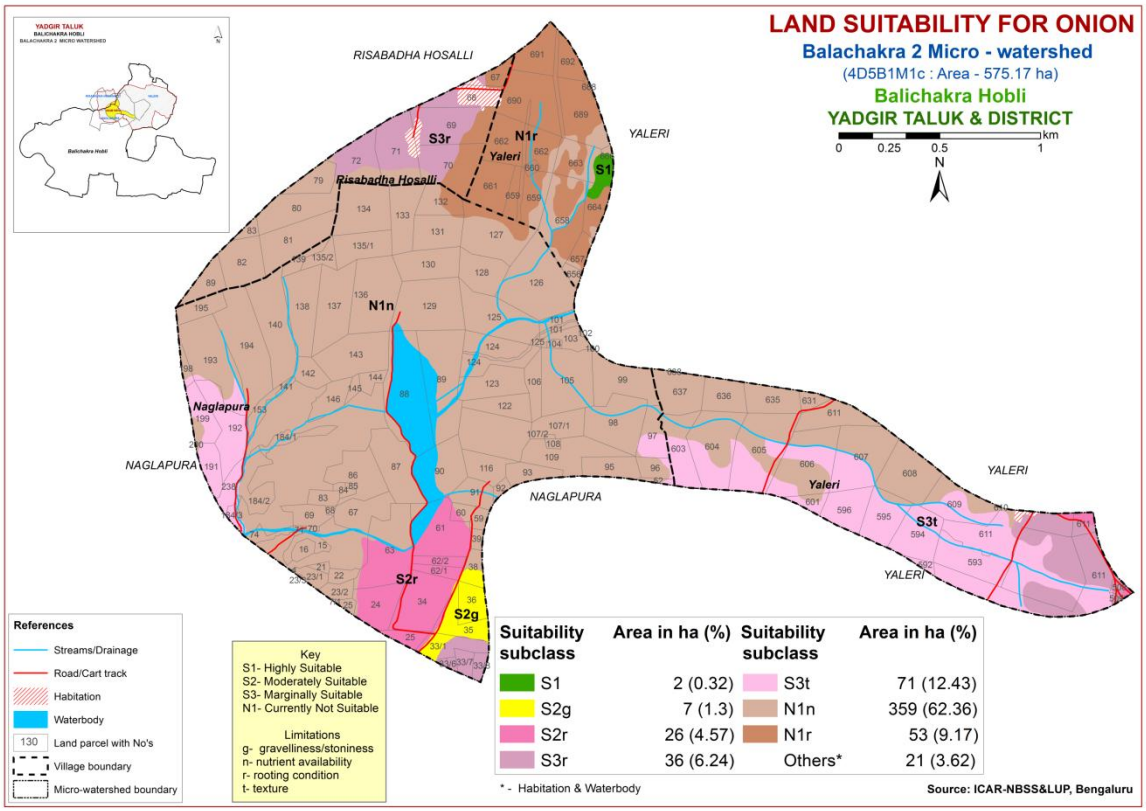

Fig 7.12 Land Suitability map of Onion

7.13 Land Suitability for Bhendi (*Abelmoschus esculentus*)

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing bhendi and distributed in the northern part of the microwatershed. An area of about 47 ha (8%) is moderately suitable (Class S2) for growing bhendi and distributed in the southern, southwestern, western and eastern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 416 ha (72%) is marginally suitable (Class S3) for growing bhendi and distributed in the major part of the microwatershed with moderate limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) and distributed in the western, northwestern, northern and eastern part of the microwatershed with moderate limitation of nutrient availability and rooting depth.

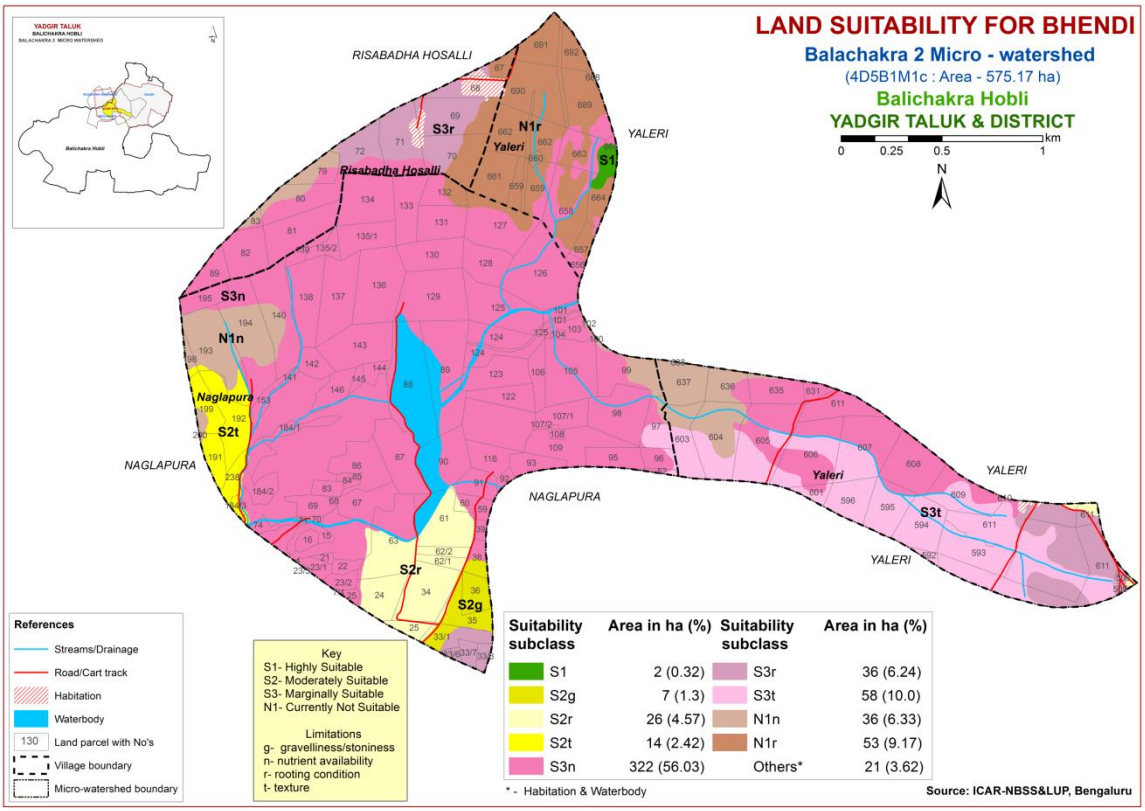

Fig 7.13 Land Suitability map of Bhendi

7.14 Land Suitability for Drumstick (*Moringa oleifera*)

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

Highly suitable (Class S1) lands for growing drumstick are not available in this microwatershed. An area of about 23 ha (4%) is moderately suitable (Class S2) for drumstick and distributed in the northern, southern, western and southwestern part of the microwatershed. They have minor limitations of rooting depth and texture. An area of about 84 ha (15%) is marginally suitable (Class S3) for growing drumstick and distributed in the southern and eastern part of the microwatershed. They have minor limitations of rooting depth and texture. Maximum area of about 448 ha (78%) is currently not suitable (Class N1) for growing drumstick and distributed in the major part of the microwatershed with moderate limitations of nutrient availability and rooting depth.

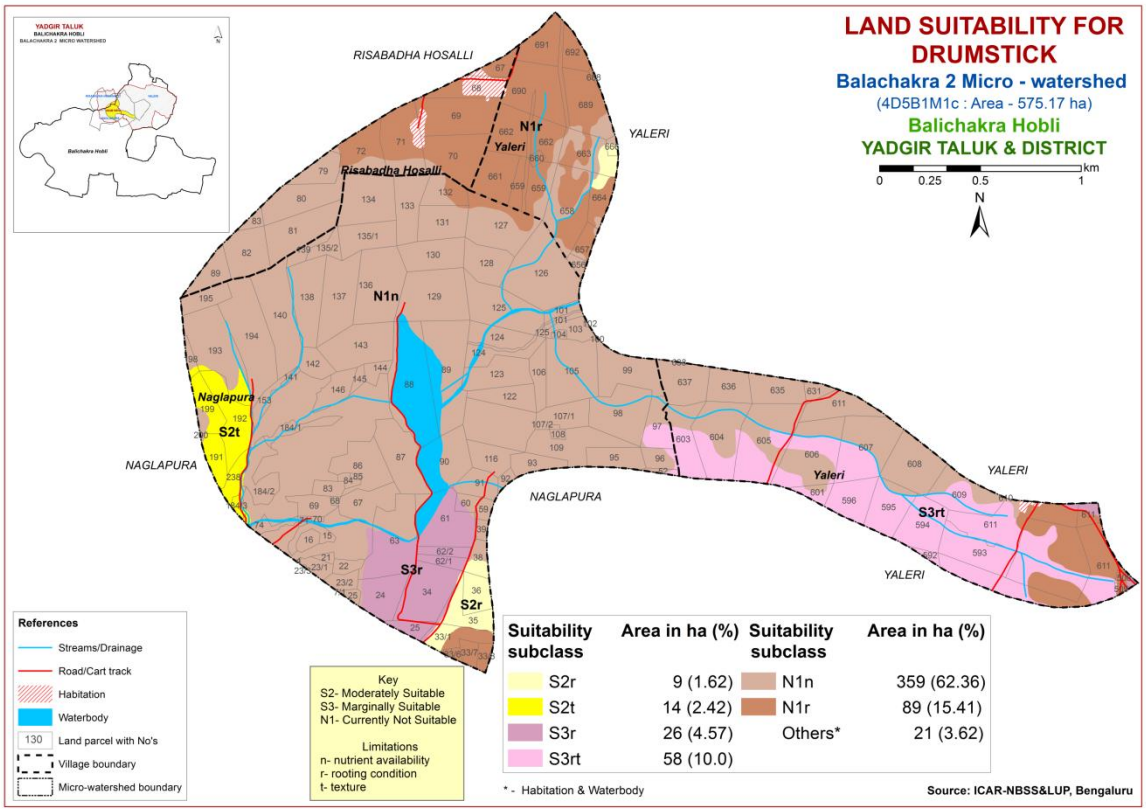

Fig 7.14 Land Suitability map of Drumstick

7.15 Land Suitability for Mango (*Mangifera indica*)

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

Highly suitable (Class S1) and moderately suitable (Class S2) lands for growing mango are not available in this microwatershed. Marginally suitable (Class S3) lands for growing mango cover a major area of about 345 ha (60%) and occur in the major part of the microwatershed. They have moderate limitations of nutrient availability, rooting depth and texture. Currently not suitable (Class N1) for growing mango occupy an area about 208 ha (36%) and occur in the southern, western, northwestern, northern and eastern part of the microwatershed. They have severe limitations of rooting depth and nutrient availability.

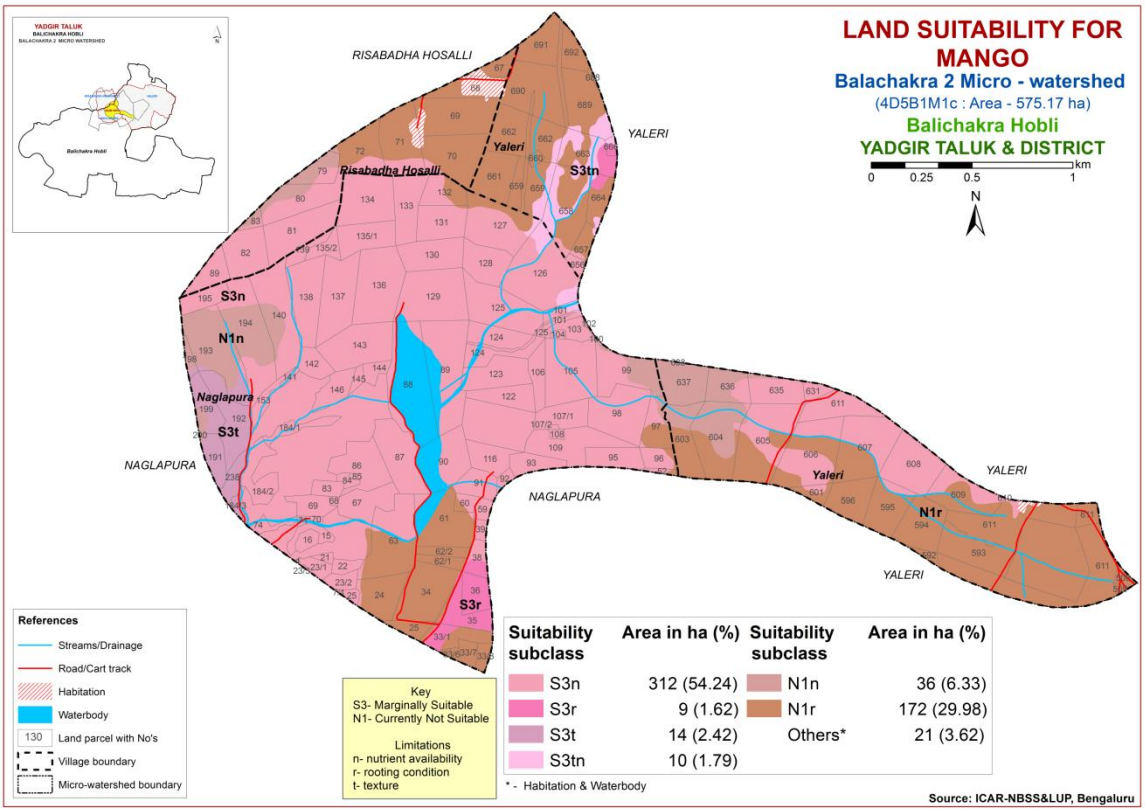

Fig. 7.15 Land Suitability map of Mango

7.16 Land Suitability for Guava (*Psidium guajava*)

Guava is one of the most important fruit crop grown in an area of 0.06 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 (7.1) and a land suitability map for growing guava was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.16.

Highly suitable (Class S1) lands for growing guava are not available in this microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for guava and distributed in the southern and northern part of the microwatershed. They have minor limitation of rooting depth. An area of about 98 ha (17%) is marginally suitable (Class S3) for growing guava and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have moderate limitations of rooting depth and texture. Maximum area of about 448 ha (78%) is currently not suitable (Class N1) for growing guava and distributed in the major part of the microwatershed with severe limitations of nutrient availability and rooting depth.

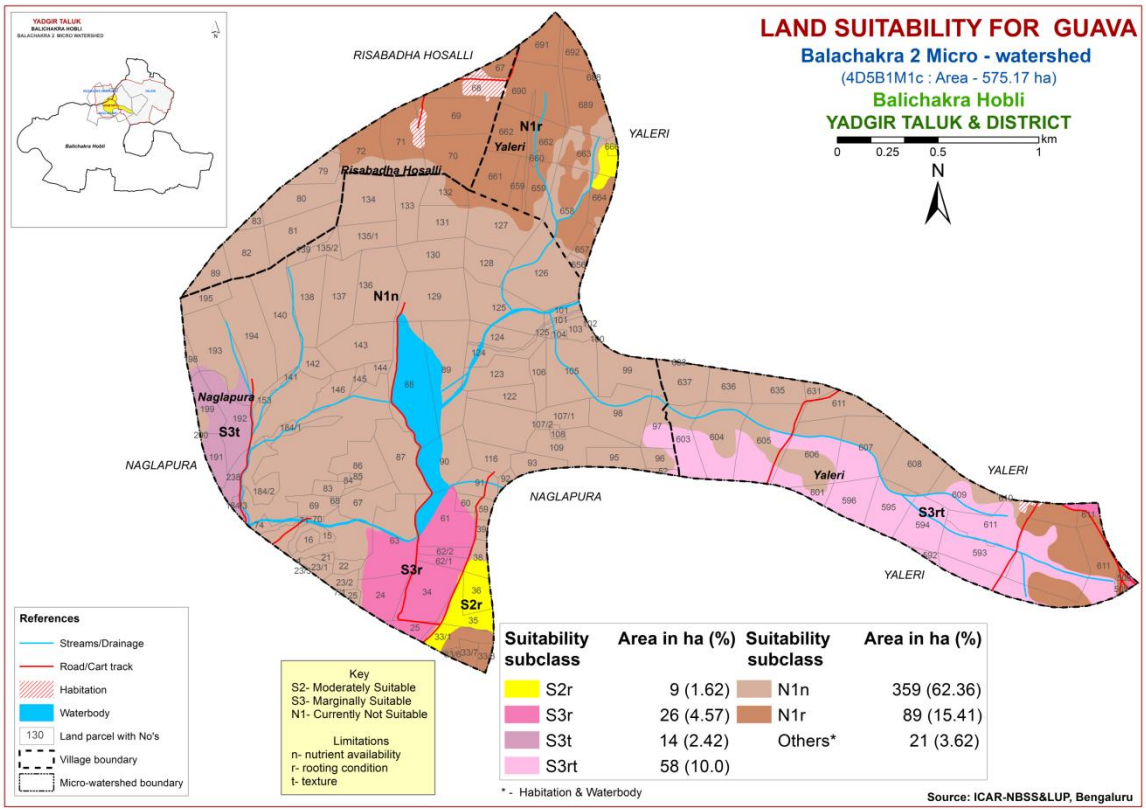

Fig. 7.16 Land Suitability map of Guava

7.17 Land Suitability for Sapota (*Manilkara zapota*)

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

Highly suitable (Class S1) lands for growing sapota are not available in this microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for growing sapota and distributed in the southern and northern part of the microwatershed. They have minor limitation of rooting depth. Maximum area of about 420 ha (73%) is marginally suitable (Class S3) for growing sapota and distributed in the major part of the microwatershed. They have minor limitations of rooting depth, texture and nutrient availability. An area of about 125 ha (22%) is currently not suitable (Class N1) for growing sapota and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

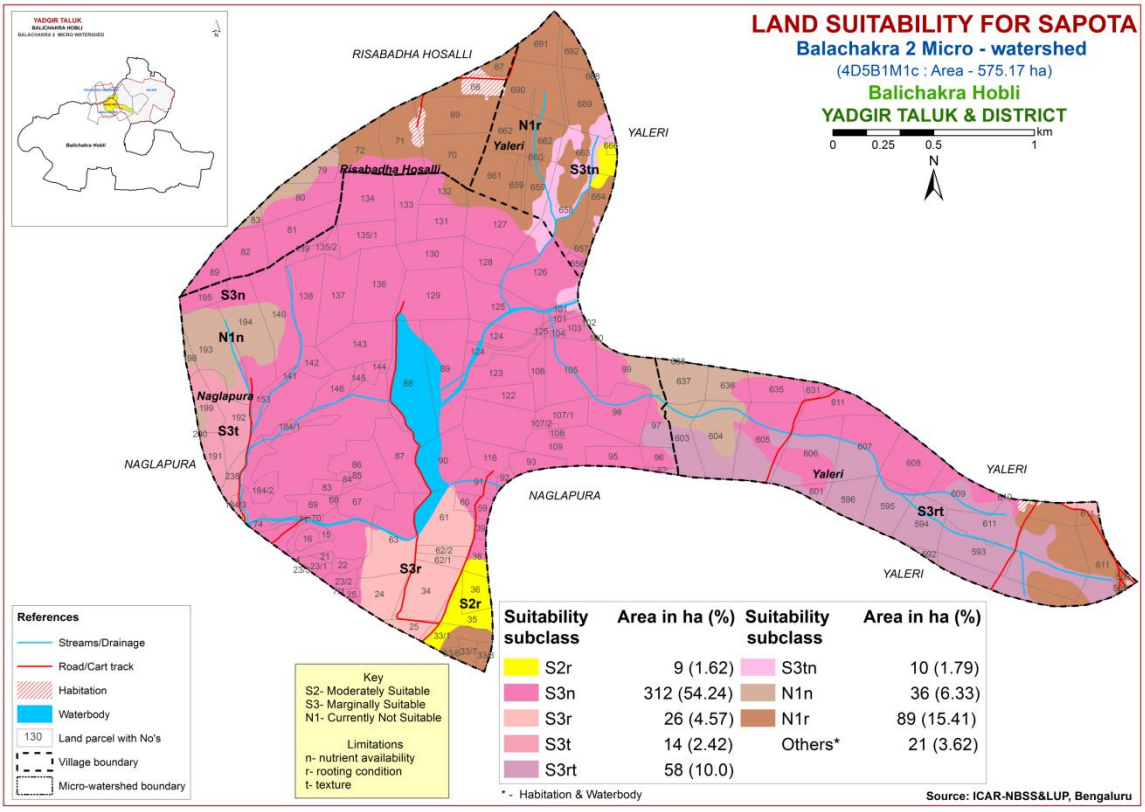

Fig. 7.17 Land Suitability map of Sapota

7.18 Land Suitability for Pomegranate (*Punica granatum*)

Pomegranate is one of the most important fruit crop commercially grown in about 18488 ha in Karnataka, mainly in Bijapur, Bagalkot, Koppal, Gadag and Chitradurga districts. The crop requirements for growing pomegranate (Table 7.19) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing pomegranate was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.18.

