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

GOUDAGERA (4D5B1M2c) MICROWATERSHED

Balichakra Hobli, Yadgir Taluk and District, Karnataka

Karnataka Watershed Development Project – II

SUJALA – III

World Bank funded Project

The World Bank

ICAR – NATIONAL BUREAU OF SOIL SURVEY AND LAND USE PLANNING

ICAR - NBSS & LUP

WATERSHED DEVELOPMENT DEPARTMENT
GOVT. OF KARNATAKA, BANGALORE

About ICAR - NBSS&LUP

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

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

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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 Goudagera Microwatershed, Yadgir Taluk & District, Karnataka" for integrated development was taken up in collaboration with the State Agricutural Universities, IISC, KSRSAC, KSNDMC as Consortia partners. The project provides detailed land resource information at cadastral level (1:7920 scale) for all the plots and socio-economic status of farm households covering thirty per cent farmers randomely selected representing landed and landless class of farmers in the micro-watershed. The project report with the accompanying maps for the Microwatershed will provide required detailed database for evolving effective land use plan, alternative land use options and conservation plans for the planners, administrators, agricutural extention personnel, KVK officials, developmental departments and other land users to manage the land resources in a sustainable manner.

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

Nagpur
Date: 07.03.2019

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PART-A

LAND RESOURCE INVENTORY

Contents

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The land resource inventory of Goudgera 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 493 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 456 ha in the microwatershed is covered by soils and about 37 ha by others (habitation and water bodies). The salient findings from the land resource inventory are summarized briefly below.

- *The soils belong to 8 soil series and 16 soil phases (management units) and 5 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 250 m grid interval.*
- *Land suitability for growing 26 major agricultural and horticultural crops was assessed and maps showing the degree of suitability along with constraints were generated.*
- *Entire area in the microwatershed is suitable for agriculture.*
- *About 64 per cent area of the microwatershed has soils that are deep to very deep (100 to >150 cm) and 29 per cent soils are shallow to moderately shallow (25-75 cm).*
- *About 39 per cent area in the microwatershed has loamy soils, 37 per cent clayey soils and 17 per cent are sandy soils at the surface.*
- *Entire area of the microwatershed has non gravelly (<15%) soils at the surface.*
- *About 7 per cent area of the microwatershed is very low (<50 mm/m) in available water capacity, 22 per cent low (51-100 mm/m) and 64 per cent area very high (>200 mm/m) in available water capacity.*
- *Entire area in the microwatershed has very gently sloping (1-3% slope) lands.*

- *An area of about 91 per cent is moderately (e2) eroded and 1 per cent is severely eroded (e3).*
- *An area of about 7 per cent soils are slightly acid (pH 6.0-6.5), 47 per cent soils are neutral (pH 6.5-7.3) in soil reaction, 21 per cent soils are slightly alkaline (pH 7.3-7.8), 12 per cent soils are moderately alkaline (7.8 - 8.4), 6 per cent soils are strongly alkaline (8.4-9.0) and 1 per cent soils are very strongly alkaline (>9.0).*
- *The Electrical Conductivity (EC) of the soils in the entire area of the microwatershed is dominantly <2 dsm^{-1} indicating that the soils are non-saline.*
- *About 11 per cent of the soils are low (<0.5%), 46 per cent are medium (0.5-0.75%) and 35 per cent soils are high (>0.75%) in organic carbon.*
- *About 60 per cent area is medium (23-57 kg/ha), 27 per cent area is high (>57 kg/ha) and 5 per cent low in available phosphorus.*
- *About 74 per cent is medium (145-337 kg/ha) in available potassium, 8 per cent high (>337 kg/ha) and 11 per cent low.*
- *Available sulphur is low (<10 ppm) in an area of about 13 per cent, and medium (10 -20 ppm) in 78 per cent and high in 7 cent area of the microwatershed.*
- *Available boron is low (<0.5 ppm) in an area of about 35 per cent, medium (0.5-1.0 ppm) in an area of 56 per cent and high in 2 per cent area of the microwatershed.*
- *Available iron is deficient (<4.5 ppm) in an area of about 5 per cent and sufficient (>4.5 ppm) in an area of 87 per cent.*
- *Available manganese and copper are sufficient in all the soils of the microwatershed.*
- *Available zinc is deficient (<0.6 ppm) in the entire area of the microwatershed.*
- *The land suitability for 26 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	-	*422(87)*		*Sapota*	-	-
Maize	-	*107(22)*		*Pomegranate*	-	*315(64)*
Bajra	-	*422(86)*		*Musambi*	-	*315(64)*
Groundnut	-	*87(18)*		*Lime*	-	*315(64)*
Sunflower	-	*315(65)*		*Amla*	-	*422(86)*
Redgram	-	*233(47)*		*Cashew*	-	-
Bengal gram	*82 (17)*	*340(70)*		*Jackfruit*	-	-
Cotton	*82 (17)*	*340(70)*		*Jamun*	-	*315(64)*
Chilli	-	*422(86)*		*Custard apple*	-	*422(86)*
Tomato	-	*107(22)*		*Tamarind*	-	*315(64)*
Drumstick	-	*315(64)*		*Mulberry*	-	-
Mango	-	-		*Marigold*	-	*422(86)*
Guava	-	-		*Chrysanthemum*	-	*422(86)*

- *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, fibre and other horticulture crops.*
- *Maintaining soil-health is vital to crop production and conserve soil and land resource base for maintaining ecological balance and to mitigate climate change. For this, several ameliorative measures have been suggested to these problematic soils like saline/alkali, highly eroded, sandy soils etc.,*
- *Soil and water conservation treatment plan has been prepared that would help in identifying the sites to be treated and also the type of structures required.*
- *As part of the greening programme, several tree species have been suggested to be planted in marginal and submarginal lands, field bunds and also in the hillocks, mounds and ridges. This would help in not only supplementing the farm income but also provide fodder and fuel and 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 Goudagera 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.

GEOGRAPHICAL SETTING

2.1 Location and Extent

The Goudagera microwatershed is located in the northern part of Karnataka in Yadgir Taluk & District, Karnataka State (Fig.2.1). It comprises of Gowdagera, Balichakra, Mallara and Killanakera villages. It lies between 16° 37’ and 16° 39’ North latitudes and 77° 13’ and 77° 15’ East longitudes, covering an area of about 493 ha. It is about 73 km south of Yadgir town and bounded by Gowdagera on the south, Killanakera on the east, Mallara on the west and south west and Balichakra village on the northern side.

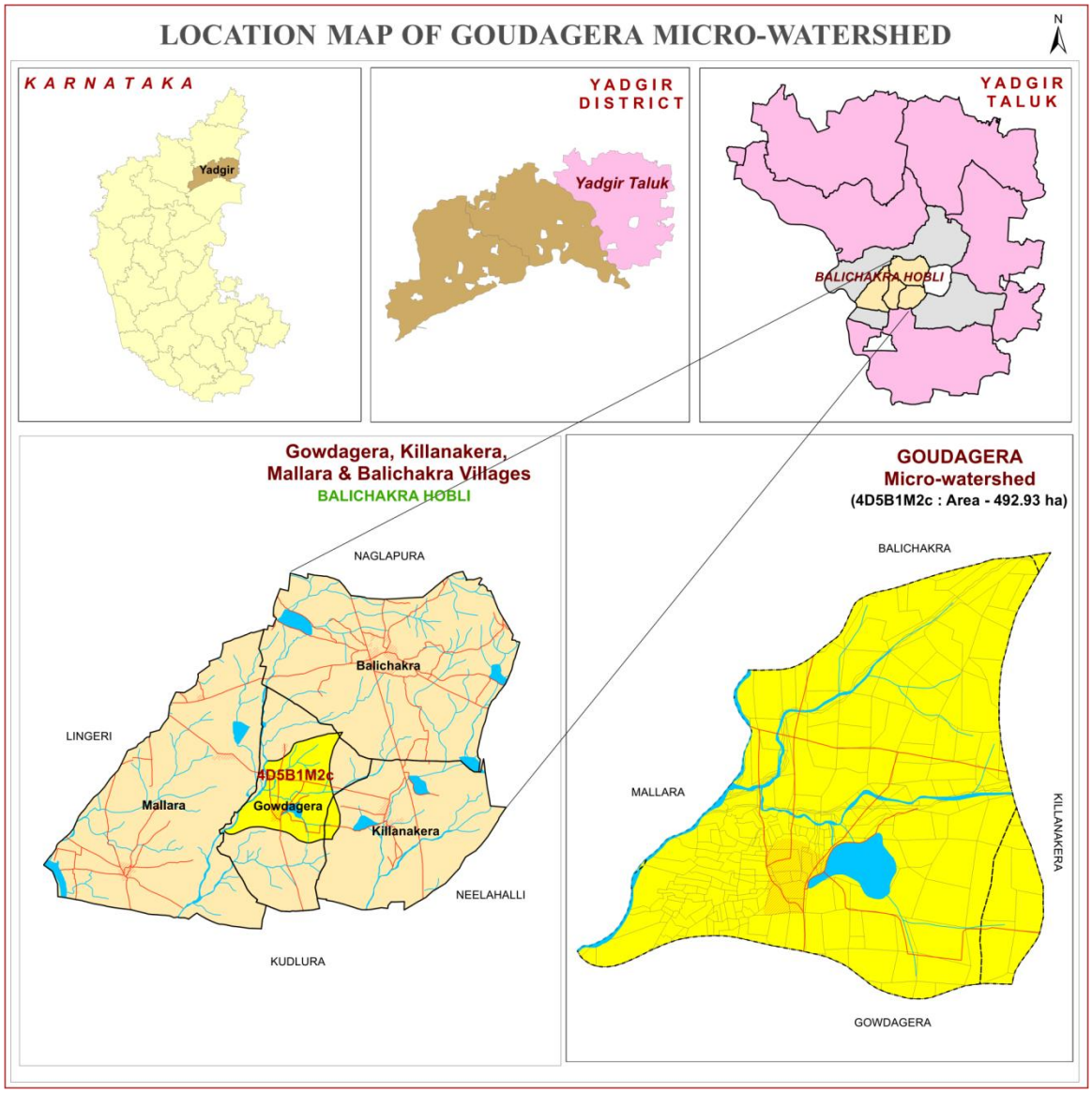

Fig.2.1 Location map of Goudagera Microwatershed

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 Goudagera 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 paleo 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 alluvial landscapes based on geology. The landscapes have been further divided 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 elevation ranges from 368-386 m above MSL. 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 July, August and September. Generally, the Length of crop Growing Period (LGP) is 120-150 days and starts from 1st week of June to 4th 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**		

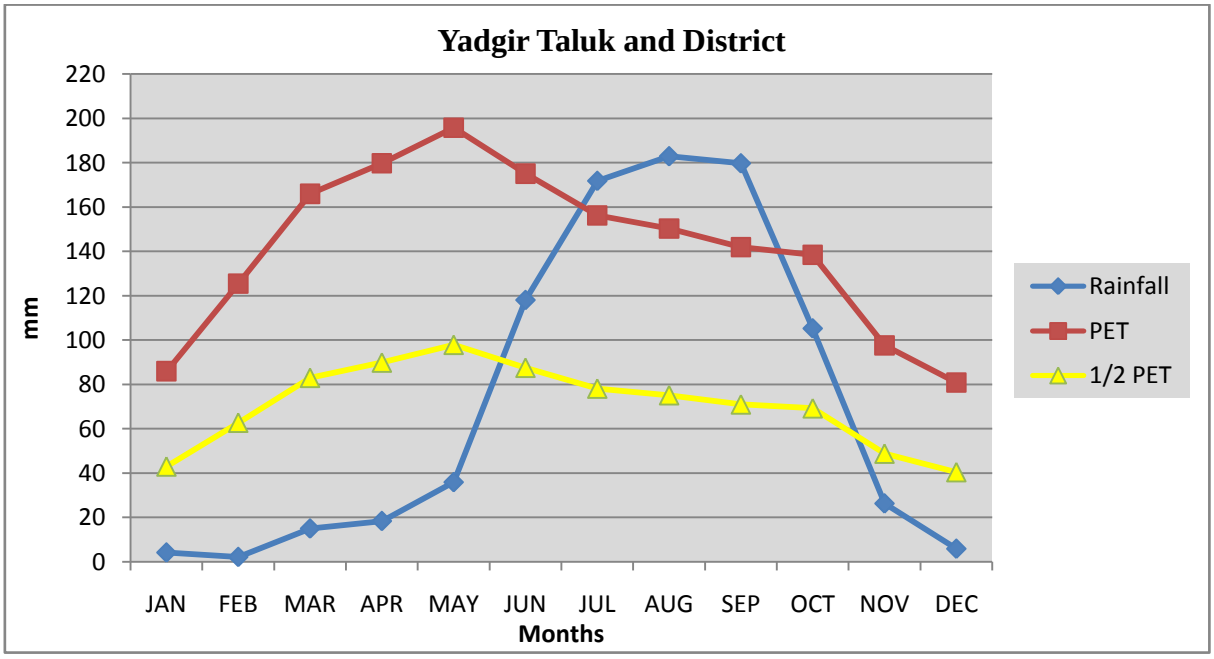

Fig 2.3 Rainfall distribution in Yadgir Taluk, Yadgir District

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.

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.

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. The cropping intensity is 120 per cent in the taluk. 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 Goudagera microwatershed is presented in Fig.2.4. The different crops and cropping systems adopted in the microwatershed is presented in the Figures 2.5 a & b. simultaneously, enumeration of existing wells (bore wells) and conservation structures is made and their location in different survey numbers is marked on the cadastral map. Map showing the location of wells in Goudagera microwatershed is presented in Fig.2.6.

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

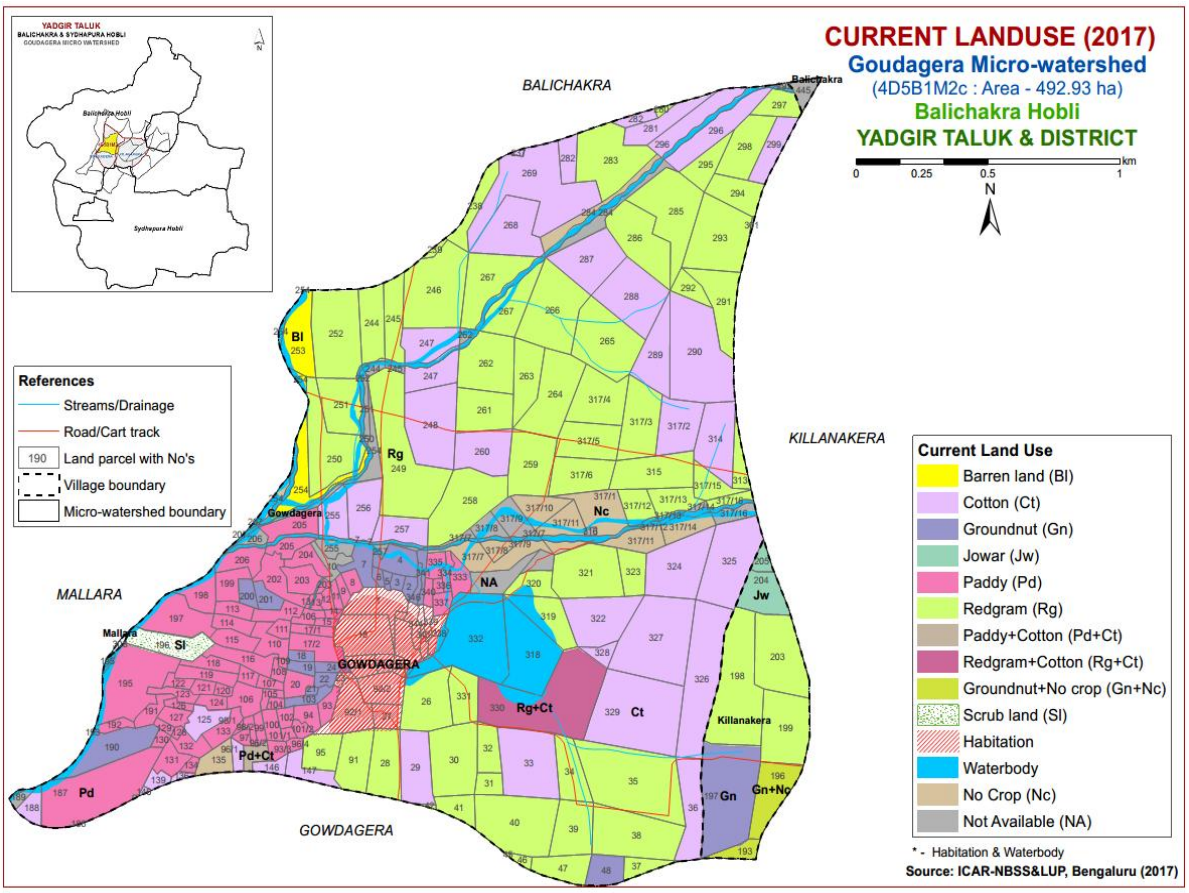

Fig.2.4 Current Land Use map of Goudagera Microwatershed

Fig 2.5 a. Different Crops and Cropping Systems in Goudagera Microwatershed

Fig. 2.5 b. Different Crops and Cropping Systems in Goudagera Microwatershed

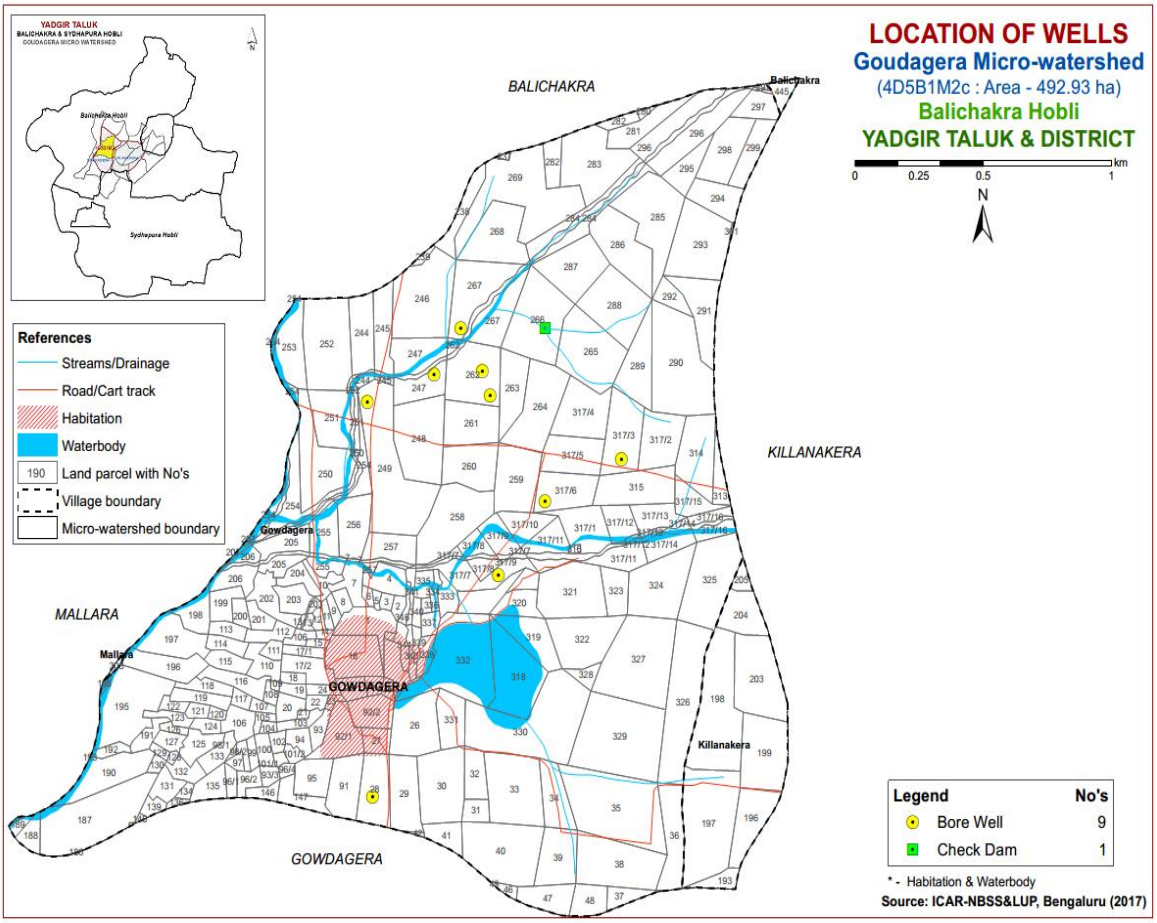

Fig.2.6 Location of Wells and conservation structures map of Goudagera Microwatershed

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 Goudagera 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 their 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 493 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 map and satellite imagery 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 and 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

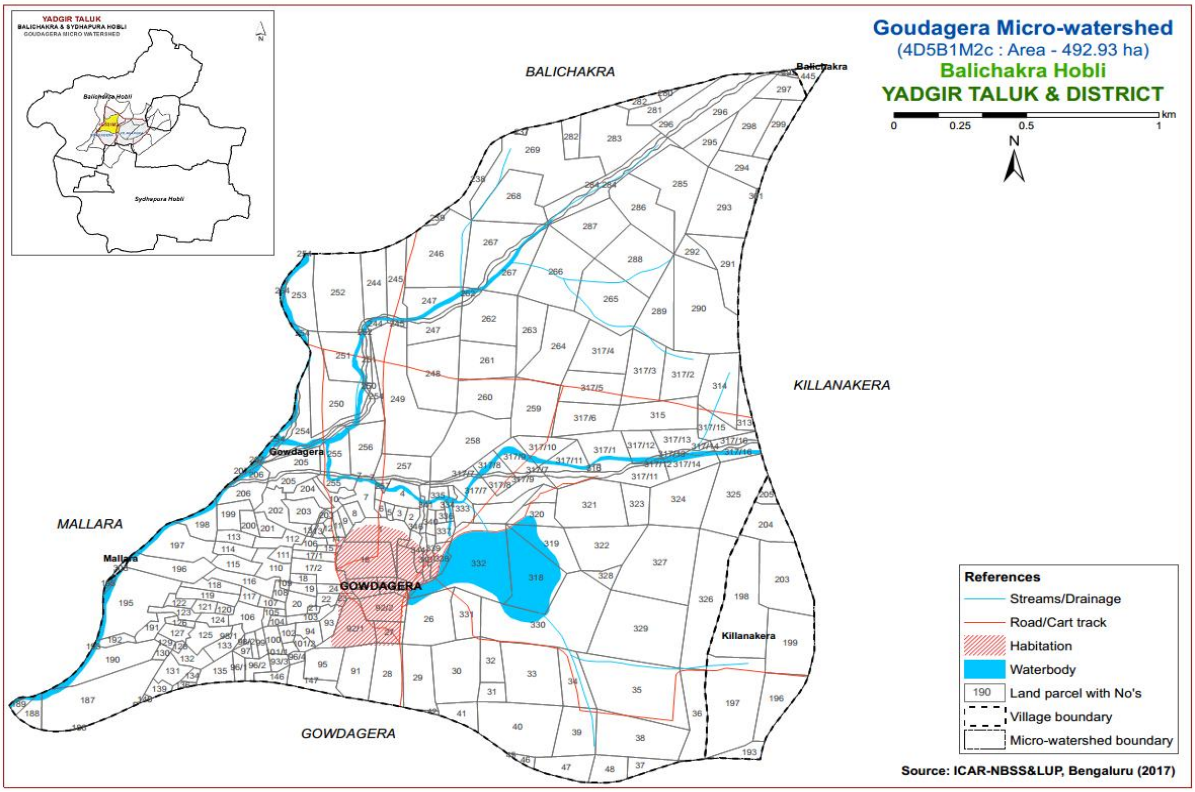

Fig. 3.1 Scanned and Digitized Cadastral map of Goudagera Microwatershed

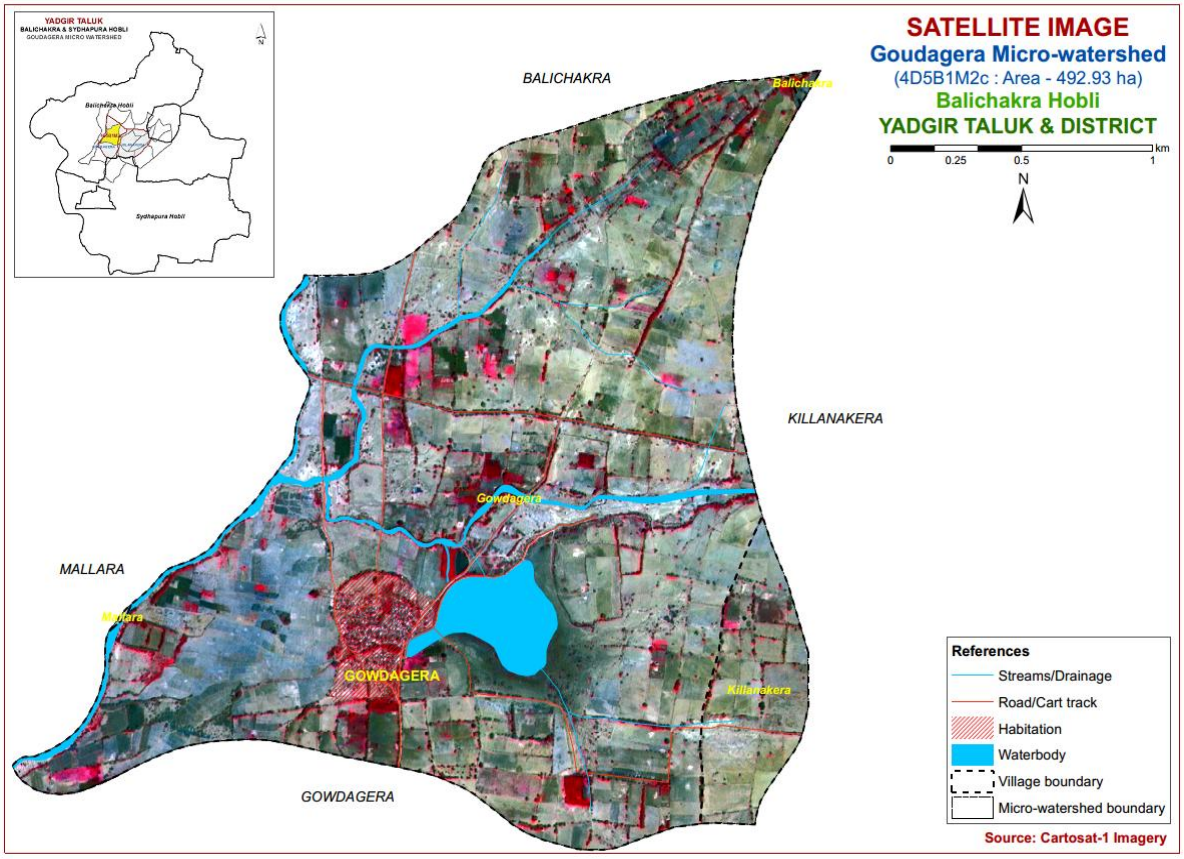

Fig. 3.2 Satellite Image of Goudagera Microwatershed

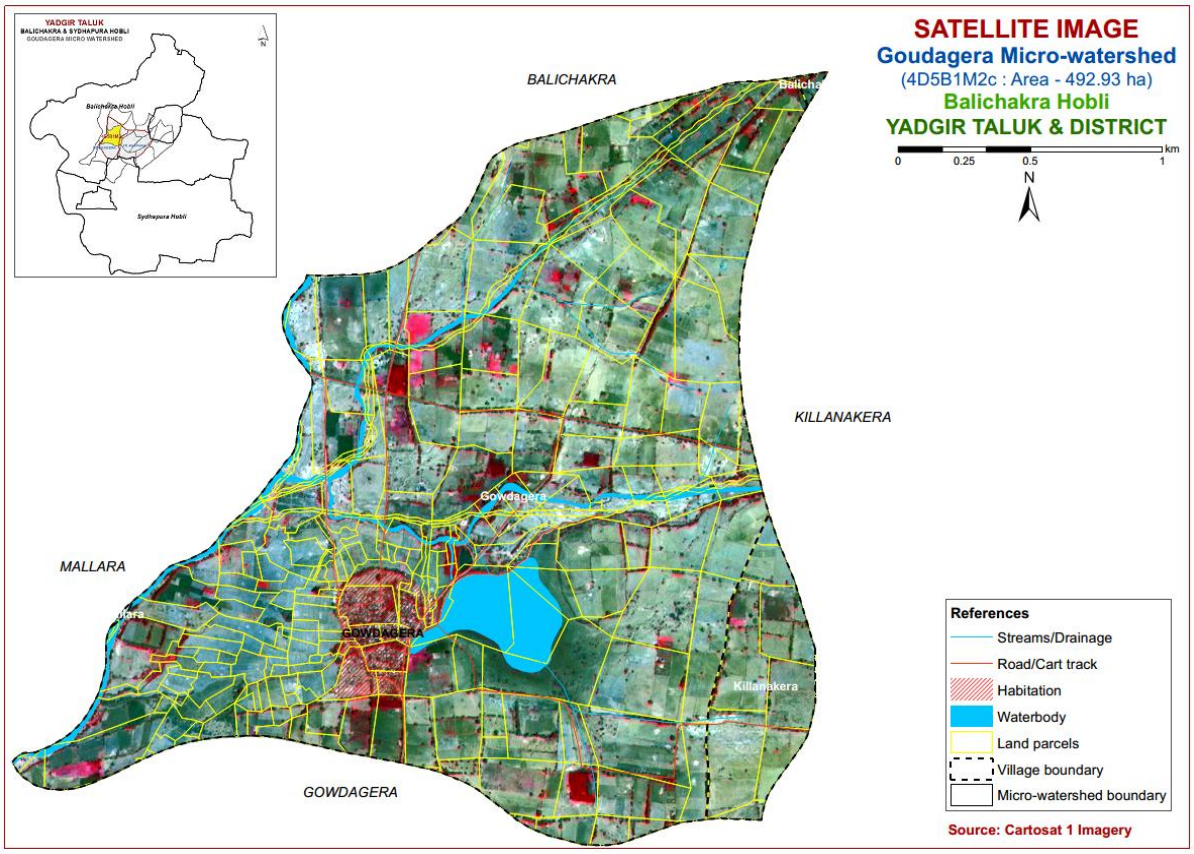

Fig. 3.3 Cadastral map overlaid on IRS PAN+LISS IV merged imagery of Goudagera Microwatershed

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).