Highly suitable (Class S1) lands for growing pomegranate are not available in this microwatershed. An area of about 23 ha (4%) is moderately suitable (Class S2) for pomegranate and distributed in the northern, southern, western and southwestern part of the microwatershed. They have minor limitations of rooting depth and texture. Maximum area of about 406 ha (71%) is marginally suitable (Class S3) for growing pomegranate and distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, texture and nutrient availability. An area of about 125 ha (22%) is currently not suitable (Class N1) for growing pomegranate and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

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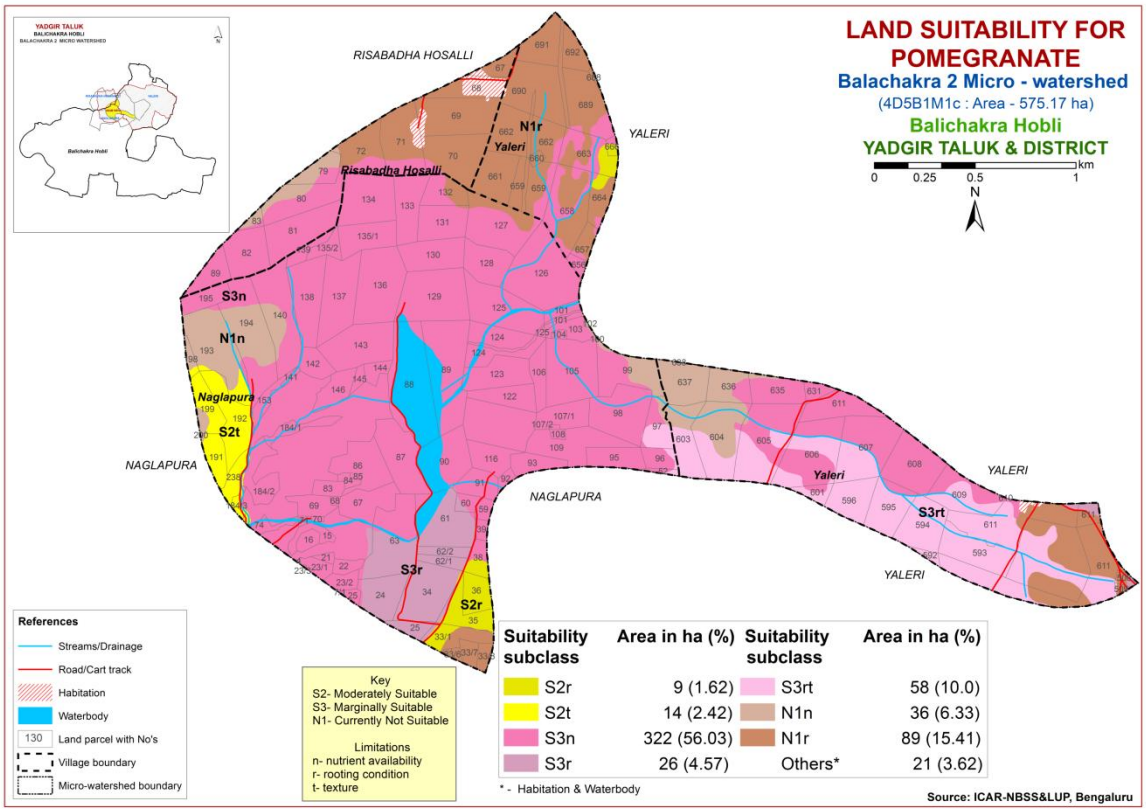

Fig 7.18 Land Suitability map of Pomegranate

7.19 Land Suitability for Musambi (*Citrus limetta*)

Musambi is one of the important fruit crop grown in an area of 3446 ha in almost all the districts of the State. The crop requirements for growing musambi (Table 7.20) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing musambi was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.19.

Highly suitable (Class S1) lands for growing musambi cover an area of about 14 ha (2%) and occur in the western and southwestern part of the microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for musambi and distributed in the southern and northern part of the microwatershed. They have minor limitation of rooting depth. Maximum area of about 406 ha (71%) is marginally suitable (Class S3) for growing musambi and distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, texture, calcareousness and nutrient availability. An area of about 125 ha (22%) is currently not suitable (Class N1) for growing musambi and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

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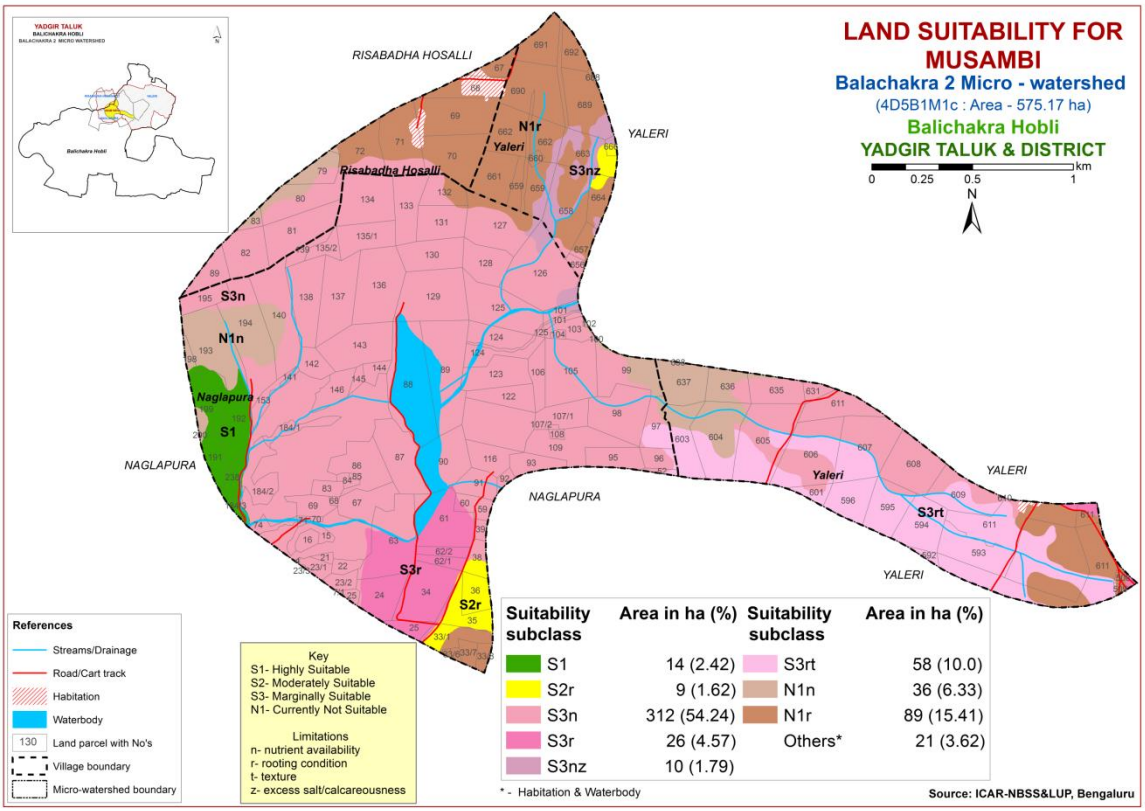

Fig. 7.19 Land Suitability map of Musambi

7.20 Land Suitability for Lime (*Citrus sp*)

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

Highly suitable (Class S1) lands for growing lime cover an area of about 14 ha (2%) and occur in the western and southwestern part of the microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for lime and distributed in the northern and southern part of the microwatershed. They have minor limitation of rooting depth. Maximum area of about 406 ha (71%) is marginally suitable (Class S3) for growing lime and distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, texture, calcareousness and nutrient availability. An area of about 125 ha (22%) is currently not suitable (Class N1) for growing lime and distributed in the southern, western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

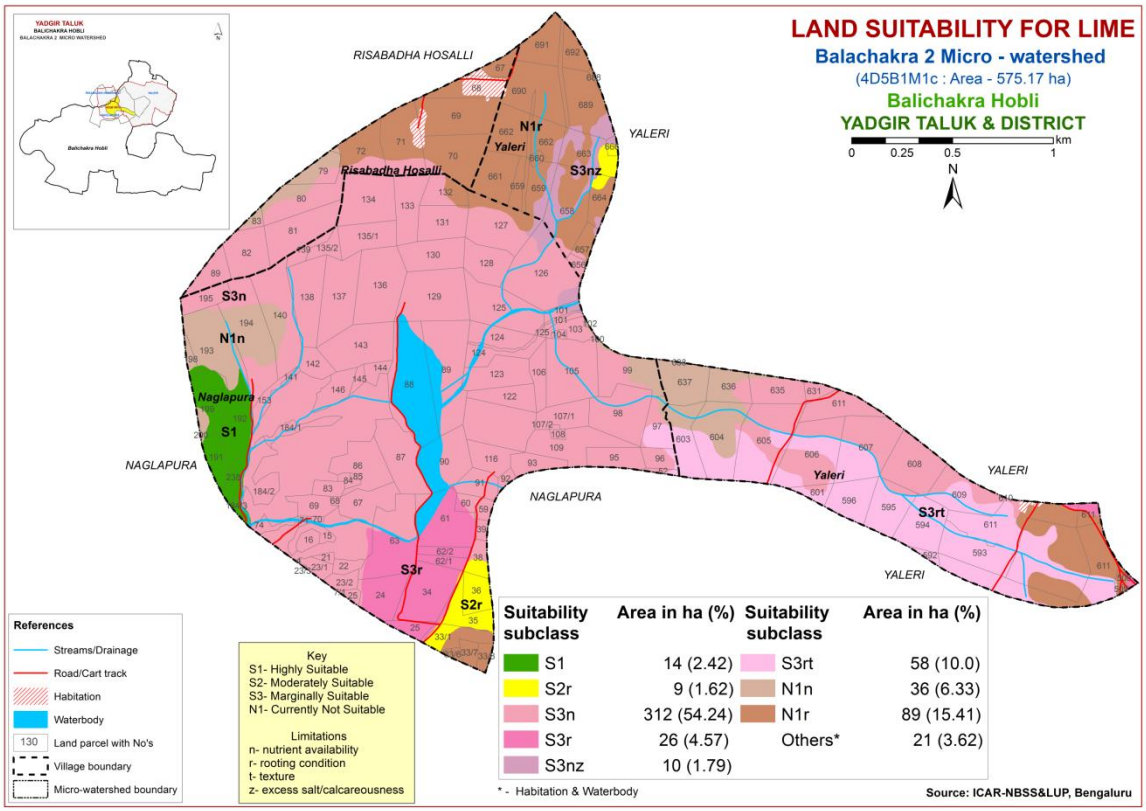

Fig. 7.20 Land Suitability map of Lime

7.21 Land Suitability for Amla (*Phyllanthus emblica*)

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

An area of about 9 ha (2%) is highly suitable (Class S1) for growing amla and distributed in the southern and northern part of the microwatershed. An area of about 40 ha (7%) is moderately suitable (Class S2) for growing amla and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth and texture. An area of about 94 ha (16%) is marginally suitable (Class S3) for growing amla and distributed in the northern, southern and eastern part of the microwatershed with moderate limitations of rooting depth and texture. Maximum area of about 412 ha (72%) is currently not suitable (Class N1) for growing amla and distributed in the major part of the microwatershed with severe limitations of nutrient availability and rooting depth.

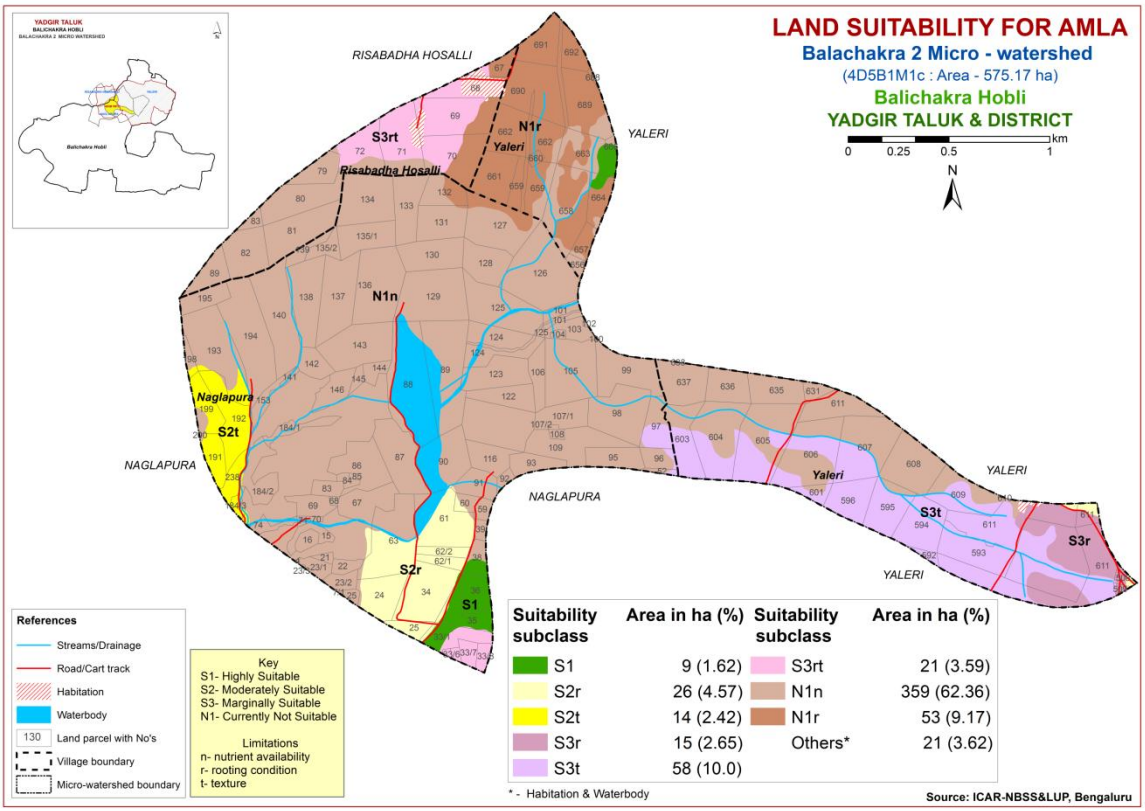

Fig. 7.21 Land Suitability map of Amla

7.22 Land Suitability for Cashew (*Anacardium occidentale)*

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

Highly suitable (Class S1) lands for growing cashew are not available in this microwatershed. An area of about 7 ha (1%) is moderately suitable (Class S2) for growing cashew and distributed in the southern part of the microwatershed with minor limitations of rooting depth and nutrient availability. Marginally (Class S3) suitable lands for growing cashew occur in an area of about 3 ha (<1%) and distributed in the northern and eastern part of the microwatershed. They have moderate limitations of rooting depth and nutrient availability. Currently not suitable (Class N1) lands for growing cashew occur in a maximum area of about 544 ha (95%) and distributed in the major part of the microwatershed with severe limitations of texture, rooting depth, calcareousness and nutrient availability.

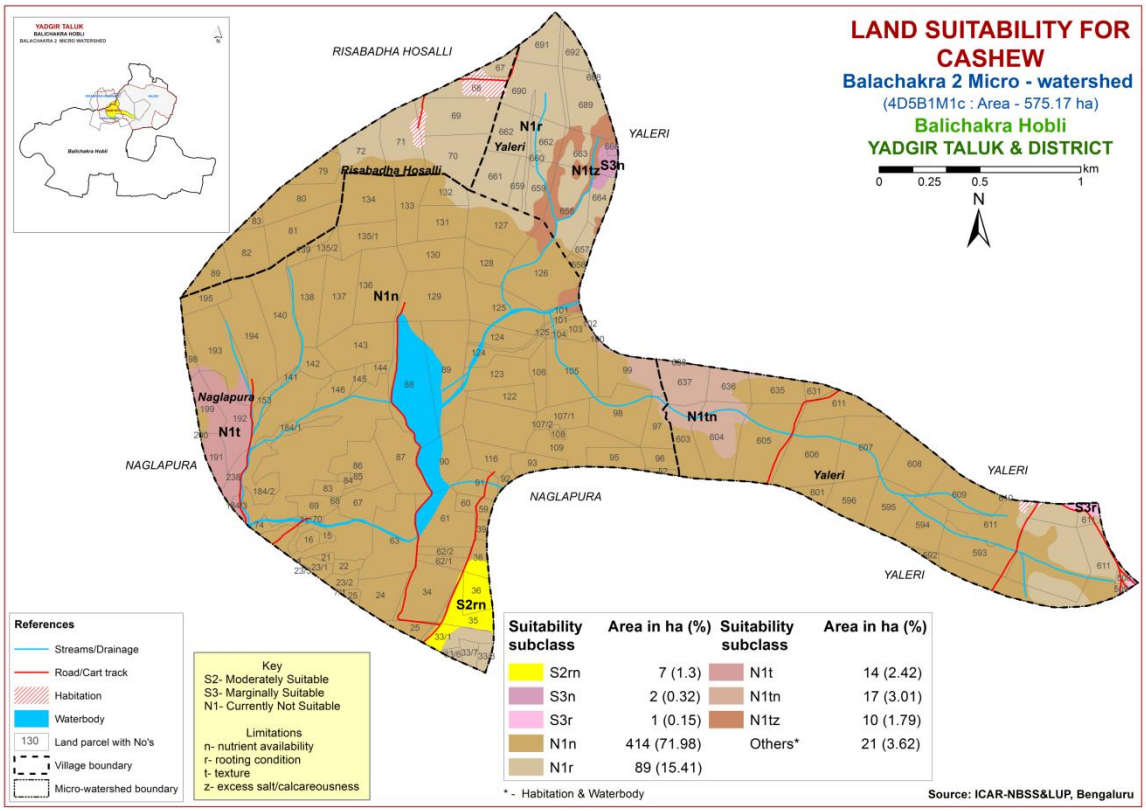

Fig. 7.22 Land Suitability map of Cashew

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

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

Highly suitable (Class S1) lands for growing jackfruit are not available in this microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for growing jackfruit and distributed in the southern and northern part of the microwatershed. They have minor limitation of rooting depth. An area of about 98 ha (17%) is marginally suitable (Class S3) for growing jackfruit and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have moderate limitations of rooting depth and texture. Maximum area of about 448 ha (78%) is currently not suitable (Class N1) for growing jackfruit and distributed in the major part of the microwatershed with severe limitations of nutrient availability and rooting depth.

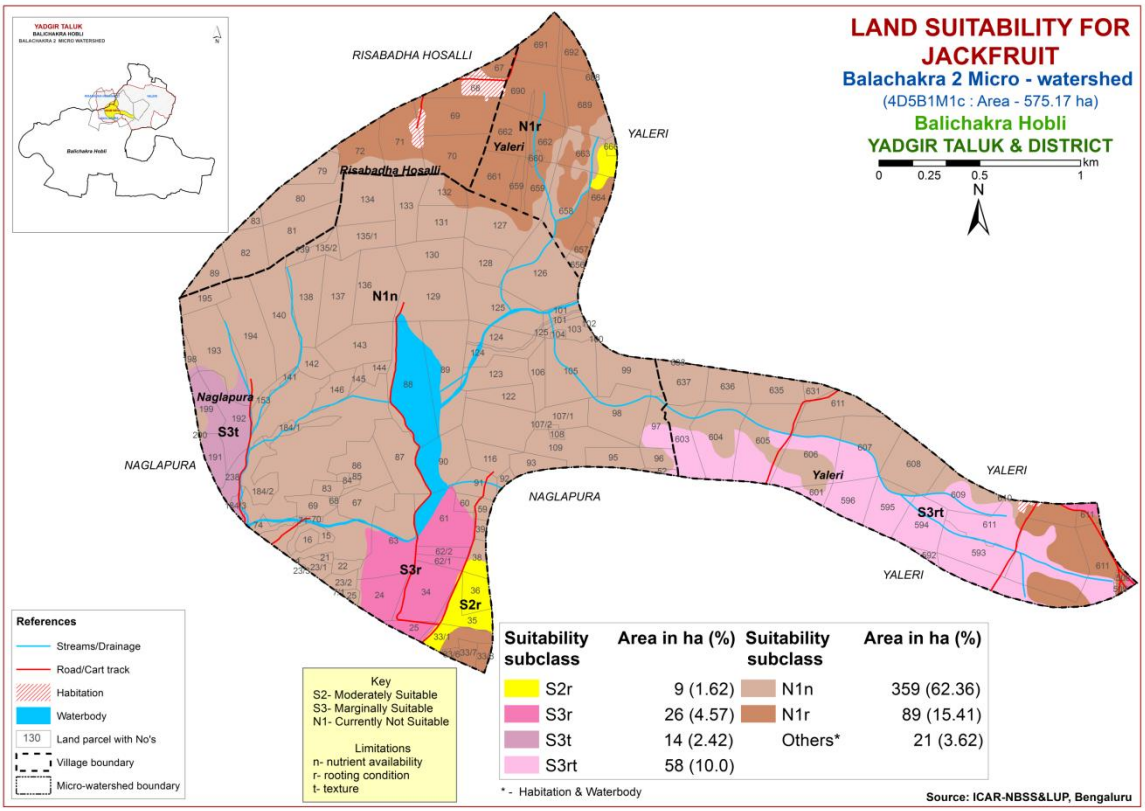

Fig. 7.23 Land Suitability map of Jackfruit

7.24 Land Suitability for Jamun (*Syzygium cumini*)

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

Highly suitable (Class S1) lands for growing jamun are not available in this microwatershed. An area of about 14 ha (2%) is moderately suitable (Class S2) for growing jamun and distributed in the western and southwestern part of the microwatershed. They have minor limitations of rooting depth and texture. An area of about 94 ha (16%) is marginally suitable (Class S3) for growing jamun and distributed in the northern, southern and eastern part of the microwatershed. They have moderate limitations of rooting depth and texture. Currently not suitable (Class N1) lands occur in a major area of about 448 ha (78%) and distributed in the major part of the microwatershed with severe limitations of rooting depth and nutrient availability.

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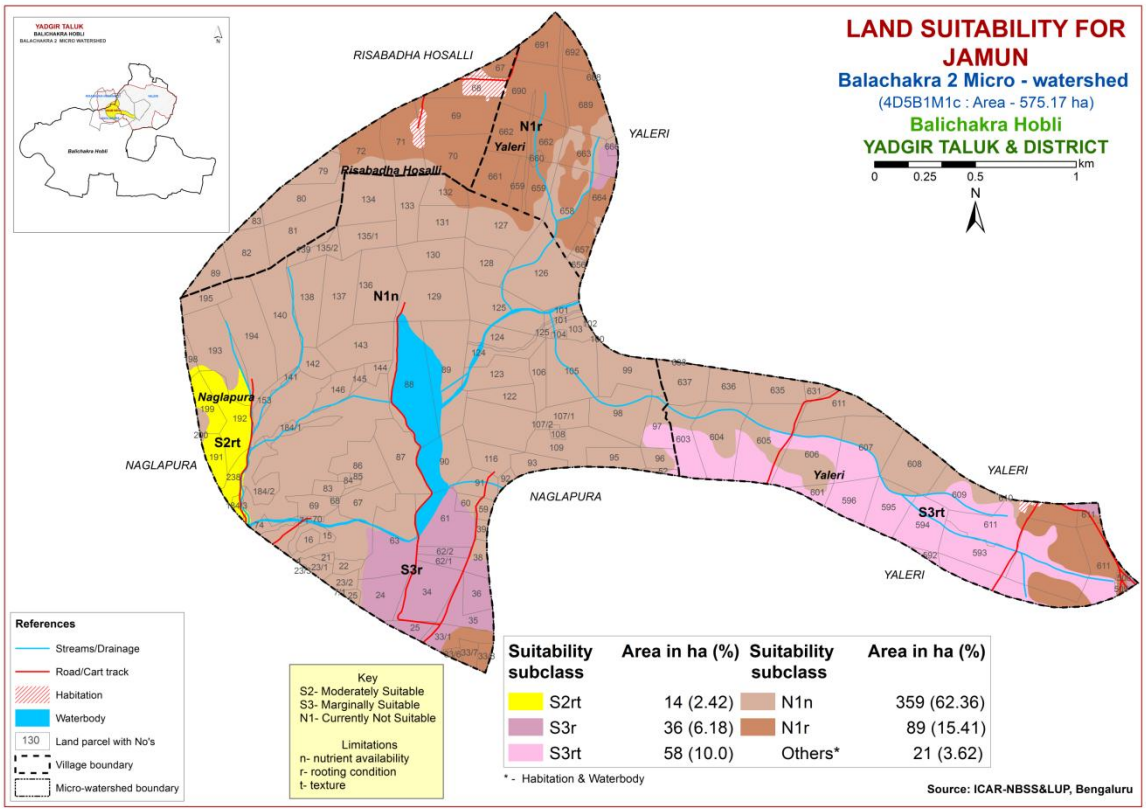


Fig. 7.24 Land Suitability map of Jamun

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

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

An area of about 21 ha (4%) is highly suitable (Class S1) for growing custard apple and distributed in the western, southwestern and southern part of the microwatershed. An area of about 28 ha (5%) is moderately suitable (Class S2) for growing custard apple and distributed in the northern, southern and eastern part of the microwatershed. They have minor limitation of rooting depth. Maximum area of about 416 ha (72%) is marginally suitable (Class S3) for growing custard apple and distributed in the major part of the microwatershed with moderate limitation of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

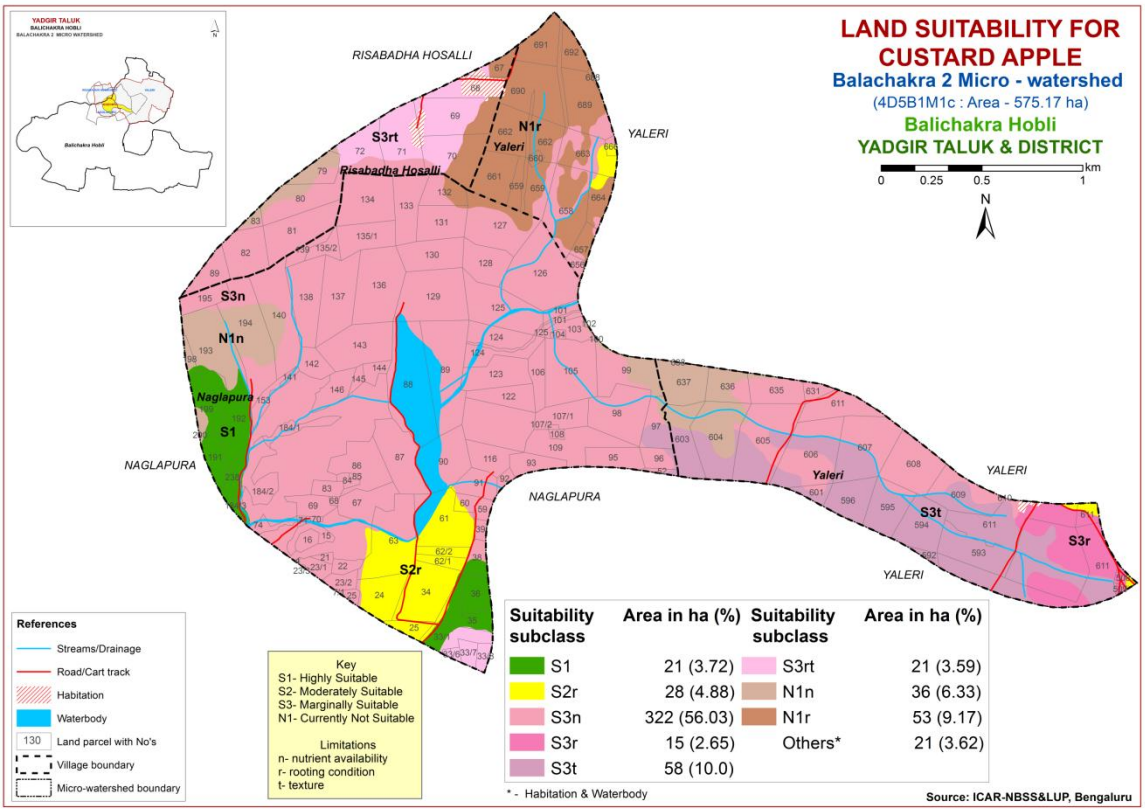


Fig. 7.25 Land Suitability map of Custard Apple

7.26 Land Suitability for Tamarind (*Tamarindus indica*)

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

Highly suitable (Class S1) lands for growing tamarind are not available in this microwatershed. An area of about 14 ha (2%) is moderately suitable (Class S2) for growing tamarind and distributed in the western and southwestern part of the microwatershed. They have minor limitations of rooting depth and texture. Marginally suitable (Class S3) lands for growing tamarind cover an area of about 9 ha (2%) and occur in the southern and northern part of the microwatershed. They have moderate limitation of rooting depth. Currently not suitable (Class N1) lands cover a major area about 531 ha (92%) and occur in the major part of the microwatershed. They have severe limitations of rooting depth and nutrient availability.

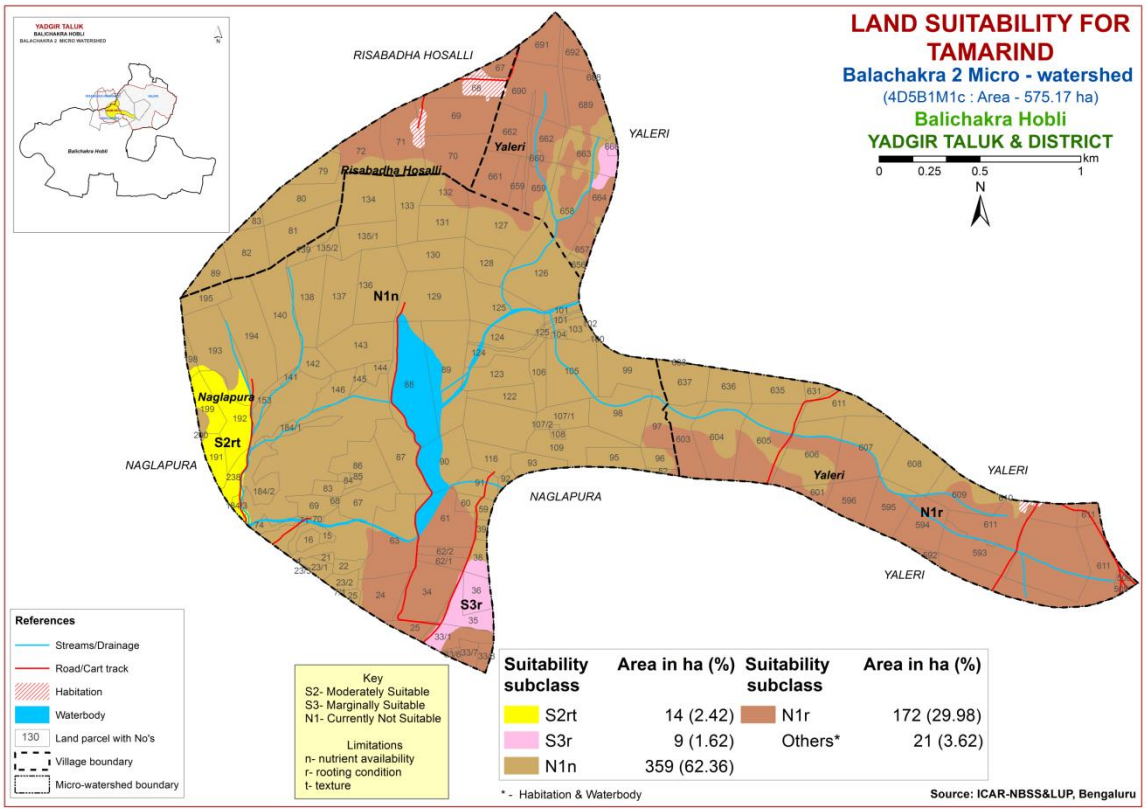


Fig. 7.26 Land Suitability map of Tamarind

7.27 Land Suitability for Mulberry (*Morus nigra*)

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

Highly suitable (Class S1) lands for growing mulberry are not available in this microwatershed. An area of about 9 ha (2%) is moderately suitable (Class S2) for mulberry and distributed in the southern and northern part of the microwatershed. They have minor limitation of rooting depth. An area of about 98 ha (17%) is marginally suitable (Class S3) for growing mulberry and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have moderate limitations of rooting depth and texture. Maximum area of about 448 ha (78%) is currently not suitable (Class N1) for growing mulberry and distributed in the major part of the microwatershed with severe limitation of nutrient availability and rooting depth.

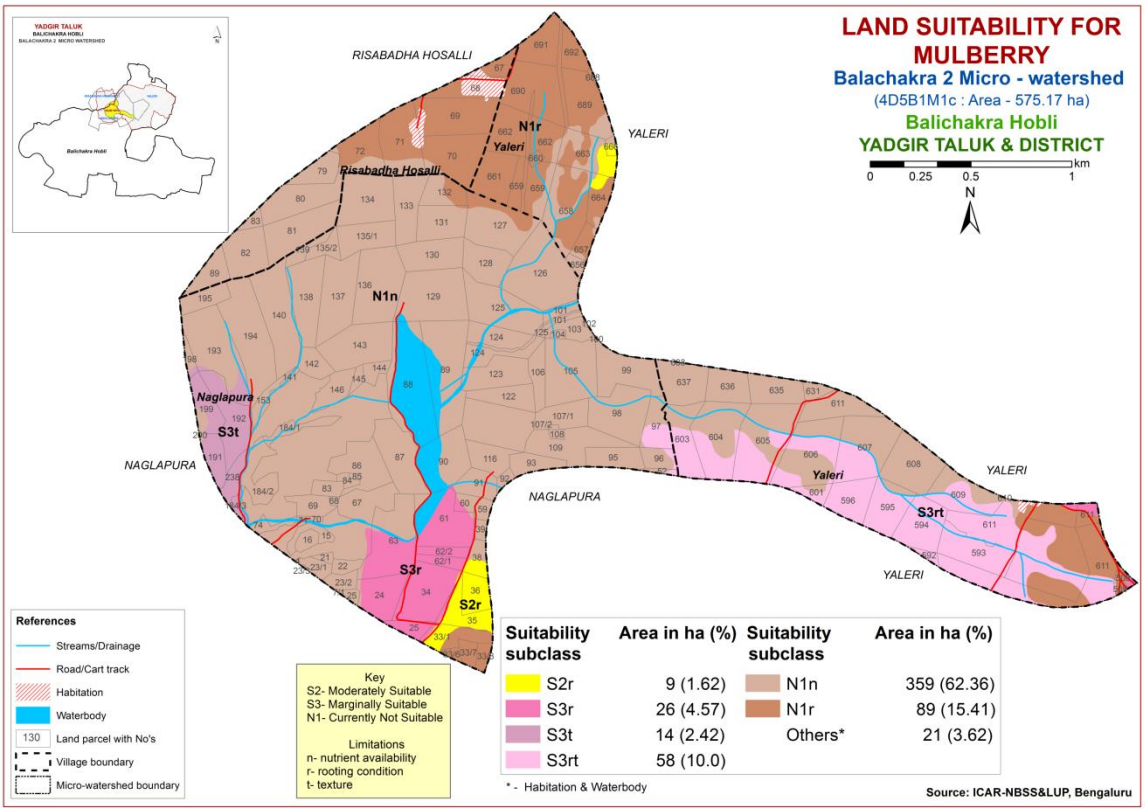


Fig 7.27 Land Suitability map of Mulberry

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

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing marigold and are distributed in the northern part of the microwatershed. An area of about 47 ha (8%) is moderately suitable (Class S2) for growing marigold and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 416 ha (72%) is marginally suitable (Class S3) for growing marigold and distributed in the major part of the microwatershed with moderate limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

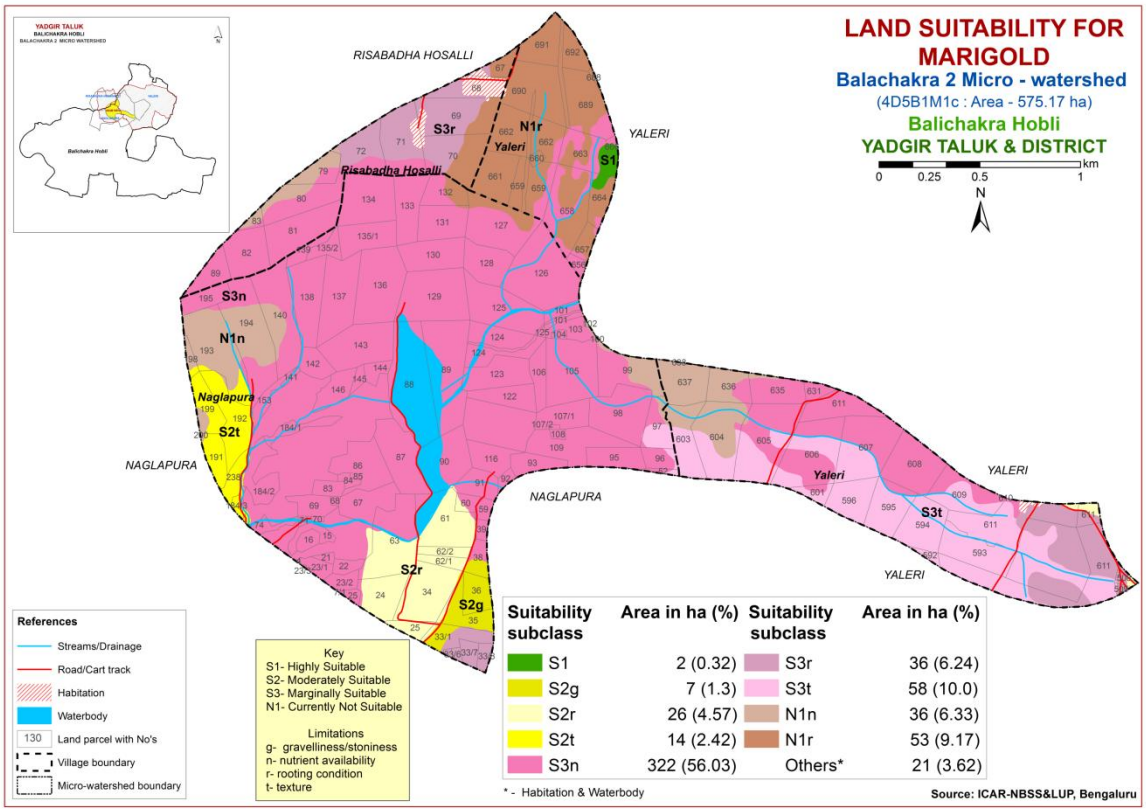


Fig. 7.28 Land Suitability map of Marigold

7.29 Land Suitability for Chrysanthemum (*Dendranthema grandiflora*)

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

An area of about 2 ha (<1%) is highly suitable (Class S1) for growing chrysanthemum and distributed in the northern part of the microwatershed. An area of about 47 ha (8%) is moderately suitable (Class S2) for growing chrysanthemum and distributed in the western, southwestern, southern and eastern part of the microwatershed. They have minor limitations of rooting depth, gravelliness and texture. Maximum area of about 416 ha (72%) is marginally suitable (Class S3) for growing chrysanthemum and distributed in the major part of the microwatershed with moderate limitations of nutrient availability, rooting depth and texture. An area of about 89 ha (16%) is currently not suitable (Class N1) and distributed in the western, northwestern, northern and eastern part of the microwatershed with severe limitations of nutrient availability and rooting depth.

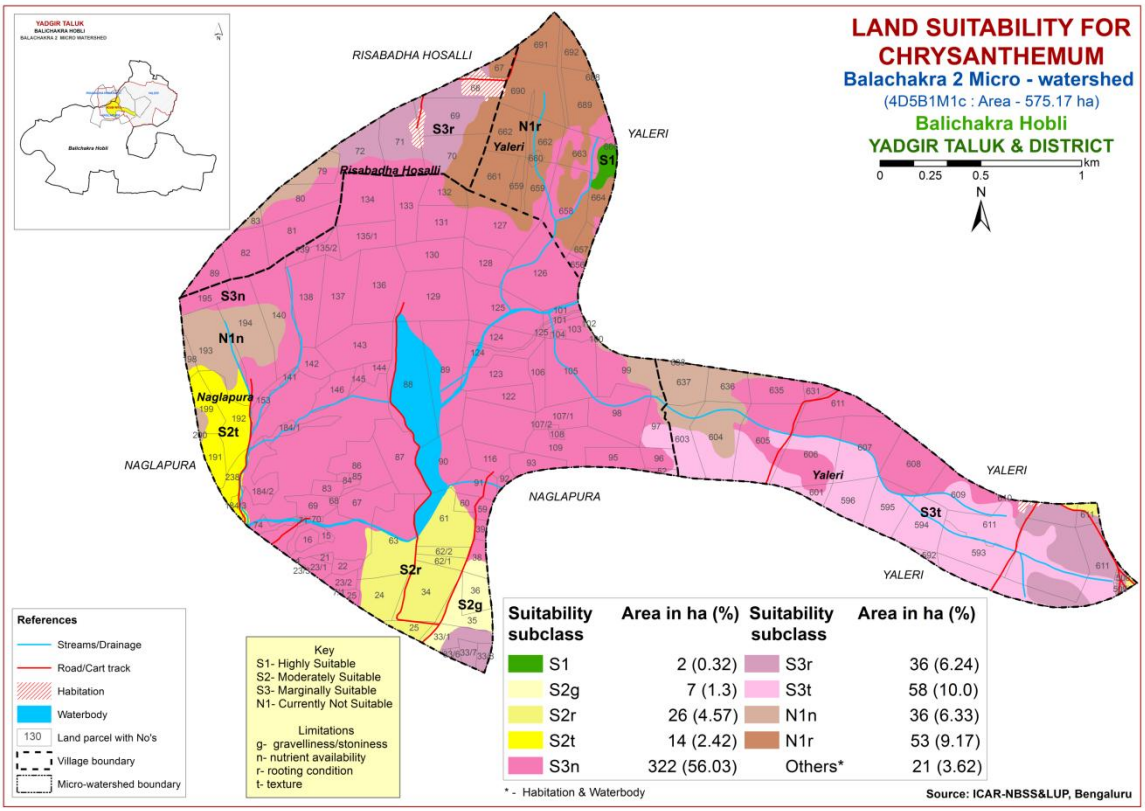


Fig. 7.29 Land Suitability map of Chrysanthemum

Table 7.1 Soil-Site Characteristics of Balachakra-2 Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drain-age Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Sur-face	Sub-surface	Surface (%)	Sub-surface (%)								
BDPcB2	866	150	WD	<25	sl	scl	<15	<15	<50	1-3	Moderate	8.58	0.262	0.35	18.10	100
BDPhB2	866	150	WD	<25	scl	scl	<15	<15	<50	1-3	Moderate	8.58	0.262	0.35	18.10	100
HTKbB2g1	866	150	WD	25-50	ls	sl	15-35	10-25	<50	1-3	Moderate	6.81	0.062	0.38	3.0	100
HTKcC2g1	866	150	WD	25-50	sl	sl	15-35	10-25	<50	3-5	Moderate	6.81	0.062	0.38	3.0	100
VNKcB3	866	150	WD	25-50	sl	sc	<15	<15	<50	1-3	Severe	5.37	0.11	2.22	6.27	75
YLRbB3	866	150	WD	50-75	ls	gc	<15	15-35	51-100	1-3	Severe	6.91	0.069	0.45	6.90	100
SBRbB3	866	150	SED	50-75	ls	ls	<15	<15	<50	1-3	Severe	8.24	0.145	1.15	7.50	100
JNKiB2	866	150	WD	50-75	sc	scl	<15	<15	51-100	1-3	Moderate	8.42	0.148	0.18	14.50	100
HSLcB2	866	150	MWD	75-100	sl	sc	<15	<15	101-150	1-3	Moderate	7.16	0.117	5.94	4.90	97
BLCcB2g1	866	150	WD	75-100	sl	scl	15-35	<15	101-150	1-3	Moderate	6.75	0.19	1.31	16.80	95
MDGcB2	866	150	WD	100-150	sl	scl	<15	<15	>200	1-3	Moderate	8.20	0.399	3.08	4.90	100
MDGhB2g1	866	150	WD	100-150	scl	scl	15-35	<15	>200	1-3	Moderate	8.20	0.399	3.08	4.90	100
MDGiB2	866	150	WD	100-150	sc	scl	<15	<15	>200	1-3	Moderate	8.20	0.399	3.08	4.90	100
ANRhB2	866	150	MWD	100-150	scl	c	<15	<15	>200	1-3	Moderate	10.17	0.365	7.08	19.90	100
ANRiB2	866	150	MWD	100-150	sc	c	<15	<15	>200	1-3	Moderate	10.17	0.365	7.08	19.90	100
YDRcB2	866	150	WD	100-150	sl	sl	<15	<15	51-100	1-3	Moderate	7.25	0.114	0.31	3.40	96
YDRcB2g1	866	150	WD	100-150	sl	sl	15-35	<15	51-100	1-3	Moderate	7.25	0.114	0.31	3.40	96
BGDmB2	866	150	MWD	100-150	c	c	<15	<15	>200	1-3	Moderate	7.85	0.253	0.26	65.90	100
KDRiB3	866	150	MWD	100-150	sc	c	<15	<15	>200	1-3	Severe	8.34	0.15	0.09	33.20	100