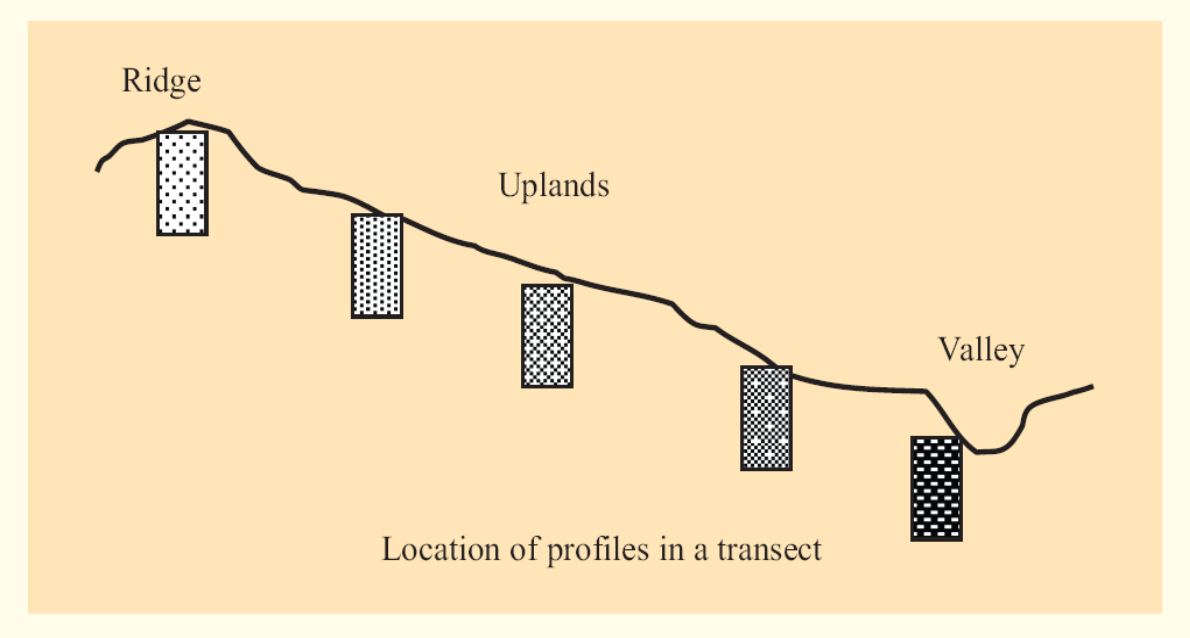

Fig: 3.4. Location of profiles in a transect

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, 8 soil series were identified in the Goudagera microwatershed.

Table 3.1 Differentiating Characteristics used for identifying Soil Series

(Characteristics are of Series Control Section)

Sl. no.	Soil Series	Depth (cm)	Colour (moist)	Texture	Gravel (%)	Horizon sequence	Calcareous-ness
Soils of Granite and Granite Gneiss Landscape							
1	JNK (Jinkera)	50-75	10 YR 3/1, 3/2 7.5 YR 3/4	scl	-	Ap-Bw	e
2	YLR (Yalleri)	50-75	2.5 YR 3/4, 4/4 5 YR ¾,7.5 YR 4/4	c	15-35	Ap-Bt	-
3	ANR (Anur)	100-150	10 YR 4/3,4/1	c	-	Ap-Bw	es
4	DSB (Dastharabad)	25-50	7.5 YR 3/3	gc	35-60	Ap-Bt-Cr	-
5	MDR (Madhwara)	>150	10 YR 3/1, 3/2,2/1,2/2	scl	-	Ap-Bw	e
Soils of Alluvial Landscape							
6	KDR (Kudlura)	100-150	10YR3/1,3/2,4/1,5/2	c	-	Ap-Bw	es
Low Land Soils							
7	TMK (Thumakur)	>150	10YR3/1,3/2,3/3,4/3	c	-	Ap-Bw	e
8	SGR (Sangwar)	>150	10 YR 3/1,4/1	c	-	Ap-Bss	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 16 soil mapping units representing 8 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 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 soil phase will have similar management needs and have to be treated accordingly.

3.5 Land Management Units (LMU's)

The 16 soil phases identified and mapped in the microwatershed were grouped into 5 Land Management Units (LMU's) for the purpose of preparing a Proposed Crop Plan for sustained development of the microwatershed. The database (soil phases) generated under LRI was utilized for identifying Land Management Units (LMU's) based on the management needs. One or more than one soil site characteristic having influence on the management have been chosen for identification and delineation of LMUs. For Goudagera microwatershed, five

soil and site characteristics, namely soil depth, soil texture, slope, erosion and gravel content have been considered for defining LMUs. The Land Management Units are expected to behave similarly for a given level of management.

3.6 Laboratory Characterization

Soil samples for each soil series were collected from representative master profiles for laboratory characterization by following the methods outlined in the Laboratory Manual (Sarma *et al*, 1987). Surface soil samples collected from farmer's fields (46 samples) for fertility status (major and micronutrients) at 250 m grid interval in the year 2017 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 Goudagera Microwatershed

Soil map unit No.	Soil Series	Soil Phase	Mapping Unit Description	Area in ha(%)
Soils of Granite and Granite Gneiss Landscape				
	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		**20 (3.99)**
20		JNKcB2	Sandy loam surface, slope 1-3%, moderate erosion	20(3.99)
	YLR	Yalleri soils are moderately shallow (50-75 cm), well drained, have brown to reddish brown and dark reddish brown, gravelly clay red soils occurring on very gently to gently sloping uplands under cultivation		**87 (17.64)**
27		YLRbB2	Loamy sand surface, slope 1-3%, moderate erosion	77(15.64)
31		YLRiB2	Sandy clay surface, slope 1-3%, moderate erosion	10(2.0)
	ANR	Anur soils are deep (100-150 cm), moderately well drained, have dark gray to brown, sodic calcareous clay soils occurring on very gently sloping uplands under cultivation		**48 (9.6)**
52		ANRbB3	Loamy sand surface, slope 1-3%, severe erosion	2(0.35)
53		ANRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	33(6.67)
55		ANRiB2	Sandy clay surface, slope 1-3%, moderate erosion	13(2.58)
	DSB	Dastharabad soils are shallow (25-50 cm), well drained, have dark brown to very dark brown, gravelly clay soils occurring on very gently to gently sloping uplands under cultivation		**34 (6.92)**
107		DSBhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	24 (4.86)
108		DSBiB2	Sandy clay surface, slope 1-3%, moderate erosion	7(1.36)
121		DSBcB2	Sandy loam surface, slope 1-3%, moderate erosion	3(0.7)
	MDR	Madhwara soils are very deep (>150 cm), moderately well drained, have very dark gray to very dark brown, slightly calcareous sandy clay loam soils occurring on nearly level to very gently sloping uplands under cultivation		**30 (6.01)**

133		MDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	30 (6.01)
Soils of Alluvial Landscape				
	KDR	Kudlura soils are deep (100-150 cm), moderately well drained, have dark gray to very dark grayish brown, calcareous clayey alluvial soils occurring on nearly level to very gently sloping uplands under cultivation		**22 (4.44)**
87		KDRiB2	Sandy clay surface, slope 1-3%, moderate erosion	22(4.44)
Lowland Soils				
	TMK	Thumakur soils are very deep (>150 cm), moderately well drained, have brown to very dark grayish brown, sodic slightly calcareous clay black soils occurring on nearly level to very gently sloping lowlands under cultivation		**134 (27.21)**
102		TMKbB3	Loamy sand surface, slope 1-3%, severe erosion	4(0.85)
104		TMKiB2	Sandy clay surface, slope 1-3%, moderate erosion	59(11.93)
140		TMKcB2	Sandy loam surface, slope 1-3%, moderate erosion	71(14.43)
	SGR	Sangwar soils are very deep (>150 cm), moderately well drained, have dark gray to very dark gray, sodic calcareous clayey black soils occurring on very gently sloping lowlands under cultivation		**82 (16.65)**
142		SGRhB2	Sandy clay loam surface, slope 1-3%, moderate erosion	41 (8.39)
143		SGRiB2	Sandy clay surface, slope 1-3%, moderate erosion	41(8.26)
1000	Others	Habitation and water bodies		37(7.54)

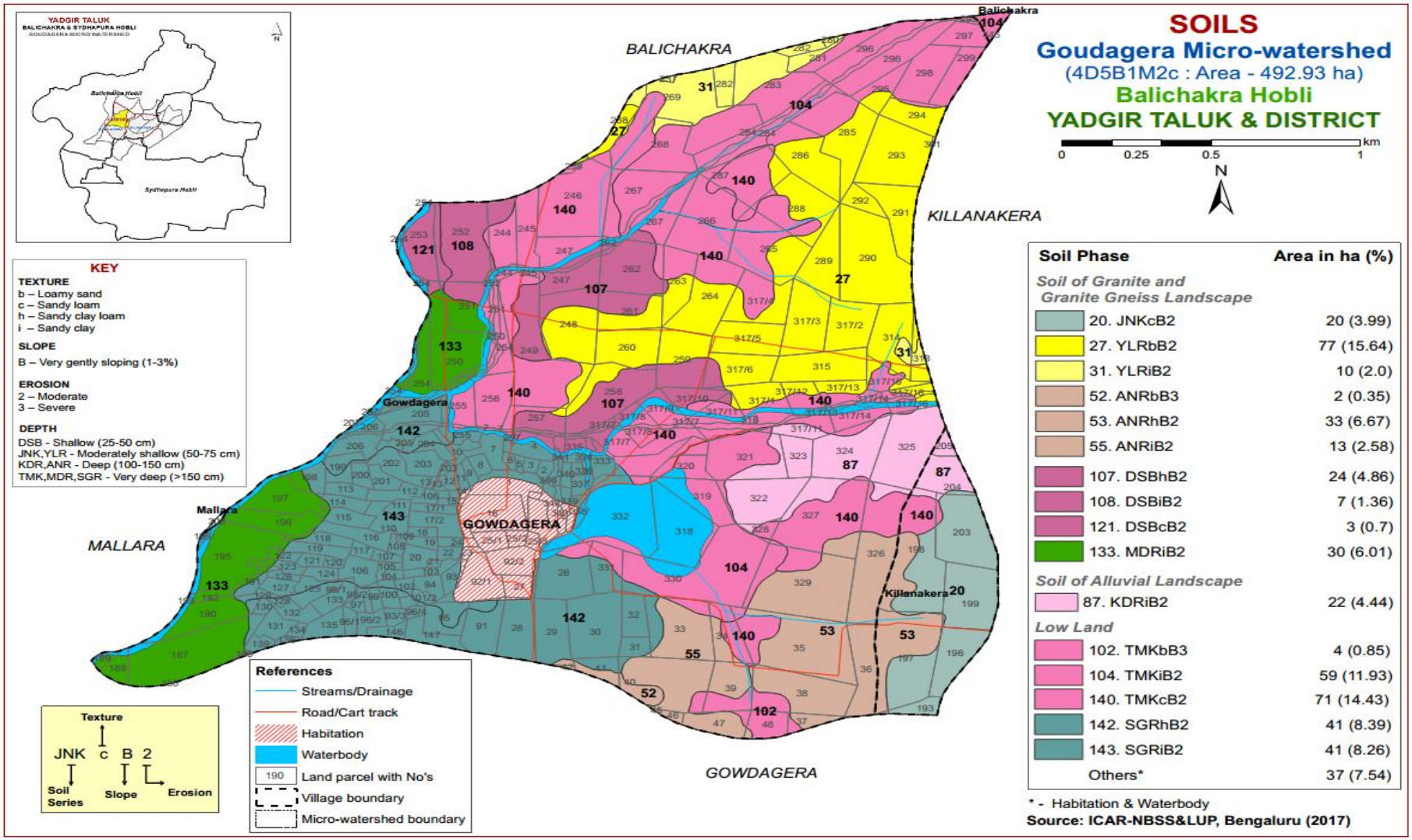

Fig 3.5 Soil Phase or Management Units - Goudagera Microwatershed.

Chapter 4

THE SOILS

Detailed information pertaining to the nature, extent and their distribution of different kinds of soils occurring in Goudagera microwatershed is provided in this chapter. The microwatershed area has been identified as granite gneiss and alluvial landscapes based on geology. In all, 8 soil series are identified. Soil formation is the result of the combined effect of environmental and terrain factors that are reflected in soil morphology. The soil formation is dominantly influenced by the parent material, climate, time and relief.

A brief description of each of the 8 soil series identified followed by 16 soil phases (management units) mapped are furnished below. The physical and chemical characteristics of soil series identified in Goudagera microwatershed are given in Table 4.1. The soils in any one map unit differ from place to place in their depth, texture, slope, gravelliness, erosion or any other site characteristic that affect management. The soil phase map can be used for identifying the suitability of areas for growing specific crops or for other alternative uses and also for deciding the type of conservation structures needed. The detailed information on soil and site-characteristics like soil depth, surface soil texture, slope, erosion, gravelliness, AWC, LCC etc, with respect to each of the soil phase identified is given village/survey number wise for the microwatershed in Appendix-I.

4.1 Soils of granite gneiss landscape

In this landscape, 5 soil series are identified and mapped. Brief description of each series identified is given below. Of these, YLR series occupies maximum area of 87 ha (18%) followed by ANR 48 ha (10%), DSB 34 ha (7%), MDR 30 ha (6%) and JNK 20 ha (4%). In Low land, 2 soil series are identified and mapped. TMK series occupied an area of 134 ha (27%) and SGR 82 ha (17%).Brief description of each series identified and number of soil phases mapped is given below.

4.1.1 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. the 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 phases was identified and mapped.

Landscape and Soil Profile characteristics of Jinkera (JNK) Series

4.1.2 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 Haplustalfs.

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). 2 soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Sambara (SBR) Series

4.1.3 Anur (ANR) Series: Anur soils are deep (100-150 cm), moderately well drained, have dark gray to dark brown, sodic calcareous 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. These are sodic with ESP ranging from 17 to 72 per cent. The available water capacity is very high (>200 mm/m). 3 soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Anur (ANR) Series

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

The thickness of the solum ranges from 28 to 50 cm. The thickness of A horizon ranges from 9 to 14 cm. Its colour is in 10 YR and 7.5 YR hue with value and chroma of 3 to 4. The texture varies from sandy loam to sandy clay. The thickness of B horizon ranges from 28 to 40 cm. Its colour is in 7.5 YR hue with value 3 and chroma 3 to 4. The texture is sandy clay to clay with 35-60 per cent gravel. The available water capacity is very low (<50 mm/m). 3 soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Dastharabad (DSB) Series

4.1.5 Madhwara (MDR) Series: Madhwara soils are very deep (>150 cm), well drained, have black to very dark brown and very dark gray to very dark grayish brown, slightly calcareous sandy clay loam soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping uplands under cultivation. The Madhwara series has been classified as a member of the fine-loamy, mixed, isohyperthermic family of Fluventic Haplustepts.

The thickness of the solum is more than150 cm. The thickness of A horizon ranges from 10 to 16 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 2 to 3. Texture varies from sandy clay and clay. The thickness of B horizon is >150 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy clay loam to sandy clay and is slightly calcareous. The available water capacity is very high (>200 mm/m). Only one soil phase was identified and mapped.


Landscape and Soil Profile characteristics of Madhwara (MDR) Series

4.1.6 Thumakur (TMK) Series: Thumakur soils are very deep (>150 cm), moderately well drained, have very dark gray to dark brown, sodic slightly calcareous clay soils. They are developed from weathered granite gneiss and occur on nearly level to very gently sloping low lands under cultivation. The Thumakur series has been classified as a member of the fine, mixed, isohyperthermic family of Typic Haplustepts.

The thickness of the solum ranges from 150-200 cm. The thickness of A horizon ranges from 7 to 14 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy loam to sandy clay and clay. The thickness of B horizon is >150 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 3. Texture varies from sandy clay to clay and is slightly calcareous. These are sodic with ESP ranging from 16 to 90 per cent. The available water capacity is very high (>200 mm/m). 3 soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Thumakur (TMK) Series

4.1.7 Sangwar (SGR) Series: Sangwar soils are very deep (>150 cm), moderately well drained, have very dark gray to dark gray, sodic calcareous, cracking clay soils. They are developed from weathered granite gneiss and occur on very gently to gently sloping lowlands under cultivation. The Sangwar series has been classified as a member of the fine, mixed, (calcareous) isohyperthermic family of sodic Haplusterts.

The thickness of the solum is more than 150 cm. The thickness of A horizon ranges from 9 to 20 cm. Its colour is in 10 YR hue with value 3 to 5 and chroma 1 to 2 with sandy clay loam to sandy clay and clay texture. The thickness of B horizon ranges from 157 to 174 cm. Its colour is in 10 YR hue with value 3 to 4 and chroma 1 to 2. Its texture varies from sandy clay to clay and is calcareous. They are sidic with ESP more than 15 per cent ranging more than 29 to 65 per cent. The available water capacity is medium (100-150 mm/m). 2 soil phases were identified and mapped.

Landscape and Soil Profile characteristics of Sangwar (SGR) Series

4.2 Soils of Alluvial landscape

In this landscape, only one soil series is identified and mapped covering an area of 22 ha (4%). Brief description of series identified is given below.

4.2.1 Kudlura (KDR) Series: Kudlura soils are deep (100-150 cm), moderately well drained, 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 in nature. The available water capacity is very high (>200 mm/m). Only one soil phases 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 Goudagera microwatershed

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: 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 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
0-5	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: 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	17.70
18-49	10.32	-	-	1.38	0.30	6.76	-	-	0.21	16.03	-	24.60	0.79	100	65.17
49-95	10.08	-	-	2.55	0.17	6.11	-	-	0.33	21.49	-	32.60	0.77	100	65.91
95-123	9.92	-	-	2.56	0.12	7.93	-	-	0.51	26.03	-	36.00	0.70	100	72.30

Contd...

Soil Series: Dastharabad **(**DSB) **Pedon:** R-17

Location: $16^0$31’ 98.6”N $77^0$22’93.0”E, Duppalli village, Sydhapura hobli, Yadgir taluk and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Clayey-skeletal, 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
0-6	Ap	90.51	4.84	4.64	7.06	8.07	37.24	26.03	12.11	35	s	5.32	1.59
6-17	Bt1	49.11	8.08	42.81	10.67	15.44	10.00	8.44	4.56	20	sc	20.68	13.16
17-43	Bt2	39.54	2.84	57.63	12.89	9.14	7.71	6.83	2.97	50	c	26.69	18.50

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	5.93	-	-	0.04	0.67	0.00	2.00	0.54	0.07	0.01	2.61	3.60	0.78	73	0.14
6-17	7.31	-	-	0.110	0.91	0.91	11.19	3.37	0.12	0.49	15.00	15.20	0.36	100	3.22
17-43	6.64	-	-	0.048	0.76	0.00	18.81	5.57	0.23	0.09	24.70	24.90	0.43	99	0.38

Contd...

Soil Series: Madhawara (MDR) **Pedon:** T_2 P_2

Location: $16^0$43'48.9"N $77^0$18'38.3"E, Yaleri village, Balichakra 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
0-11	Ap	58.94	20.74	20.32	5.41	7.28	13.31	20.89	12.06	-	scl	16.47	8.85
11-30	Bw1	55.52	19.32	25.16	5.00	7.19	13.12	19.69	10.52	-	scl	18.25	10.18
30-53	Bw2	53.95	19.15	26.90	4.68	7.48	12.58	19.65	9.56	-	scl	26.99	14.02
53-117	Bw3	52.68	19.51	27.81	2.84	5.47	14.72	20.82	8.83	-	scl	37.86	17.40
117-160	Bw4	49.95	17.27	32.79	2.11	5.07	14.15	20.49	8.13	-	scl	44.15	20.38

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}							%	%
0-11	8.31	-	-	0.33	0.46	2.76	-	-	0.45	0.47	-	20.57	1.01	100	2.26
11-30	9.25	-	-	0.20	0.31	4.20	-	-	0.19	1.40	-	23.98	0.95	100	5.84
30-53	9.78	-	-	0.40	0.19	5.76	-	-	0.16	1.53	-	24.53	0.91	100	6.22
53-117	9.94	-	-	0.88	0.23	4.80	-	-	0.18	9.09	-	24.31	0.87	100	37.40
117-160	9.98	-	-	0.93	0.15	3.00	-	-	0.24	11.09	-	28.27	0.86	100	39.23

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	0.22
6-26	8.55	-	-	0.11	0.85	4.90	-	-	0.33	0.25	-	32.70	0.91	100	0.76
26-67	9.08	-	-	0.17	0.60	5.02	-	-	0.18	1.34	-	36.20	0.89	100	3.69
67-115	9.44	-	-	0.37	0.52	6.61	-	-	0.25	6.72	-	39.30	0.90	100	17.09
115-144	9.53	-	-	0.43	0.56	6.10	-	-	0.26	7.85	-	33.70	0.81	100	23.29

Contd...

Soil Series: Thumakuru (TMK) **Pedon:** R-10

Location: $16^0$38'01.3"N $77^0$16'49.8"E, Kilankera village, Balichakra 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
0-12	Ap	62.92	15.76	21.32	5.56	9.37	21.83	18.33	7.83	-	scl	17.98	6.60
12-29	Bw1	45.91	18.53	35.56	6.08	8.18	15.41	11.43	4.82	-	sc	33.40	11.79
29-74	Bw2	48.47	16.24	35.29	5.93	9.84	16.40	11.75	4.55	-	sc	28.66	11.19
74-132	Bw3	38.25	20.59	41.16	3.21	8.23	14.64	8.97	3.21	-	c	38.85	14.72
132-158	Bw4	36.87	19.99	43.14	3.54	7.61	13.08	8.57	4.07	-	c	44.36	15.75

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	9.60	-	-	0.35	0.48	1.44	-	-	0.23	3.62	-	21.83	1.02	100	16.57
12-29	9.72	-	-	1.27	0.50	1.44	-	-	0.59	20.88	-	30.50	0.86	100	68.48
29-74	9.16	-	-	3.44	0.31	3.72	-	-	0.38	25.84	-	28.68	0.81	100	90.10
74-132	9.33	-	-	2.52	0.23	4.92	-	-	0.82	20.25	-	34.99	0.85	100	57.87
132-158	9.23	-	-	2.07	0.31	3.48	-	-	0.70	21.03	-	34.24	0.79	100	61.41

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Soil Series: Sangwar **(**SGR) **Pedon:** R-4

Location: $16^0$32'25.9"N $77^0$12'52.6"E, Bheemanahalli village, Sydhapura hobli, Yadgir taluka and district

Analysis at: NBSS&LUP, Regional Centre, Bengaluru **Classification:** Fine, mixed, calcareous, isohyperthermic Sodic Haplusterts

Depth (cm)	Horizon	Size class and particle diameter (mm)								Coarse fragments w/w (%)	Texture Class (USDA)	% Moisture	
		Total			Sand								
		Sand (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)			1/3 Bar	15 Bar
0-8	Ap	37.30	18.18	44.52	4.91	6.76	12.10	4.80	8.72	-	c	32.36	23.18
8-30	BA	42.04	17.77	40.19	8.28	16.34	7.42	6.13	3.87	-	c	29.89	20.87
30-70	Bss1	33.77	18.63	47.60	5.45	11.66	6.21	6.75	3.70	-	c	37.04	26.13
70-100	Bss2	26.95	18.65	54.40	5.39	9.79	4.95	4.07	2.75	-	c	43.07	32.05
100-150	Bss3	14.35	17.32	68.33	2.69	4.15	2.35	2.69	2.47	-	c	55.74	38.19

Depth (cm)	pH (1:2.5)			E.C. (1:2.5)	O.C.	$CaCO_3$	Exchangeable bases					CEC	CEC/ Clay	Base saturation	ESP
							Ca	Mg	K	Na	Total				
	Water	$CaCl_2$	M KCl	dS m^{-1}	%	%	cmol kg^{-1}							%	%
0-8	8.3	-	-	6.49	1.48	6.69	-	-	1.32	10.09	-	34.77	0.78	100	29.02
8-30	9.09	-	-	2.54	0.64	6.76	-	-	0.75	10.00	-	33.76	0.84	100	29.62
30-70	9.23	-	-	2.6	0.28	6.63	-	-	0.42	11.55	-	38.98	0.82	100	29.64
70-100	9.39	-	-	3.01	0.36	6.89	-	-	0.73	27.73	-	42.46	0.78	100	65.33
100-150	9.28	-	-	4	0.24	7.15	-	-	0.80	27.78	-	47.67	0.70	100	58.27

Chapter 5

INTERPRETATION FOR LAND RESOURCE MANAGEMENT

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

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

The 16 soil map units identified in the Goudagera microwatershed are grouped under 3 land capability classes and 6 land capability subclasses. Entire area in the microwatershed is suitable for agriculture and about 37 ha (8%) is covered by others (habitation and water bodies) (Fig. 5.1).

Good cultivable lands (Class II) cover maximum area of about 84 per cent and are distributed in the major part of the microwatershed with minor problems of soil, erosion and drainage. Moderately good cultivable lands (Class III) cover very less area of about 2 per cent and are distributed in the southern and eastern part of the microwatershed with major problems of soil, erosion and drainage. Marginally suitable lands (Class IV) cover an area of about 6 per cent and are distributed in the central and western part of the microwatershed with severe limitations of soil and erosion.

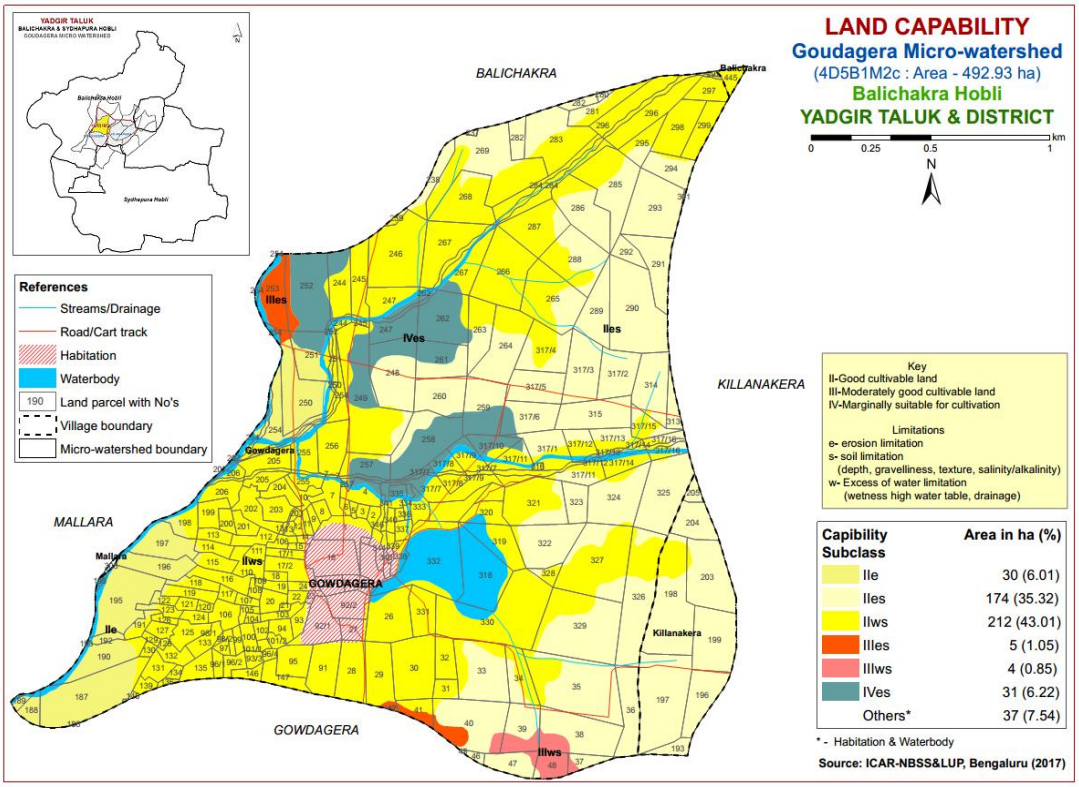


Fig. 5.1 Land Capability map of Goudagera Microwatershed.

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.

Shallow (25-50 cm) soils occur in a small area of 34 ha (7%) and are distributed in the central and western part of the microwatershed. Moderately shallow (50-75 cm) soils occupy an area of about 107 ha (22%) and are distributed in the northern, central and eastern part of the microwatershed. Deep (100-150 cm) soils occupy an area of 69 ha (14%) and are distributed in the southern and southeastern part of the microwatershed. Very deep (>150 cm) soils cover maximum area of 246 ha (50%) and are distributed in the major part of the microwatershed.

The most productive lands 315 ha (64%) with respect to soil rooting depth where all climatically adapted annual and perennial crops can be grown are deep to

very deep (100 to >150 cm depth) soils occurring in the major part of the microwatershed. The problem soils (25-50 cm depth) cover an area of 34 ha (7%) where only short duration crops can be grown and the probability of crop failure is high.

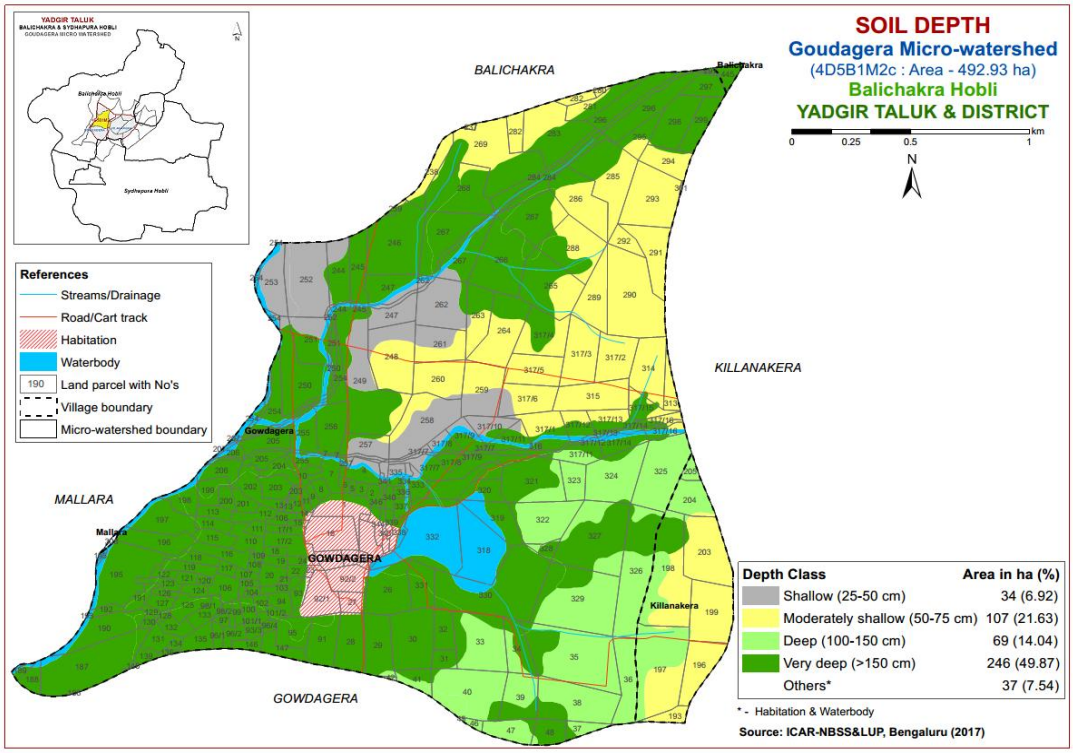


Fig. 5.2 Soil Depth map of Goudagera Microwatershed.

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 83 ha (17%) has soils that are sandy at the surface and are distributed in the central, northern and southern part of the microwatershed. An area of about 192 ha (39%) has soils that are loamy at the surface and are distributed in the northern, western and southeastern part of the microwatershed. An area of 180 ha (37%) has soils that are clayey at the surface and occur in the major part of the microwatershed.

The most productive lands with respect to surface soil texture are loamy and clayey soils (76%) that have high potential for soil-water retention and availability, and nutrient retention and availability, but clayey soils have more problems of drainage, infiltration, workability and other physical problems. The problem soils are sandy covering 17 per cent area that have moisture and nutrient constraints.

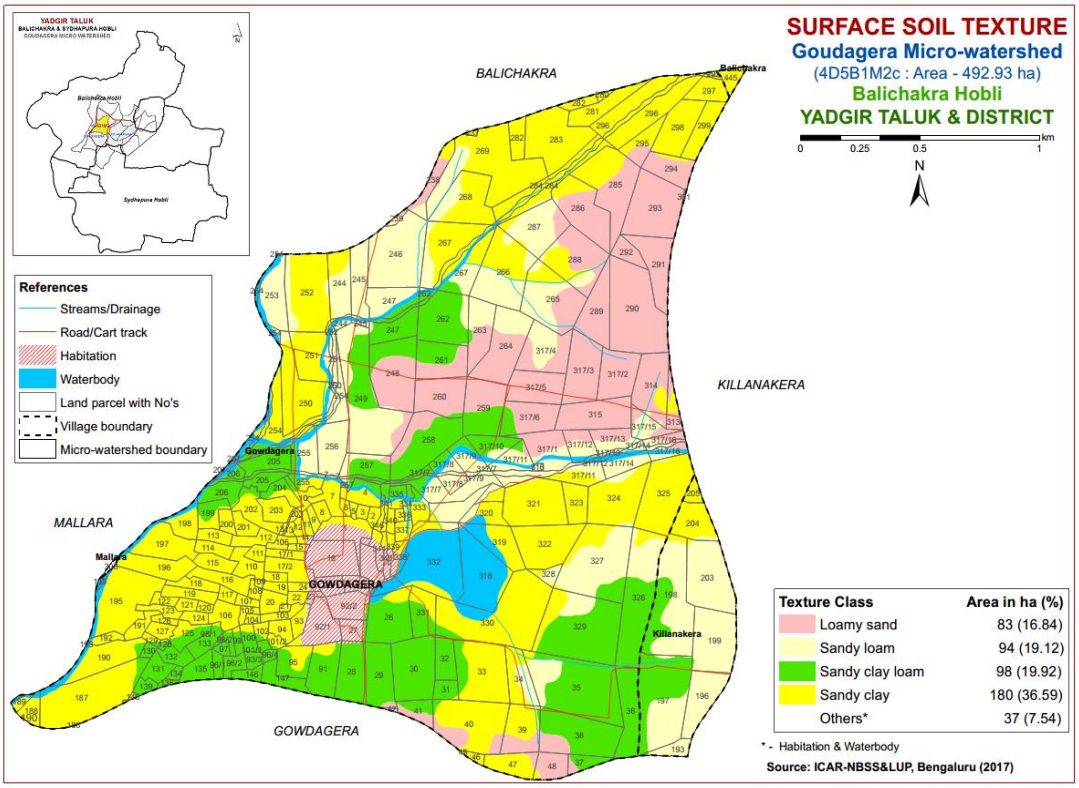


Fig. 5.3 Surface Soil Texture map of Goudagera Microwatershed.

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 are shown in Figure 5.4.

Non gravelly (<15%) soils cover an entire area of 92 per cent of the microwatershed. These are the most productive soils, where all climatically adapted short and long duration crops can be grown.

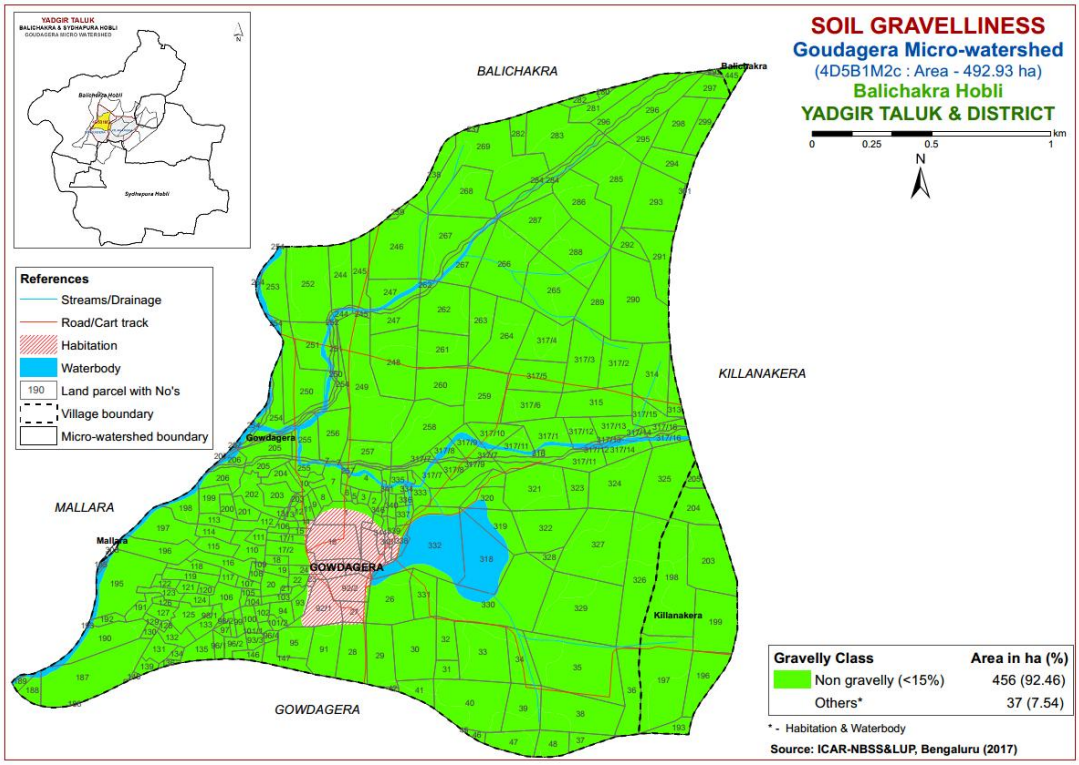


Fig. 5.4 Soil Gravelliness map of Goudagera Microwatershed.

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 34 ha (7%) in the microwatershed has soils that are very low (<50 mm/m) in available water capacity and are distributed in the eastern and central part of the microwatershed and 107 ha (22%) area are low (51-100 mm/m) and are distributed in the northern, central and southeastern part of the microwatershed. Maximum area of about 315 ha (64%) are very high (>200 mm/m) in available water capacity and are distributed in all parts of the microwatershed.

About 34 ha (7%) area in the microwatershed has soils that are problematic with regard to available water capacity. Here, only short duration crops can be grown and the probability of crop failure is very high. These areas are best put to other alternative uses. An area of 315 ha (64%) are potential areas with regard to AWC where all climatically adapted annual and perennial crops can be grown.

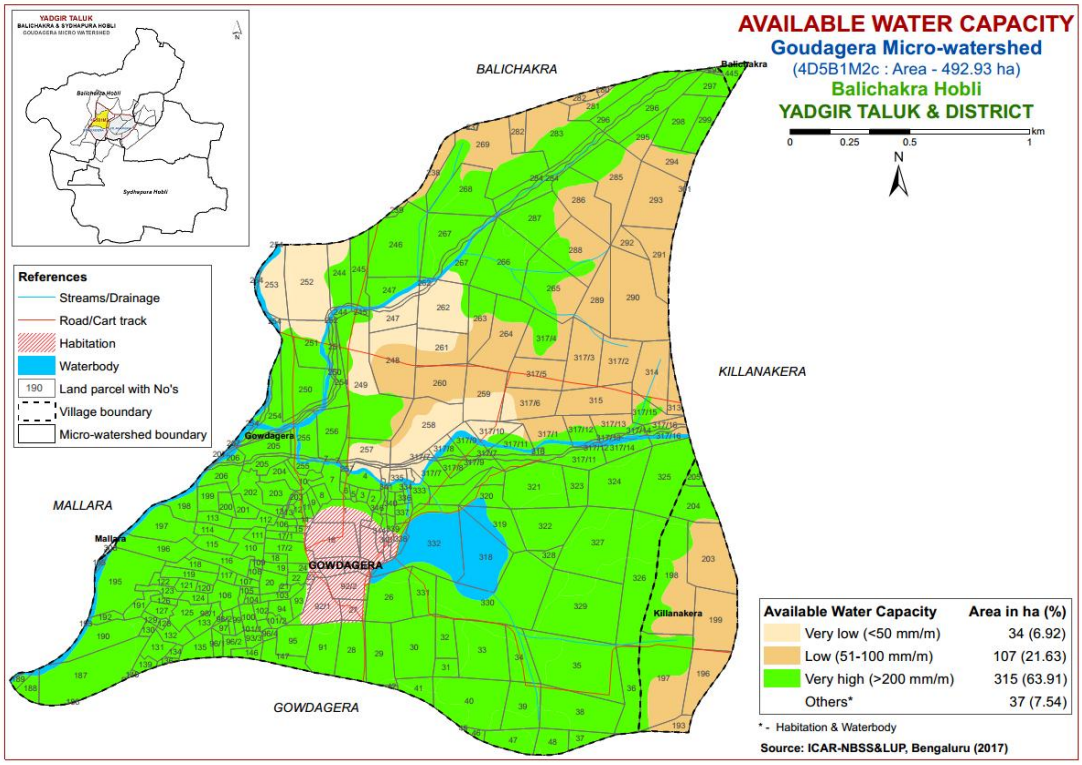


Fig. 5.5 Soil Available Water Capacity map of Goudagera Microwatershed.

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 a single slope class and a slope map was generated showing the area extent and their geographic distribution in the microwatershed (Fig. 5.6).

Entire area of the microwatershed falls under very gently sloping (1-3% slope) lands and 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.

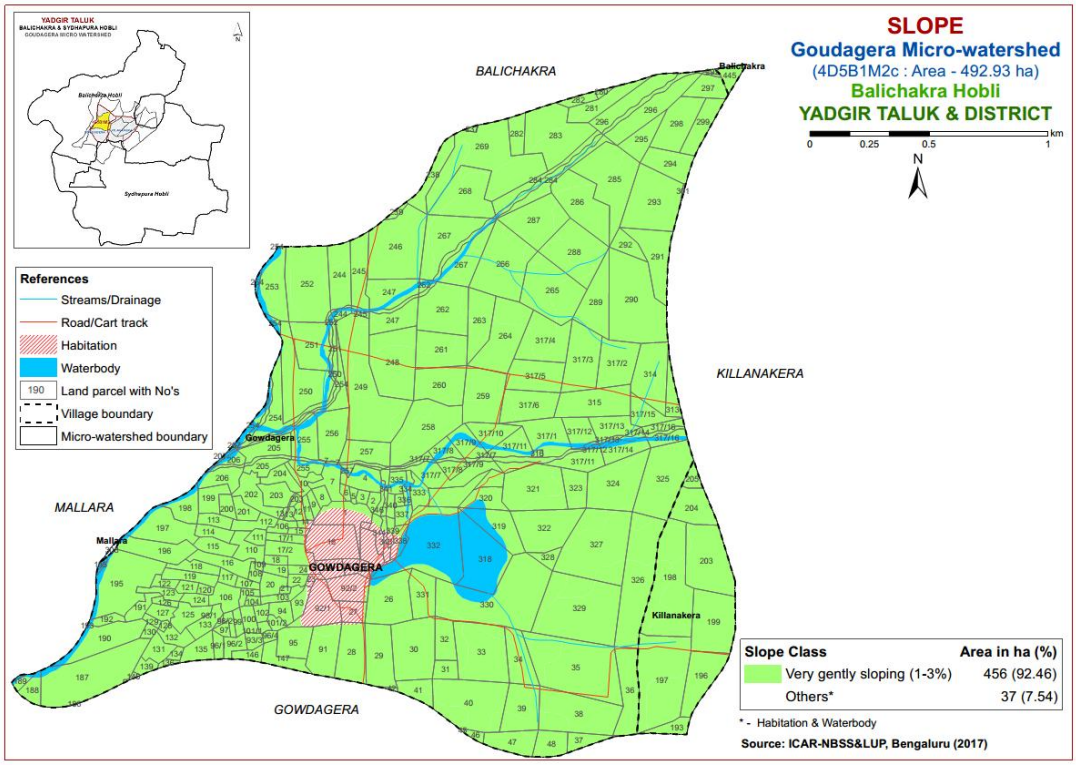


Fig. 5.6 Soil Slope map of Goudagera Microwatershed.

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.

Majority of the soils are moderately eroded (e2 class) covering an area of 450 ha (91%) and are distributed in all parts of the microwatershed. An area of about 6 ha (1%) has soils that are severely eroded (e3) and distributed in the southern part of the micrwatershed.

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

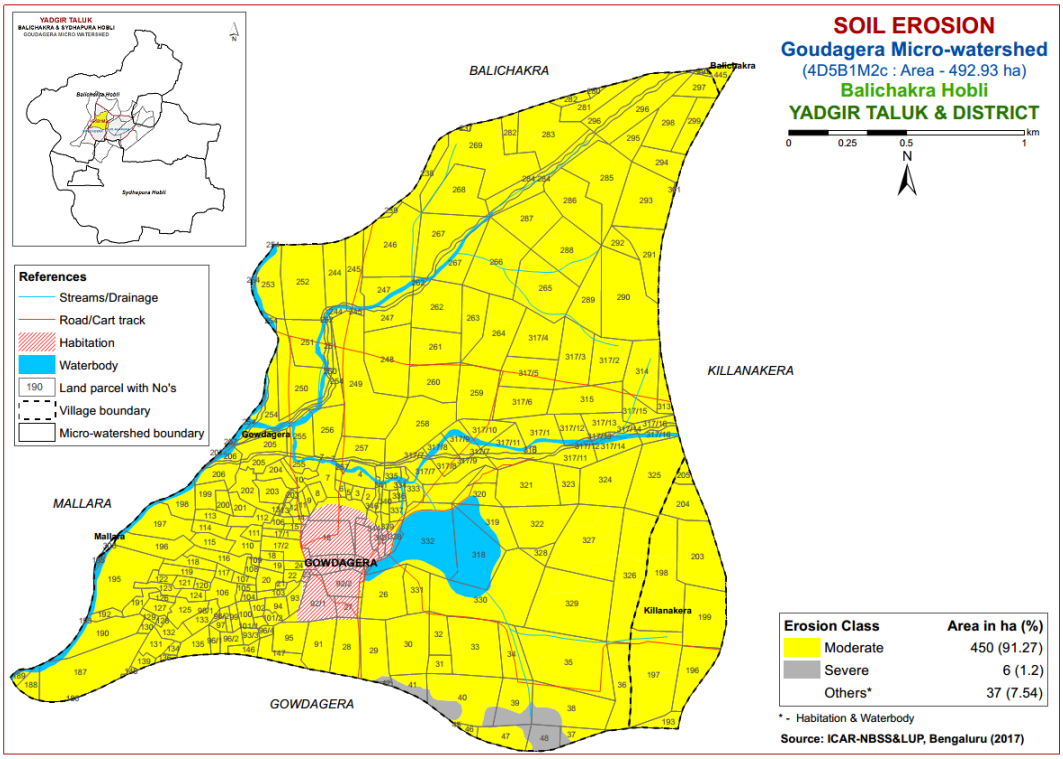


Fig. 5.7 Soil Erosion map of Goudagera Microwatershed.

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 250 m interval) all over the microwatershed through land resource inventory in the year 2017 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 Goudagera microwatershed for soil reaction (pH) showed that an area of about 33 ha (7%) is slightly acid (pH 6.0-6.5) and are distributed in the southern and southwestern part of the microwatershed. Maximum area of about 231 ha (47%) is neutral (6.5-7.3) and are distributed in all parts of the microwatershed. An area of about 103 ha (21%) is slightly alkaline (pH 7.3-7.8) and are distributed in the western part of the microwatershed. An area of about 58 ha (12%) is moderately alkaline (pH 7.8-8.4) and are distributed in the northern, central and western part of the microwatershed. Strongly alkaline (pH 8.4-9.0) soils occupy an area about 29 ha (6%) and are distributed in the northwestern part of the microwatershed. Very small area of 3 ha (1%) is very strongly alkaline (pH >9.0) and are distributed in the northwestern part of the microwatershed (Fig. 6.1).

6.2 Electrical Conductivity (EC)

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

6.3 Organic Carbon

The soil organic carbon content (an index of available Nitrogen) in the soils of the microwatershed is low (<0.5%) in an area of about 53 ha (11%) and are distributed in the eastern and western part of the microwatershed. Maximum area of about 229 ha (46%) are medium (0.5-0.75%) in organic carbon and are distributed in

all parts of the microwatershed. High (>0.75) covering an area of about 174 ha (35%) are distributed in the northern, central and eastern part of the microwatershed (Fig. 6.3).

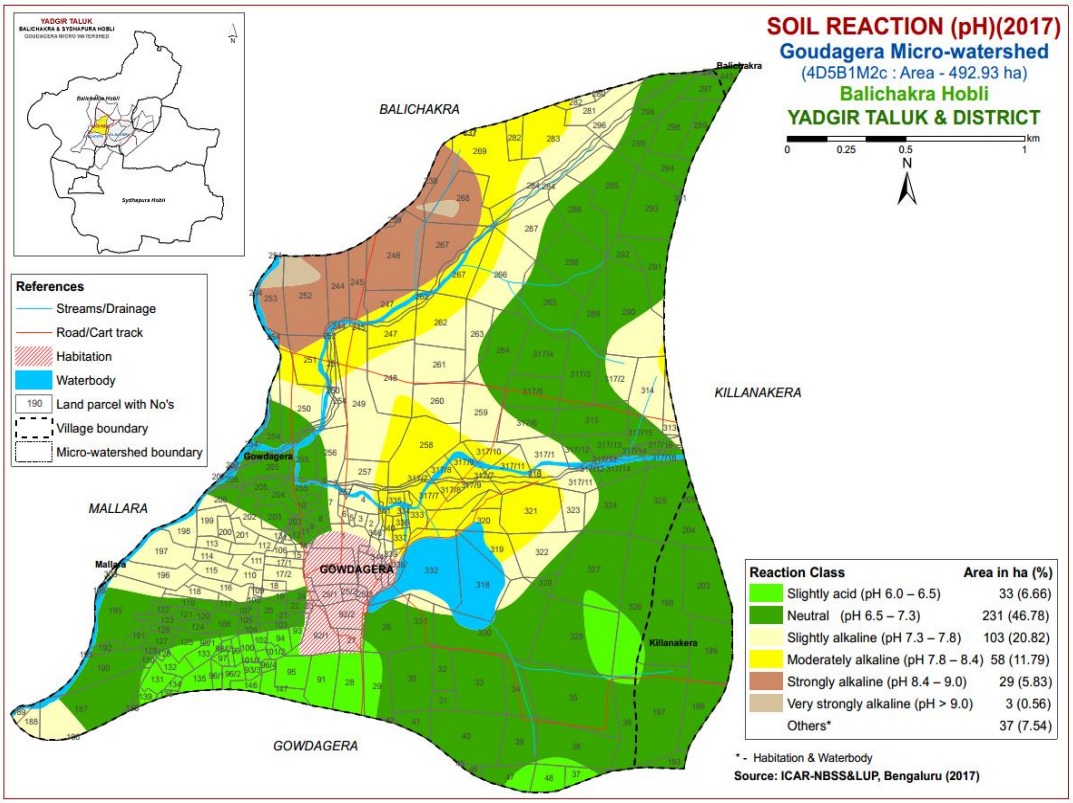


Fig.6.1 Soil Reaction (pH) map of Goudagera Microwatershed

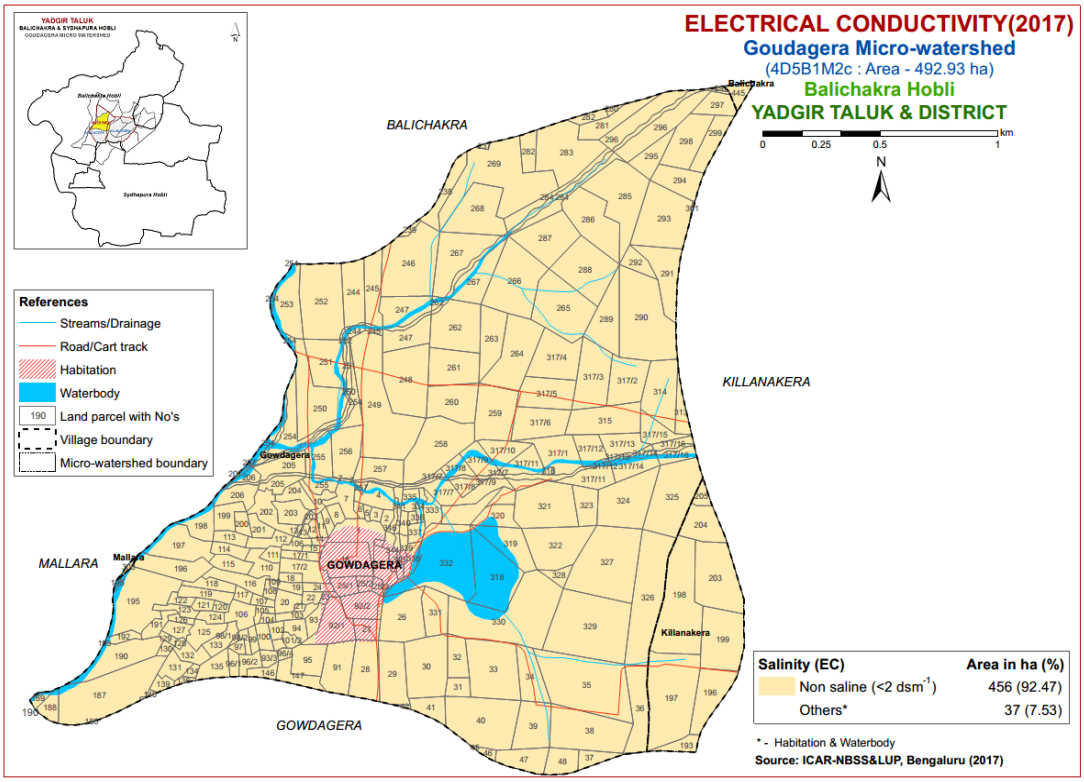


Fig.6.2 Electrical Conductivity (EC) map of Goudagera Microwatershed

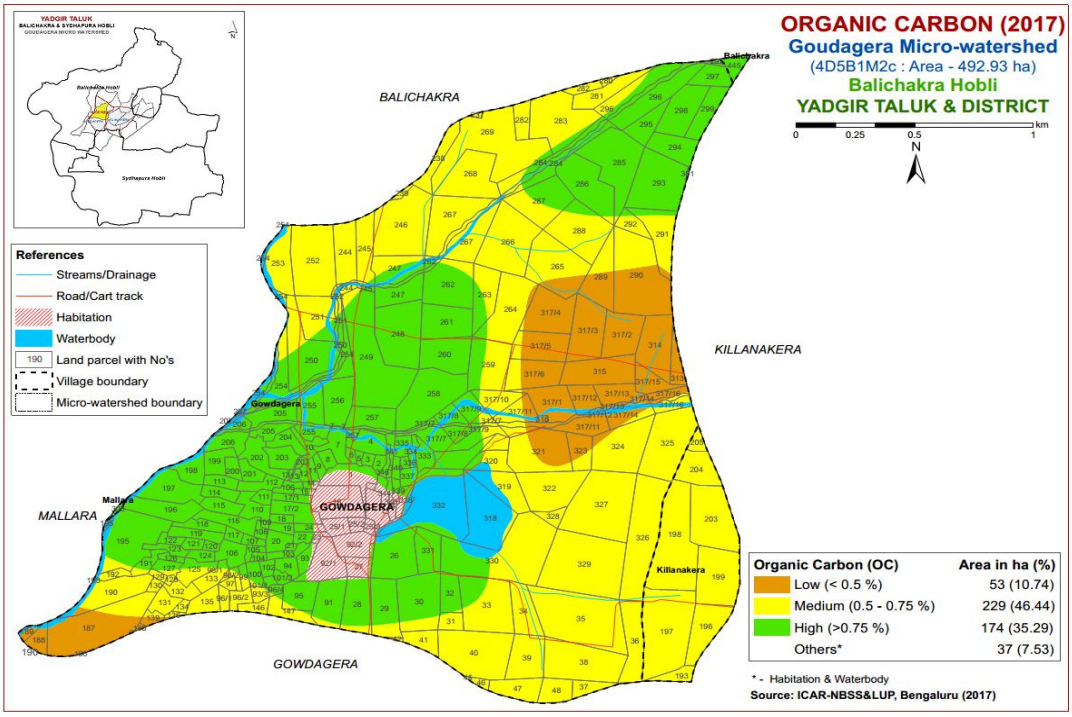


Fig.6.3 Soil Organic Carbon map of Goudagera Microwatershed

6.4 Available Phosphorus

Available phosphorus content is low (<23 kg/ha) in an area of 26 ha (5%) and are distributed in the northwestern part of the microwatershed. Medium (23-57 kg/ha) in maximum area of about 296 ha (60%) and are distributed in all parts of the microwatershed (Fig. 6.4). An area of about 134 ha (27%) is high in available phosphourous and are distributed in the northern, southeastern and western part of the microwatershed.