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

Table 7.2 Land suitability criteria for Sorghum

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

Table 7.3 Land suitability criteria for Maize

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

Table 7.4 Land suitability criteria for Bajra

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

Table 7.5 Land suitability criteria for Groundnut

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

Table 7.6 Land suitability criteria for Sunflower

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

Table 7.7 Land suitability criteria for Redgram

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

Table 7.8 Land suitability criteria for Bengal gram

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

Table 7.9 Land suitability criteria for Cotton

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

Table 7.10 Land suitability criteria for Chilli

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

Table 7.11 Land suitability criteria for Tomato

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

Table 7.12 Land suitability criteria for Brinjal

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

Table 7.13 Land suitability criteria for Onion

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

Table 7.14 Land suitability criteria for Bhendi

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

Table 7.15 Land suitability criteria for Drumstick

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

Table 7.16 Land suitability criteria for Mango

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

Table 7.17 Land suitability criteria for Guava

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

Table 7.18 Land suitability criteria for Sapota

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

Table 7.19 Land suitability criteria for Pomegranate

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

Table 7.20 Land suitability criteria for Musambi

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

Table 7.21 Land suitability criteria for Lime

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

Table 7.22 Land suitability criteria for Amla

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

Table 7.23 Land suitability criteria for Cashew

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

Table 7.24 Land suitability criteria for Jackfruit

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

Table 7.25 Land suitability criteria for Jamun

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

Table 7.26 Land suitability criteria for Custard apple

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

Table 7.27 Land suitability criteria for Tamarind

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

Table 7.28 Land suitability criteria for Mulberry

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

Table 7.29 Land suitability criteria for Marigold

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

Table 7.30 Land suitability criteria for Chrysanthemum

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

7.30 Land Management Units (LMUs)

The 19 soil map units identified in Balachakra-2 microwatershed have been grouped into 8 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. 7.30) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

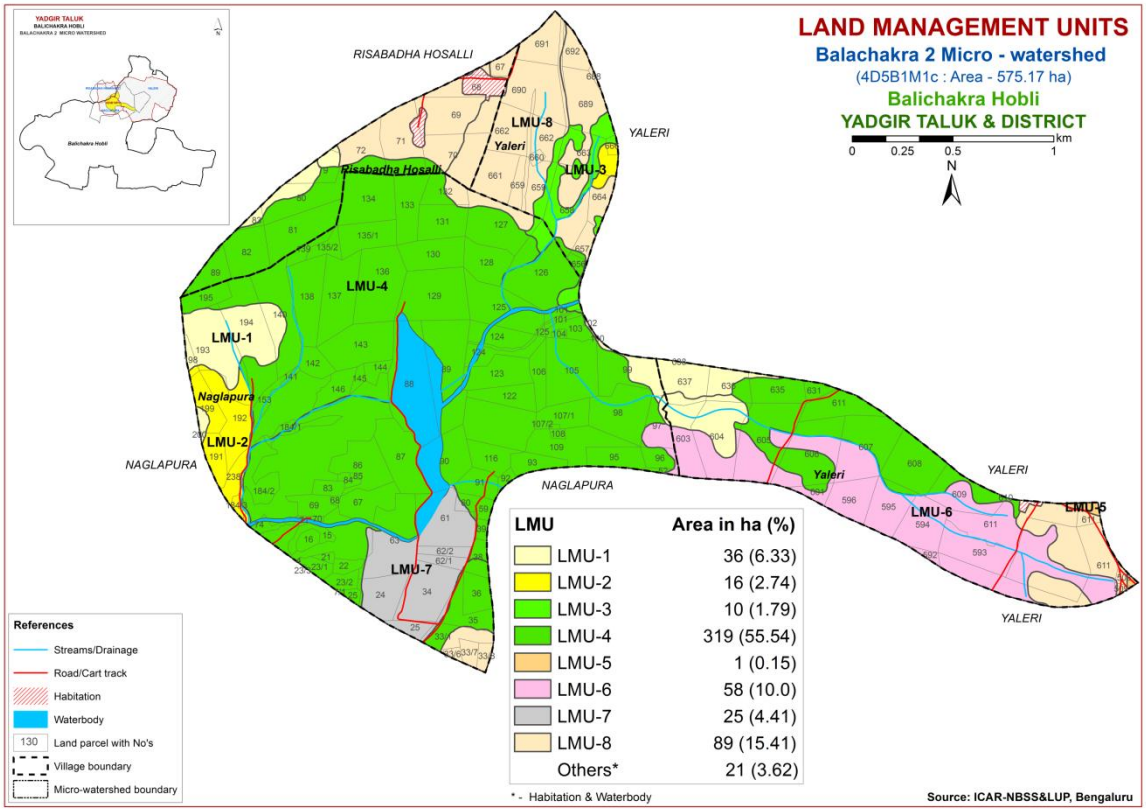


Fig. 7.30 Land Management Units Map Balachakra-2 Microwatershed

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

LMU	Soil map units	Soil and site characteristics
1	53.ANRhB2 55.ANRiB2 42.YDRcB2 154.YDRcB2g1	Deep, sodic, sandy loam to sandy clay loam soils, 1-3 % slopes, non-gravelly to gravelly (<15-35%), moderate erosion.
2	115.BGDmB2 32.HSLcB2	Moderately deep to deep, black sandy clay to clay soils, 1-3 % slopes, non-gravelly (<15%), moderate erosion.
3	88.KDRiB3	Deep, calcareous, black sandy clay soils, 1- 3% slopes, non- gravelly (<15%), severe erosion.
4	57.MDGcB2	Moderately deep to deep, sandy loam soils, 1-3 %

	149.MDGhB2g1 58.MDGiB2 155.BLCcB2g1	slopes, non-gravelly (<15%), moderate erosion.
5	28.YLRbB3	Moderately shallow, red loamy sand soils, 1-3 % slopes, non-gravelly (<15%), severe erosion.
6	124.SBRbB3	Moderately shallow, loamy sand soils, 1-3 % slope, non-gravelly (<15%), severe erosion.
7	22.JNKiB2	Moderately shallow, sandy clay soils, 1-3 % slope, non-gravelly (<15%), moderate erosion.
8	118.BDPcB2 120.BDPhB2 161.HTKbB2g1 113.HTKcC2g1 122.VNKcB3	Shallow to very shallow, sandy clay loam to sandy loam soils, 1-5 % slope, non-gravelly to gravelly (<15-35%), moderate to severe erosion.

7.31 Proposed Crop Plan for Balachakra-2 Microwatershed

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

Table 7.31 Proposed Crop Plan for Balachakra-2 Microwatershed

LMU	Soil Map Units	Survey Number	Soil and site characteristics	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
1	53.ANRhB2 55.ANRiB2 42.YDRcB2 154.YDRcB2g1	**Naglapura**:100,102,193,194,198,200 **Risabadha Hosalli** : 79,83 **Yaleri** : 604,636,637,638	Deep, sodic, sandy loam to sandy clay loam soils, 1-3 % slopes, non-gravelly to gravelly (<15-35%), moderate erosion.	-	**Agri-Silvi-Pasture:** Ber, Aonla, *Acacia sp.* Dhaincha, Rhodes grass, Para grass, Bermuda grass	Application of gypsum, iron pyrites and elemental sulphur. Addition of farm yard manures, green manures and providing subsurface drainage
2	115.BGDmB2 32.HSLcB2	**Naglapura**:184/3,191,192,199, 238 **Yaleri** : 666	Moderately deep to deep, black sandy clay to clay soils, 1-3 % slopes, non-gravelly (<15%), moderate erosion.	Sorghum, Maize, Sunflower, Groundnut, Red gram, Bajra, Bengal gram, Safflower, Linseed	**Fruit crops**: Musambi, Sapota, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Lime **Vegetables**: Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick, Coriander **Flowers**: Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
3	88.KDRiB3	**Yaleri** : 663	Deep, calcareous, black sandy clay soils, 1- 3% slopes, non- gravelly (<15%), severe erosion.	Maize, Sorghum, Sunflower, Cotton, Red gram, Bengalgram, Bajra	**Fruit crops:** Lime, Musambi, Custard apple, Pomegranate **Vegetables**: Chilli, Bhendi **Flowers**: Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
4	57.MDGcB2 149.MDGhB2g1 58.MDGiB2 155.BLCcB2g1	**Naglapura**:4,7/1,15,16,21,22,23/1,23/2,23/3,35,36,38,39,52,59,60,67,68,69,70,71,74,83,84,85,86,87,89,90,91,92,93,95,96,98,99,101,103,104,105,106,107/1,107/2,108,109,116,122,123,124,125,126,127,128,129,130,131,132,133,134,135/1,135/2,136,137,138,139,1	Moderately deep to deep, sandy loam soils, 1-3 % slopes, non-gravelly (<15%), moderate erosion.	Sunflower, Sorghum, Maize, Groundnut, Red gram, Bajra	**Fruit crops**: Musambi, Sapota, Pomegranate, Amla, Custard apple, Guava, Jackfruit, Lime **Vegetables**: Tomato, Onion, Bhendi, Chilli, Brinjal, Drumstick,	Application of FYM, Bio-fertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices

LMU	Soil Map Units	Survey Number	Soil and site characteristics	Field Crops/ Commercial crops	Horticulture Crops (Rainfed/Irrigated)	Suitable Interventions
		40,141,142,143,144,145,146,153,184/1,184/2,195 **Risabadha Hosalli**:80,81,82,89 **Yaleri**:605,606,607,608,610,631,635,656			Coriander **Flowers**: Marigold, Chrysanthemum	
5	28.YLRbB3	**Yaleri** :508,509,611	Moderately shallow, red loamy sand soils, 1-3 % slopes, non-gravelly (<15%), severe erosion.	Maize, Sorghum, Cotton, Bajra	**Fruit crops**: Amla, Custard apple **Vegetables**: Tomato, Onion, Bhendi, Chilli, Brinjal **Flowers**: Marigold, Chrysanthemum	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
6	124.SBRbB3	**Naglapura** : 97 **Yaleri**:592,593,594,595,596,601,603,609,611	Moderately shallow, loamy sand soils, 1-3 % slope, non-gravelly (<15%), severe erosion.	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra*	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
7	22.JNKiB2	**Naglapura**:24,25,34,61,62/1,62/2,63	Moderately shallow, sandy clay soils, 1-3 % slope, non-gravelly (<15%), moderate erosion.	Maize, Sorghum Groundnut, Bajra	**Fruit crops**: Amla, Custard apple **Vegetables**: Tomato, Chilli, Brinjal, Bhendi, Onion **Flowers**: Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
8	118.BDPcB2 120.BDPhB2 161.HTKbB2g1 113.HTKcC2g1 122.VNKcB3	**Naglapura**:33/1,33/5,33/6,33/7,33/8 **Risabadha Hosalli**:67,69,70,71,72 **Yaleri**:508,509,657,658,659,660,661,662,664,688,689,690,691,692	Shallow to very shallow, sandy clay loam to sandy loam soils, 1-5 % slope, non-gravelly to gravelly (<15-35%), moderate to severe erosion.	-	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata, Styloxanthes scabra*	Use of short duration varieties, sowing across the slope, drip irrigation and mulching is recommended

Chapter 8

SOIL HEALTH MANAGEMENT

8.1 Soil Health

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

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

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

The most important characteristics of a healthy soil are

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

Characteristics of Balachakra-2 Microwatershed

- The soil phases identified in the microwatershed belonged to different soil series, MDG series occupies maximum area of 311 ha (54%) followed by SBR 58 ha (10%), BDP 53 ha (9%), JNK 25 ha (4%), HTK 21 ha (4%), YDR 19 ha (3%), ANR 17 ha (3%), VNK 15 ha (3%), BGD 14 ha (2%), KDR 10 ha (2%), BLC 7 ha (1%), HSL 2 ha (<1%) and YLR 1 ha (<1%).
- As per land capability classification an area of about 555 ha 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 about 411 ha (71%) are neutral (pH 6.5-7.3) and 143 ha (25%) are slightly alkaline (pH 7.3-7.8) in soil 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.

Neutral soils

Major area of about 411 ha is under neutral soils.

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

Alkaline soils

Slightly alkaline soils cover an area of about 143 ha (25%) in the microwatershed.

1. Regular addition of organic manure, green manuring, green leaf manuring, crop residue incorporation and mulching needs to be taken up to improve the soil organic matter status.
2. Application of Biofertilizers (Azospirullum, Azotobacter, Rhizobium).
3. Application of 25% extra N and P (125 % RDN&P).
4. Application of ZnSO4 – 12.5 kg/ha (once in three years).
5. Application of Boron – 5 kg/ha (once in three years).

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

Soil Degradation

Soil erosion is one of the major factors affecting the soil health in the microwatershed. Out of total 555 ha area in the microwatershed, an area of about 470 ha (82%) is suffering from moderate erosion and an area of about 84 ha (15%) is suffering from severe erosion. These areas 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 Plan for each plot or farm.
2. Productivity enhancement measures/ interventions for existing crops/livestock/other farm enterprises.
3. Diversification of farming mainly with perennial horticultural crops and livestock.
4. Improving livelihood opportunities and income generating activities.

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

- **Soil Depth:** The depth of a soil decides the amount of moisture and nutrients it can hold, what crops can be taken up or not, depending on the rooting depth and the length of growing period available for raising any crop. Deeper the soil, better for a wide variety of crops. If sufficient depth is not available for growing deep rooted crops, either choose medium or short duration crops or deeper planting pits need to be opened and additional good quality soil brought from outside has to be filled into the planting pits.
- **Surface Soil Texture:** Lighter soil texture in the top soil means, better rain water infiltration, less run-off and soil moisture conservation, less capillary rise and less evaporation losses. Lighter surface textured soils are amenable to good soil tilth and are highly suitable for crops like groundnut, root vegetables (carrot, raddish, potato etc) but not ideal for crops that need stagnant water like lowland paddy. Heavy textured soils are poor in water infiltration and percolation. They are prone for sheet erosion; such soils can be improved by sand mulching. The technology that is developed by the AICRP-Dryland Agriculture, Vijayapura, Karnataka can be adopted.
- **Gravelliness:** More gravel content is favorable for run-off harvesting but poor in soil moisture storage and nutrient availability. It is a significant parameter that decides the kind of crop to be raised.
- **Land Capability Classification:** The land capability map shows the areas suitable and not suitable for agriculture and the major constraints in each of the plot/survey number. Hence, one can decide what kind of enterprise is possible in each of these units. In general, erosion and soil are the major constraints in Balachakra-2 microwatershed.
- **Organic Carbon:** The OC content (an index of available Nitrogen) is high (>0.75%) in an area of about 34 ha (6%) and medium (0.5-0.75%) in 520 ha (90%) area of the microwatershed. The areas that are medium and low in OC needs to be further

improved by applying farmyard manure and rotating crops with cereals and legumes or mixed cropping.

- **Promoting Green Manuring:** Growing of green manuring crops costs Rs. 1250/ha (green manuring seeds) and about Rs. 2000/ha towards cultivation that totals to Rs. 3250/- per ha. On the other hand, application of organic manure @ 10 tons/ha costs Rs. 5000/ha. The practice needs to be continued for 2-3 years or more. Nitrogen fertilizer needs to be supplemented by 25% in addition to the recommended level in 520 ha area where OC is medium (0.5-0.75%). For example, a rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: Available Phosphorus is high (>57 kg/ha) covering an area of about 23 ha (4%), medium (23-57 kg/ha) cover an area of about 435 ha (76%) and low (<23 kg/ha) cover an area of 97 ha (17%) in the microwatershed. Hence all the plots, where available phosphorus is low and medium, for all the crops 25% additional P needs to be applied.
- **Available Potassium:** Available potassium is medium (145-337 kg/ha) covering an area of about 178 ha (31%) and low (<145 kg/ha) cover an area of 376 ha (65%) in the microwatershed. All the plots, where available potassium is medium and low, additional 25% potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops. It is medium (10-20 ppm) in an area of about 8 ha (1%) and low (<10 ppm) in an area of about 546 ha (95%). Medium and low areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% of sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Boron:** An area of 233 ha (41%) is low (<0.5ppm) and an area of about 321 ha (56%) is medium (0.5-1.0ppm) in available boron content. For these low and medium areas, application of sodium borate @ 10 kg/ha as soil application or 0.2 % borax as foliar spray is recommended.
- **Available Iron:** Available iron content is sufficient (>4.5 ppm) in an area of about 554 ha (96%) and deficient (<4.5 ppm) is <1 ha (<1%) in the microwatershed. The deficient areas need to be applied with iron sulphate @25 kg/ha as soil application for 2-3 years to correct iron deficiency.
- **Available Manganese:** Entire cultivated area in the microwatershed is sufficient (>1.0 ppm) in available manganese content**.**
- **Available Copper:** Entire cultivated area in the microwatershed is sufficient (>0.2 ppm) in available copper content.
- **Available Zinc:** Entire cultivated area in the microwatershed is deficient (<0.6 ppm) in available zinc content. Application of zinc sulphate @ 25 kg/ha is recommended for the deficient areas.
- **Soil Alkalinity:** An area of about 143 ha (25%) in the microwatershed has soils that are slightly alkaline. These areas need application of gypsum and wherever calcium is

in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.

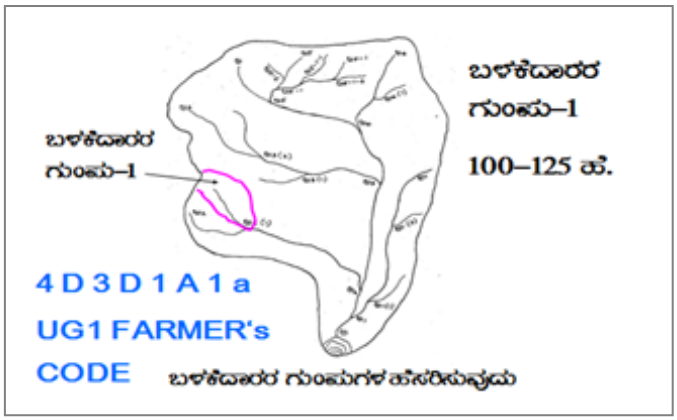
- **Land Suitability for various crops:** Areas that are highly, moderately and marginally suitable for growing various crops are indicated. Along with the suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth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

Chapter 9

SOIL AND WATER CONSERVATION TREATMENT PLAN

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

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



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

Steps for Survey and Preparation of Treatment Plan

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

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

9.1 Treatment Plan

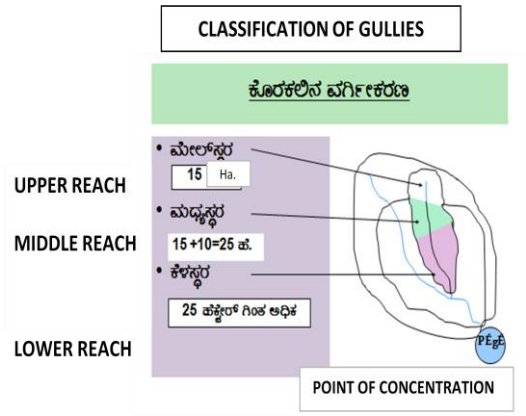
The treatment plan recommended for arable lands is briefly described below

9.1.1 Arable Land Treatment

A. BUNDING

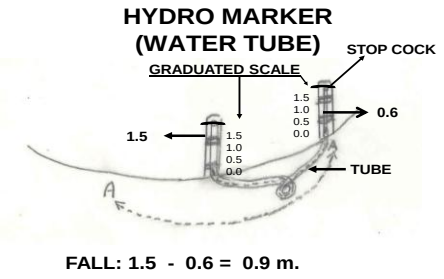
Steps for Survey and Preparation of Treatment Plan	
• Cadastral map (1:7920 scale) is enlarged to a scale of 1:2500 scale • Existing network of waterways, pothissa boundaries, grass belts, natural drainage lines/ watercourse, cut ups/ terraces are marked on the cadastral map to the scale • Drainage lines 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)

USER GROUP-1



Measurement of Land Slope

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



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

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

Note: (i) The above intervals are maximum.