6.5 Available Potassium

An area of about 53 ha (11%) is low in available potassium and are distributed in the northern, central and southern part of the microwatershed. Medium (145-337 kg/ha) in a maximum area of about 365 ha (74%) and are distributed in all parts of the microwatershed (Fig. 6.5). High (>337 kg/ha) in an area of 37 ha (8%) and are distributed in the southwestern part of the microwatershed.

6.6 Available Sulphur

An area of about 62 ha (13%) is low (<10 ppm) in available sulphur content and are distributed in the northern and eastern part of the microwatershed. Medium (10-20 ppm) in a maximum area of about 386 ha (78%) and are distributed in the all parts of the microwatershed (Fig. 6.6). A very small area of about 7 ha (2%) is high (>20 ppm) in available sulphur content and are distributed in eastern part of the microwatershed.

6.7 Available Boron

Available boron content is low (<0.5 ppm) in an area of about 174 ha (35%) and are distributed in the central, western and southern part of the microwatershed. Medium (0.5-1.0 ppm) in maximum area of 274 ha (56%) and are distributed in all parts of the microwatershed. Very small area of about 8 ha (2%) is high (>1.0 ppm) in available boron and are distributed in the northern part of the microwatershed (Fig. 6.7).

6.8 Available Iron

Available iron content is deficient (<4.5 ppm) in a small area of about 27 ha (5%) and are distributed in the northern part of the microwatershed. Sufficient (>4.5 ppm) in the maximum area of 429 ha (87%) and are distributed in the major part of the microwatershed (Fig .6.8).

6.9 Available Manganese

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

6.10 Available Copper

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

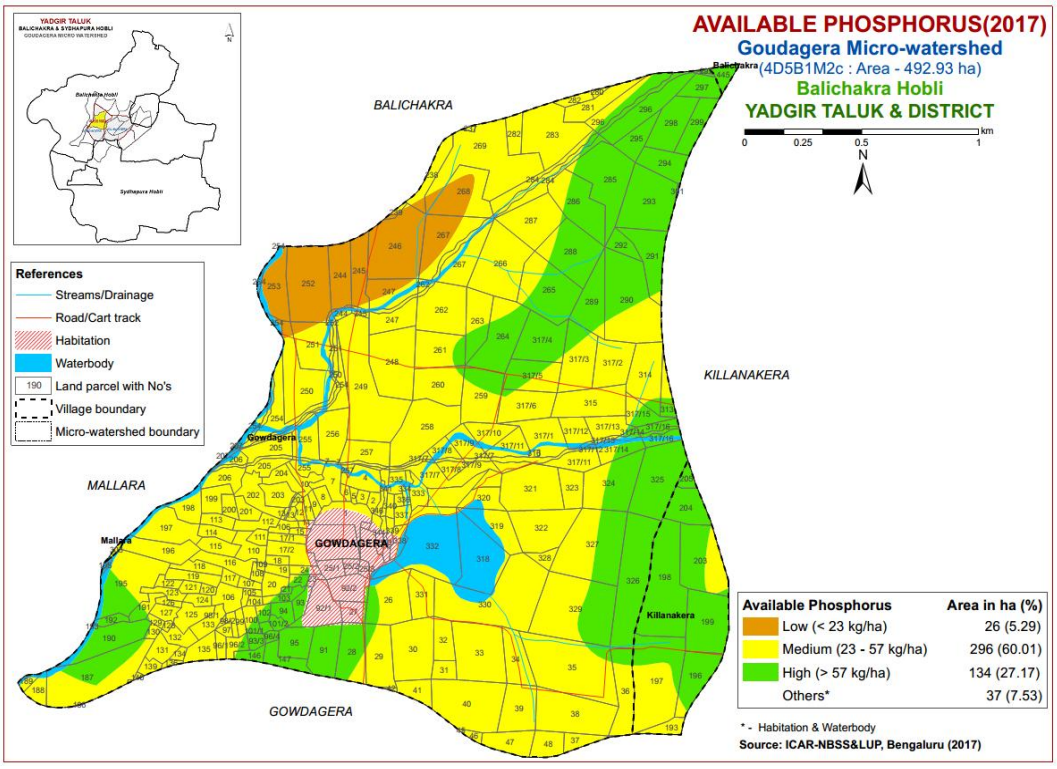


Fig. 6.4 Soil Available Phosphorus map of Goudagera Microwatershed

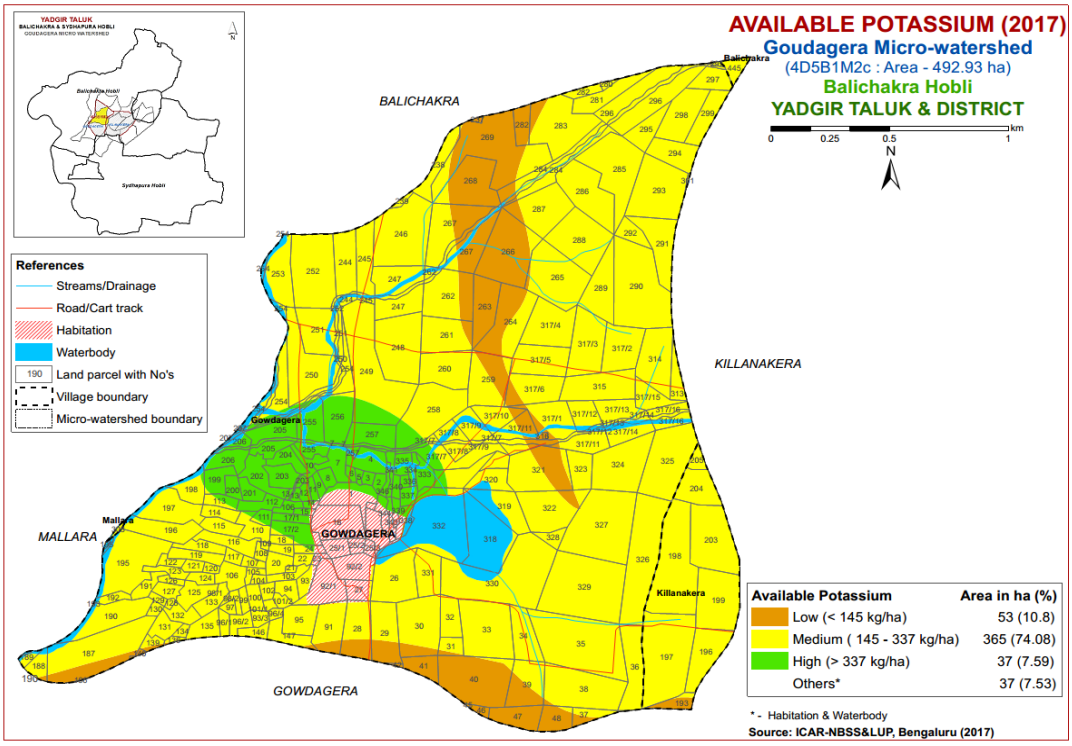


Fig.6.5 Soil Available Potassium map of Goudagera Microwatershed

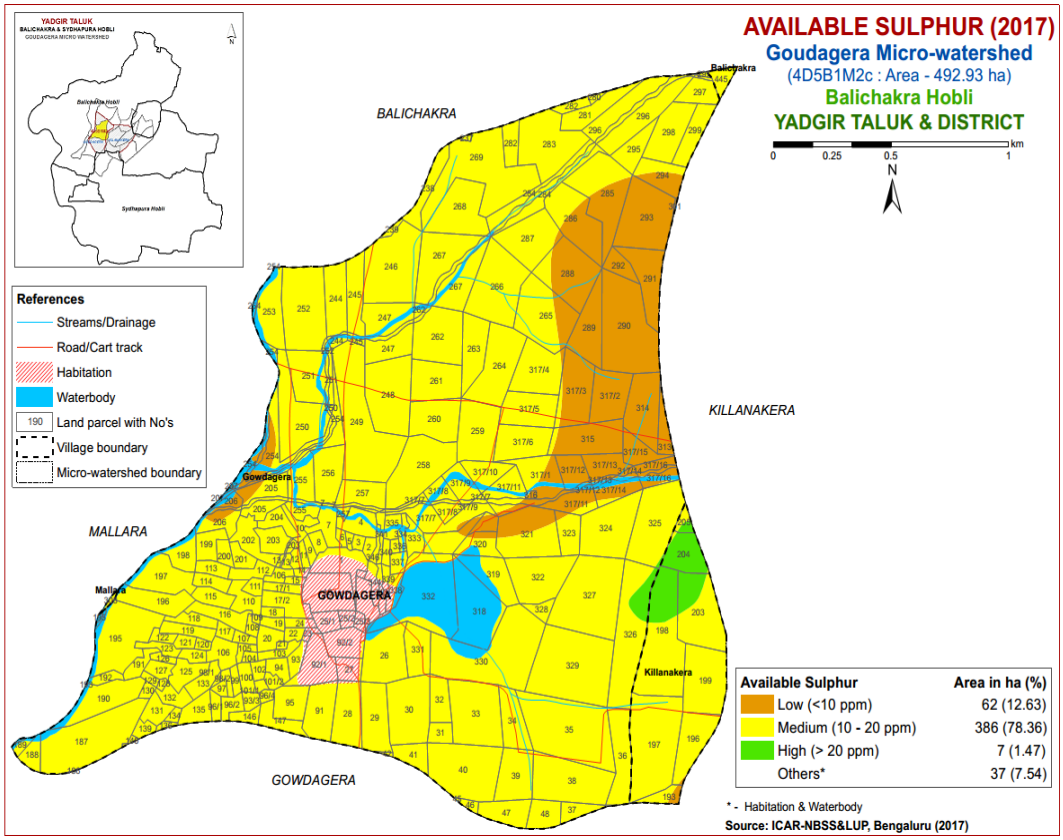


Fig.6.6 Soil Available Sulphur map of Goudagera Microwatershed

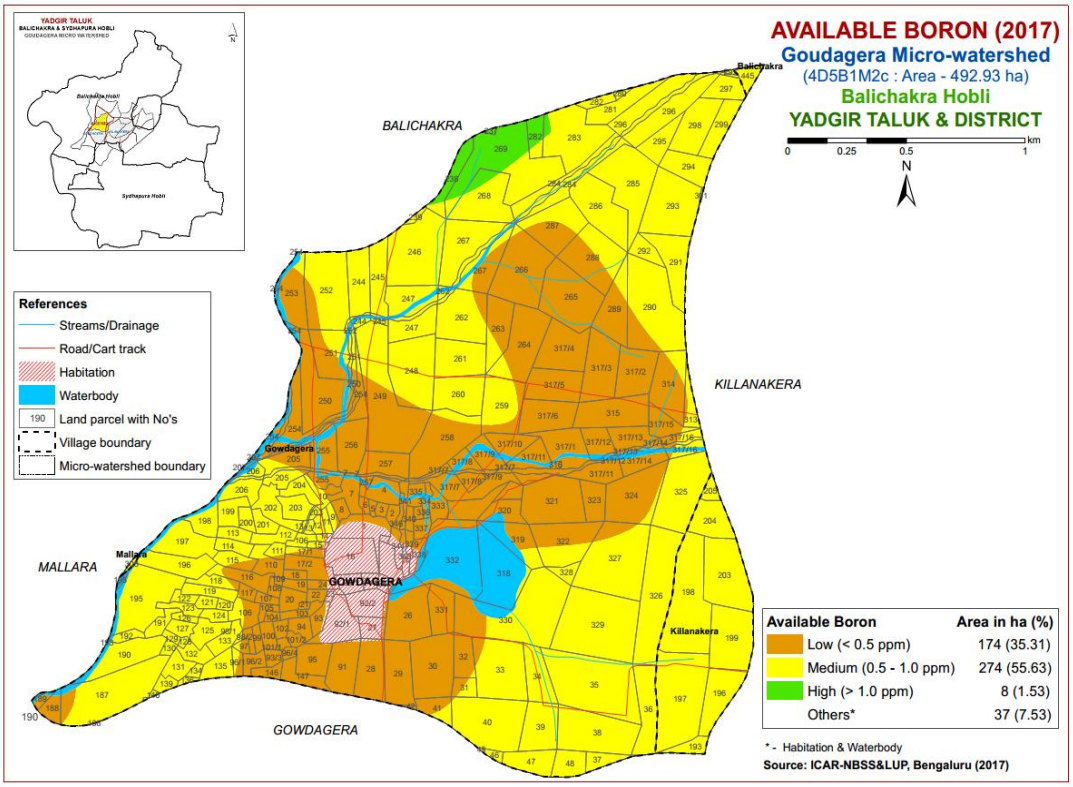


Fig.6.7 Soil Available Boron map of Goudagera Microwatershed

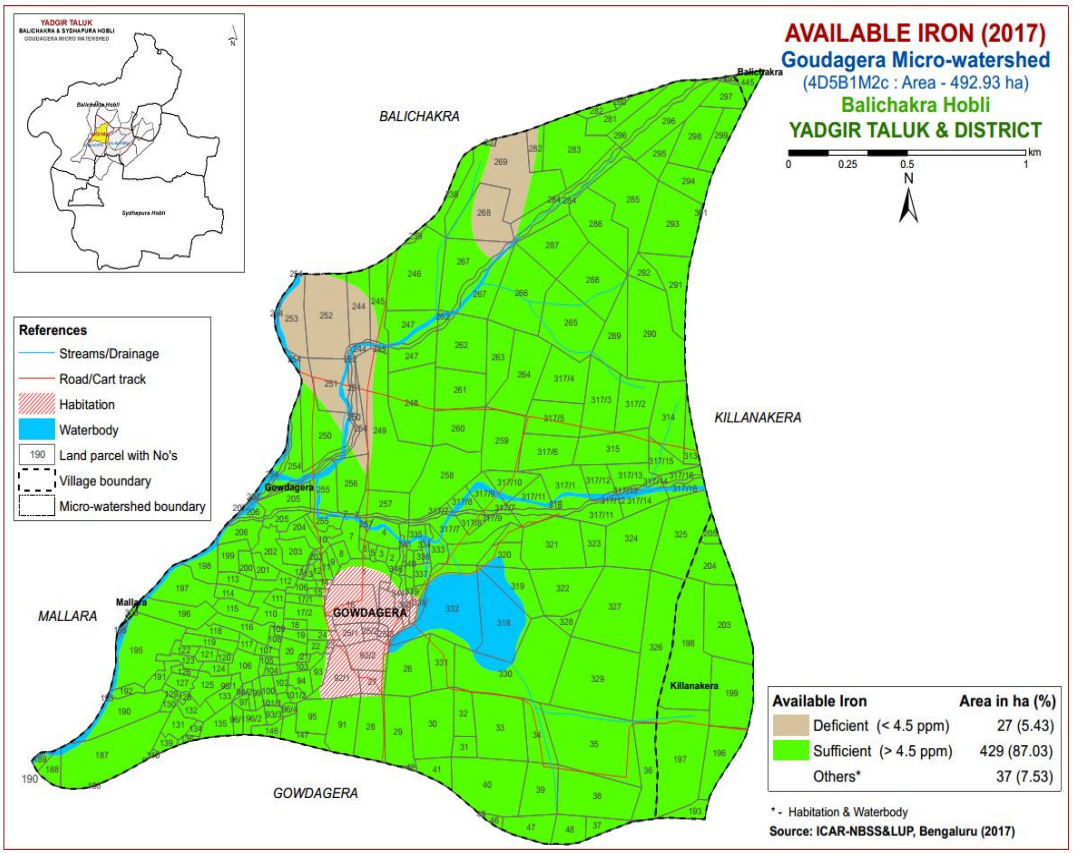


Fig.6.8 Soil Available Iron map of Goudagera Microwatershed

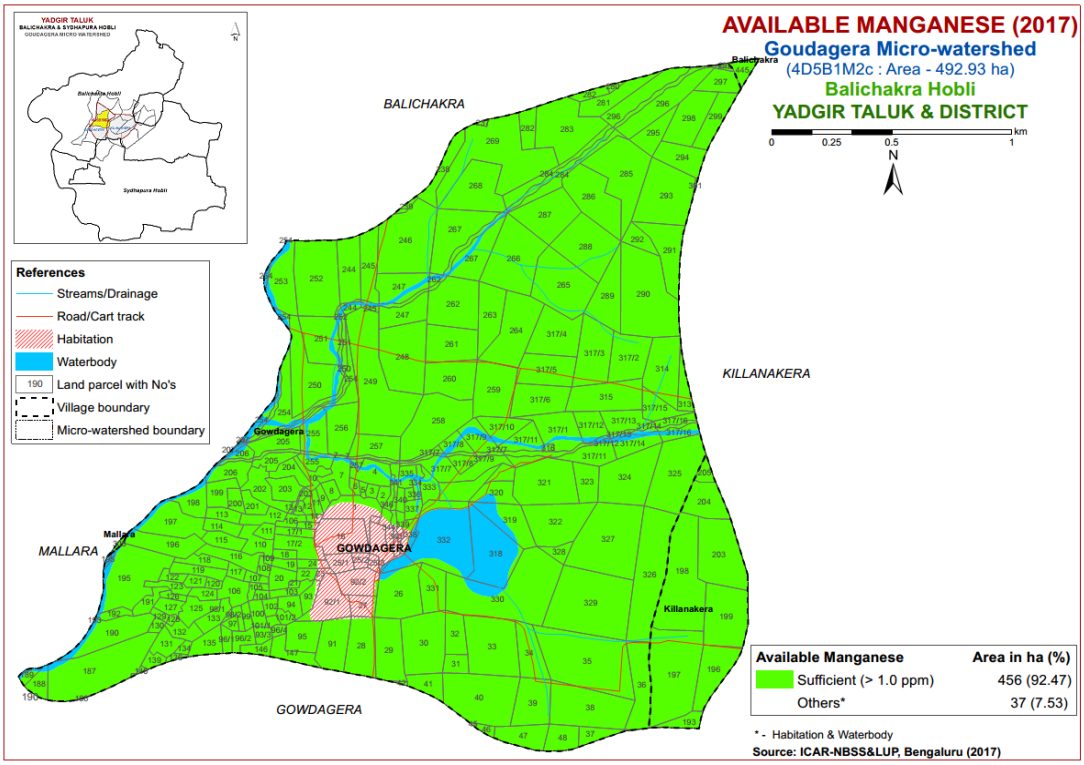


Fig.6.9 Soil Available Manganese map of Goudagera Microwatershed

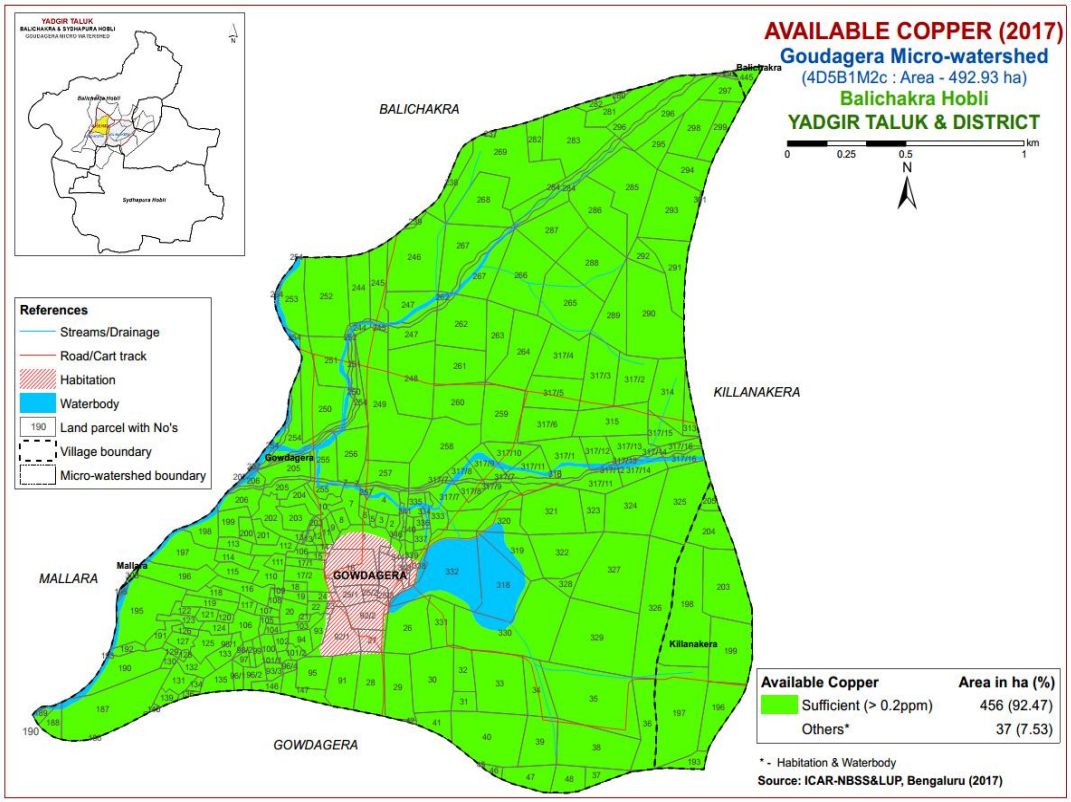


Fig.6.10 Soil Available Copper map of Goudagera Microwatershed

6.11 Available Zinc

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

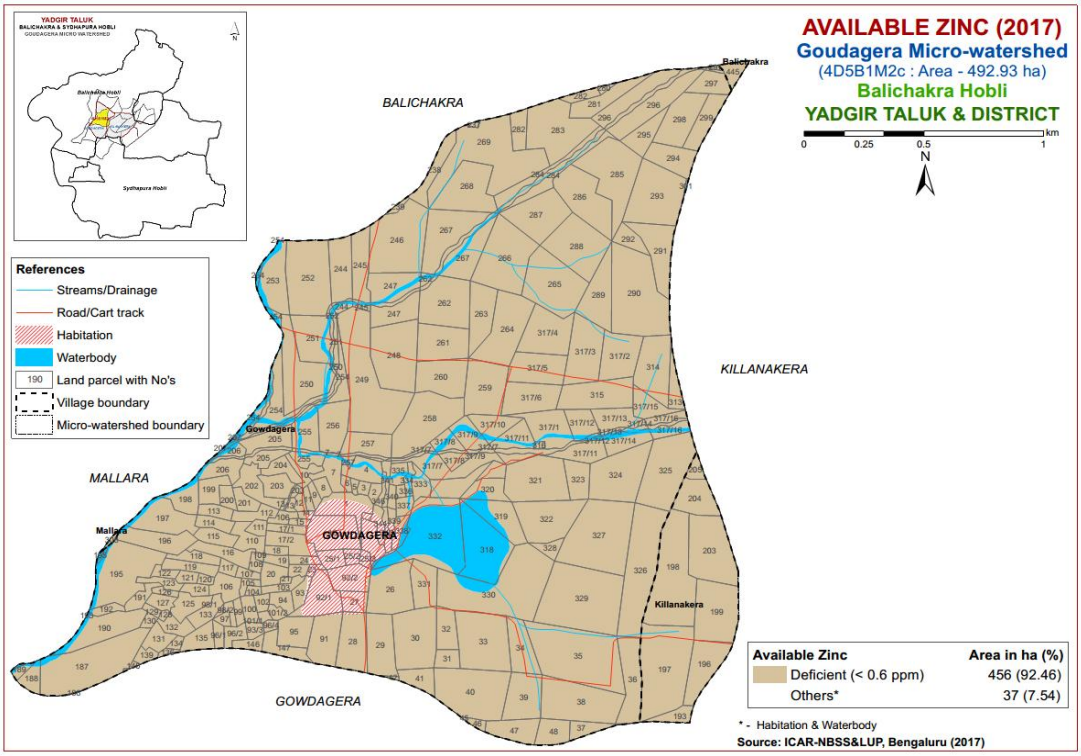


Fig.6.11 Soil Available Zinc map of Goudagera Microwatershed

Chapter 7

LAND SUITABILITY FOR MAJOR CROPS

The soil and land resource units (soil phases) of Goudagera microwatershed were assessed for their suitability for growing food, fodder, fibre and other horticulture crops by following the procedure as outlined in FAO, 1976 and 1983. Crop requirements were developed for each of the crop from the available research data and also by referring to Naidu *et. al.* (2006) and Natarajan *et. al* (2015). The crop requirements were matched with the soil and land characteristics (Table 7.1) to arrive at the crop suitability. In FAO land suitability classification, two orders are recognized. Order S-Suitable and Order N-Not suitable. The orders have classes, subclasses and units. Order-S has three classes, Class S1-Highly Suitable, Class S2-Moderately Suitable and Class S3- Marginally Suitable. Order N has two classes, N1-Currently not Suitable and N2- Permanently not Suitable. There are no subclasses within the Class S1 as they will have very minor or no limitations for crop growth. Classes S2, S3 and N1 are divided into subclasses based on the kinds of limitations encountered. The limitations that affect crop production are 'c' for erratic rainfall and its distribution and length of growing period (LGP), 'e' for erosion hazard, 'r' for rooting condition, 't' for lighter or heavy texture, 'g' for gravelliness or stoniness, 'n' for nutrient availability, 's' for sodicity, '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 26 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-III.

7.1 Land Suitability for Sorghum (*Sorghum bicolor*)

Sorghum is one of the major crops grown in Karnataka in an area of 10.47 lakh ha in Bijapur, Gulbarga, Raichur, Bidar, Belgaum, Dharwad, Bellary, Chitradurga, Mysore and 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.

No highly suitable (Class S1) lands are available for growing Sorghum in the microwatershed. Maximum area of about 422 ha (87%) is moderately suitable

(Class S2) for growing sorghum and are distributed in the major part of the microwatershed. They have minor limitations of calcareousness, drainage and rooting depth. An area of about 34 ha (7%) is marginally suitable (Class S3) for growing sorghum and are distributed in the central and northwestern part of the microwatershed with major limitations of rooting depth and gravelliness.

Table 7.2 Crop suitability criteria for Sorghum

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

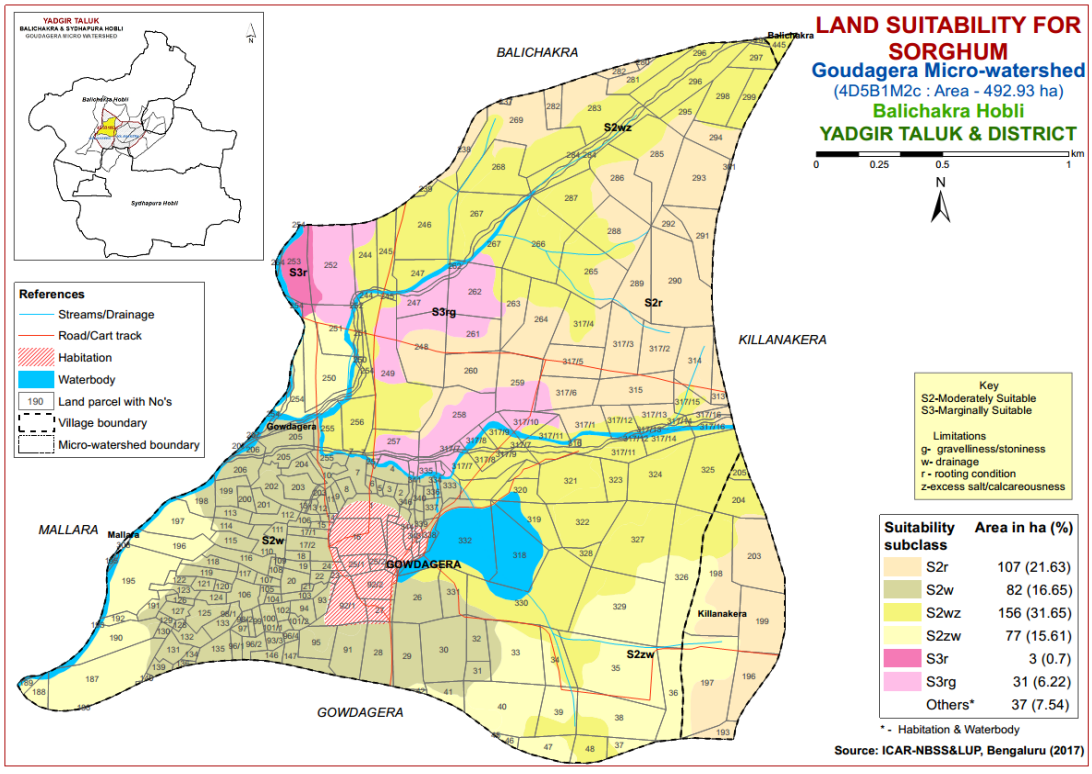


Fig. 7.1 Land Suitability map of Sorghum

Table 7.1 Soil-Site Characteristics of Goudagera Microwatershed

Soil Map Units	Climate (P) (mm)	Growing period (Days)	Drainage Class	Soil depth (cm)	Soil texture		Gravelliness		AWC (mm/m)	Slope (%)	Erosion	pH	EC (dSm^{-1})	ESP (%)	CEC [Cmol (p^{+})kg^{-1}]	BS (%)
					Sur-face	Sub-surface	Surface (%)	Sub-surface (%)								
JNKcB2	866	150	WD	50-75	sl	scl	-	-	51-100	1-3	moderate	8.42	0.15	0.18	14.50	100
YLRbB2	866	150	WD	50-75	ls	c	-	15-35	51-100	1-3	moderate	6.91	0.07	0.45	6.90	100
YLRiB2	866	150	WD	50-75	sc	c	-	15-35	51-100	1-3	moderate	6.91	0.07	0.45	6.90	100
ANRbB3	866	150	MWD	100-150	ls	c	-	-	>200	1-3	severe	10.20	0.37	17.70	20.00	100
ANRhB2	866	150	MWD	100-150	scl	c	-	-	>200	1-3	moderate	10.20	0.37	17.70	20.00	100
ANRiB2	866	150	MWD	100-150	sc	c	-	-	>200	1-3	moderate	10.20	0.37	17.70	20.00	100
DSBhB2	866	150	WD	25-50	scl	gc	-	35-60	<50	1-3	moderate	5.93	0.04	0.14	3.60	73
DSBiB2	866	150	WD	25-50	sc	gc	-	35-60	<50	1-3	moderate	5.93	0.04	0.14	3.60	73
DSBcB2	866	150	WD	25-50	sl	gc	-	35-60	<50	1-3	moderate	5.93	0.04	0.14	3.60	73
MDRiB2	866	150	MWD	>150	sc	scl	-	-	>200	1-3	moderate	8.31	0.33	2.26	20.57	100
KDRiB2	866	150	MWD	100-150	sc	c	-	-	>200	1-3	moderate	8.34	0.15	0.22	33.20	100
TMKbB3	866	150	MWD	>150	ls	c	-	-	>200	1-3	severe	9.60	0.35	16.57	21.83	100
TMKiB2	866	150	MWD	>150	sc	c	-	-	>200	1-3	moderate	9.60	0.35	16.57	21.83	100
TMKcB2	866	150	MWD	>150	sl	c	-	-	>200	1-3	moderate	9.60	0.35	16.57	21.83	100
SGRhB2	866	150	MWD	>150	scl	c	-	-	>200	1-3	moderate	8.30	6.49	29.02	34.77	100
SGRiB2	866	150	MWD	>150	sc	c	-	-	>200	1-3	moderate	8.30	6.49	29.02	34.77	100

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

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.

Table 7.3 Crop suitability criteria for Maize

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

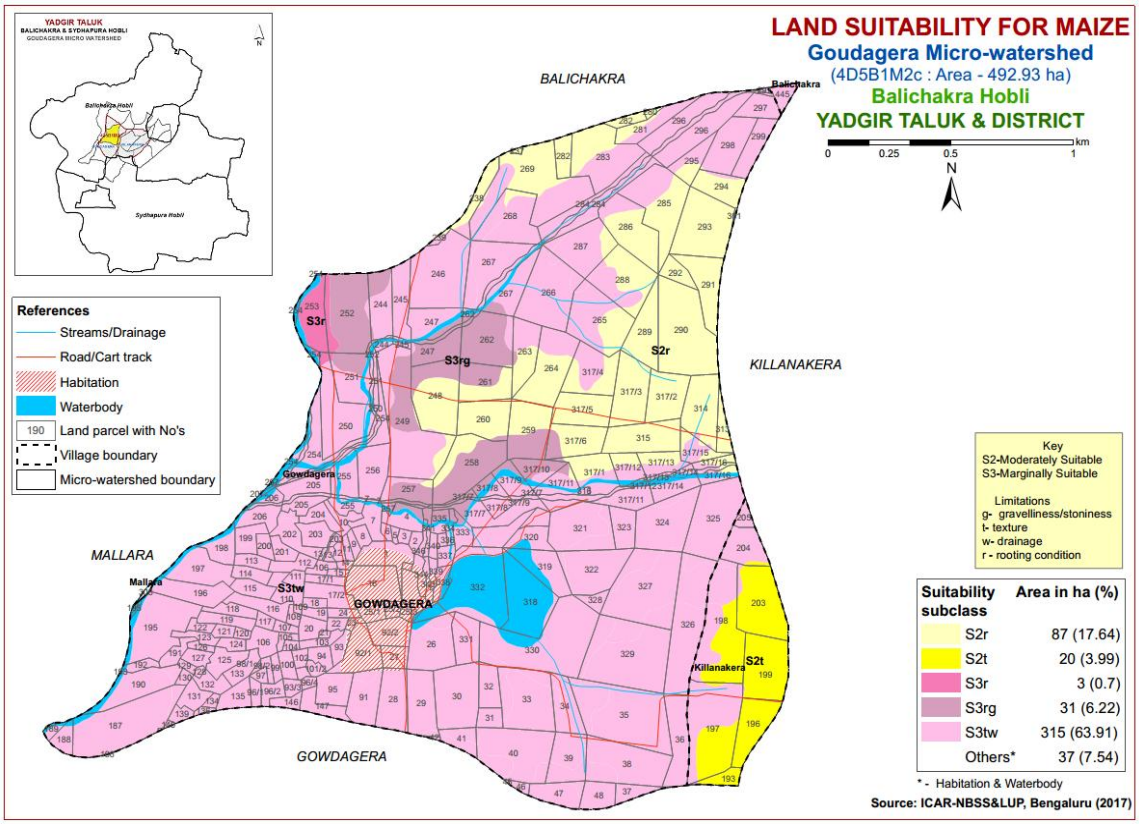


Fig. 7.2 Land Suitability map of Maize

No highly suitable (Class S1) lands are available for growing maize in the microwatershed. An area of about 107 ha (22%) is moderately suitable (Class S2) for growing maize and are distributed in the northern and southern part of the microwatershed with minor limitations of texture and rooting depth. Marginally suitable lands (Class S3) for growing maize occupy an area of 349 ha (71%) and occur in all parts of the microwatershed. They have major limitations of texture, rooting depth, drainage and gravelliness.

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.

No highly suitable (Class S1) lands are available for growing bajra in the microwatershed. Maximum area of about 422 ha (86%) is moderately suitable (Class S2) for growing bajra and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage, calcareousness and rooting depth. An area of about 34 ha (7%) is marginally suitable (Class S3) for growing Bajra and is distributed in the central and western part of the microwatershed with major limitation of rooting depth and gravelliness.

Table 7.4 Crop suitability criteria for Bajra.

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

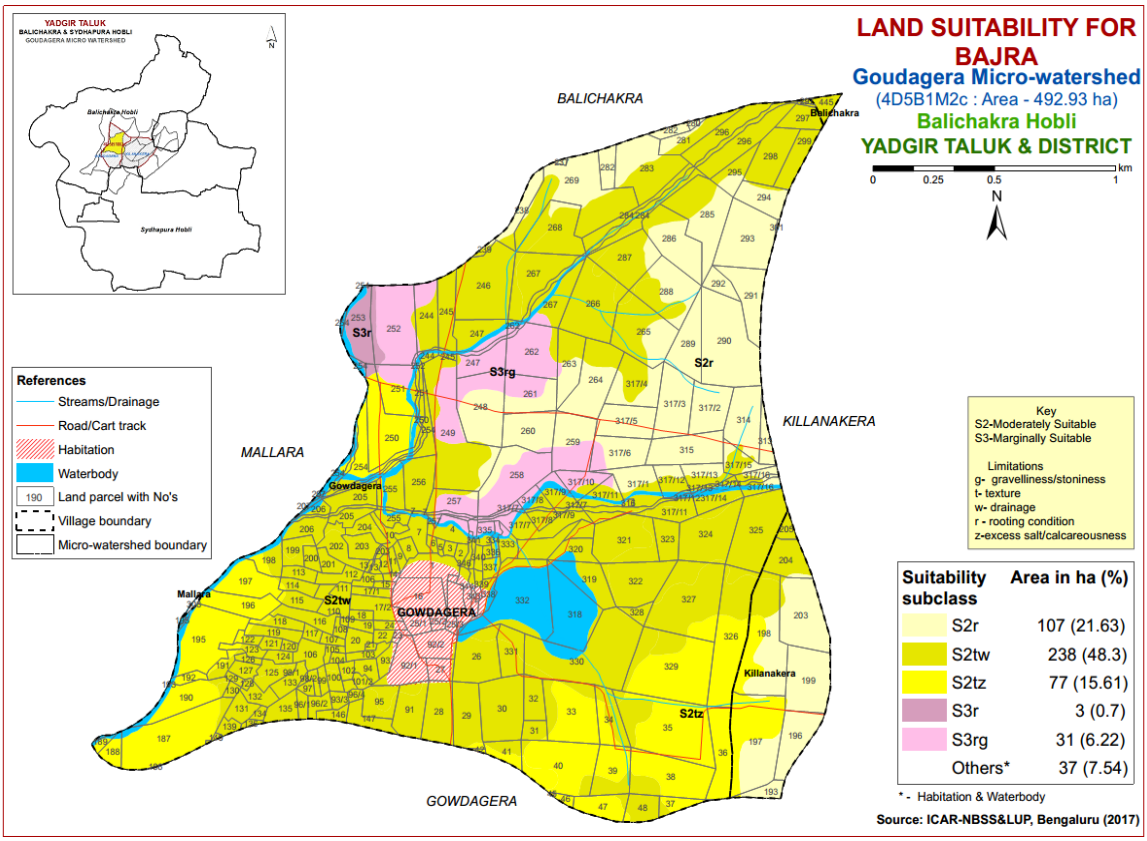


Fig. 7.3 Land Suitability map of Bajra

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.

No highly suitable (Class S1) lands are available for growing Groundnut in the microwatershed. An area of about 87 ha (18%) is moderately suitable (Class S2) for groundnut and are distributed in the northern, central and eastern part of the microwatershed with minor limitation of rooting depth. Marginally suitable lands (Class S3) for growing groundnut occupy a maximum area of about 369 ha (75%) and are distributed in the major part of the microwatershed. They have major limitations of texture, drainage, gravelliness and rooting depth.

Table 7.5 Crop suitability criteria for Groundnut

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

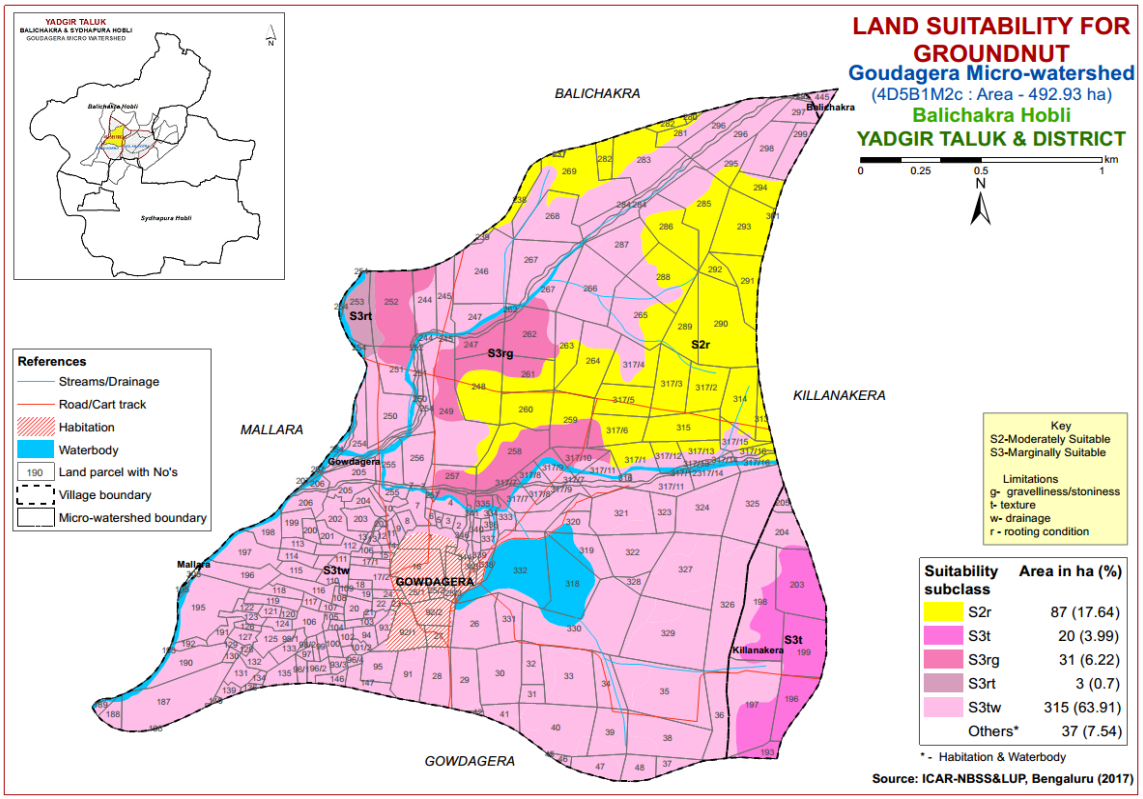


Fig. 7.4 Land Suitability map of Groundnut.

7.5 Land Suitability for Sunflower (*Helianthus annus*)

Sunflower is one of the most important oilseed crop grown in an area of 4.1 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.

Table 7.6 Crop suitability criteria for Sunflower

Crop requirement		Rating			
Soil–site characteristics	**Unit**	**Highly suitable(S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>90	80-90	70-80	<70
Soil drainage	Class	Well drained	Mod. well rained	Imperfectly drained	Poorly drained
Soil reaction	pH	6.5-8.0	8.1-8.55.5-6.4	8.6-9.0;4.5-5.4	>9.0<4.5
Surface soil texture	Class	l, cl, sil, sc	scl, sic, c,	c (>60%), sl	ls, s
Soil depth	Cm	>100	75-100	50-75	<50
Gravel content	% vol.	<15	15-35	35-60	>60
Salinity (EC)	dS m^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

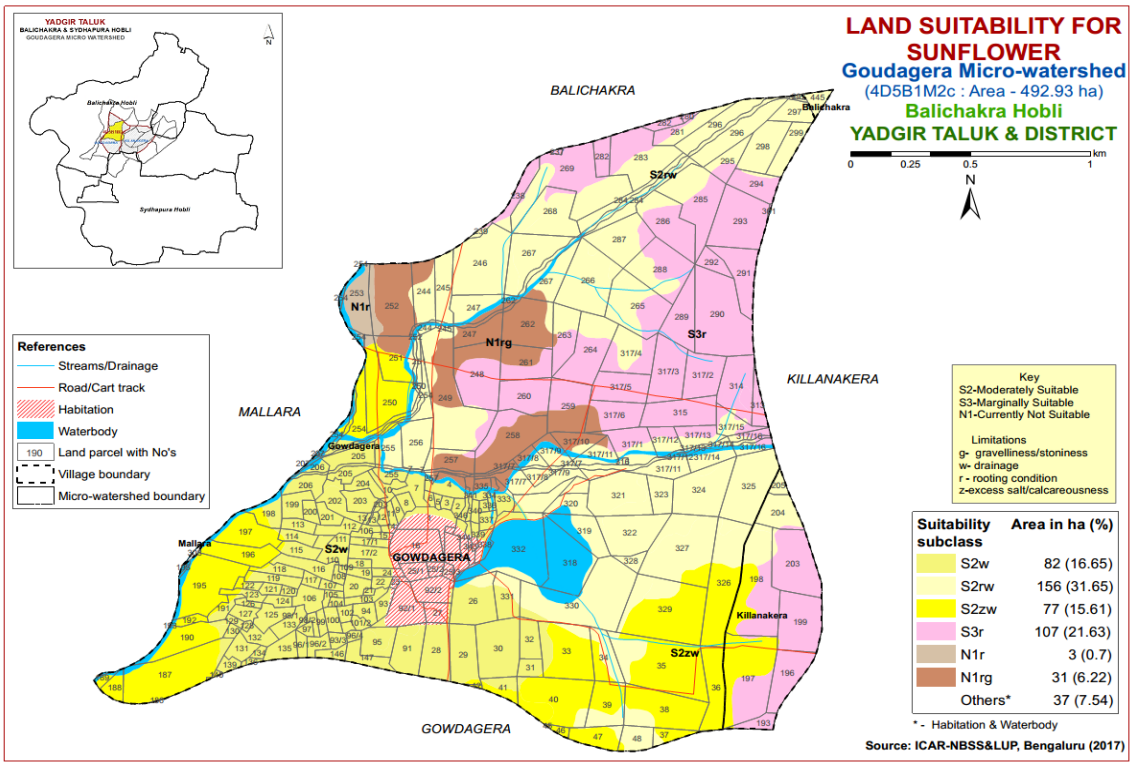


Fig. 7.5 Land Suitability map of Sunflower

No highly suitable (Class S1) lands available for growing sunflower in the microwatershed. Maximum area of about 315 ha (65%) is moderately suitable (Class S2) for sunflower and are distributed in the major part of the microwatershed with minor limitations of drainage, calcareousness and rooting depth. An area of about 107 ha (22%) is marginally suitable (Class S3) for sunflower and are distributed in the northern, central and eastern part of the microwatershed. They have major limitation of rooting depth. An area of about 34 ha (7%) is not suitable (Class N1) for sunflower and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

7.6 Land suitability criteria 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.

Table 7.7 Land suitability criteria for Redgram

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

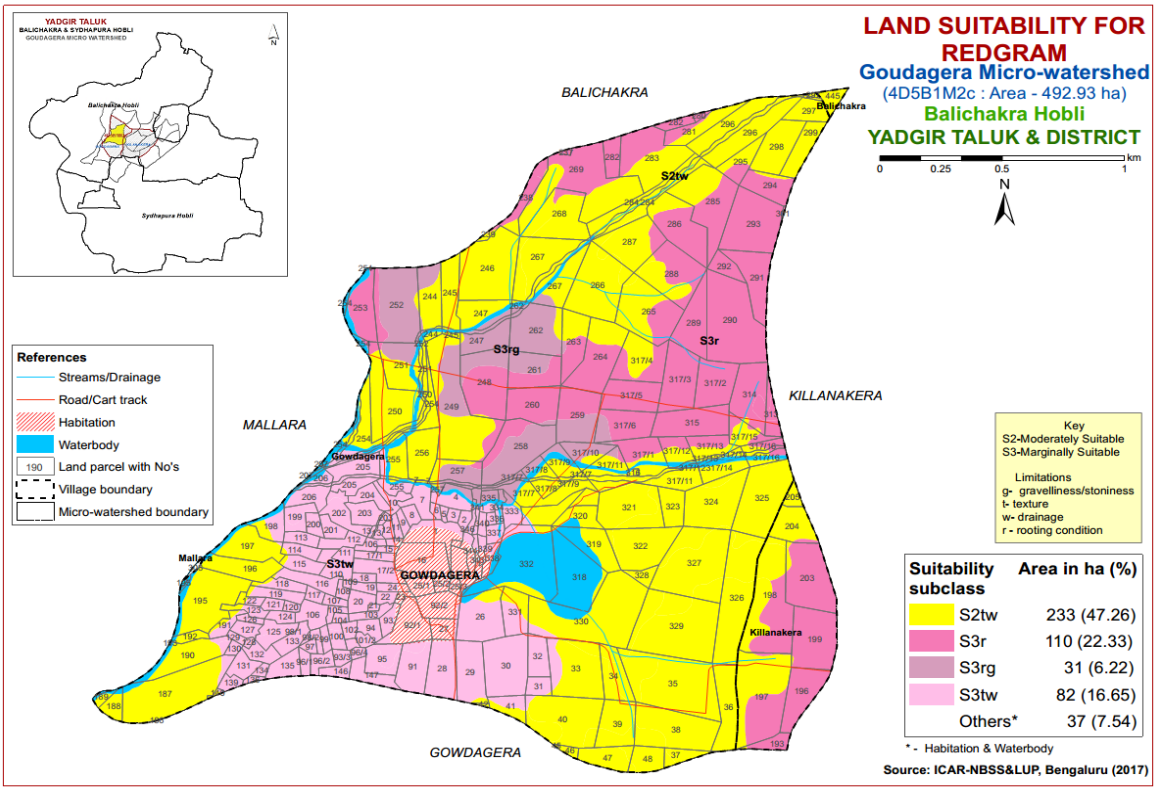


Fig. 7.6 Land Suitability map of Redgram.

No highly suitable (Class S1) lands available for growing redgram in the microwatershed. Maximum area of about 233 ha (47%) is moderately suitable (Class S2) for growing redgram and are distributed in the major part of the microwatershed with minor limitations texture and drainage. An area of about 223 ha (45%) is marginally suitable (Class S3) for redgram and are distributed in the northern, central, western and eastern part of the microwatershed. They have major limitations of rooting depth, gravelliness, texture and drainage

7.7 Land Suitability for Bengalgram (*Cicer aerativum*)

Bengal gram is one of the most important pulse crop grown in about 9.39 lakh ha area in Bijapur, Raichur, Kalaburgi, Dharwd, 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 are given in Figure 7.7.

Highly suitable (Class S1) lands for growing Bengal gram cover an area of about 82 ha (17%) in the microwatershed. Maximum area of about 340 ha (69%) is moderately suitable (Class S2) for growing Bengal gram and are distributed in all parts of the microwatershed with minor limitations of drainage, calcareousness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 34 ha (7%) and are distributed in the central and western part of the microwatershed. They have major limitations of rooting depth, texture and gravelliness.

Table 7.8 Crop suitability criteria for Bengalgram

Crop requirement		**Rating**			
Soil –site characteristics	**Unit**	**Highly suitable (S1)**	**Moderately Suitable (S2)**	**Marginally suitable (S3)**	**Not suitable (N)**
Slope	%	<3	3-5	5-10	>10
LGP	Days	>100	90-100	70-90	<70
Soil drainage	class	Well drained	Mod. to well drained; imper. drained	Poorly drained; excessively drained	Very Poorly drained
Soil reaction	pH	6.0-7.5	5.5-5.7, 7.6-8.0	8.1-9.0;4.5-5.4	>9.0
Surface soil texture	Class	l, scl, sil, cl,	sicl, sic, c	sl, c>60%	
Soil depth	Cm	>75	51-75	25-50	<25
Gravel content	% vol.	<15	15-35	>35	
Salinity (ECe)	dsm^{-1}	<1.0	1.0-2.0	>2.0	
Sodicity (ESP)	%	<10	10-15	>15	

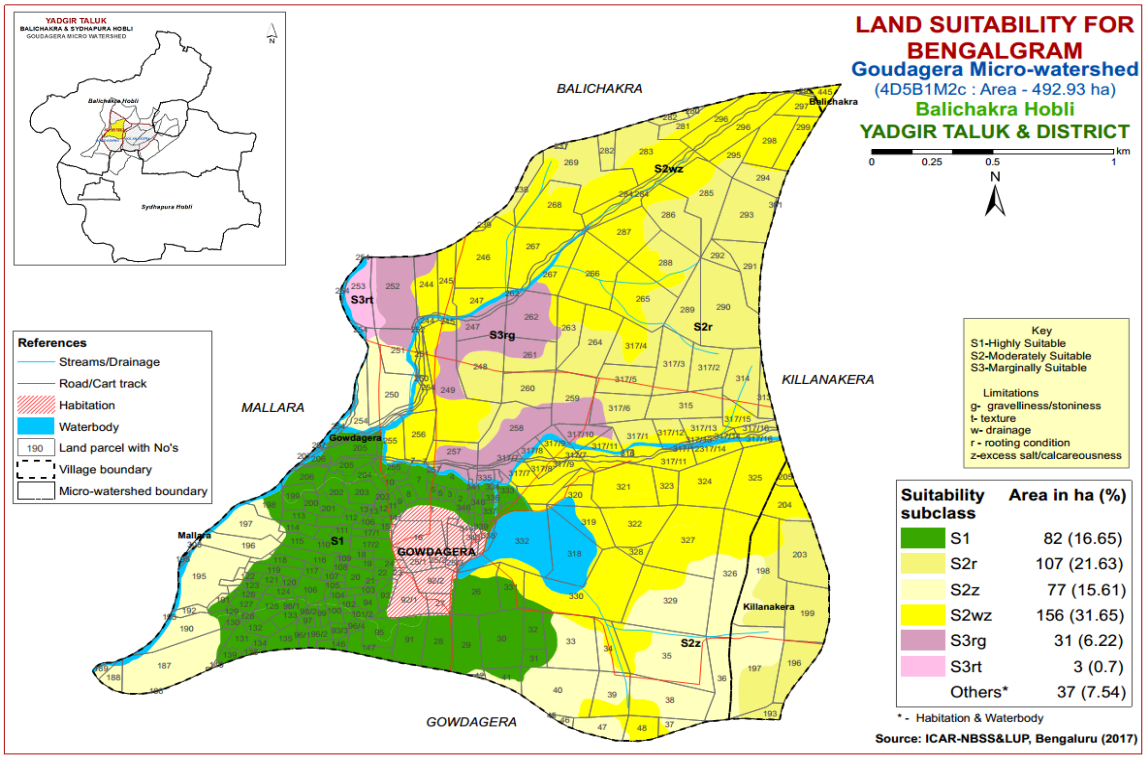


Fig. 7.7 Land Suitability map of Bengalgram

7.8 Land Suitability for Cotton (*Gossypium hirsutum*)

Cotton is 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.