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

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

Section of the Bund

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

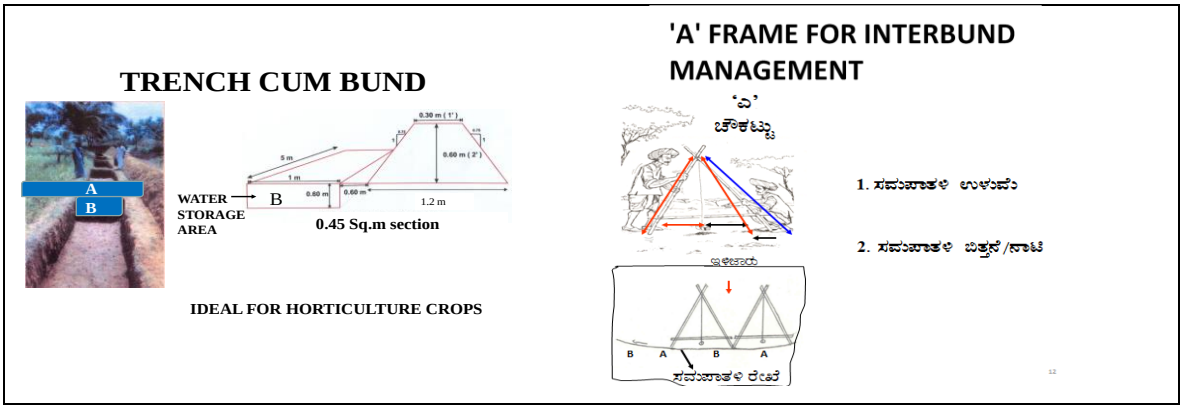
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below:



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

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

B. Water Ways

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

C. Farm Ponds

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

D. Diversion Channel

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

9.1.2 Non-Arable Land Treatment

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

9.1.3 Treatment of Natural Water Course/ Drainage Lines

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

9.2 Recommended Soil and Water Conservation Measures

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

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

A map (Fig. 9.1) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area about 76 ha (13%) requires trench cum bunding and 478 ha (83%) needs Graded bunding.

The conservation plan prepared may be presented to all the stakeholders including farmers and after considering their suggestions, the conservation plan for the microwatershed may be finalised in a participatory approach.

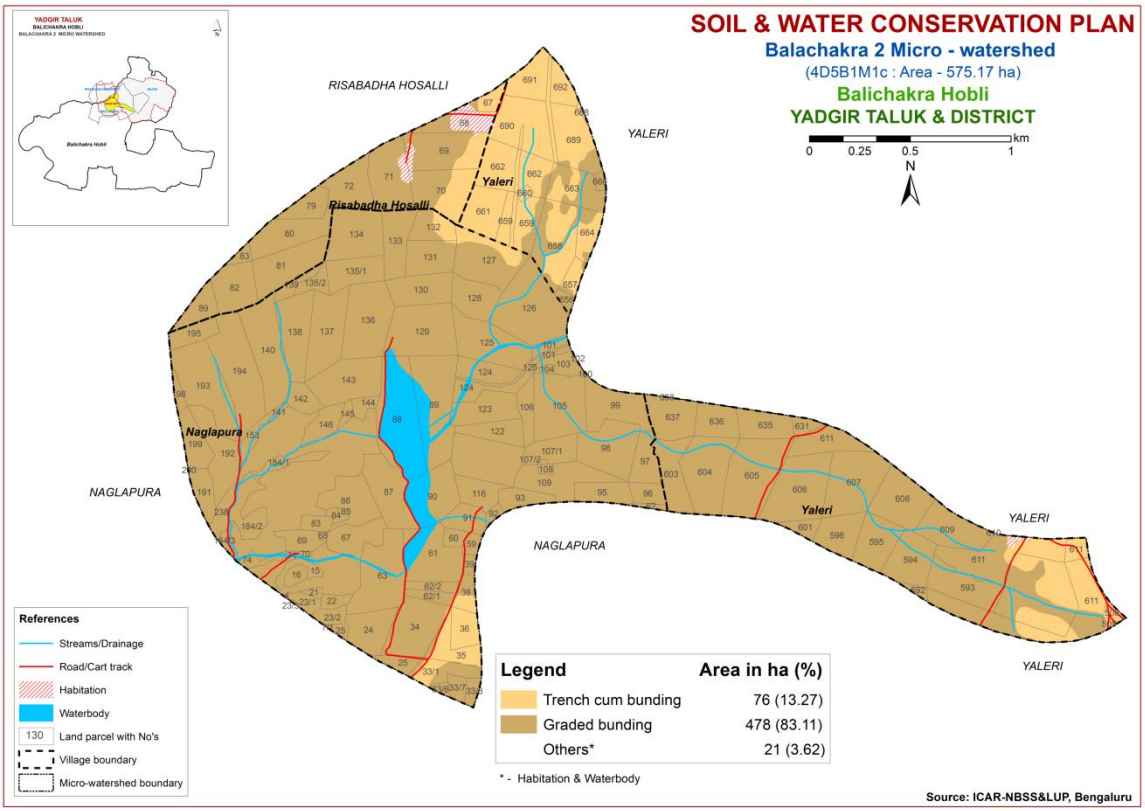


Fig. 9.1 Soil and Water Conservation Plan map of Balachakra-2 Microwatershed

9.3 Greening of Microwatershed

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

It is recommended to open pits during the 1st week of March along the contour and heap the 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 Nerale (*Sizyzium cumini*) and Bamboo. Dry areas are to be planted with species like Honge, Bevu, Seetaphal *etc*.

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

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Appendix I

Balachakra-2 (1M1c) Microwatershed

Soil Phase Information

Village	Survey Number	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
Risabadha Hosalli	67	1.58	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IVes	Trench cum bunding
Risabadha Hosalli	68	3.39	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Risabadha Hosalli	69	7.16	HTKbB2g1	LMU-8	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIIes	Graded bunding
Risabadha Hosalli	70	6.45	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Risabadha Hosalli	71	6.49	HTKbB2g1	LMU-8	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIIes	Graded bunding
Risabadha Hosalli	72	4.71	HTKbB2g1	LMU-8	Shallow (25-50 cm)	Loamy sand	Gravelly (15-35%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Groundnut (Ct+Gn)	Not Available	IIIes	Graded bunding
Risabadha Hosalli	79	2.52	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Risabadha Hosalli	80	5.33	MDGhB2g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Risabadha Hosalli	81	6.07	MDGhB2g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Risabadha Hosalli	82	4.57	MDGhB2g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Greengram (Gg)	Not Available	IIes	Graded bunding
Risabadha Hosalli	83	0.7	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Risabadha Hosalli	89	2.51	MDGhB2g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Yaleri	508	0.65	VNKcB3	LMU-8	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Yaleri	509	0.27	VNKcB3	LMU-8	Shallow (25-50 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IIIes	Trench cum bunding
Yaleri	592	0.52	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	593	5.16	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	594	5.07	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	595	4.65	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	596	3.94	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	601	1.24	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	603	4.66	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	604	7.91	ANRiB2	LMU-1	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IVes	Graded bunding

Village	Survey Number	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
Yaleri	605	9.54	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	606	8.84	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	607	8.12	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Jowar (Gn+Jw)	Not Available	IIes	Graded bunding
Yaleri	608	6.09	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	609	5.35	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	610	0.0005	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	611	24.03	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Forest	Not Available	IVes	Graded bunding
Yaleri	631	0.98	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	635	3.59	MDGcB2	LMU-4	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Jowar (Gn+Jw)	Not Available	IIes	Graded bunding
Yaleri	636	3.38	ANRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	637	4.7	ANRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Graded bunding
Yaleri	638	0.002	ANRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IVes	Graded bunding
Yaleri	656	0.65	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	657	1.37	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Trench cum bunding
Yaleri	658	7.36	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	659	4.5	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	660	0.41	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Jowar (Jw)	Not Available	IVes	Trench cum bunding
Yaleri	661	4.36	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	662	6.95	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	663	4.66	KDRiB3	LMU-3	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Severe	Jowar (Jw)	Not Available	IIIes	Graded bunding
Yaleri	664	2.57	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Trench cum bunding
Yaleri	666	0.47	HSLcB2	LMU-2	Moderately deep (75-100 cm)	Sandy loam	Non gravelly (<15%)	Medium (101-150 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Yaleri	688	0.18	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Trench cum bunding
Yaleri	689	5.89	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding

Village	Survey Number	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
Yaleri	690	6.93	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	691	3.59	BDPhB2	LMU-8	Very shallow (<25 cm)	Sandy clay loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Yaleri	692	2.04	BDPcB2	LMU-8	Very shallow (<25 cm)	Sandy loam	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Naglapura	4	0.04	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	7/1	0.04	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	15	1.2	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	16	0.93	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	21	0.37	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	22	0.93	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	23/1	1.11	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	23/2	1.22	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	23/3	0.03	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	24	4.14	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	25	1.83	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	33/1	3.08	HTKcC2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Sunflower+Paddy+Forest (Ct+Pd+Fo)	Not Available	IIIes	Graded bunding
Naglapura	33/5	0.15	HTKcC2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Forest	Not Available	IIIes	Graded bunding
Naglapura	33/6	0.29	HTKcC2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Forest	Not Available	IIIes	Graded bunding
Naglapura	33/7	1.03	HTKcC2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Forest	Not Available	IIIes	Graded bunding
Naglapura	33/8	0.85	HTKcC2g1	LMU-8	Shallow (25-50 cm)	Sandy loam	Gravelly (15-35%)	Very low (<50 mm/m)	Gently sloping (3-5%)	Moderate	Forest	Not Available	IIIes	Graded bunding
Naglapura	34	6.65	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	35	3.17	BLCcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Trench cum bunding
Naglapura	36	2.52	BLCcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Cotton (Sf+Ct)	Not Available	IIes	Trench cum bunding
Naglapura	38	1.67	BLCcB2g1	LMU-4	Moderately deep (75-100 cm)	Sandy loam	Gravelly (15-35%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Naglapura	39	0.6	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding

Village	Survey Number	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
Naglapura	52	0.41	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	59	0.83	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Cotton (Ct+Sf)	Not Available	IIes	Graded bunding
Naglapura	60	0.92	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	61	7.02	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	62/1	1.2	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	62/2	1.21	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	63	8.4	JNKiB2	LMU-7	Moderately shallow (50-75 cm)	Sandy clay	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	67	3.77	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	68	0.2	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	69	1.92	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	70	0.16	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	71	0.27	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	74	0.93	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	83	1.15	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	84	0.51	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	85	0.16	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	86	4.93	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	87	6.02	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	88	10.97	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Naglapura	89	9.74	MDGhB2g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Waterbody	Not Available	IIes	Graded bunding
Naglapura	90	5.98	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Waterbody	Not Available	IIes	Graded bunding
Naglapura	91	2.45	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	92	0.55	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	93	2.16	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding

Village	Survey Number	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
Naglapura	95	2.86	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	96	1.69	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	97	2.96	SBRbB3	LMU-6	Moderately shallow (50-75 cm)	Loamy sand	Non gravelly (<15%)	Very low (<50 mm/m)	Very gently sloping (1-3%)	Severe	Redgram (Rg)	Not Available	IVes	Graded bunding
Naglapura	98	6.67	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	99	5.66	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Naglapura	100	0.01	ANRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Naglapura	101	1.37	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	102	0.07	ANRhB2	LMU-1	Deep (100-150 cm)	Sandy clay loam	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Naglapura	103	1.7	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	104	0.32	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	105	7.89	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	106	2.11	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	107/1	3.08	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	107/2	0.12	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	108	0.35	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	109	5.62	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Paddy (Pd)	Not Available	IIes	Graded bunding
Naglapura	116	2.84	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	122	3	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	123	4.43	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	124	5.19	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Naglapura	125	6.93	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Scrub land (Sf+Sl)	Not Available	IIes	Graded bunding
Naglapura	126	10.23	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Scrub land (Sl)	Not Available	IIes	Graded bunding
Naglapura	127	7.28	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Sunflower (Rg+Sf)	Not Available	IIes	Graded bunding
Naglapura	128	3.91	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram+Cotton (Rg+Ct)	Not Available	IIes	Graded bunding

Village	Survey Number	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
Naglapura	129	8.35	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	130	4.56	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	131	4.04	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	132	2.9	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	133	4.33	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	134	6.49	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	135/1	3.89	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Cotton (Sf+Ct)	Not Available	IIes	Graded bunding
Naglapura	135/2	1.37	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	136	8.05	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	137	6.7	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IIes	Graded bunding
Naglapura	138	5.91	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	139	1.16	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IIes	Graded bunding
Naglapura	140	8	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower+Ground nut (Sf+Gn)	Not Available	IIes	Graded bunding
Naglapura	141	0.3	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	142	1.94	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Waterbody	Not Available	IIes	Graded bunding
Naglapura	143	6.55	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton+Paddy (Ct+Pd)	Not Available	IIes	Graded bunding
Naglapura	144	1.06	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	145	0.57	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	146	2.42	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	153	1.24	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	184/1	1.53	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Not Available (NA)	Not Available	IIes	Graded bunding
Naglapura	184/2	3.37	MDGiB2	LMU-4	Deep (100-150 cm)	Sandy clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Naglapura	184/3	0.49	BGDmB2	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding
Naglapura	191	2.31	BGDmB2	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding

Village	Survey Number	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
Naglapura	192	5.42	BGDmB2	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IIes	Graded bunding
Naglapura	193	8.55	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Sunflower (Sf)	Not Available	IVes	Graded bunding
Naglapura	194	9.57	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut+Cotton (Gn+Ct)	Not Available	IVes	Graded bunding
Naglapura	195	2.26	MDGhB2 g1	LMU-4	Deep (100-150 cm)	Sandy clay loam	Gravelly (15-35%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	198	0.73	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IVes	Graded bunding
Naglapura	199	3.05	BGDmB2	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Groundnut (Gn)	Not Available	IIes	Graded bunding
Naglapura	200	0.03	YDRcB2	LMU-1	Deep (100-150 cm)	Sandy loam	Non gravelly (<15%)	Low (51-100 mm/m)	Very gently sloping (1-3%)	Moderate	Redgram (Rg)	Not Available	IVes	Graded bunding
Naglapura	238	1.67	BGDmB2	LMU-2	Deep (100-150 cm)	Clay	Non gravelly (<15%)	Very high (>200 mm/m)	Very gently sloping (1-3%)	Moderate	Cotton (Ct)	Not Available	IIes	Graded bunding

Appendix II

Balachakra-2 (1M1c) Microwatershed

Soil Fertility Information

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Risabadha Hosalli	67	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	68	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Risabadha Hosalli	69	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	70	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	71	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	72	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	79	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	80	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	81	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	82	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	83	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Risabadha Hosalli	89	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	508	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	509	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	592	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	593	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	594	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	595	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	596	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	601	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	603	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	604	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Yaleri	605	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	606	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	607	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	608	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	609	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	610	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	611	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (> 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	631	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	635	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	636	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	637	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	638	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	656	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	657	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	658	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	659	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	660	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	661	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	662	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	663	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	664	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	666	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	688	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	689	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	High (> 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Yaleri	690	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	691	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Yaleri	692	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	4	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	7/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	15	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	21	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	22	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	23/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	23/2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	23/3	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	24	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	25	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	33/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	33/5	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	33/6	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	33/7	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	33/8	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Medium (10 – 20 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	34	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	35	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	36	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	38	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	39	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Naglapura	52	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	59	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	60	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	61	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	62/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	62/2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	63	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	67	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	68	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	69	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	70	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	71	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	74	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	83	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	84	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	85	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	86	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	87	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	88	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Naglapura	89	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	90	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	91	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	92	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	93	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	95	Neutral (pH 6.5 –	Non saline	Medium (0.5	Medium (23 –	Low (<145	Low (<10	Medium (0.5 –	Sufficient	Sufficient (>	Sufficient (>	Deficient (<

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
		7.3)	(<2 dsm)	– 0.75 %)	57 kg/ha)	kg/ha)	ppm)	1.0 ppm)	(>4.5 ppm)	1.0 ppm)	0.2 ppm)	0.6 ppm)
Naglapura	96	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	97	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	98	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	99	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	100	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	101	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	102	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	103	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	104	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	105	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	106	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	107/1	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	107/2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	108	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	109	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	116	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	122	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	123	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	124	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	125	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	126	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Low (< 23 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	127	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	128	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Naglapura	129	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	130	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	131	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	132	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	133	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	134	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	135/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	135/2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	136	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	137	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	138	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	139	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	140	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	141	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	142	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	143	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	144	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	145	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	146	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	153	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	184/1	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	184/2	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	184/3	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	191	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Naglapura	192	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	193	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	194	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	195	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	198	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	199	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	200	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Low (<145 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)
Naglapura	238	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 – 0.75 %)	Medium (23 – 57 kg/ha)	Medium (145 – 337 kg/ha)	Low (<10 ppm)	Medium (0.5 – 1.0 ppm)	Sufficient (>4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2 ppm)	Deficient (< 0.6 ppm)

Appendix III

Balachakra-2 (1M1c) Microwatershed

Soil Suitability Information

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Risabadha Hosalli	67	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Risabadha Hosalli	68	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Risabadha Hosalli	69	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Risabadha Hosalli	70	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Risabadha Hosalli	71	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Risabadha Hosalli	72	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Risabadha Hosalli	79	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Risabadha Hosalli	80	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Risabadha Hosalli	81	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Risabadha Hosalli	82	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Risabadha Hosalli	83	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Risabadha Hosalli	89	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	508	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	N1r	S3r	N1r	S3r	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Yaleri	509	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	N1r	S3r	N1r	S3r	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3r	S3r	S3r	N1r	N1r
Yaleri	592	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	593	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	594	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	595	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	596	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	601	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	603	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Yaleri	604	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Yaleri	605	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	606	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	607	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	608	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	609	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	610	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	611	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Yaleri	631	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	635	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	636	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Yaleri	637	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Yaleri	638	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Yaleri	656	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Yaleri	657	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	658	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	659	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	660	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	661	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	662	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	663	S3tn	S2tz	S3tn	S2z	N1n	S3n	N1n	S3nz	S2z	S3n	S2tz	N1n	N1n	S3n	N1tz	N1n	S3nz	S3tn	N1n	S3n	S3tn	S3n	S3n	S3n	S2tz	S3tn	S3n	N1n	N1n
Yaleri	664	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	666	S3r	S1	S2r	S1	S2r	S2r	S3r	S2r	S3t	S2r	S2r	S1	S2r	S2r	S3n	S3r	S2r	S2t	S1	S1	S1	S1	S1	S2r	S1	S1	S1	S2r	S2r
Yaleri	688	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	689	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	690	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Yaleri	691	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r

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Yaleri	692	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r	N1r
Naglapura	4	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	7/1	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	15	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	16	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	21	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	22	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	23/1	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	23/2	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	23/3	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	24	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	25	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	33/1	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Naglapura	33/5	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Naglapura	33/6	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Naglapura	33/7	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Naglapura	33/8	N1r	S3rt	N1r	S3rt	N1r	N1t	N1r	N1r	N1t	N1r	N1r	S3rt	N1r	S3rt	N1r	N1r	N1r	S3r	S3r	S3r	S3r	S3r	S3r	N1r	S3rt	S3rt	S3r	N1r	N1r
Naglapura	34	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	35	S3r	S2g	S2r	S2gt	S2r	S3t	S3r	S2r	S3t	S2rt	S2rt	S1	S2r	S1	S2rn	S3r	S2r	S1	S2g	S2g	S2g	S2g	S2g	S2r	S1	S2g	S2g	S2r	S2r
Naglapura	36	S3r	S2g	S2r	S2gt	S2r	S3t	S3r	S2r	S3t	S2rt	S2rt	S1	S2r	S1	S2rn	S3r	S2r	S1	S2g	S2g	S2g	S2g	S2g	S2r	S1	S2g	S2g	S2r	S2r
Naglapura	38	S3r	S2g	S2r	S2gt	S2r	S3t	S3r	S2r	S3t	S2rt	S2rt	S1	S2r	S1	S2rn	S3r	S2r	S1	S2g	S2g	S2g	S2g	S2g	S2r	S1	S2g	S2g	S2r	S2r
Naglapura	39	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	52	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	59	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	60	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Naglapura	61	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	62/1	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	62/2	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	63	N1r	S2r	S3r	S2rt	S3r	S3t	N1r	S3r	S3t	S3r	S3r	S2r	S3r	S2r	N1n	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S2r	S2r	S3r	S3r
Naglapura	67	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	68	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	69	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	70	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	71	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	74	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	83	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	84	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	85	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	86	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	87	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	88	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Naglapura	89	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	90	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	91	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	92	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	93	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	95	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	96	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	97	N1r	S3t	S3rt	S3t	S3rt	N1t	N1r	S3rt	N1t	S3rt	S3rt	S3t	S3rt	S3t	N1n	S3rt	S3rt	S3t	S3t	S3t	S3t	S3t	S3t	S3rt	S3t	S3t	S3t	S3rt	S3rt
Naglapura	98	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	99	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Naglapura	100	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	101	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	102	N1n	S3n	N1n	S3n	N1n	S3n	N1n	N1n	S3n	N1n	S3n	N1n	N1n	N1n	N1tn	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	103	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	104	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	105	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	106	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	107/1	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	107/2	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	108	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	109	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	116	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	122	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	123	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	124	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	125	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	126	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	127	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	128	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	129	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	130	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	131	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	132	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	133	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	134	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	135/1	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n