Table 7.9 Crop suitability criteria for Cotton

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

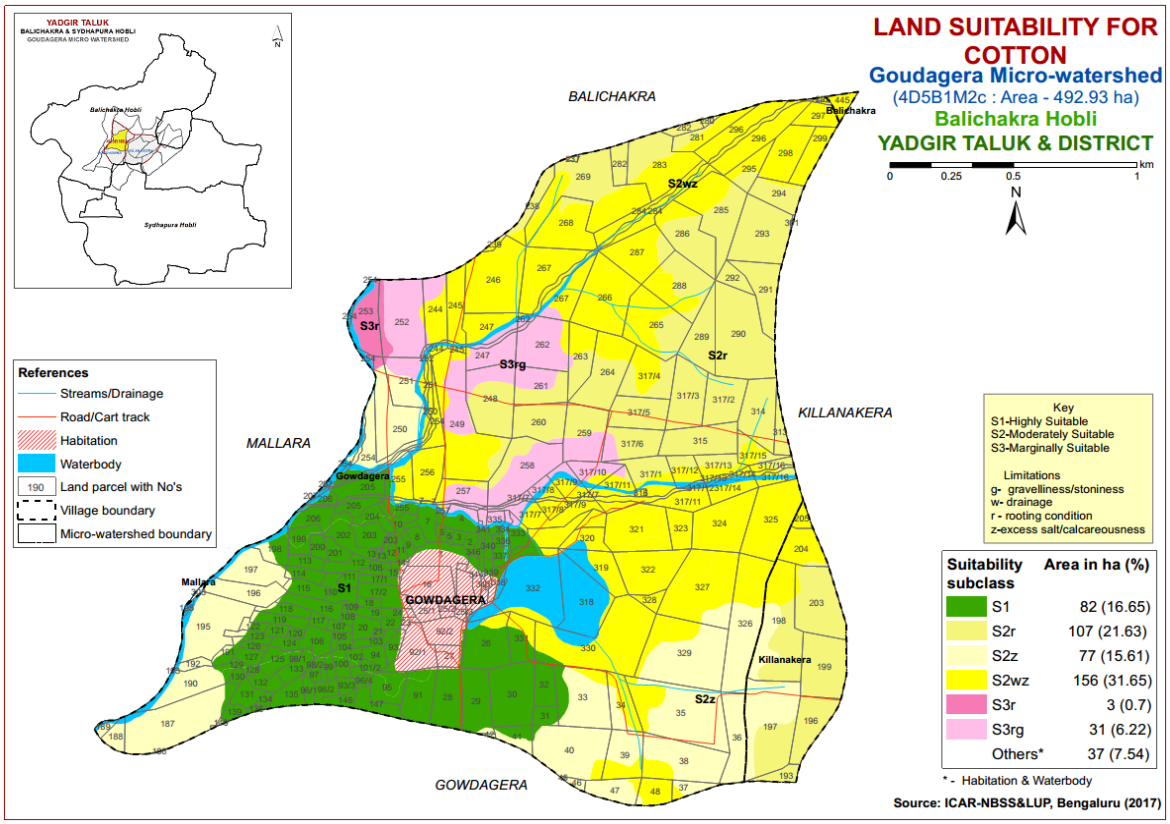


Fig. 7.8 Land Suitability map of Cotton

7.9 Land Suitability for Chilli (*Capsicum annuum)*

Chilli is one of the most important vegetable and 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.

Table 7.10 Crop suitability criteria for Chilli

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

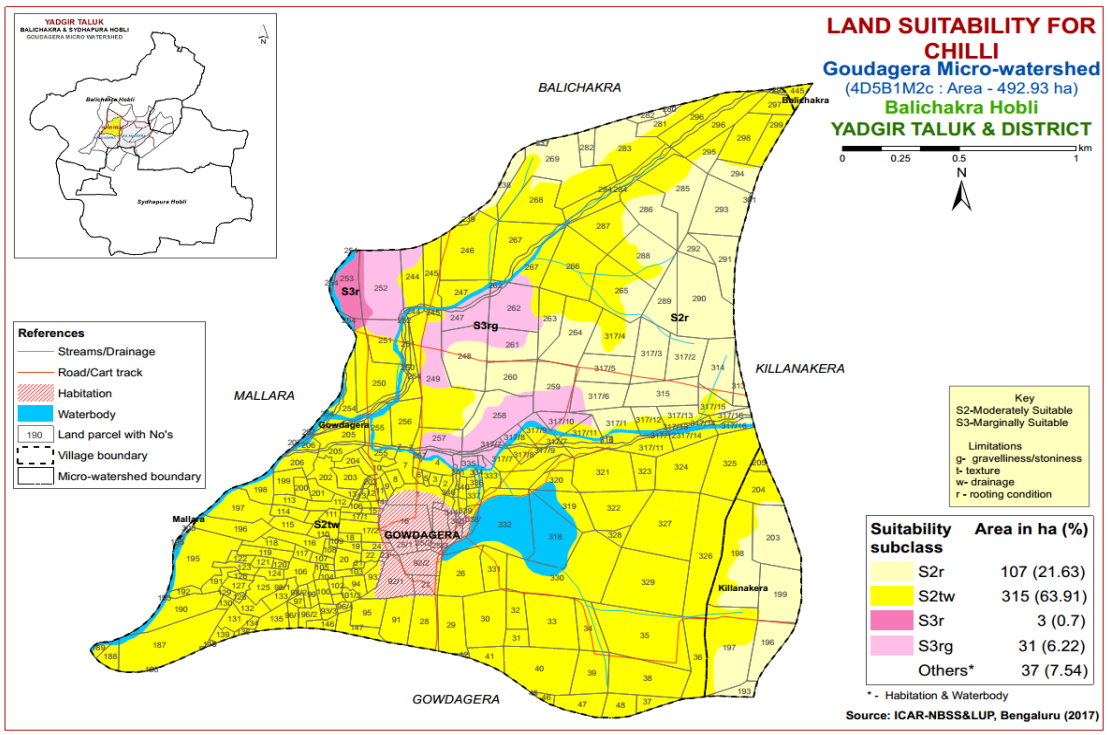


Fig 7.9 Land Suitability map of Chilli

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.

Table 7.11 Crop suitability criteria for Tomato

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable(S2)	Marginally suitable(S3)	Not suitable(N)
Climate	Temperature in growing season	^{0}C	25-28	29-32 , 20-24	15-19 33-36	<15, >36
Soil moisture	Growing period	Days	>150	120-150	90-120	
Soil aeration	Soil drainage	class	Well drained	Moderately well drained	Poorly drained	V. poorly drained
Nutrient availability	Texture	Class	l, sl, cl, scl	sic,sicl,sc,c(m/k)	c (ss), ls	s
	pH	1:2.5	6.0-7.3	5.5-6.0 7.3-8.4	8.4-9.0	>9.0
	$CaCO_3$ in root zone	%	Non calcareous	Slightly calcareous	Strongly calcareous	
Roting conditions	Soil depth	Cm	>75	50-75	25-50	<25
	Gravel content	%vol.	<15	15-35	>35	
Soil toxicity	Salinity	ds/m	Non saline	slight	strongly	
	Sodicity (ESP)	%	<10	10-15	>15	-
Erosion	Slope	%	1-3	3-5	5-10	>10

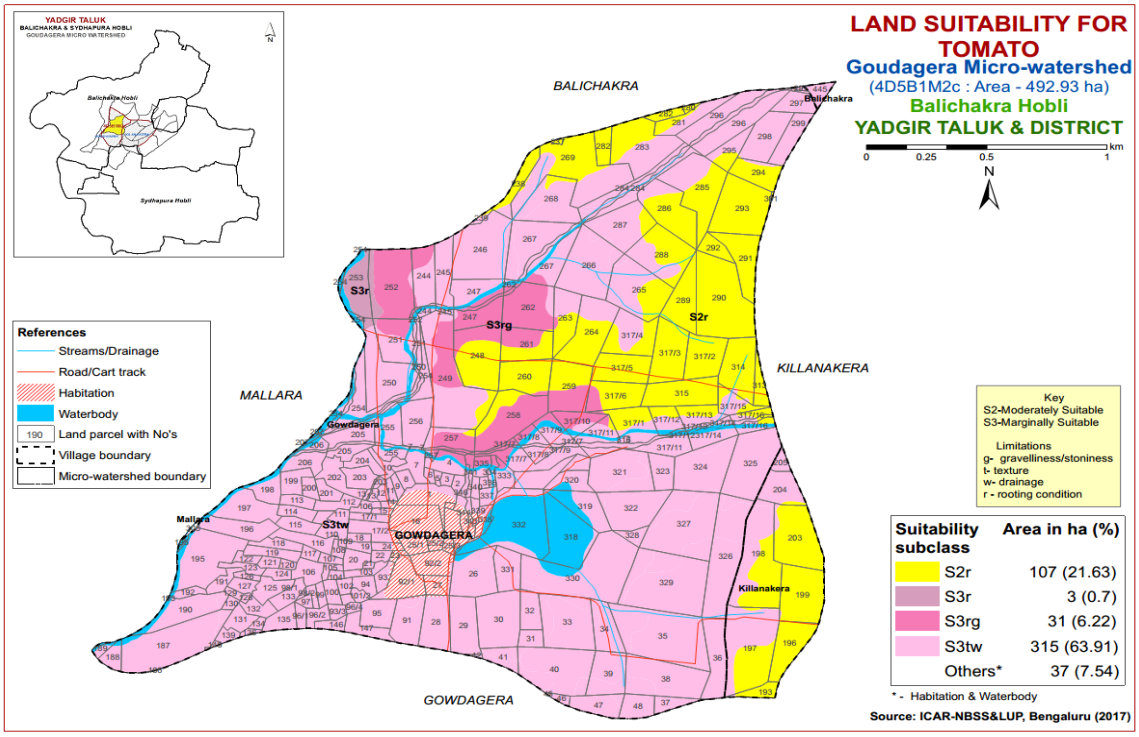


Fig 7.10 Land Suitability map of Tomato

No highly (Class S1) suitable lands available for growing tomato in the microwatershed. An area of about 107 ha (22%) is moderately suitable (Class S2) for growing tomato and are distributed in the northern, central and eastern part of the microwatershed. They have minor limitation of rooting depth. Marginally suitable lands (Class S3) occupy major area of about 349 ha (71%) and are distributed in all parts of the microwatershed. They have moderate limitations of texture, rooting depth, gravelliness and drainage.

7.11 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 7.12) were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing drumstick was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed is given in Figure 7.11.

There are no highly (Class S1) suitable lands available for growing drumstick in the microwatershed. Major area of about 315 ha (64%) is moderately suitable (Class S2) for drumstick and is distributed in the major part of the microwatershed. They have minor limitations of texture and drainage. An area of about 107 ha (22%) is marginally suitable (Class S3) for growing drumstick and are distributed in the northern, central and eastern part of the microwatershed. They have moderate limitations of rooting depth. An area of about 34 ha (7%) is not suitable (Class N1) for growing drumstick and are distributed in the central and western part of the microwatershed. They have severe limitations of rooting depth and gravelliness.

Table 7.12 Crop suitability criteria for Drumstick

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

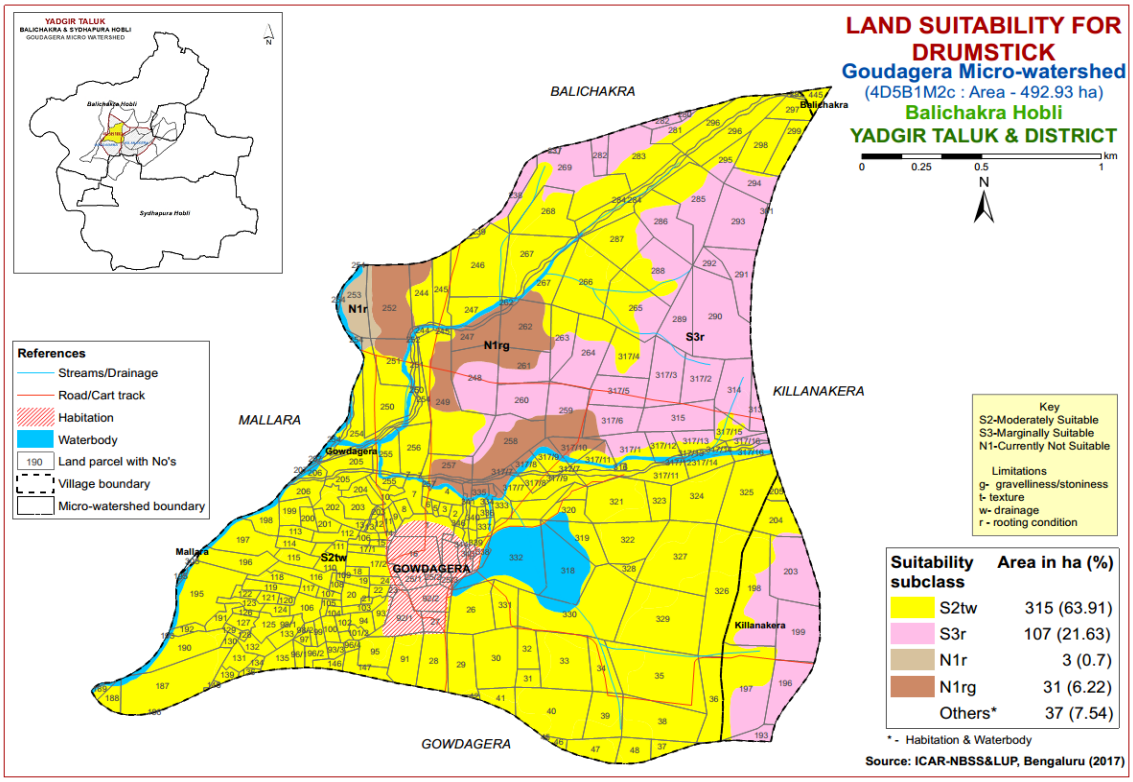


Fig 7.11 Land Suitability map of Drumstick

7.12 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 7.13) 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 7.12.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mango in the microwatershed. Maximum area of 315 ha (64%) is marginally suitable (Class S3) for growing mango with moderate limitations of drainage, texture and calcareousness and are distributed in the major part of the microwatershed. An area of about 141 ha (28%) is not suitable (Class N1) for growing mango and occur in the northern,

northeastern, central and southeastern part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.13 Crop suitability criteria for Mango

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

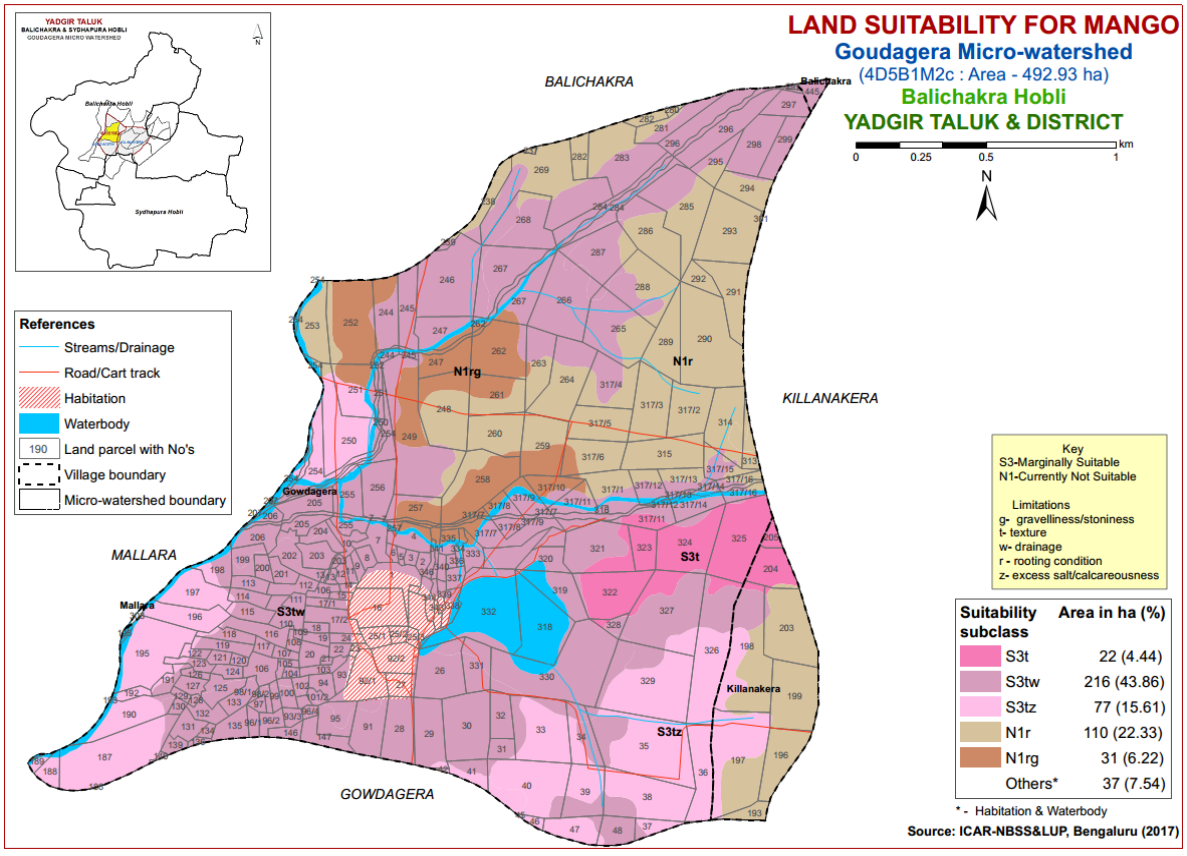


Fig. 7.12 Land Suitability map of Mango

7.13 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 7.14) 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 7.13.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing guava in the microwatershed. Maximum area of 422 ha (86%) is marginally suitable (Class S3) for growing guava with moderate limitations of drainage, texture and rooting depth and are distributed in the major part of the microwatershed. An area of about 34 ha (7%) is not suitable (Class N1) for growing guava and occur in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.14 Crop suitability criteria for Guava

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

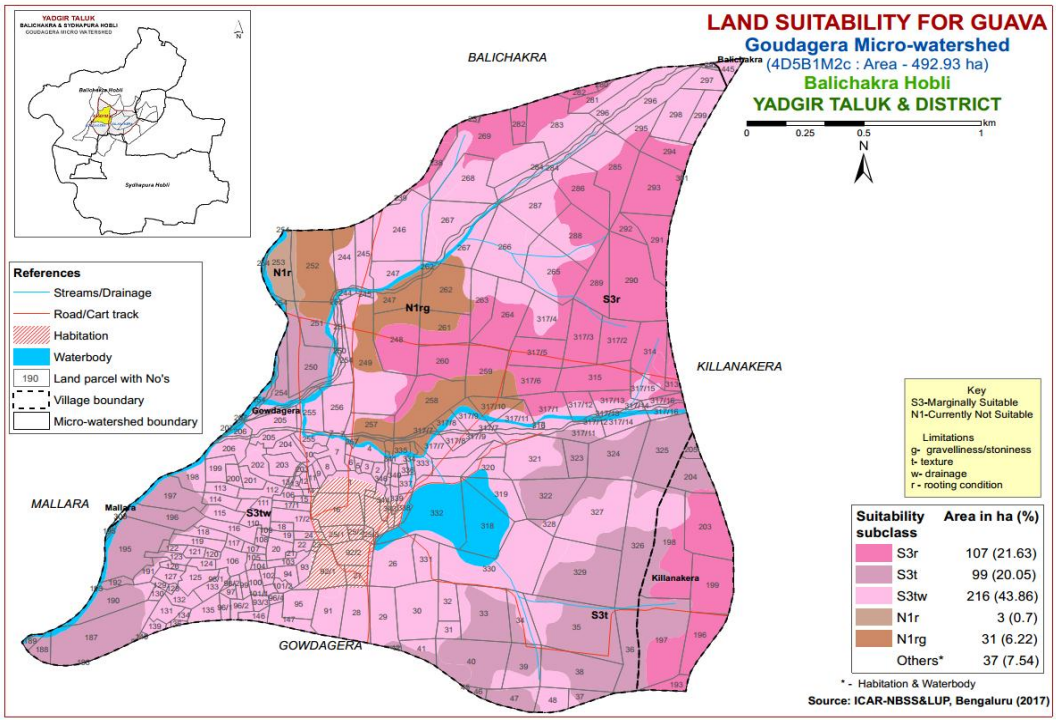


Fig. 7.13 Land Suitability map of Guava

7.14 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 7.15) for growing sapota were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing sapota was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.14.

Table 7.15 Crop suitability criteria for Sapota

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

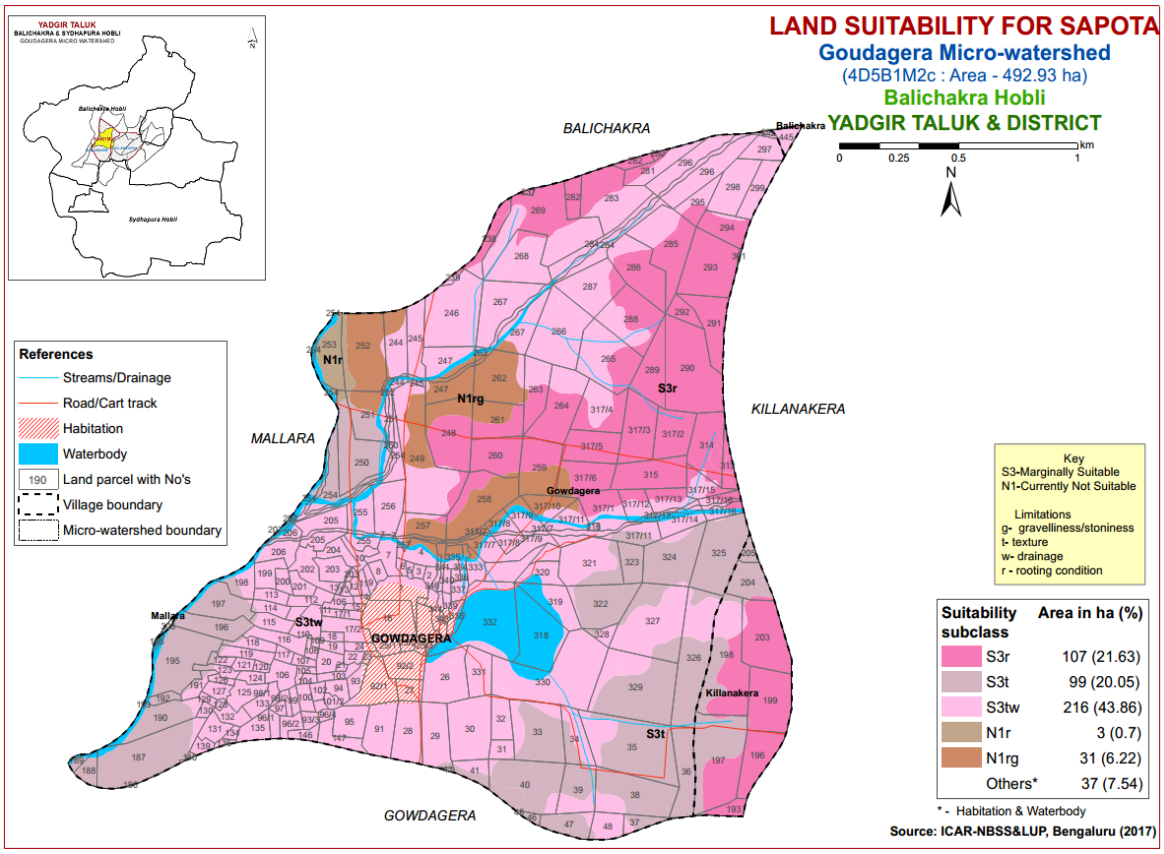


Fig. 7.14 Land Suitability map of Sapota

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing Sapota in the microwatershed. Maximum area of about 422 ha (86%) is marginally suitable (Class S3) for growing sapota and are distributed in the major part of the microwatershed. They have moderate limitations of rooting depth, texture and drainage. An area of about 34 ha (7%) is not suitable (Class N1) for growing sapota and occur in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

7.15 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 7.16) 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 7.15.

No highly (Class S1) suitable lands available for growing pomegranate in the microwatershed. Major area of about 315 ha (64%) is moderately suitable (Class S2) for growing pomegranate and is distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 107 ha (22%) is marginally suitable (Class S3) for growing pomegranate and are distributed in the northern, northeastern, central and eastern part of the microwatershed. They have moderate limitation of rooting depth.

About 34 ha (7%) of area is not suitable (Class N1) for growing pomegranate and is distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.16 Crop suitability criteria for Pomegranate

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

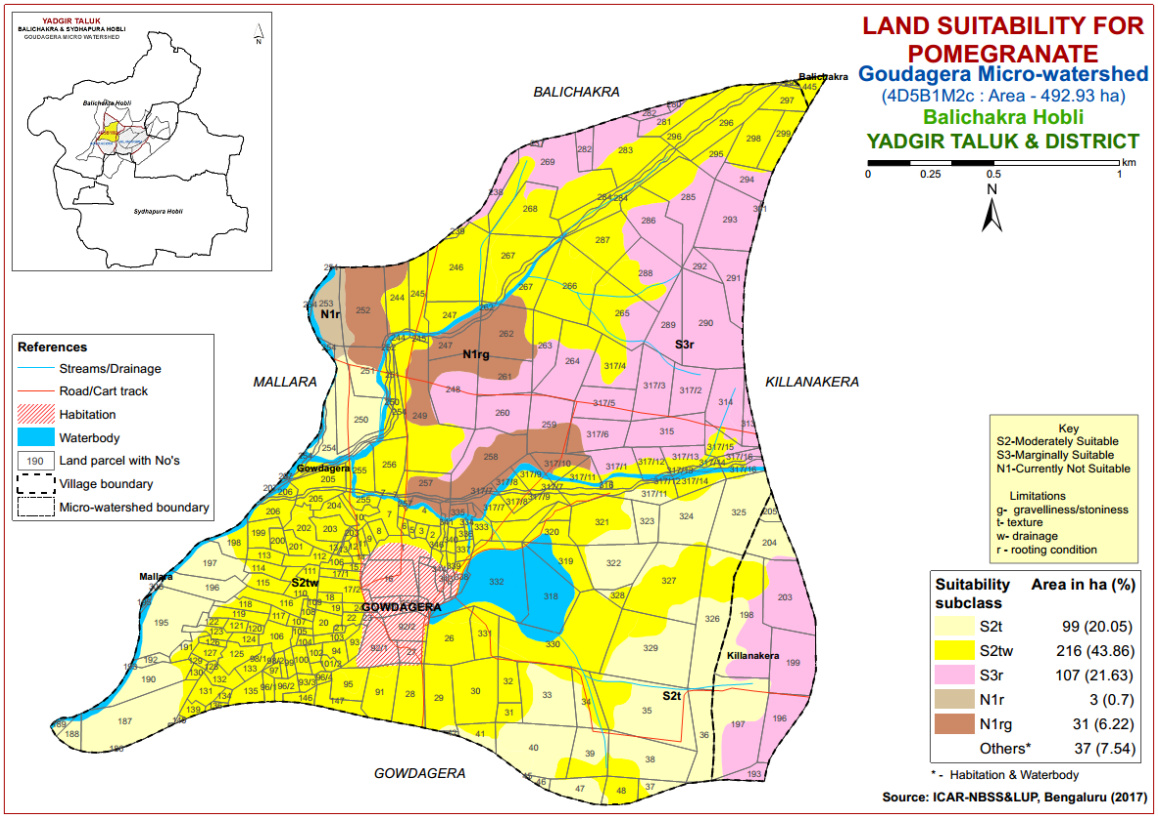


Fig 7.15 Land Suitability map of Pomegranate

7.16 Land Suitability for 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 7.17) 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 7.16.

Table 7.17 Crop suitability criteria for Musambi

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable(S1)	Moderately suitable (S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperf.drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl, l, sicl, cl, s	sc, sc, c	c(>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.47.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Erosion	Slope	%	<3	3-5	5-10	

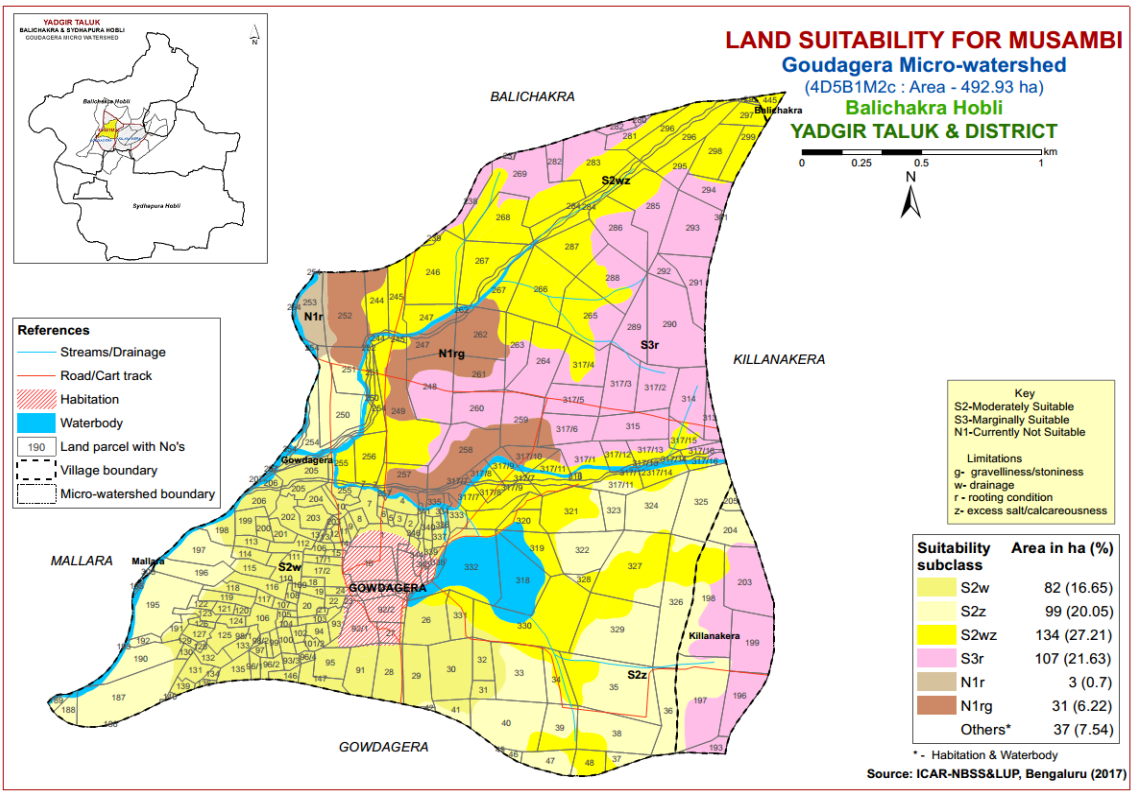


Fig. 7.16 Land Suitability map of Musambi

No highly suitable (Class S1) lands available for growing Musambi in the microwatershed. Major area of about 315 ha (64%) is moderately suitable (Class S2) for growing Musambi and are distributed in all parts of the microwatershed. They have minor limitations of drainage and calcareousness. Marginally suitable (Class S3) lands occupy an

area of about 107 ha (22%) and are distributed in the northern, central and southeastern part of the microwatershed. They have moderate limitation of rooting depth. An area of about 34 ha (7%) is not suitable (Class N1) for growing musambi and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

7.17 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 7.18) 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. 17.

No highly suitable (Class S1) lands available for growing Lime in the microwatershed. Major area of about 315 ha (64%) is moderately suitable (Class S2) for growing lime and are distributed in all parts of the microwatershed. They have minor limitations of drainage and calcareousness. Marginally suitable (Class S3) lands occupy an area of about 107 ha (22%) and are distributed in the northern, central and southeastern part of the microwatershed. They have moderate limitation of rooting depth. An area of about 34 ha (7%) is not suitable (Class N1) and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.18 Crop suitability criteria for Lime

Crop requirement			**Rating**			
Soil –site characteristics		**Unit**	**Highly suitable (S1)**	**Moderately suitable (S2)**	**Marginally suitable(S3)**	**Not suitable(N)**
Climate	Temperature in growing season	^{0}C	28-30	31-35 24-27	36-40 20-23	>40 <20
Soil moisture	Growing period	Days	240-265	180-240	150-180	<150
Soil aeration	Soil drainage	Class	Well drained	Mod. to imperfectly drained	poorly	Very poorly
Nutrient availability	Texture	Class	scl, l,sicl, cl, s	sc, sc, c	c(>70%)	s, ls
	pH	1:2.5	6.0-7.5	5.5-6.47.6-8.0	4.0-5.4,8.1-8.5	<4.0,>8.5
	$CaCO_3$ in root zone	%	Non 34calcareous	Upto 5	5-10	>10
Rooting conditions	Soil depth	Cm	>150	100-150	50-100	<50
	Gravel content	% vol.	Non gravelly	15-35	35-55	>55
Soil toxicity	Salinity	dS/m	Non saline	Upto 1.0	1.0-2.5	>2.5
	Sodicity	%	Non sodic	5-10	10-15	>15
Erosion	Slope	%	<3	3-5	5-10	

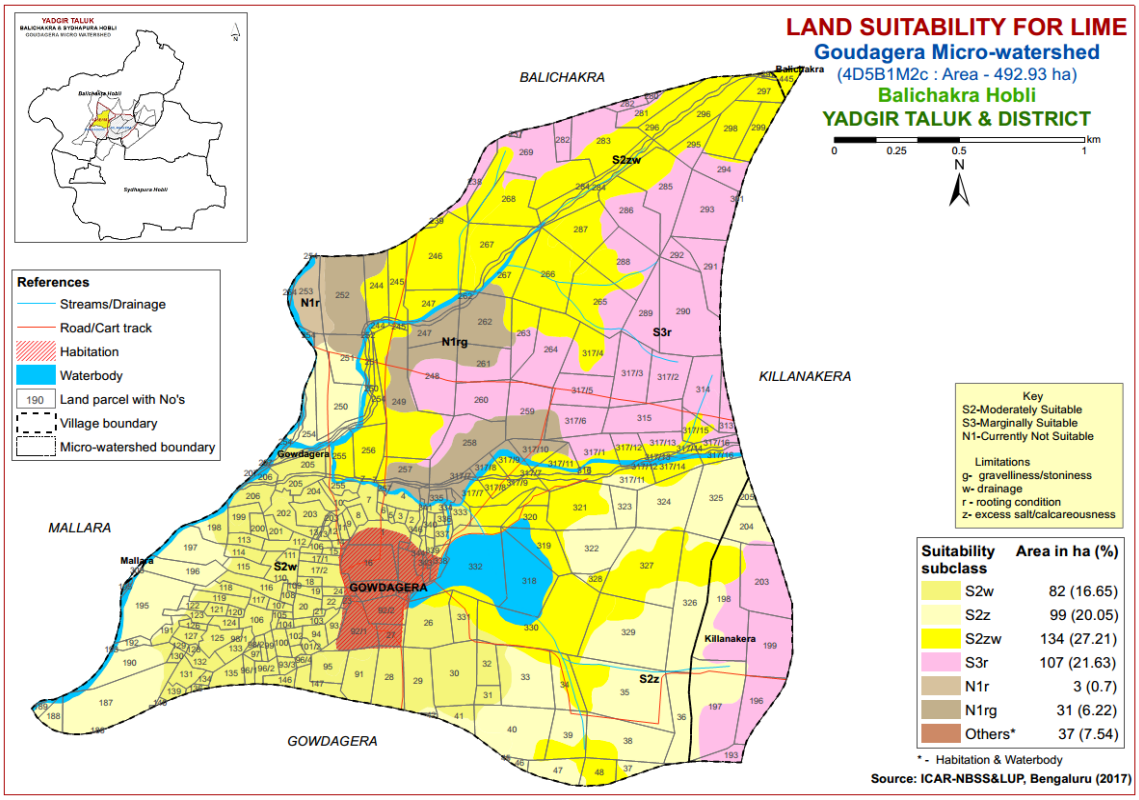


Fig. 7.17 Land Suitability map of Lime

7.18 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 7.19) 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 7.18.

No highly (Class S1) suitable lands available for growing amla in the microwatershed. Maximum area of about 422 ha (86%) is moderately suitable (Class S2) for growing amla and are distributed in all parts of the microwatershed. They have minor limitations of texture, drainage, calcareousness and rooting depth. Marginally suitable lands (Class S3) occupy an area of about 34 ha (7%) and are distributed in the central and western part of the microwatershed with major limitations of rooting depth and gravelliness.

Table 7.19 Land suitability criteria for Amla

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

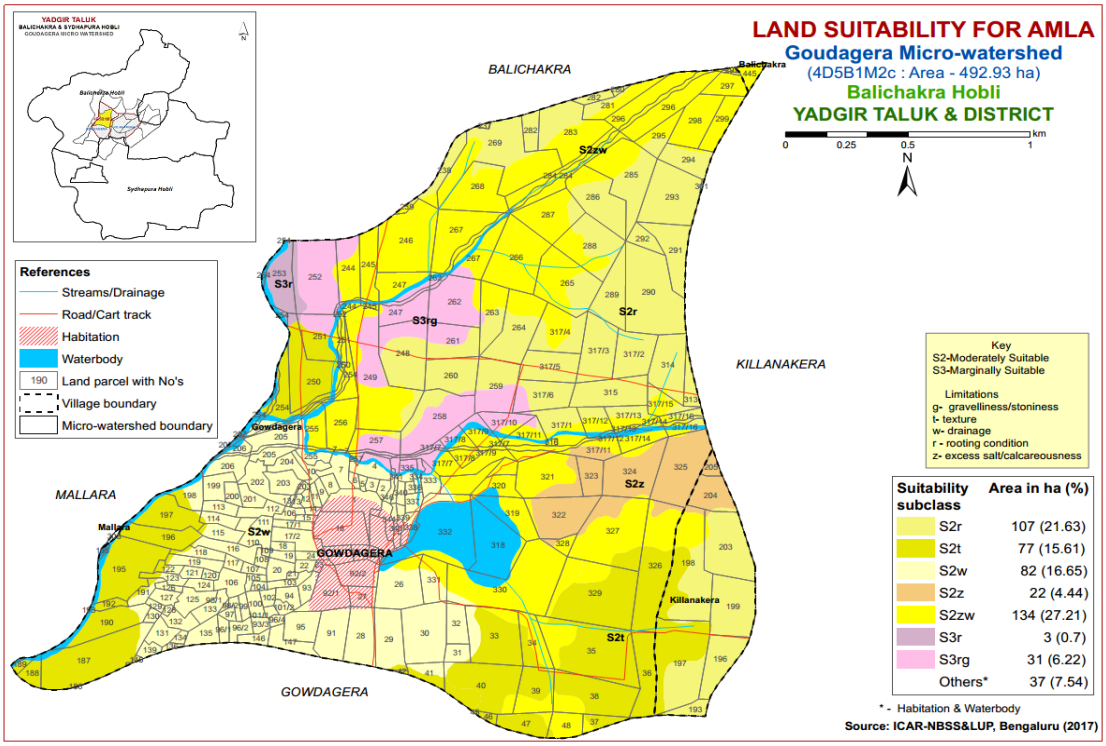


Fig. 7.18 Land Suitability map of Amla

7.19 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 7.20) 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 7.19.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing cashew in the microwatershed. A small area of about 87 ha (18%) is marginally suitable (Class S3) for growing cashew and are distributed in the northern, central and eastern part of the microwatershed. They have moderate limitation of rooting depth. Maximum area of about 369 ha (76%) is not suitable (Class N1) for growing cashew and occur in all parts of the microwatershed with severe limitations of texture, rooting depth, drainage and calcareousness.

Table 7.20 Land suitability criteria for Cashew

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

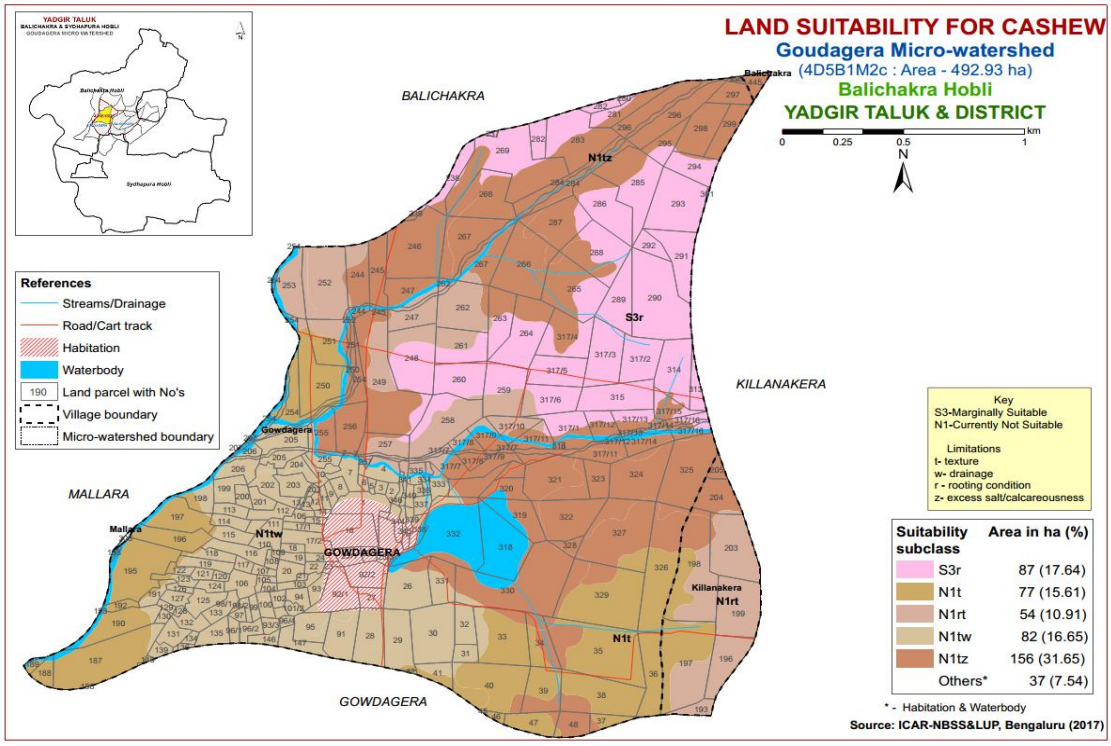


Fig. 7.19 Land Suitability map of Cashew

7. 20 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 7.21) 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 7.20.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing Jackfruit in the microwatershed. Major area of about 422 ha (86%) is marginally suitable (Class S3) for growing Jackfruit and are distributed in all parts of the microwatershed. They have moderate limitations of rooting depth, texture and drainage. An area of about 34 ha (7%) is not suitable (Class N1) for growing Jackfruit and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.21 Land suitability criteria for Jackfruit

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

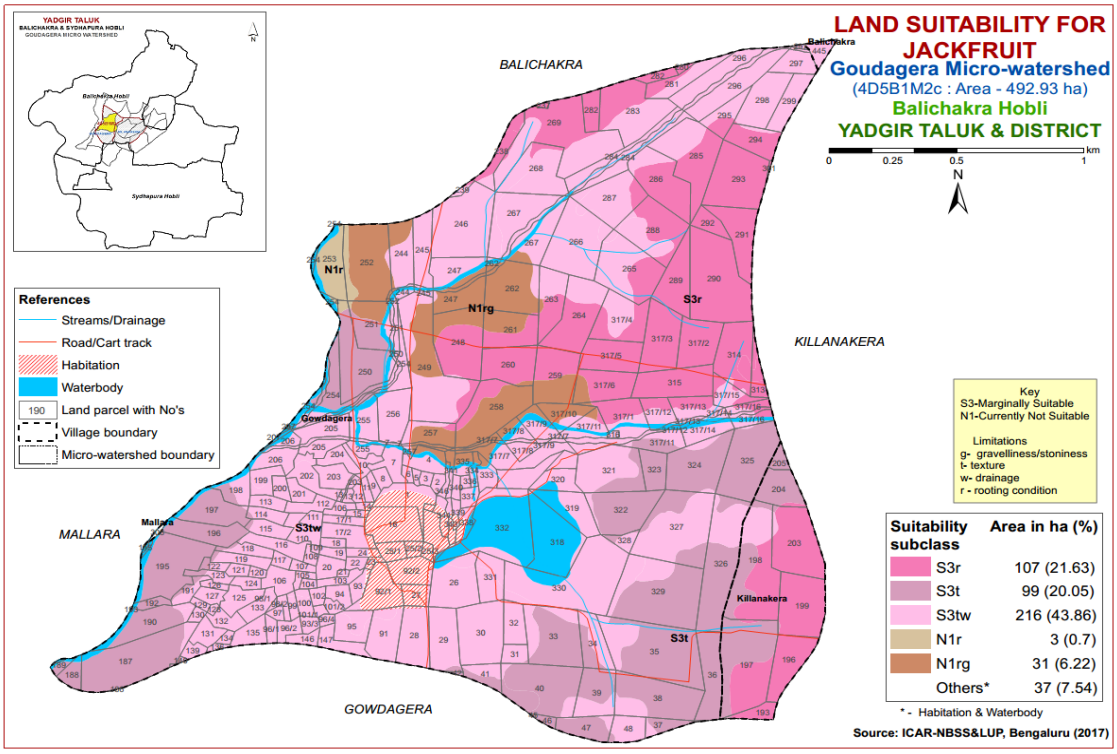


Fig. 7.20 Land Suitability map of Jackfruit

7.21 Land Suitability for Jamun (*Syzygium cumini*)

Jamun is an important fruit crop grown in almost all the districts of the State. The crop requirements for growing jamun (Table 22) 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 are given in Figure 7.21.

Table 7.22 Land suitability criteria for Jamun

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

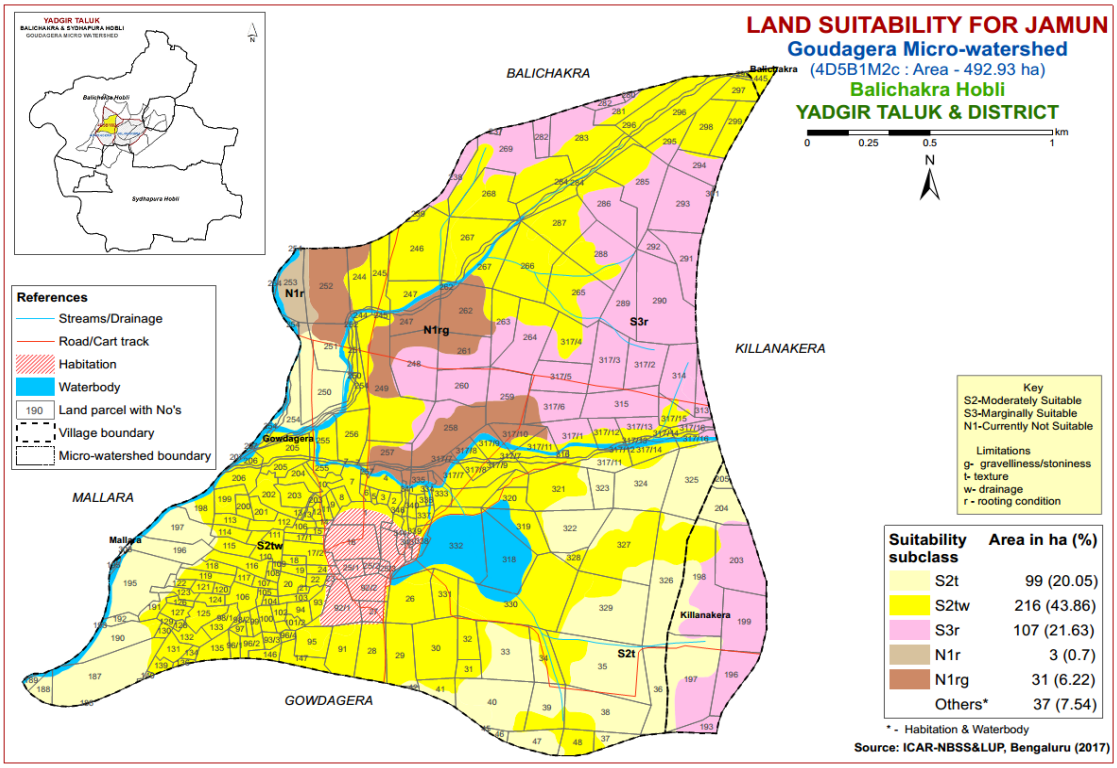


Fig. 7.21 Land Suitability map of Jamun

No highly suitable (Class S1) lands are available for growing Jamun in the microwatershed. Maximum area of about 315 ha (64%) is moderately suitable (Class S2) for growing Jamun and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 107 ha (22%) is marginally suitable (Class S3) for growing Jamun and are distributed in the northern, central, northeastern and southeastern part of the microwatershed. They have moderate limitation of rooting depth. About 34 ha (7%) of area is not suitable (Class N1) for growing Jamun and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

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

Custard apple is one of the most important fruit crop grown in almost all the districts of the State. The crop requirements for growing custard apple (Table 7.23) 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 7.22.

No highly (Class S1) suitable lands are available for growing custard apple in the microwatershed. Maximum area of about 422 ha (86%) is moderately suitable (Class S2) for growing custard apple with minor limitations of drainage, calcareousness and rooting depth and are distributed in all parts of the microwatershed. An area of about 34 ha (7%) is marginally suitable (Class S3) for growing custard apple and are distributed in the central and western part of the microwatershed with major limitations of rooting depth and gravelliness.

Table 7.23 Land suitability criteria for Custard apple

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

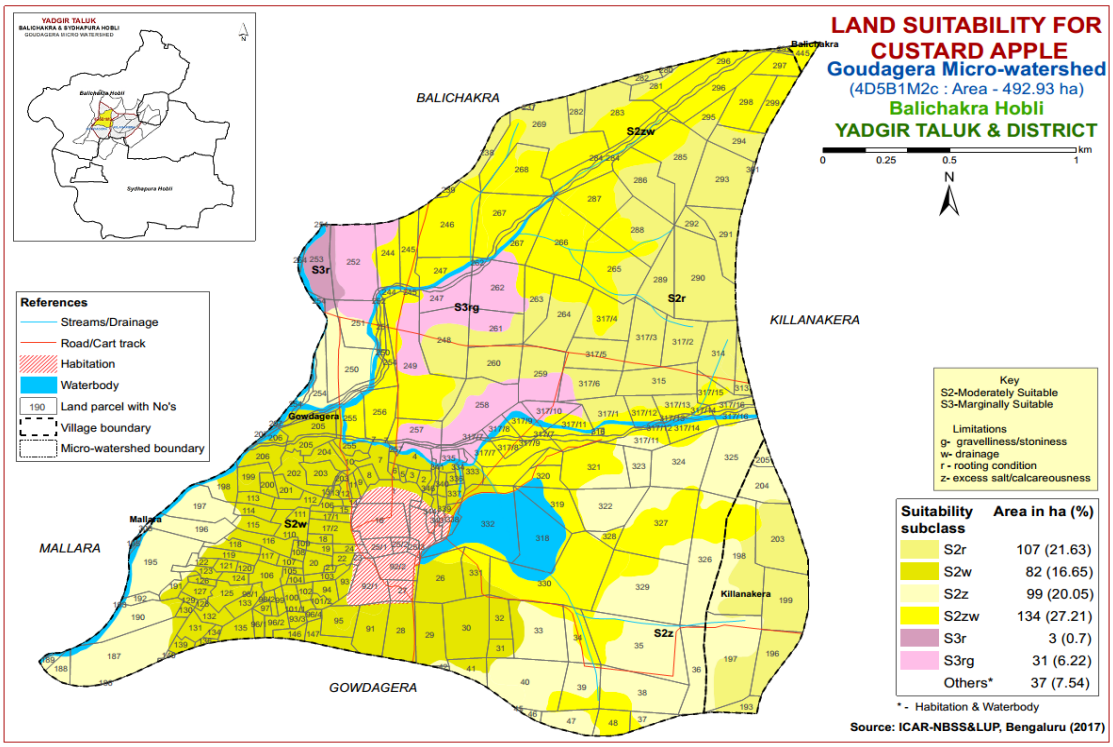


Fig. 7.22 Land Suitability map of Custard Apple

7.23 Land Suitability for Tamarind (*Tamarindus indica*)

Tamarind is the most important spice crop grown in almost all the districts of the state. The crop requirements for growing tamarind (Table 7.24) 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. 7.23.

No highly suitable (Class S1) and marginally suitable (Class S3) lands are available for growing Tamarind in the microwatershed. Maximum area of about 315 ha (64%) is moderately suitable (Class S2) for growing Tamarind and are distributed in all parts of the microwatershed. They have minor limitations of texture and drainage. An area of about 141 ha (28%) is not suitable (Class N1) for growing Tamarind and occur in the northern,

northeastern, central and southeastern part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.24 Land suitability criteria for Tamarind

Crop requirement			Rating			
Soil –site characteristics		Unit	Highly suitable (S1)	Moderately suitable (S2)	Marginally suitable(S3)	Not suitable(N)
Soil aeration	Soil drainage	Class	Well drained	Mod.well drained	Poorly drained	V.Poorly drained
Nutrient availability	Texture	Class	scl, cl,sc, c (red)	sl, c (black)	ls	-
	pH	1:2.5	6.0-7.3	5.0-6.0,7.3-7.8	7.8-8.4	>8.4
Rooting conditions	Soil depth	Cm	>150	100-150	75-100	<50
	Gravel content	% vol.	<15	15-35	35-60	60-80
Erosion	Slope	%	0-3	3-5	5-10	>10

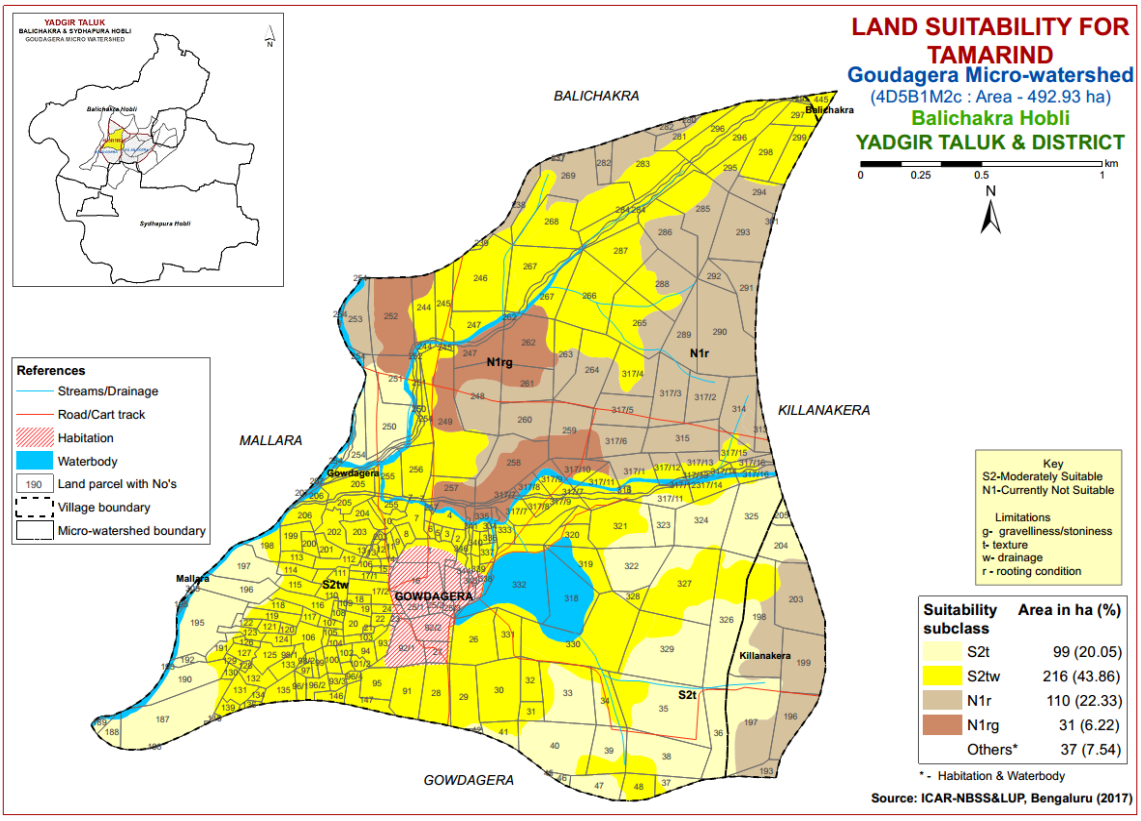


Fig. 7.23 Land Suitability map of Tamarind

7.24 Land Suitability for Mulberry (*Morus nigra*)

Mulberry is an important leaf crop grown for rearing silkworms in about 1.6 lakh ha area in all the districts of the state. The crop requirements for growing mulberry (Table 7.25) 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 7.24.