Village	Survey Number	Mango	Maize	Sapota	Sorghum	Guava	Cotton	Tamarind	Lime	Bengal gram	Sunflower	Red gram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Onion	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Brinjal	Bhendi	Drumstick	Mulberry
Naglapura	135/2	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	136	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	137	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	138	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	139	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	140	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	141	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	142	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	143	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	144	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	145	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	146	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	153	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	184/1	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	184/2	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	184/3	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t
Naglapura	191	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t
Naglapura	192	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t
Naglapura	193	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	194	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	195	S3n	S2n	S3n	S2tn	N1n	S3tn	N1n	S3n	S3t	S3n	S2tn	N1n	N1n	S3n	N1n	N1n	S3n	S3n	N1n	S3n	S3n	S3n	S3n	S3n	S2n	S3n	S3n	N1n	N1n
Naglapura	198	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	199	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t
Naglapura	200	N1n	S3nt	N1n	S3nt	N1n	N1t	N1n	N1n	N1t	N1n	S3n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	N1n	S3n	N1n	N1n	N1n	N1n
Naglapura	238	S3t	S2t	S3t	S1	S3t	S1	S2rt	S1	S1	S1	S2t	S2t	S3t	S1	N1t	S2rt	S1	S3t	S3t	S2t	S3t	S2t	S2t	S2t	S2t	S3t	S2t	S2t	S3t

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

SALIENT FINDINGS OF THE SURVEY

- *The data on households sampled for socio economic survey indicated that 35 farmers were sampled in Balachakra-2 micro-watershed among them 2 (5.71%) were landless, 10 (28.57 %) were marginal farmers, 12 (34.29 %) were small farmers, 7 (20 %) semi medium farmers, 3 (8.57 %) were medium farmers and 1 (2.86 %) were large farmers.*
- *The data indicated that there were 124 (60.49 %) men and 81 (39.51 %) women among the sampled households. The average family size of landless was 6.5, marginal farmers' was 5.5, small farmers' was 5.5, semi medium farmers' was 6.14, medium farmers' was 8 and large farmers' was 4.*
- *The data indicated that, 39 (19.02 %) people were in 0-15 years of age, 92 (44.88 %) were in 16-35 years of age, 61 (29.76 %) were in 36-60 years of age and 13 (6.34 %) were above 61 years of age.*
- *The results indicated that Balachakra-2 had 59.02 per cent illiterates, 0.49 per cent of them had Functional Literate, 22.93 per cent of them had primary school, 1.46 per cent of them had middle school, 6.83 per cent of them had high school education, 2.93 per cent of them had PUC and 0.98 per cent of them had Degree education.*
- *The results indicate that, 48.57 per cent of household heads were practicing agriculture and agricultural labourers.*
- *The results indicate that agriculture was the major occupation for 26.34 per cent of the household members, 39.02 per cent were agricultural labourers, 0.49 per cent were private service and Trade & Business, 20 per cent were students, 11.22 per cent were housewives and 2.44 per cent were children.*
- *The results show that, 0.49 per cent of the population in the micro watershed has participated in Cooperative bank.*
- *The results indicate that, 34.29 per cent of the households possess Thatched house, 57.14 per cent of the households possess Katcha house and 8.57 per cent of them possess Pucca/RCC house.*
- *The results show that 57.14 per cent of the households possess TV, 51.43 per cent of the households possess mixer/grinder, 25.71 per cent of the households possess motor cycle, 2.86 per cent of the households possess Auto and Landline Phone and 97.14 per cent of the households possess mobile phones.*
- *The results show that the average value of television was Rs. 9,000, mixer/grinder was Rs. 1583.33, motor cycle was Rs. 56,888, Landline Phone was Rs. 2,000, Auto was Rs. 120,000 and mobile phone was Rs. 2,970.*
- *About 2.86 per cent of the households possess Bullock Cart, 8.57 per cent of the households possess plough and 94.29 per cent of them possess weeder.*
- *The result shows that the average value of bullock cart was Rs. 35,000, plough was Rs. 1,500 and the average value of weeder was Rs. 51.*

- *The results indicate that, 11.43 per cent of the households possess bullocks, per cent of the households possess 22.86 local cow and 2.86 per cent of the households possess Buffalo.*
- *The results indicate that, average own labour men available in the micro watershed was 2.26, average own labour (women) available was 1.56, average hired labour (men) available was 11.33 and average hired labour (women) available was 10.42.*
- *The results indicate that, 97.14 per cent of the households opined that the hired labour was adequate.*
- *The results indicate that, households of the Balachakra-2 micro-watershed possess 17 ha (38.71 %) of dry land, 21.90 ha (49.87 %) of irrigated land and 5.02 ha (11.43 %) of Permanent Fallow land. Marginal farmers possess 4.27 ha (84.59 %) of dry land, 0.53 ha (10.59 %) of irrigated land and 0.24 ha (4.82 %) of Permanent Fallow land. Small farmers possess 8.69 ha (65.32 %) of dry land, 4.17 ha (31.34 %) of irrigated land and 0.45 ha (3.35 %) of Permanent Fallow land. Semi medium farmers possess 2.83 ha (65.32 %) of dry land and 7.08 ha (62.06 %) of irrigated land and 1.50 ha (13.12 %) of Permanent Fallow land. Medium farmers possess 1.21 ha (13.64 %) of dry land and 4.86 ha (54.55 %) of irrigated land, 2.83 ha (31.82 %) of Permanent Fallow land. Large farmers possess 5.26 ha (100 %) of irrigated land.*
- *The results indicate that, the average value of dry land was Rs. 482,123.30, the average value of irrigated land was Rs. 462,326.31 and the average value of Permanent Fallow land was Rs. 292,814.52. In case of marginal famers, the average land value was Rs. 609,297.91 for dry land and the average value of irrigated land was Rs. 804,621.22 and the average value of Permanent Fallow land was Rs. 493,999.99. In case of small famers, the average land value was Rs. 494,690.26 for dry land, Rs. 695,436.89 for irrigated land and Rs. 898,181.80 for Permanent Fallow land. In case of semi medium famers, the average land value was Rs. 282,285.71 for dry land, Rs. 691,600 for irrigated land and Rs. 367,162.16 for Permanent Fallow land. In case of medium farmers, the average land value was Rs. 411,666.67 for dry land, Rs. 226,416.67 for irrigated land and Rs. 141,142.86 for Permanent Fallow land. In case of large farmers, the average land value was Rs. 152,000 for irrigated land.*
- *The results indicate that, there were 16 functioning bore wells in the micro watershed.*
- *The results indicate that, bore well was the major irrigation source in the micro water shed for 45.71 per cent of the farmers.*
- *The results indicate that, the depth of bore well was found to be 48.77 meters.*
- *The results indicate that, marginal, small, semi medium, medium and large farmers had an irrigated area of 0.53 ha, 4.17 ha, 8.53 ha, 4.86 ha and 5.26 ha respectively.*
- *The results indicate that, farmers have grown cotton (16.08 ha), groundnut (13.96 ha), Paddy (6.39 ha) and Sorghum (1.79 ha). Marginal farmers have grown sorghum, cotton, paddy and groundnut. Small farmers have grown cotton, groundnut and paddy.*

Semi medium farmers have grown sorghum, cotton, paddy and groundnut. Medium farmers have grown groundnut and paddy. Large farmers have grown cotton.

- *The results indicate that, the cropping intensity in Balachakra-2 micro-watershed was found to be 90.16 per cent.*
- *The results indicate that, the total cost of cultivation for Cotton was Rs. 37926.63. The gross income realized by the farmers was Rs. 69904.76. The net income from Cotton cultivation was Rs. 31978.12. Thus the benefit cost ratio was found to be 1: 1.84.*
- *The results indicate that, the total cost of cultivation for Sorghum was Rs. 32863.51. The gross income realized by the farmers was Rs. 41451.87. The net income from Sorghum cultivation was Rs. 8588.36. Thus the benefit cost ratio was found to be 1: 1.26.*
- *The results indicate that, the total cost of cultivation for groundnut was Rs. 60722.13. The gross income realized by the farmers was Rs. 63445.98. The net income from groundnut cultivation was Rs. 2723.85. Thus the benefit cost ratio was found to be 1: 1.04.*
- *The results indicate that, the total cost of cultivation for paddy was Rs. 71170.09. The gross income realized by the farmers was Rs. 65539.52. The net income from paddy cultivation was Rs. -5630.56. Thus the benefit cost ratio was found to be 1: 0.92.*
- *The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and green fodder was adequate.*
- *The results indicate that the annual gross income was Rs. 25,000 for landless, Rs. 69,955 for marginal farmers, for small farmers it was Rs. 99,860, semi medium farmers it was Rs. 112,857.14, medium farmers it was Rs. 110,006.67 and large farmers it was Rs. 345,000.*
- *The results indicate that the average annual expenditure is Rs. 16,517.12. For landless it was Rs. 7,500, marginal farmers it was Rs. 6,769.44, for small farmers it was Rs. 5,583.33, for semi medium farmers it was Rs. 13,010.20, medium farmers it was Rs. 25,111.11 and large farmers it was Rs. 262,000.*
- *The results indicate that, households have planted 26 Mango in their field and 8 Mango and 2 coconut trees in their backyard.*
- *The results indicate that, households have planted 4 Eucalyptus, 99 Neem and 2 Banyan trees in their field and 1 Neem tree in their backyard.*
- *The results indicated that, households have an average investment capacity of Rs. 4,685.71 for land development, households have an average investment capacity of Rs. 7,457.14 for Irrigation facility, households have an average investment capacity of Rs. 2,371.43 for improved crop production and households have an average investment capacity of Rs. 571.43 improved livestock management.*
- *The results indicated that Government subsidy was the source of additional investment for 5.71 per cent for irrigation facility. Loan from bank was the source of additional investment for 28.57 per cent for land development, 8.57 per cent for irrigation*

facility, 20.0 per cent for improved crop production and 11.43 per cent for improved livestock management. Own funds were the source of additional investment for 2.86 per cent for land development and improved crop production.

- *The results indicated that, cotton was sold to the extent of 100 per cent, Groundnut was sold to the extent of 92.47per cent, Paddy was sold to the extent of 93.18 per cent and Sorghum was sold to the extent of 88.46 per cent.*
- *The results indicated that, about 97.14 per cent of the farmers sold their produce to local/village merchants.*
- *The results indicated that, 97.14 per cent of the households have used tractor as a mode of transportation.*
- *The results indicated that, 77.14 per cent of the households have experienced soil and water erosion problems in the farm.*
- *The results indicated that, 94.29 per cent have shown interest in soil test.*
- *The results indicated that, 88.57 per cent of the households used firewood as a source of fuel and 11.43 per cent of the households used LPG as a source of fuel.*
- *The results indicated that, piped supply was the major source of drinking water for 97.14 per cent of the households in the micro watershed.*
- *The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.*
- *The results indicated that, 54.29 per cent of the households possess sanitary toilet facility.*
- *The results indicated that, 100 per cent of the sampled households possessed BPL cards.*
- *The results indicated that, 88.57 per cent of the households participated in NREGA programme.*
- *The results indicated that, cereals were adequate for 100 per cent of the households, Pulses were adequate for 68.57 per cent of the households, Vegetables were adequate for 88.57 per cent, Fruits were adequate for 11.43 per cent, Milk and were adequate for 97.14 per cent and Meat and Egg were adequate for 100 per cent.*
- *The results indicated that, Pulses were inadequate for 31.43 per cent of the households, oilseeds were inadequate for 100 per cent, vegetables were inadequate for 11.43 per cent, fruits were inadequate for 85.71 per cent and milk was inadequate for 2.86 per cent of the households.*
- *The results indicated that, lower fertility status of the soil was the constraint experienced by 80 per cent of the households, Wild animal menace on farm field (20 %), frequent incidence of pest and diseases (85.71 %), Inadequacy of irrigation water (42.86 %), High cost of Fertilizers and plant protection chemicals (80 %), High rate of interest on credit (74.29 %), Lack of marketing facilities in the area (14.29 %), Inadequate extension services (2.86 %) and Low price for the agricultural commodities (62.86 %).*

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

Description of the study area

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

Yadgiri district is the second smallest district in the state, area wise is very rich in cultural traditions. The vast stretch of fertile black soil of the district is known for bumper red gram and jowar crops. The district is a "Daal bowl" of the state. The district is also known for cluster of cement industries and a distinct stone popularly known as "Malakheda Stone". Two main rivers, Krishna and Bhima, and a few tributaries flow in this region. Krishna and Bhima Rivers drain the district. They constitute the two major river basins of the district. Kagna and Amarja are the two sub - basins of Bhima River, which occur within the geographical area of the district

According to the 2011 census Yadgiri district has a population of 1, 172,985, roughly equal to the nation of Timor-Lesteor the US state of Rhode Island. This gives it a ranking of 404th in India (out of a total of 640). The district has a population density of 224 inhabitants per square kilometre (580/sq mi). Its population growth rate over the decade 2001-2011 was 22.67%. Yadgiri has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

Description of the micro watershed

Balachakra-2 micro-watershed in Naglapura sub-watershed (Yadgiri taluk and district) is located in between $16^0$43’21.001’’ to 16^0 41’36.255’’North latitudes and 77^0 17’52.781’’ to $77^0$15’18.307’’East longitudes, covering an area of about 574.90 ha, bounded by Risabadha Hosalli, Yaleri and Naglapura villages.

Methodology followed in assessing socio-economic status of households

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

crops, livestock management. The statistical components such as frequency and percentage were used to analyze the data. About 35 households located in the micro-watershed were interviewed for the survey.

Chapter 4

SALIENT FEATURES OF THE SURVEY

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Balachakra-2 micro-watershed is presented in Table 1 and it indicated that 35 farmers were sampled in Balachakra-2 micro-watershed among them 2 (5.71%) were landless, 10 (28.57 %) were marginal farmers, 12 (34.29 %) were small farmers, 7 (20 %) semi medium farmers, 3 (8.57 %) were medium farmers and 1 (2.86 %) were large farmers.

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

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	2	5.71	10	28.57	12	34.29	7	20	3	8.57	1	2.86	35	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Balachakra-2 micro-watershed is presented in Table 2. The data indicated that there were 124 (60.49 %) men and 81 (39.51 %) women among the sampled households. The average family size of landless was 6.5, marginal farmers' was 5.5, small farmers' was 5.5, semi medium farmers' was 6.14, medium farmers' was 8 and large farmers' was 4.

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

Sl. No.	Particulars	LL (13)		MF (55)		SF (66)		SMF(43)		MDF(24)		LF (4)		All (205)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Men	7	53.85	33	60	43	65.15	24	55.81	14	58.33	3	75	124	60.49
2	Women	6	46.15	22	40	23	34.85	19	44.19	10	41.67	1	25	81	39.51
Total		13	100	55	100	66	100	43	100	24	100	4	100	205	100
Average		6.5		5.5		5.5		6.14		8		4		5.85	

Age wise classification of population: The age wise classification of household members in Balachakra-2 micro-watershed is presented in Table 3. The data indicated that, 39 (19.02 %) people were in 0-15 years of age, 92 (44.88 %) were in 16-35 years of age, 61 (29.76 %) were in 36-60 years of age and 13 (6.34 %) were above 61 years of age.

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

Sl. No.	Particulars	LL (13)		MF (55)		SF (66)		SMF(43)		MDF(24)		LF (4)		All (205)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	1	7.69	12	21.82	13	19.70	8	18.60	4	16.67	1	25	39	19.02
2	16-35 years of age	8	61.54	22	40	29	43.94	20	46.51	12	50	1	25	92	44.88
3	36-60 years of age	4	30.77	19	34.55	16	24.24	13	30.23	7	29.17	2	50	61	29.76
4	> 61 years	0	0	2	3.64	8	12.12	2	4.65	1	4.17	0	0	13	6.34
Total		13	100	55	100	66	100	43	100	24	100	4	100	205	100

Education level of household members: Education level of household members in Balachakra-2 micro-watershed is presented in Table 4. The results indicated that Balachakra-2 had 59.02 per cent illiterates, 0.49 per cent of them had Functional Literate, 22.93 per cent of them had primary school, 1.46 per cent of them had middle school, 6.83 per cent of them had high school education, 2.93 per cent of them had PUC and 0.98 per cent of them had Degree education.

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

Sl. No.	Particulars	LL (13)		MF (55)		SF (66)		SMF(43)		MDF(24)		LF (4)		All (205)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	7	53.85	34	61.82	40	60.61	22	51.16	15	62.50	3	75	121	59.02
2	Functional Literate	0	0	0	0	0	0	1	2.33	0	0	0	0	1	0.49
3	Primary School	6	46.15	13	23.64	16	24.24	7	16.28	5	20.83	0	0	47	22.93
4	Middle School	0	0	0	0	0	0	1	2.33	2	8.33	0	0	3	1.46
5	High School	0	0	3	5.45	4	6.06	5	11.63	2	8.33	0	0	14	6.83
6	PUC	0	0	2	3.64	2	3.03	2	4.65	0	0	0	0	6	2.93
7	Degree	0	0	0	0	0	0	2	4.65	0	0	0	0	2	0.98
8	Others	0	0	3	5.45	4	6.06	3	6.98	0	0	1	25	11	5.37
Total		13	100	55	100	66	100	43	100	24	100	4	100	205	100

Occupation of household heads: The data regarding the occupation of the household heads in Balachakra-2 micro-watershed is presented in Table 5. The results indicate that, 48.57 per cent of household heads were practicing agriculture and agricultural labourers.

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

Sl. No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	4	40	8	66.67	3	42.86	1	33.33	1	100	17	48.57
2	Agricultural Labour	2	100	5	50	4	33.33	4	57.14	2	66.67	0	0	17	48.57
Total		2	100	9	100	12	100	7	100	3	100	1	100	34	100

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

Sl. No.	Particulars	LL (13)		MF (55)		SF (66)		SMF(43)		MDF(24)		LF (4)		All (205)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	19	34.55	26	39.39	6	13.95	1	4.17	2	50	54	26.34
2	Agricultural Labour	12	92.31	19	34.55	18	27.27	13	30.23	18	75	0	0	80	39.02
3	Private Service	0	0	0	0	0	0	1	2.33	0	0	0	0	1	0.49
4	Trade & Business	0	0	0	0	0	0	1	2.33	0	0	0	0	1	0.49
5	Student	1	7.69	10	18.18	15	22.73	10	23.26	5	20.83	0	0	41	20
6	Housewife	0	0	5	9.09	7	10.61	10	23.26	0	0	1	25	23	11.22
7	Children	0	0	2	3.64	0	0	2	4.65	0	0	1	25	5	2.44
Total		13	100	55	100	66	100	43	100	24	100	4	100	205	100

Occupation of the household members: The data regarding the occupation of the household members in Balachakra-2 micro-watershed is presented in Table 6. The results indicate that agriculture was the major occupation for 26.34 per cent of the household members, 39.02 per cent were agricultural labourers, 0.49 per cent were private service and Trade & Business, 20 per cent were students, 11.22 per cent were housewives and 2.44 per cent were children.

Institutional participation of the household members: The data regarding the institutional participation of the household members in Balachakra-2 micro-watershed is presented in Table 7. The results show that, 0.49 per cent of the population in the micro watershed has participated in Cooperative bank.

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

Sl. No.	Particulars	LL (13)		MF (55)		SF (66)		SMF(43)		MDF(24)		LF (4)		All (205)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	No Participation	13	100	55	100	65	98.48	43	100	24	100	4	100	204	99.51
2	Cooperative bank	0	0	0	0	1	1.52	0	0	0	0	0	0	1	0.49
Total		13	100	55	100	66	100	43	100	24	100	4	100	205	100

Type of house owned: The data regarding the type of house owned by the households in Balachakra-2 micro-watershed is presented in Table 8. The results indicate that, 34.29 per cent of the households possess Thatched house, 57.14 per cent of the households possess Katcha house and 8.57 per cent of them possess Pucca/RCC house.

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

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	2	100	3	30	4	33.33	2	28.57	0	0	1	100	12	34.29
2	Katcha	0	0	6	60	8	66.67	4	57.14	2	66.67	0	0	20	57.14
3	Pucca/RCC	0	0	1	10	0	0	1	14.29	1	33.33	0	0	3	8.57
Total		2	100	10	100	12	100	7	100	3	100	1	100	35	100

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

Sl. No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Television	2	100	4	40	6	50	5	71.43	3	100	0	0	20	57.14
2	Mixer/Grinder	2	100	5	50	4	33.33	4	57.14	3	100	0	0	18	51.43
3	Motor Cycle	1	50	3	30	1	8.33	1	14.29	3	100	0	0	9	25.71
4	Auto	0	0	1	10	0	0	0	0	0	0	0	0	1	2.86
5	Landline Phone	0	0	0	0	1	8.33	0	0	0	0	0	0	1	2.86
6	Mobile Phone	2	100	10	100	11	91.67	7	100	3	100	1	100	34	97.14

Durable Assets owned by the households: The data regarding the Durable Assets owned by the households in Balachakra-2 micro-watershed is presented in Table 9. The results show that 57.14 per cent of the households possess TV, 51.43 per cent of the

households possess mixer/grinder, 25.71 per cent of the households possess motor cycle, 2.86 per cent of the households possess Auto and Landline Phone and 97.14 per cent of the households possess mobile phones.

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Balachakra-2 micro-watershed is presented in Table 10. The results show that the average value of television was Rs. 9,000, mixer/grinder was Rs. 1583.33, motor cycle was Rs. 56,888, Landline Phone was Rs. 2,000, Auto was Rs. 120,000 and mobile phone was Rs. 2,970.

Table10. Average value of durable assets owned by households in Balachakra-2 micro-watershed Average value (Rs.)

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF(3)	LF (1)	All (35)
1	Television	9,000	9,000	9,000	9,000	9,000	0	9,000
2	Mixer/Grinder	2,000	2,000	2,000	1,500	2,000	0	1583.33
3	Motor Cycle	35,000	58,333	75,000	45,000	60,666	0	56,888
4	Auto	0	120,000	0	0	0	0	120,000
5	Landline Phone	0	0	2,000	0	0	0	2,000
6	Mobile Phone	1,500	3,357	2,821	2,909	3,333	4,000	2,970

Farm Implements owned: The data regarding the farm implements owned by the households in Balachakra-2 micro-watershed is presented in Table 11. About 2.86 per cent of the households possess Bullock Cart, 8.57 per cent of the households possess plough and 94.29 per cent of them possess weeder.

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

Sl. No.	Particulars	LL (2)		MF(10)		SF (12)		SMF(7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	0	0	0	0	1	8.33	0	0	0	0	0	0	1	2.86
2	Plough	1	50	0	0	1	8.33	1	14.29	0	0	0	0	3	8.57
3	Weeder	2	100	9	90	12	100	6	85.71	3	100	1	100	33	94.29
4	Blank	0	0	1	10	0	0	1	14.29	0	0	0	0	2	5.71

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Balachakra-2 micro-watershed is presented in Table 12. The results shows that the average value of bullock cart was Rs. 35,000, plough was Rs. 1,500 and the average value of weeder was Rs. 51.

Table 12. Average value of farm implements owned by households in Balachakra-2 micro-watershed AverageValue (Rs.)

Sl.No.	Particulars	LL (2)	MF(10)	SF (12)	SMF(7)	MDF(3)	LF (1)	All (35)
1	Bullock Cart	0	0	35,000	0	0	0	35,000
2	Plough	1,500	0	1,500	1,500	0	0	1,500
3	Weeder	50	54	48	52	54	66	51

Livestock possession by the households: The data regarding the Livestock possession by the households in Balachakra-2 micro-watershed is presented in Table 13. The results indicate that, 11.43 per cent of the households possess bullocks, per cent of the households possess 22.86 local cow and 2.86 per cent of the households possess Buffalo.

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

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	1	50	1	10	0	0	1	14.29	1	33.33	0	0	4	11.43
2	Local cow	1	50	2	20	1	8.33	3	42.86	1	33.33	0	0	8	22.86
3	Buffalo	0	0	0	0	0	0	0	0	1	33.33	0	0	1	2.86
4	blank	1	50	7	70	11	91.67	4	57.14	1	33.33	1	100	25	71.43

Average Labour availability: The data regarding the average labour availability in Balachakra-2 micro-watershed is presented in Table 14. The results indicate that, average own labour men available in the micro watershed was 2.26, average own labour (women) available was 1.56, average hired labour (men) available was 11.33 and average hired labour (women) available was 10.42.

In case of marginal farmers, average own labour men available was 2.30, average own labour (women) was 1.90, average hired labour (men) was 7.40 and average hired labour (women) available was 6.90. In case of small farmers, average own labour men available was 2.42, average own labour (women) was 1.08, average hired labour (men) was 11.67 and average hired labour (women) available was 10.83. In case of semi medium farmers, average own labour men available was 2, average own labour (women) was 1.63, average hired labour (men) was 11.43 and average hired labour (women) available was 10. In case of medium farmers, average own labour men available was 2.67 and average own labour (women) was 2.33, average hired labour (men) was 10 and average hired labour (women) available was 8.33. In case of large farmers, average own labour men available was 1 and average own labour (women) was 1, average hired labour (men) was 50 and average hired labour (women) available was 50.

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

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Hired labour Female	0	6.90	10.83	10	8.33	50	10.42
2	Own Labour Female	0	1.90	1.08	1.63	2.33	1	1.56
3	Own labour Male	0	2.30	2.42	2	2.67	1	2.26
4	Hired labour Male	0	7.40	11.67	11.43	10	50	11.33

Adequacy of Hired Labour: The data regarding the adequacy of hired labour in Balachakra-2 micro-watershed is presented in Table 15. The results indicate that, 97.14 per cent of the households opined that the hired labour was adequate.

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

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	0	0	10	100	12	100	8	114.29	3	100	1	100	34	97.14

Distribution of land (ha): The data regarding the distribution of land (ha) in Balachakra-2 micro-watershed is presented in Table 16. The results indicate that, households of the Balachakra-2 micro-watershed possess 17 ha (38.71 %) of dry land, 21.90 ha (49.87 %) of irrigated land and 5.02 ha (11.43 %) of Permanent Fallow land. Marginal farmers

possess 4.27 ha (84.59 %) of dry land, 0.53 ha (10.59 %) of irrigated land and 0.24 ha (4.82 %) of Permanent Fallow land. Small farmers possess 8.69 ha (65.32 %) of dry land, 4.17 ha (31.34 %) of irrigated land and 0.45 ha (3.35 %) of Permanent Fallow land. Semi medium farmers possess 2.83 ha (65.32 %) of dry land and 7.08 ha (62.06 %) of irrigated land and 1.50 ha (13.12 %) of Permanent Fallow land. Medium farmers possess 1.21 ha (13.64 %) of dry land and 4.86 ha (54.55 %) of irrigated land, 2.83 ha (31.82 %) of Permanent Fallow land. Large farmers possess 5.26 ha (100 %) of irrigated land.

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

Sl. No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
1	Dry	0	0	4.27	84.59	8.69	65.32	2.83	24.82	1.21	13.64	0	0	17	38.71
2	Irrigated	0	0	0.53	10.59	4.17	31.34	7.08	62.06	4.86	54.55	5.26	100	21.90	49.87
3	Permanent Fallow	0	0	0.24	4.82	0.45	3.35	1.50	13.12	2.83	31.82	0	0	5.02	11.43
Total		0	100	5.04	100	13.30	100	11.41	100	8.90	100	5.26	100	43.92	100

Average land value (Rs./ha): The data regarding the average land value (Rs./ha) in Balachakra-2 micro-watershed is presented in Table 17. The results indicate that, the average value of dry land was Rs. 482,123.30, the average value of irrigated land was Rs. 462,326.31 and the average value of Permanent Fallow land was Rs. 292,814.52. In case of marginal famers, the average land value was Rs. 609,297.91 for dry land and the average value of irrigated land was Rs. 804,621.22 and the average value of Permanent Fallow land was Rs. 493,999.99. In case of small famers, the average land value was Rs. 494,690.26 for dry land, Rs. 695,436.89 for irrigated land and Rs. 898,181.80 for Permanent Fallow land. In case of semi medium famers, the average land value was Rs. 282,285.71 for dry land, Rs. 691,600 for irrigated land and Rs. 367,162.16 for Permanent Fallow land. In case of medium farmers, the average land value was Rs. 411,666.67 for dry land, Rs. 226,416.67 for irrigated land and Rs. 141,142.86 for Permanent Fallow land. In case of large farmers, the average land value was Rs. 152,000 for irrigated land.

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

Sl. No.	Particulars	LL(2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Dry	0	609,297.91	494,690.26	282,285.71	411,666.67	0	482,123.30
2	Irrigated	0	804,621.22	695,436.89	691,600	226,416.67	152,000	462,326.31
3	Permanent Fallow	0	493,999.99	898,181.80	367,162.16	141,142.86	0	292,814.52

Status of bore wells: The data regarding the status of bore wells in Balachakra-2 micro-watershed is presented in Table 18. The results indicate that, there were 16 functioning bore wells in the micro watershed.

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

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	De-functioning	0	0	0	0	0	0	0
2	Functioning	0	2	5	6	2	1	16

Source of irrigation: The results (Table 19) indicate that, bore well was the major irrigation source in the micro water shed for 45.71 per cent of the farmers.

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

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	2	20	5	41.67	6	85.71	2	66.67	1	100	16	45.71

Depth of water (Avg. in meters): The data regarding the depth of water in Balachakra-2 micro-watershed is presented in Table 20. The results indicate that, the depth of bore well was found to be 48.77 meters.

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

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
		N	N	N	N	N	N	N
1	Bore Well	0	21.34	44.45	91.44	71.12	106.68	48.77

Irrigated Area (ha): The results (Table 21) indicate that, marginal, small, semi medium, medium and large farmers had an irrigated area of 0.53 ha, 4.17 ha, 8.53 ha, 4.86 ha and 5.26 ha respectively.

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

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
1	Kharif	0	0.53	4.17	8.53	4.86	5.26	23.35
Total		0	0.53	4.17	8.53	4.86	5.26	23.35

Cropping pattern: The results (Table 22) indicate that, farmers have grown cotton (16.08 ha), groundnut (13.96 ha), Paddy (6.39 ha) and Sorghum (1.79 ha). Marginal farmers have grown sorghum, cotton, paddy and groundnut. Small farmers have grown cotton, groundnut and paddy. Semi medium farmers have grown sorghum, cotton, paddy and groundnut. Medium farmers have grown groundnut and paddy. Large farmers have grown cotton.

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

Sl.No.	Particulars	LL(2)	MF(10)	SF(12)	SMF(7)	MDF(3)	LF(1)	All(35)
1	Kharif - Cotton	0	2.43	7.17	1.21	0	5.26	16.08
2	Kharif - Groundnut	0	1.29	2.14	5.67	4.86	0	13.96
3	Kharif - Paddy	0	0.13	3.55	1.50	1.21	0	6.39
4	Kharif - Sorghum	0	0.55	0	1.24	0	0	1.79
Total		0	4.40	12.86	9.62	6.07	5.26	38.21

Cropping intensity: The data regarding the cropping intensity in Balachakra-2 micro-watershed is presented in Table 23. The results indicate that, the cropping intensity in Balachakra-2 micro-watershed was found to be 90.16 per cent.

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

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
1	Cropping Intensity	0	91.57	100	91.17	68.18	100	90.16

Cost of cultivation of Cotton: The data regarding the cost of cultivation of Cotton in Balachakra-2 micro-watershed is presented in Table 24. The results indicate that, the total cost of cultivation for Cotton was Rs. 37926.63. The gross income realized by the farmers was Rs. 69904.76. The net income from Cotton cultivation was Rs. 31978.12. Thus the benefit cost ratio was found to be 1: 1.84.

Table 24. Cost of Cultivation of Cotton in Balachakra-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	48.76	8720.97	22.99
2	Bullock		Pairs/day	3.02	1810.88	4.77
3	Tractor		Hours	4.21	3293.27	8.68
4	Machinery		Hours	0.19	152	0.40
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	4.41	4184.89	11.03
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	2.98	595.33	1.57
8	Fertilizer + micronutrients		Quintal	7.03	5611.67	14.80
9	Pesticides (PPC)		Kgs / liters	1.23	1229.72	3.24
10	Irrigation		Number	6.04	0	0
11	Repairs			0	0	0
12	Msc. Charges (Marketing costs etc)			0	0	0
13	Depreciation charges			0	4.80	0.01
14	Land revenue and Taxes			0	3.29	0.01
II	**Cost B1**					
16	Interest on working capital				1394.71	3.68
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**				27001.54	71.19
III	**Cost B2**					
18	Rental Value of Land				333.33	0.88
19	**Cost B2 = (Cost B1 + Rental value)**				27334.88	72.07
IV	**Cost C1**					
20	Family Human Labour			28.98	7142.88	18.83
21	**Cost C1 = (Cost B2 + Family Labour)**				34477.76	90.91
V	**Cost C2**					
22	Risk Premium				1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				34478.76	90.91
VI	**Cost C3**					
24	Managerial Cost				3447.88	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				37926.63	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.79	69904.76	
		b) Main Crop Sales Price (Rs.)			4726.92	
b.	Gross Income (Rs.)				69904.76	
c.	Net Income (Rs.)				31978.12	
d.	Cost per Quintal (Rs./q.)				2564.58	
e.	Benefit Cost Ratio (BC Ratio)				1:1.84	

Cost of Cultivation of Sorghum: The data regarding the cost of cultivation of Sorghum in Balachakra-2 micro-watershed is presented in Table 25. The results indicate that, the total cost of cultivation for Sorghum was Rs. 32863.51. The gross income realized by the farmers was Rs. 41451.87. The net income from Sorghum cultivation was Rs. 8588.36. Thus the benefit cost ratio was found to be 1: 1.26.

Table 25. Cost of Cultivation of Sorghum in Balachakra-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	26.48	5020.72	15.28
2	Bullock		Pairs/day	6.70	4019.80	12.23
3	Tractor		Hours	3.96	3164.18	9.63
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	7.29	1020.83	3.11
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	0	0	0
8	Fertilizer + micronutrients		Quintal	6.08	4803.85	14.62
9	Pesticides (PPC)		Kgs / liters	1.83	1829.63	5.57
10	Irrigation		Number	0	0	0
11	Depreciation charges			0	2.64	0.01
12	Land revenue and Taxes			0	3.29	0.01
II	**Cost B1**					
13	Interest on working capital				918.64	2.80
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				20783.58	63.24
III	**Cost B2**					
15	Rental Value of Land				333.33	1.01
16	**Cost B2 = (Cost B1 + Rental value)**				21116.92	64.26
IV	**Cost C1**					
17	Family Human Labour			33.20	8758.01	26.65
18	**Cost C1 = (Cost B2 + Family Labour)**				29874.92	90.91
V	**Cost C2**					
19	Risk Premium				1	0
20	**Cost C2 = (Cost C1 + Risk Premium)**				29875.92	90.91
VI	**Cost C3**					
21	Managerial Cost				2987.59	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				32863.51	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		14.58	34999.74	
		b) Main Crop Sales Price (Rs.)			2400	
	By Product	c) Main Product (q)		5.87	6452.14	
		d) Main Crop Sales Price (Rs.)			1100	
b.	Gross Income (Rs.)				41451.87	
c.	Net Income (Rs.)				8588.36	
d.	Cost per Quintal (Rs./q.)				2253.51	
e.	Benefit Cost Ratio (BC Ratio)				1:1.26	

Cost of cultivation of Groundnut: The data regarding the cost of cultivation of groundnut in Balachakra-2 micro-watershed is presented in Table 26. The results indicate that, the total cost of cultivation for groundnut was Rs. 60722.13. The gross income realized by the farmers was Rs. 63445.98. The net income from groundnut cultivation was Rs. 2723.85. Thus the benefit cost ratio was found to be 1: 1.04.

Table 26. Cost of Cultivation of groundnut in Balachakra-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	48.10	8261.15	13.60
2	Bullock		Pairs/day	3.66	2194.11	3.61
3	Tractor		Hours	4.05	3236.27	5.33
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	145.88	21881.92	36.04
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	2.45	490.78	0.81
8	Fertilizer + micronutrients		Quintal	9.56	7860.44	12.94
9	Pesticides (PPC)		Kgs / liters	1.03	1030.16	1.70
10	Irrigation		Number	3.19	0	0
11	Depreciation charges			0	8.01	0.01
12	Land revenue and Taxes			0	3.29	0.01
II	**Cost B1**					
13	Interest on working capital				3751.72	6.18
14	**Cost B1 = (Cost A1 + sum of 15 and 16)**				48717.85	80.23
III	**Cost B2**					
15	Rental Value of Land				333.33	0.55
16	**Cost B2 = (Cost B1 + Rental value)**				49051.18	80.78
IV	**Cost C1**					
17	Family Human Labour			25.54	6149.76	10.13
18	**Cost C1 = (Cost B2 + Family Labour)**				55200.94	90.91
V	**Cost C2**					
19	Risk Premium				1	0
20	**Cost C2 = (Cost C1 + Risk Premium)**				55201.94	90.91
VI	**Cost C3**					
21	Managerial Cost				5520.19	9.09
22	**Cost C3 = (Cost C2 + Managerial Cost)**				60722.13	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		15.48	54376.89	
		b) Main Crop Sales Price (Rs.)			3513.64	
	By Product	c) Main Product (q)		13.13	9069.09	
		d) Main Crop Sales Price (Rs.)			690.91	
b.	Gross Income (Rs.)				63445.98	
c.	Net Income (Rs.)				2723.85	
d.	Cost per Quintal (Rs./q.)				3923.64	
e.	Benefit Cost Ratio (BC Ratio)				1:1.04	

Cost of cultivation of Paddy: The data regarding the cost of cultivation of paddy in Balachakra-2 micro-watershed is presented in Table 27. The results indicate that, the total cost of cultivation for paddy was Rs. 71170.09. The gross income realized by the farmers was Rs. 65539.52. The net income from paddy cultivation was Rs. -5630.56. Thus the benefit cost ratio was found to be 1: 0.92.

Table 27. Cost of Cultivation of Paddy in Balachakra-2 micro-watershed

Sl.No	Particulars		Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**					
1	Hired Human Labour		Man days	47.65	8875.77	12.47
2	Bullock		Pairs/day	1.89	1135.83	1.60
3	Tractor		Hours	4.44	3552.61	4.99
4	Machinery		Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenance)		Kgs (Rs.)	42.22	30983.38	43.53
6	Seed Inter Crop		Kgs.	0	0	0
7	FYM		Quintal	3.15	629.05	0.88
8	Fertilizer + micronutrients		Quintal	7.63	6076.73	8.54
9	Pesticides (PPC)		Kgs / liters	1.12	1121.02	1.58
10	Irrigation		Number	6.24	0	0
11	Repairs			0	0	0
12	Depreciation charges			0	114.15	0.16
13	Land revenue and Taxes			0	3.29	0
II	**Cost B1**					
14	Interest on working capital				4657.34	6.54
15	**Cost B1 = (Cost A1 + sum of 15 and 16)**				57149.17	80.30
III	**Cost B2**					
16	Rental Value of Land				583.33	0.82
17	**Cost B2 = (Cost B1 + Rental value)**				57732.51	81.12
IV	**Cost C1**					
18	Family Human Labour			29.25	6966.57	9.79
19	**Cost C1 = (Cost B2 + Family Labour)**				64699.08	90.91
V	**Cost C2**					
20	Risk Premium				1	0
21	**Cost C2 = (Cost C1 + Risk Premium)**				64700.08	90.91
VI	**Cost C3**					
22	Managerial Cost				6470.01	9.09
23	**Cost C3 = (Cost C2 + Managerial Cost)**				71170.09	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		33.16	60928.29	
		b) Main Crop Sales Price (Rs.)			1837.50	
	By Product	c) Main Product (q)		6.71	4611.24	
		d) Main Crop Sales Price (Rs.)			687.50	
b.	Gross Income (Rs.)				65539.52	
c.	Net Income (Rs.)				-5630.56	
d.	Cost per Quintal (Rs./q.)				2146.38	
e.	Benefit Cost Ratio (BC Ratio)				1:0.92	

Adequacy of fodder: The data regarding the adequacy of fodder in Balachakra-2 micro-watershed is presented in Table 28. The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and green fodder was adequate.

Table 28. Adequacy of fodder in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	4	40	3	25	3	42.86	2	66.67	1	100	13	37.14
2	Adequate-Green Fodder	0	0	4	40	3	25	3	42.86	2	66.67	1	100	13	37.14

Annual gross income: The data regarding the annual gross income in Balachakra-2 micro-watershed is presented in Table 29. The results indicate that the annual gross income was Rs. 25,000 for landless, Rs. 69,955 for marginal farmers, for small farmers it was Rs. 99,860, semi medium farmers it was Rs. 112,857.14, medium farmers it was Rs. 110,006.67 and large farmers it was Rs. 345,000.

Table 29. Annual gross income in Balachakra-2 micro-watershed

(Avg. value in Rs.)

Sl.No.	Particulars	LL (2)	MF(10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
1	Business	0	2,000	0	0	0	0	571.43
2	Wage	25,000	28,200	28,333.33	34,285.71	27,833.33	20,000	29,014.29
3	Agriculture	0	35,250	70,500	74,071.43	78,066.67	325,000	65,034.29
4	Dairy Farm	0	4,505	1,026.67	4,500	4,106.67	0	2,891.14
Income(Rs.)		25,000	69,955	99,860	112,857.14	110,006.67	345,000	97,511.14

Average annual expenditure: The data regarding the average annual expenditure in Balachakra-2 micro-watershed is presented in Table 30. The results indicate that the average annual expenditure is Rs. 16,517.12. For landless it was Rs. 7,500, marginal farmers it was Rs. 6,769.44, for small farmers it was Rs. 5,583.33, for semi medium farmers it was Rs. 13,010.20, medium farmers it was Rs. 25,111.11 and large farmers it was Rs. 262,000.

Table 30. Average annual expenditure in Balachakra-2 micro-watershed

(Avg.value in Rs.)

Sl.No.	Particulars	LL (2)	MF (10)	SF (12)	SMF (7)	MDF (3)	LF (1)	All (35)
1	Business	0	12,000	0	0	0	0	342.86
2	Wage	15,000	22,250	15,750	20,857.14	18,000	12,000	17,400
3	Agriculture	0	24,111.11	48,000	54,214.29	54,333.33	250,000	45,300
4	Dairy Farm	0	9,333.33	3,250	16,000	3,000	0	1,614.29
Total		15,000	67,694.44	67,000	91,071.43	75,333.33	262,000	578,099.21
Average		7,500	6,769.44	5,583.33	13,010.20	25,111.11	262,000	16,517.12

Horticultural species grown: The data regarding horticultural species grown in Balachakra-2 micro-watershed is presented in Table 31. The results indicate that, households have planted 26 Mango in their field and 8 Mango and 2 coconut trees in their backyard.

Table 31: Horticultural species grown in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	0	0	0	0	0	0	0	0	0	2	0	0	0	2
2	Mango	0	0	2	0	9	0	13	8	2	0	0	0	26	8

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

Forest species grown: The data regarding forest species grown in Balachakra-2 micro-watershed is presented in Table 32. The results indicate that, households have planted 4 Eucalyptus, 99 Neem and 2 Banyan trees in their field and 1 Neem tree in their backyard.

Table 32: Forest species grown in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		F	B	F	B	F	B	F	B	F	B	F	B	F	B
1	Eucalyptus	0	0	0	0	2	0	2	0	0	0	0	0	4	0
2	Neem	0	0	16	0	38	0	37	0	6	1	2	0	99	1
3	Banyan	0	0	2	0	0	0	0	0	0	0	0	0	2	0

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

Average Additional investment capacity: The data regarding average additional investment capacity in Balachakra-2 micro-watershed is presented in Table 33. The results indicated that, households have an average investment capacity of Rs. 4,685.71 for land development, households have an average investment capacity of Rs. 7,457.14 for Irrigation facility, households have an average investment capacity of Rs. 2,371.43 for improved crop production and households have an average investment capacity of Rs. 571.43 improved livestock management.

Table 33: Average Additional investment capacity in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL(2)	MF(10)	SF (12)	SMF(7)	MDF (3)	LF(1)	All (35)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Land development	0	3,100	5,500	6,000	8,333.33	0	4,685.71
2	Irrigation facility	0	0	10,416.67	1,142.86	42,666.67	0	7,457.14
3	Improved crop production	0	1,500	1,500	3,857.14	7,666.67	0	2,371.43
4	Improved livestock management	0	0	833.33	714.29	1,666.67	0	571.43

Table 34: Source of funds for additional investment capacity in Balachakra-2 micro –watershed

Sl. No	Item	Land development		Irrigation facility		Improved crop production		Improved livestock management	
		N	%	N	%	N	%	N	%
1	Government subsidy	0	0.0	2	5.71	0	0.0	0	0.0
2	Loan from bank	10	28.57	3	8.57	7	20.0	4	11.43
3	Own funds	1	2.86	0	0.0	1	2.86	0	0.0

Source of additional investment: The data regarding source of funds for additional investment in Balachakra-2 micro-watershed is presented in Table 34. The results indicated that Government subsidy was the source of additional investment for 5.71 per cent for irrigation facility. Loan from bank was the source of additional investment for 28.57 per cent for land development, 8.57 per cent for irrigation facility, 20.0 per cent for improved crop production and 11.43 per cent for improved livestock management. Own funds were the source of additional investment for 2.86 per cent for land development and improved crop production.

Marketing of the agricultural produce: The data regarding marketing of the agricultural produce in Balachakra-2 micro-watershed is presented in Table 35. The results indicated that, cotton was sold to the extent of 100 per cent, Groundnut was sold to the extent of 92.47per cent, Paddy was sold to the extent of 93.18 per cent and Sorghum was sold to the extent of 88.46 per cent.

Table 35. Marketing of the agricultural produce in Balachakra-2 micro-watershed

Sl.No	Crops	Output obtained (q)	Output retained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Cotton	233.0	0.0	233.0	100.0	4726.92
2	Groundnut	186.0	14.0	172.0	92.47	3513.64
3	Paddy	264.0	18.0	246.0	93.18	1837.5
4	Sorghum	26.0	3.0	23.0	88.46	2400.0

Marketing Channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Balachakra-2 micro-watershed is presented in Table 36. The results indicated that, about 97.14 per cent of the farmers sold their produce to local/village merchants.

Table 36. Marketing Channels used for sale of agricultural produce in Balachakra-2 micro-watershed

Sl.No.	Particulars	MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	9	90	12	100	8	114.29	4	133.33	1	100	34	97.14

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Balachakra-2 micro-watershed is presented in Table 37. The results indicated that, 97.14 per cent of the households have used tractor as a mode of transportation.

Table 37. Mode of transport of agricultural produce in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Tractor	0	0	9	90	12	100	8	114.29	4	133.33	1	100	34	97.14

Incidence of soil and water erosion problems: The data regarding incidence of soil and water erosion problems in Balachakra-2 micro-watershed is presented in Table 38. The

results indicated that, 77.14 per cent of the households have experienced soil and water erosion problems in the farm.

Table 38. Incidence of soil and water erosion problems in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Soil and water erosion problems in the farm	0	0	6	60	11	91.67	6	85.71	3	100	1	100	27	77.14

Interest shown towards soil testing: The data regarding Interest shown towards soil testing in Balachakra-2 micro-watershed is presented in Table 39. The results indicated that, 94.29 per cent have shown interest in soil test.

Table 39. Interest shown towards soil testing in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Interest in soil test	0	0	9	90	12	100	8	114.29	3	100	1	100	33	94.29

Usage pattern of fuel for domestic use: The data regarding usage pattern of fuel for domestic use in Balachakra-2 micro-watershed is presented in Table 40. The results indicated that, 88.57 per cent of the households used firewood as a source of fuel and 11.43 per cent of the households used LPG as a source of fuel.

Table 40. Usage pattern of fuel for domestic use in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	1	50	10	100	11	91.67	6	85.71	2	66.67	1	100	31	88.57
2	LPG	1	50	0	0	1	8.33	1	14.29	1	33.33	0	0	4	11.43

Source of drinking water: The data regarding source of drinking water in Balachakra-2 micro-watershed is presented in Table 41. The results indicated that, piped supply was the major source of drinking water for 97.14 per cent of the households in the micro watershed.

Table 41. Source of drinking water in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	2	100	10	100	12	100	6	85.71	3	100	1	100	34	97.14

Source of light: The data regarding source of light in Balachakra-2 micro-watershed is presented in Table 42. The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.

Table 42. Source of light in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	2	100	10	100	12	100	7	100	3	100	1	100	35	100

Existence of Sanitary toilet facility: The data regarding existence of sanitary toilet facility in Balachakra-2 micro-watershed is presented in Table 43. The results indicated that, 54.29 per cent of the households possess sanitary toilet facility.

Table 43. Existence of Sanitary toilet facility in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF(10)		SF (12)		SMF(7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	2	100	5	50	6	50	2	28.57	3	100	1	100	19	54.29

Possession of PDS card: The data regarding possession of PDS card in Balachakra-2 micro-watershed is presented in Table 44. The results indicated that, 100 per cent of the sampled households possessed BPL cards.

Table 44. Possession of PDS card in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	2	100	10	100	12	100	7	100	3	100	1	100	35	100

Participation in NREGA program: The data regarding participation in NREGA programme in Balachakra-2 micro-watershed is presented in Table 45. The results indicated that, 88.57 per cent of the households participated in NREGA programme.

Table 45. Participation in NREGA programme in Balachakra-2 micro-watershed

Sl. No.	Particulars	LL (2)		MF (10)		SF(12)		SMF(7)		MDF(3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Participation in NREGA programme	2	100	10	100	9	75	6	85.71	3	100	1	100	31	88.57

Adequacy of food items: The data regarding adequacy of food items in Balachakra-2 micro-watershed is presented in Table 46. The results indicated that, cereals were adequate for 100 per cent of the households, Pulses were adequate for 68.57 per cent of the households, Vegetables were adequate for 88.57 per cent, Fruits were adequate for 11.43 per cent, Milk and were adequate for 97.14 per cent and Meat and Egg were adequate for 100 per cent.

Table 46. Adequacy of food items in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	2	100	10	100	12	100	7	100	3	100	1	100	35	100
2	Pulses	1	50	6	60	10	83.33	6	85.71	1	33.33	0	0	24	68.57
3	Vegetables	2	100	8	80	11	91.67	6	85.71	3	100	1	100	31	88.57
4	Fruits	1	50	1	10	1	8.33	0	0	1	33.33	0	0	4	11.43
5	Milk	2	100	9	90	12	100	7	100	3	100	1	100	34	97.14
6	Egg	2	100	10	100	12	100	7	100	3	100	1	100	35	100
7	Meat	2	100	10	100	12	100	7	100	3	100	1	100	35	100

Response on Inadequacy of food items: The data regarding inadequacy of food items in Balachakra-2 micro-watershed is presented in Table 47. The results indicated that, Pulses were inadequate for 31.43 per cent of the households, oilseeds were inadequate for 100

per cent, vegetables were inadequate for 11.43 per cent, fruits were inadequate for 85.71 per cent and milk was inadequate for 2.86 per cent of the households.

Table 47. Response on Inadequacy of food items in Balachakra-2 micro-watershed

Sl.No.	Particulars	LL (2)		MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	Pulses	1	50	4	40	2	16.67	1	14.29	2	66.67	1	100	11	31.43
2	Oilseed	2	100	10	100	12	100	7	100	3	100	1	100	35	100
3	Vegetables	0	0	2	20	1	8.33	1	14.29	0	0	0	0	4	11.43
4	Fruits	1	50	8	80	11	91.67	7	100	2	66.67	1	100	30	85.71
5	Milk	0	0	1	10	0	0	0	0	0	0	0	0	1	2.86

Farming constraints: The data regarding farming constraints experienced by households in Balachakra-2 micro-watershed is presented in Table 48. The results indicated that, lower fertility status of the soil was the constraint experienced by 80 per cent of the households, Wild animal menace on farm field (20 %), frequent incidence of pest and diseases (85.71 %), Inadequacy of irrigation water (42.86 %), High cost of Fertilizers and plant protection chemicals (80 %), High rate of interest on credit (74.29 %), Lack of marketing facilities in the area (14.29 %), Inadequate extension services (2.86 %) and Low price for the agricultural commodities (62.86 %).

Table 48. Farming constraints Experienced in Balachakra-2 micro-watershed

Sl. No.	Particulars	MF (10)		SF (12)		SMF (7)		MDF (3)		LF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Lower fertility status of the soil	7	70	12	100	5	71.43	3	100	1	100	28	80
2	Wild animal menace on farm field	2	20	1	8.33	3	42.86	1	33.33	0	0	7	20
3	Frequent incidence of pest and diseases	9	90	12	100	6	85.71	2	66.67	1	100	30	85.71
4	Inadequacy of irrigation water	3	30	4	33.33	5	71.43	2	66.67	1	100	15	42.86
5	High cost of Fertilizers and plant protection chemicals	9	90	10	83.33	5	71.43	3	100	1	100	28	80
6	High rate of interest on credit	9	90	9	75	6	85.71	1	33.33	1	100	26	74.29
7	Low price for the agricultural commodities	4	40	11	91.67	5	71.43	1	33.33	1	100	22	62.86
8	Lack of marketing facilities in the area	0	0	1	8.33	2	28.57	1	33.33	1	100	5	14.29
9	Inadequate extension services	0	0	0	0	1	14.29	0	0	0	0	1	2.86

Chapter 5

SUMMARY

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

The data on households sampled for socio economic survey indicated that 35 farmers were sampled in Balachakra-2 micro-watershed among them 2 (5.71%) were landless, 10 (28.57 %) were marginal farmers, 12 (34.29 %) were small farmers, 7 (20 %) semi medium farmers, 3 (8.57 %) were medium farmers and 1 (2.86 %) were large farmers.

The data indicated that there were 124 (60.49 %) men and 81 (39.51 %) women among the sampled households. The average family size of landless was 6.5, marginal farmers' was 5.5, small farmers' was 5.5, semi medium farmers' was 6.14, medium farmers' was 8 and large farmers' was 4.

The data indicated that, 39 (19.02 %) people were in 0-15 years of age, 92 (44.88 %) were in 16-35 years of age, 61 (29.76 %) were in 36-60 years of age and 13 (6.34 %) were above 61 years of age.

The results indicated that Balachakra-2 had 59.02 per cent illiterates, 0.49 per cent of them had Functional Literate, 22.93 per cent of them had primary school, 1.46 per cent of them had middle school, 6.83 per cent of them had high school education, 2.93 per cent of them had PUC and 0.98 per cent of them had Degree education.

The results indicate that, 48.57 per cent of household heads were practicing agriculture and agricultural labourers. The results indicate that agriculture was the major occupation for 26.34 per cent of the household members, 39.02 per cent were agricultural labourers, 0.49 per cent were private service and Trade & Business, 20 per cent were students, 11.22 per cent were housewives and 2.44 per cent were children.

The results show that, 0.49 per cent of the population in the micro watershed has participated in Cooperative bank.

The results indicate that, 34.29 per cent of the households possess Thatched house, 57.14 per cent of the households possess Katcha house and 8.57 per cent of them possess Pucca/RCC house.

The results show that 57.14 per cent of the households possess TV, 51.43 per cent of the households possess mixer/grinder, 25.71 per cent of the households possess motor

cycle, 2.86 per cent of the households possess Auto and Landline Phone and 97.14 per cent of the households possess mobile phones.

The results show that the average value of television was Rs. 9,000, mixer/grinder was Rs. 1583.33, motor cycle was Rs. 56,888, Landline Phone was Rs. 2,000, Auto was Rs. 120,000 and mobile phone was Rs. 2,970.

About 2.86 per cent of the households possess Bullock Cart, 8.57 per cent of the households possess plough and 94.29 per cent of them possess weeder. The result shows that the average value of bullock cart was Rs. 35,000, plough was Rs. 1,500 and the average value of weeder was Rs. 51.

The results indicate that, 11.43 per cent of the households possess bullocks, per cent of the households possess 22.86 local cow and 2.86 per cent of the households possess Buffalo.

The results indicate that, average own labour men available in the micro watershed was 2.26, average own labour (women) available was 1.56, average hired labour (men) available was 11.33 and average hired labour (women) available was 10.42. The results indicate that, 97.14 per cent of the households opined that the hired labour was adequate.

The results indicate that, households of the Balachakra-2 micro-watershed possess 17 ha (38.71 %) of dry land, 21.90 ha (49.87 %) of irrigated land and 5.02 ha (11.43 %) of Permanent Fallow land. Marginal farmers possess 4.27 ha (84.59 %) of dry land, 0.53 ha (10.59 %) of irrigated land and 0.24 ha (4.82 %) of Permanent Fallow land. Small farmers possess 8.69 ha (65.32 %) of dry land, 4.17 ha (31.34 %) of irrigated land and 0.45 ha (3.35 %) of Permanent Fallow land. Semi medium farmers possess 2.83 ha (65.32 %) of dry land and 7.08 ha (62.06 %) of irrigated land and 1.50 ha (13.12 %) of Permanent Fallow land. Medium farmers possess 1.21 ha (13.64 %) of dry land and 4.86 ha (54.55 %) of irrigated land, 2.83 ha (31.82 %) of Permanent Fallow land. Large farmers possess 5.26 ha (100 %) of irrigated land.

The results indicate that, the average value of dry land was Rs. 482,123.30, the average value of irrigated land was Rs. 462,326.31 and the average value of Permanent Fallow land was Rs. 292,814.52. In case of marginal famers, the average land value was Rs. 609,297.91 for dry land and the average value of irrigated land was Rs. 804,621.22 and the average value of Permanent Fallow land was Rs. 493,999.99. In case of small famers, the average land value was Rs. 494,690.26 for dry land, Rs. 695,436.89 for irrigated land and Rs. 898,181.80 for Permanent Fallow land. In case of semi medium famers, the average land value was Rs. 282,285.71 for dry land, Rs. 691,600 for irrigated land and Rs. 367,162.16 for Permanent Fallow land. In case of medium farmers, the average land value was Rs. 411,666.67 for dry land, Rs. 226,416.67 for irrigated land and

Rs. 141,142.86 for Permanent Fallow land. In case of large farmers, the average land value was Rs. 152,000 for irrigated land.

The results indicate that, there were 16 functioning bore wells in the micro watershed. The results indicate that, bore well was the major irrigation source in the micro water shed for 45.71 per cent of the farmers. The results indicate that, the depth of bore well was found to be 48.77 meters.

The results indicate that, marginal, small, semi medium, medium and large farmers had an irrigated area of 0.53 ha, 4.17 ha, 8.53 ha, 4.86 ha and 5.26 ha respectively.

The results indicate that, farmers have grown cotton (16.08 ha), groundnut (13.96 ha), Paddy (6.39 ha) and Sorghum (1.79 ha). Marginal farmers have grown sorghum, cotton, paddy and groundnut. Small farmers have grown cotton, groundnut and paddy. Semi medium farmers have grown sorghum, cotton, paddy and groundnut. Medium farmers have grown groundnut and paddy. Large farmers have grown cotton.

The results indicate that, the cropping intensity in Balachakra-2 micro-watershed was found to be 90.16 per cent. The results indicate that, the total cost of cultivation for Cotton was Rs. 37926.63. The gross income realized by the farmers was Rs. 69904.76. The net income from Cotton cultivation was Rs. 31978.12. Thus the benefit cost ratio was found to be 1: 1.84.

The results indicate that, the total cost of cultivation for Sorghum was Rs. 32863.51. The gross income realized by the farmers was Rs. 41451.87. The net income from Sorghum cultivation was Rs. 8588.36. Thus the benefit cost ratio was found to be 1: 1.26.

The results indicate that, the total cost of cultivation for groundnut was Rs. 60722.13. The gross income realized by the farmers was Rs. 63445.98. The net income from groundnut cultivation was Rs. 2723.85. Thus the benefit cost ratio was found to be 1: 1.04.

The results indicate that, the total cost of cultivation for paddy was Rs. 71170.09. The gross income realized by the farmers was Rs. 65539.52. The net income from paddy cultivation was Rs. -5630.56. Thus the benefit cost ratio was found to be 1: 0.92.

The results indicate that, 37.14 per cent of the households opined that dry fodder was adequate and green fodder was adequate. The results indicate that the annual gross income was Rs. 25,000 for landless, Rs. 69,955 for marginal farmers, for small farmers it was Rs. 99,860, semi medium farmers it was Rs. 112,857.14, medium farmers it was Rs. 110,006.67 and large farmers it was Rs. 345,000.

The results indicate that the average annual expenditure is Rs. 16,517.12. For landless it was Rs. 7,500, marginal farmers it was Rs. 6,769.44, for small farmers it was

Rs. 5,583.33, for semi medium farmers it was Rs. 13,010.20, medium farmers it was Rs. 25,111.11 and large farmers it was Rs. 262,000.

The results indicate that, households have planted 26 Mango in their field and 8 Mango and 2 coconut trees in their backyard. The results indicate that, households have planted 4 Eucalyptus, 99 Neem and 2 Banyan trees in their field and 1 Neem tree in their backyard.

The results indicated that, households have an average investment capacity of Rs. 4,685.71 for land development, households have an average investment capacity of Rs. 7,457.14 for Irrigation facility, households have an average investment capacity of Rs. 2,371.43 for improved crop production and households have an average investment capacity of Rs. 571.43 improved livestock management.

The results indicated that Government subsidy was the source of additional investment for 5.71 per cent for irrigation facility. Loan from bank was the source of additional investment for 28.57 per cent for land development, 8.57 per cent for irrigation facility, 20.0 per cent for improved crop production and 11.43 per cent for improved livestock management. Own funds were the source of additional investment for 2.86 per cent for land development and improved crop production.

The results indicated that, cotton was sold to the extent of 100 per cent, Groundnut was sold to the extent of 92.47per cent, Paddy was sold to the extent of 93.18 per cent and Sorghum was sold to the extent of 88.46 per cent.

The results indicated that, about 97.14 per cent of the farmers sold their produce to local/village merchants. The results indicated that, 97.14 per cent of the households have used tractor as a mode of transportation.

The results indicated that, 77.14 per cent of the households have experienced soil and water erosion problems in the farm. The results indicated that, 94.29 per cent have shown interest in soil test. The results indicated that, 88.57 per cent of the households used firewood as a source of fuel and 11.43 per cent of the households used LPG as a source of fuel.

The results indicated that, piped supply was the major source of drinking water for 97.14 per cent of the households in the micro watershed. The results indicated that, Electricity was the major source of light for 100 per cent of the households in micro watershed.

The results indicated that, 54.29 per cent of the households possess sanitary toilet facility. The results indicated that, 100 per cent of the sampled households possessed BPL cards. The results indicated that, 88.57 per cent of the households participated in NREGA programme.

The results indicated that, cereals were adequate for 100 per cent of the households, Pulses were adequate for 68.57 per cent of the households, Vegetables were adequate for 88.57 per cent, Fruits were adequate for 11.43 per cent, Milk and were adequate for 97.14 per cent and Meat and Egg were adequate for 100 per cent.

The results indicated that, Pulses were inadequate for 31.43 per cent of the households, oilseeds were inadequate for 100 per cent, vegetables were inadequate for 11.43 per cent, fruits were inadequate for 85.71 per cent and milk was inadequate for 2.86 per cent of the households.

The results indicated that, lower fertility status of the soil was the constraint experienced by 80 per cent of the households, Wild animal menace on farm field (20 %), frequent incidence of pest and diseases (85.71 %), Inadequacy of irrigation water (42.86 %), High cost of Fertilizers and plant protection chemicals (80 %), High rate of interest on credit (74.29 %), Lack of marketing facilities in the area (14.29 %), Inadequate extension services (2.86 %) and Low price for the agricultural commodities (62.86 %).