No highly suitable (Class S1) and moderately suitable (Class S2) lands are available for growing mulberry in the microwatershed. Major area of about 422 ha (86%) is marginally

suitable (Class S3) for growing mulberry and are distributed in all parts of the microwatershed. They have major limitations of texture, drainage and rooting depth. Not suitable lands (Class N1) occupy an area of about 34 ha (7%) and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.25 Crop suitability criteria for Mulberry

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

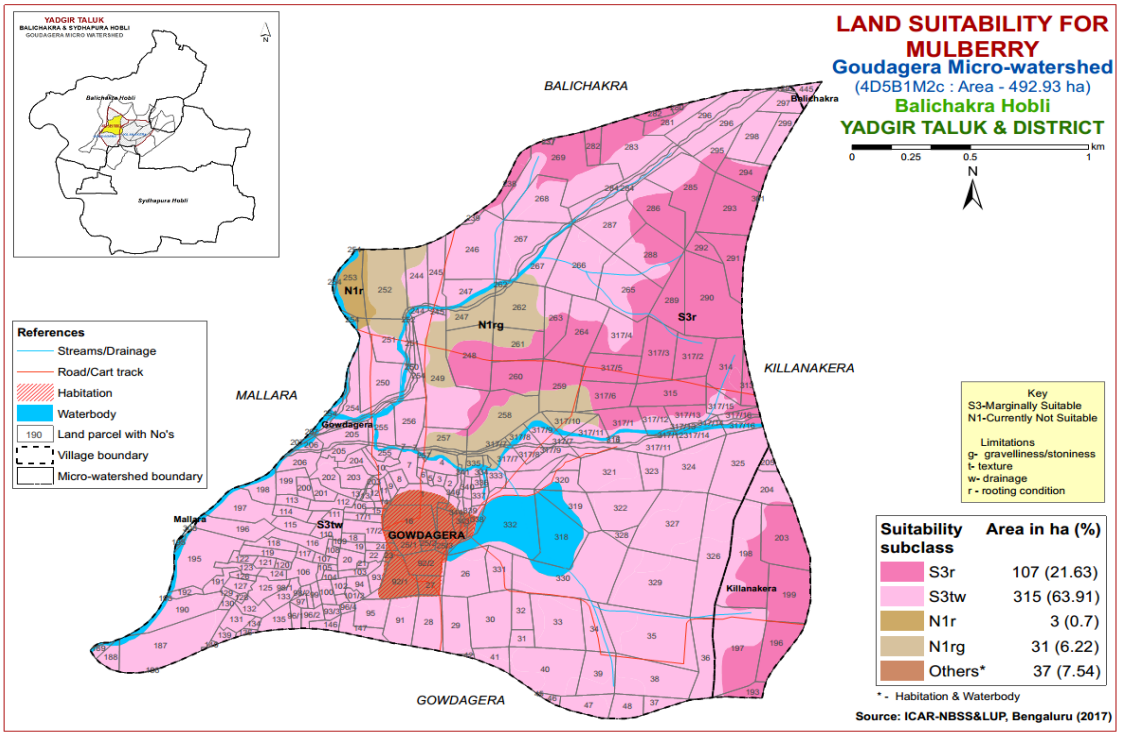


Fig 7.24 Land Suitability map of Mulberry

7.25 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 7.26) 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 7.25.

Table 7.26 Land suitability criteria for Marigold

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

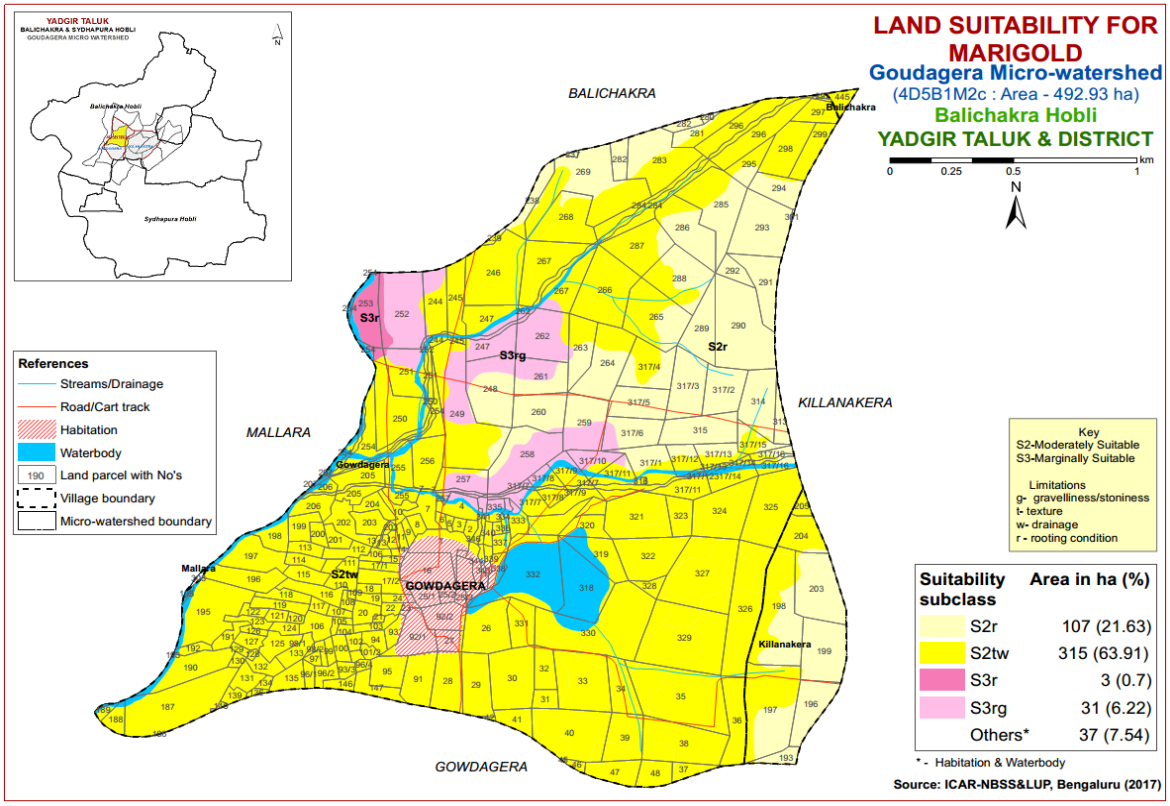


Fig. 7.25 Land Suitability map of Marigold

No highly suitable (Class S1) lands available for growing Marigold in the microwatershed. Maximum area of about 422 ha (86%) is moderately suitable (Class S2) for growing Marigold and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage and rooting depth. Marginally suitable (Class S3) lands for growing Marigold occupy an area of about 34 ha (7%) and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

7.26 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 7.27) for growing chrysanthemum were matched with the soil-site characteristics (Table 7.1) and a land suitability map for growing chrysanthemum was generated. The area extent and their geographical distribution of different suitability subclasses in the microwatershed are given in Figure 7.26.

No highly suitable (Class S1) lands are available for growing Chrysanthemum in the microwatershed. Maximum area of about 422 ha (86%) is moderately suitable (Class S2) for growing Chrysanthemum and are distributed in the major part of the microwatershed. They have minor limitations of texture, drainage and rooting depth. Marginally suitable (Class S3) lands for growing Chrysanthemum occupy an area of about 34 ha (7%) and are distributed in the central and western part of the microwatershed with severe limitations of rooting depth and gravelliness.

Table 7.27 Land suitability criteria for Chrysanthemum

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

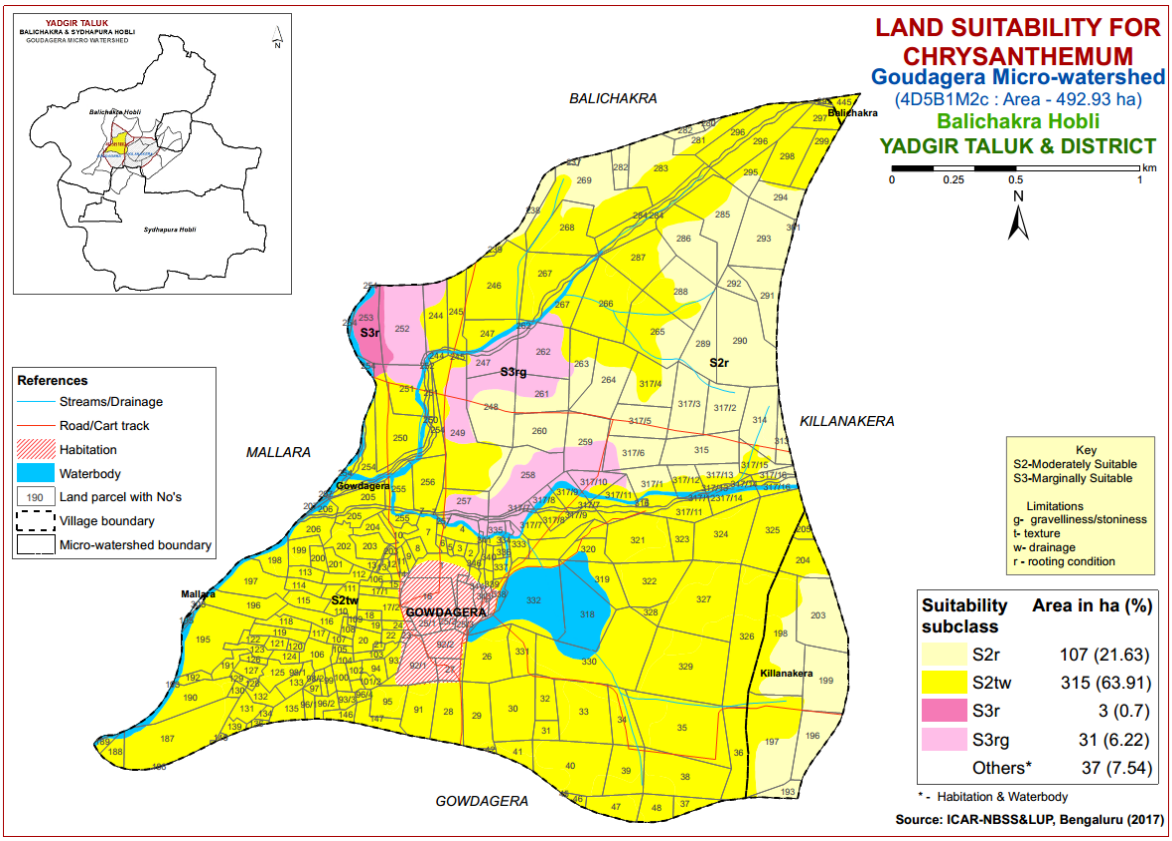


Fig. 7.26 Land Suitability map of Chrysanthemum

7.27 Land Management Units (LMU)

The 16 soil map units identified in Goudagera microwatershed have been grouped into 5 Land Management Units (LMU) 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. 7.28) has been generated. These Land Management Units are expected to behave similarly for a given level of management.

The map units that have been grouped into 5 Land Use Classes along with brief description of soil and site characteristics are given below.

LMU NO.	Soil map units	Soil and site characteristics
1	102.TMKbB3,104.TMKiB2 140.TMKcB2,142.SGRhB2 143.SGRiB2	Very deep (>150 cm), sandy clay to clay soils, 1-3% slope, non gravelly (<15%), moderate to severe erosion.
2	133.MDRiB2,52.ANRbB3 53.ANRhB2,55.ANRiB2 87.KDRiB2	Deep to very deep (100 to >150 cm), sandy clay to sandy clay loam soils, 1-3 % slopes, non gravelly (<15%), moderate to severe erosion.
3	20.JNKcB2	Moderately shallow (50-75 cm), black sandy clay loam soils, 1-3 % slopes, non gravelly (15-35%), moderate erosion.
4	27.YLRbB2 31.YLRiB2	Moderately shallow (50-75 cm), red sandy clay soils, 1-3 % slopes, non gravelly (15-35%), moderate erosion.
5	107.DSBhB2 108.DSBiB2 121.DSBcB2	Shallow (25-50 cm), sandy clay to sandy clay loam soils, 1-3 % slopes, non gravelly (<15%), moderate erosion.

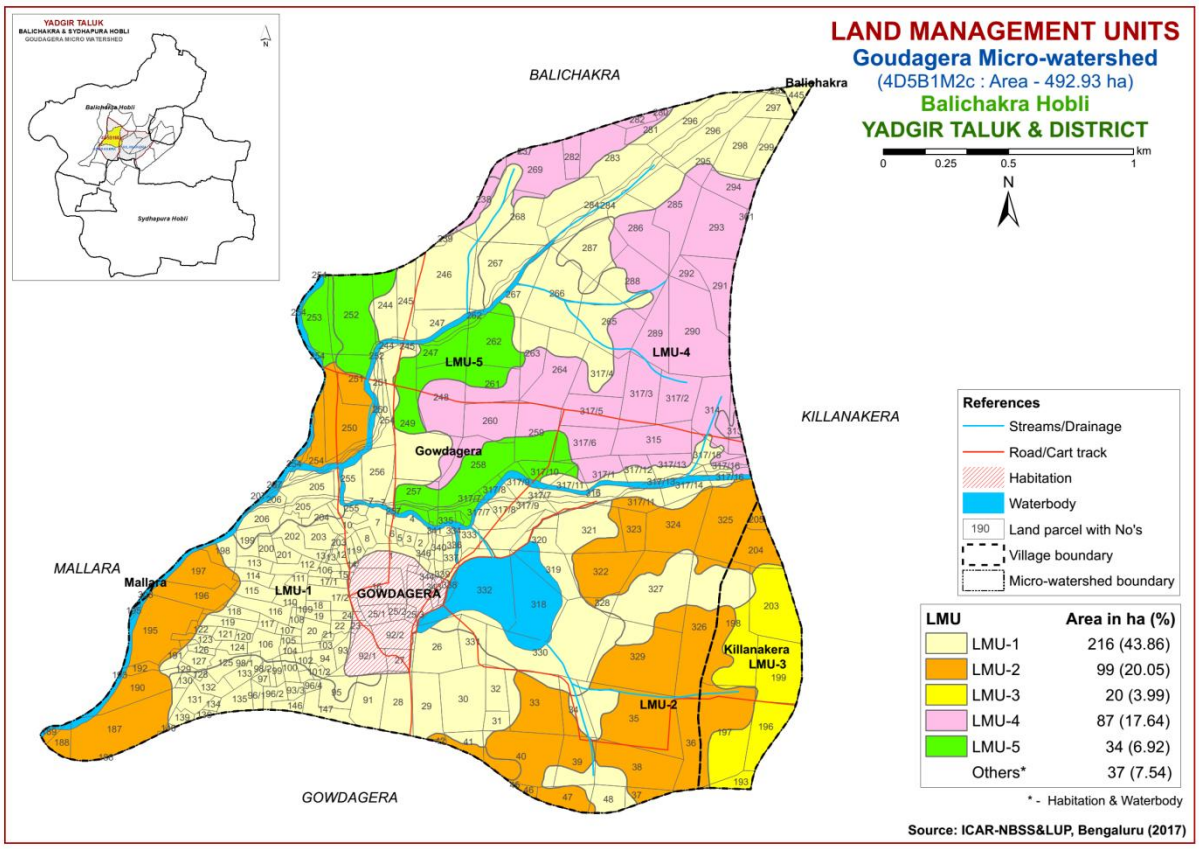


Fig. 7.27 Land Management Units Map- Goudagera Microwatershed

7.28 Proposed Crop Plan for Goudagera Microwatershed

After assessing the land suitability for the 26 crops, the proposed crop plan has been prepared for the 5 identified LMUs by considering only the highly (Class S1) and moderately (Class S2) suitable lands for each of the 26 crops. The resultant proposed crop plan is presented below in Table 7.28.

Table 7.28 Proposed Crop Plan for Goudagera Microwatershed

Proposed LMU	Soil Map Units	Survey Number	Soil Characteristics	Field Crops	Horticulture Crops	Suitable Interventions
1	102.TMKbB3 104.TMKiB2 140.TMKcB2 142.SGRhB2 143.SGRiB2	**Gowdagera:** 2,3,4,5,6,7,8,9,,10,11,12,13,14,15,17/1,17/2, 18,19,20,21,22,24,26,28,29,30, 31,32,34,41, 48,100,101/1,101/2,102,103,104,105,106, 107,108,109,110,111,112,113,114,115,116, 117,118,119,120,121,122,123,124,125,126, 127,128,129,130,131,132,133,134,135,136, 139,146,147,191,198,199,200,201,202,203, 204,205,206,239,244,245,246,249,255,256, 265,266,267,268,281,283,284,287,295,296, 297,298,299,316,317/11,317/12,317/14, 317/15,317/7,317/8,317/9,319,320,321,327, 328,330,331,333,334,336,337,338,339,340, 346,91,93,93/3,94,95,96/1,96/2,96/4,97, 98/1, 98/2,99	Very deep (>150 cm), sandy clay to clay soils, 1-3% slope, non gravelly (<15%), moderate to severe erosion.	Sunflower, Cotton, Bengal gram, Bajra	**Fruit crops:** Lime, Musambi, Amla, Jamun **Vegetables:** Drumstick, Chilli, Coriander **Flowers:**Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, suitable soil and water conservation practices
2	133.MDRiB2 52.ANRbB3 53.ANRhB2 55.ANRiB2 87.KDRiB2	**Gowdagera:** 33,35,36,37,38,39,40,42,45,46,47,140,186, 187,188,189,190,192,195,196,197,250,251, 254,322,323,324,325,326, 329, **Kilankera:** 197,204,205	Deep to very deep (100 to >150 cm), sandy clay to sandy clay loam soils, 1-3 % slopes, non gravelly (<15%), moderate to severe erosion.	Sunflower, Sorghum, Cotton, Bengal gram, Safflower, Linseed, Bajra	**Fruit crops:** Pomegranate, Lime, Musambi,Jamun, Amla, Custardapple, Tamarind **Vegetables:** Drumstick, Chilli, Coriander **Flowers:** Marigold, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, Mulching, suitable soil and water conservation practices

3	20.JNKcB2	**Kilankera:** 193,196,198,199,203	Moderately shallow (50-75 cm), black sandy clay loam soils, 1-3 % slopes, non gravelly (15-35%), moderate erosion.	Bengal gram, Sorghum, Bajra, Safflower, Linseed, Coriander	**Fruit crops:** Amla, Custard apple **Flowers:** Marigold, Jasmine, Chrysanthemum	Application of FYM, Biofertilizers and micronutrients, drip irrigation, mulching, suitable soil and water conservation practices
4	27.YLRbB2 31.YLRiB2	**Gowdagera:** 237,238,248,259,260,261,263,264,269,280, 282,285,286,288,289,290,291,292,293,294, 301,313,314,315,317/1,317/13,317/16, 317/2,317/3,317/4, 317/5,317/6	Moderately shallow (50-75 cm), red sandy clay soils, 1-3 % slopes, non gravelly (15-35%), moderate erosion.	Maize, Sorghum, Groundnut, Bajra, Red gram	**Fruit crops:** Amla, Custard apple **Vegetables:** Tomato, Chilli **Flowers:** Marigold Chrysanthemum	Drip irrigation, mulching, suitable soil and water conservation practices (Crescent Bunding with Catch Pit etc)
5	107.DSBhB2 108.DSBiB2 121.DSBcB2	**Gowdagera:** 247,252,253,257,258,262,317/10,335,341	Shallow (25-50 cm), sandy clay to sandy clay loam soils, 1-3 % slopes, non gravelly (<15%), moderate erosion.	Bengal gram, Horse gram, Linseed, Safflower, Coriander	**Agri-Silvi-Pasture:** Hybrid Napier, *Styloxanthes hamata*, Glyricidia, *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 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 Goudagera Microwatershed

- The soil phases identified in the microwatershed belonged to the soil series of TMK 134 ha (27%), YLR 87 ha (18%), SGR 82 ha (17%), ANR 48 ha (10%), DSB 34 ha (7%), MDR 30 ha (6%), KDR 22 ha (4%) and JNK 20 ha (4%).
- As per land capability classification, entire area of the microwatershed falls under arable land category (Class II & III). The major limitations identified in the arable lands were soil, erosion and drainage.
- On the basis of soil reaction, about 33 ha (7%) is slightly acid (pH 6.0-6.5), 231 ha (47%) is neutral (6.5-7.3), 103 ha (21%) is slightly alkaline (pH 7.3-7.8), 58 ha (12%) is moderately

alkaline (pH 7.8-8.4), 29 ha (6%) is strongly alkaline (pH 8.4-9.0) and 3 ha (1%) is very strongly alkaline (>9.0) in reaction.

Soil Health Management

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

Acid soils

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

Liming materials:

1. $CaCO_3$ (Calcium Carbonate)
2. Dolomite [Ca Mg $(Co_3)_2$]
3. Quick lime (Cao)
4. Slaked lime [Ca $(OH)_2$]

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

Alkaline soils

(Slightly alkaline to moderately alkaline soils)

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

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.

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

Soil Degradation

Soil erosion is one of the major factor affecting the soil health in the microwatershed. An area of about 450 ha is suffering from moderate erosion and 6 ha 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 soil, erosion and drainage are the major constraints in Goudagera microwatershed.

- **Organic Carbon:** The OC content (an index of available Nitrogen) is high (>0.75%) in 174 ha (35%), medium (0.5-0.75%) in about 229 ha (46%) and low in an area of 53 ha (11%). The areas that are medium and low in OC needs to be further improved by applying farm yard 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 282 ha area where OC is low to medium (<0.5 - 0.75%). For example, for rainfed maize, recommended level is 50 kg N per ha and an additional 12 kg /ha needs to be applied for all the crops grown in these plots.
- **Available Phosphorus**: Available Phosphorus is low (<23 kg/ha) in an area of 26 ha (5%), medium (23-57 kg/ha) in an area of 296 ha (60%) and high (>57 kg/ha) in an area of 134 ha (27%) of the microwatershed. For all the crops, 25% additional P needs to be applied where available P is low and medium.
- **Available Potassium:** Available potassium is low (<145 kg/ha) in an area of 53 ha (11%), medium (145-337 kg/ha) in maximum area of 365 ha (74%) of the microwatershed and an area of about 37 ha (8%) is high (>337 kg/ha) in available potassium. All the plots, where available potassium is low and medium, for all the crops, additional 25 % potassium may be applied.
- **Available Sulphur:** Available sulphur is a very critical nutrient for oilseed crops, it is low in 62 ha (13%), medium in 386 ha (78%) and high in 7 ha (1%). Low and medium areas need to be applied with magnesium sulphate or gypsum or Factamphos (p) fertilizer (13% sulphur) for 2-3 years for the deficiency to be corrected.
- **Available Boron:** An area of 174 ha (35%) is low, 274 ha (56%) is medium and 8 ha (2%) is high. For areas that are low and medium, application of sodium borate @ 10 kg/ha as soil application or 0.2 % borax as foliar spray is recommended.
- **Available Iron:** An area of about 27 ha (5%) is deficient and 429 ha (87%) in the microwatershed is sufficient in available iron. To manage iron deficiency, iron sulphate @ 25 kg/ha needs to be applied for 2 to 3 years in the areas where it is deficient.
- **Available Zinc:** Almost entire area of about 456 ha (92%) of the microwatershed is deficient in available zinc content. Application of zinc sulphate @ 25 kg/ha is to be recommended for these areas.
- **Soil Alkalinity:** The microwatershed has 193 ha (94%) area with soils that are slightly to very strongly alkaline. These areas need application of gypsum and wherever calcium is in excess, iron pyrites and element sulphur can be recommended. Management practices like treating repeatedly with good quality water to drain out the excess salts and provision of subsurface drainage and growing of salt tolerant crops like Casuarina, Acasia, Neem, Ber etc, are recommended.
- **Land Suitability for various crops:** Areas that are highly, moderately, marginally suitable and currently not suitable for growing various crops are indicated. Along with the

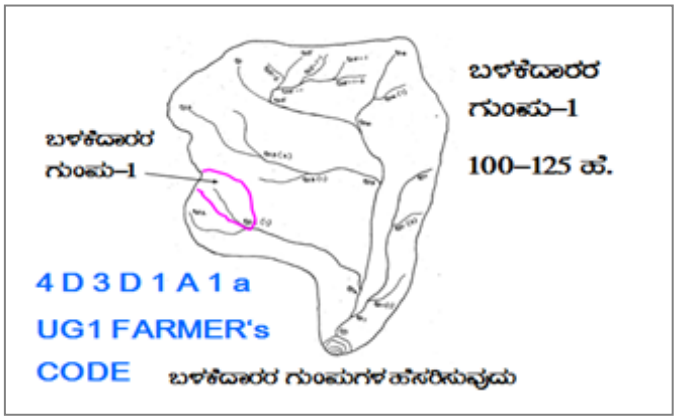
suitability, various constraints that are limiting the productivity are also indicated. For example, in case of cotton, gravel content, rooting depth and salinity/alkalinity are the major constraints in various plots. With suitable management interventions, the productivity can be enhanced. In order to increase 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 Goudagera 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.

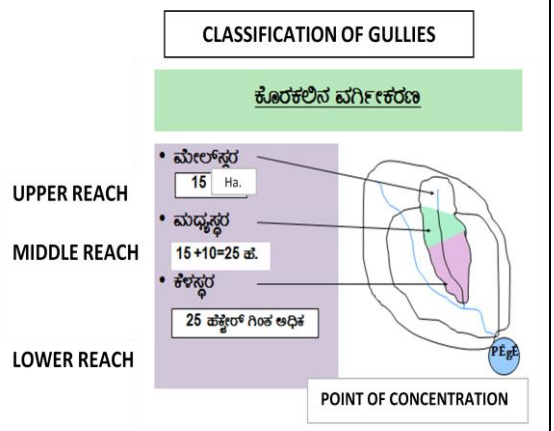
- Naming of user groups and farmers
- Identification of arable and non arable lands
- Identification of drainage lines and gullies
- Identification of non treatable areas
- Identification of priority areas in the arable lands
- Treatment plan for arable lands
- Location of water harvesting and recharge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

9.1 Treatment Plan

The treatment plan recommended for arable lands is briefly described below

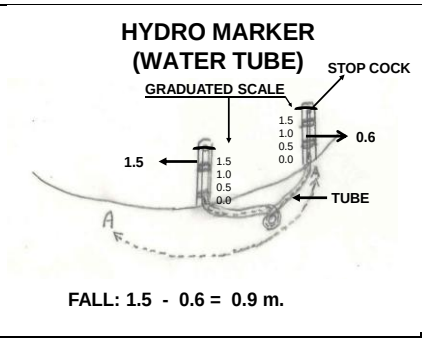
9.1.1 Arable Land Treatment

A. BUNDING

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

Measurement of Land Slope

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



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

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

Note: (i) The above intervals are maximum.

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

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

Section of the Bund

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

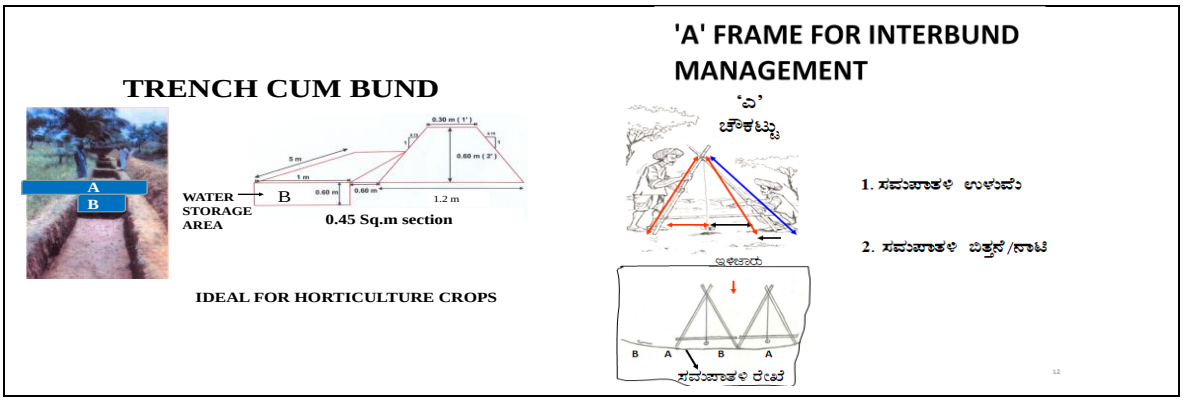
Recommended Bund Section

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

Formation of Trench cum Bund

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

Details of Borrow Pit dimensions are given below:



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

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

B. 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 are formed in the field.

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 (Fig. 9.1).

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 Levelling Survey using Dumpy Level / Total Station has to be carried out to arrive at the site-specific designs as shown in the Manual.

f) The location of ground water recharge structures are decided by examining the lineaments and fracture zones from geological maps.

g) Rainfall intensity data of the nearest Rain Gauge Station is considered for Hydrologic Designs.

h) Silt load to the Storage/Recharge Structures is reduced by providing vegetative, boulder and earthern checks in the natural water course. Location and design details are given in the Manual.

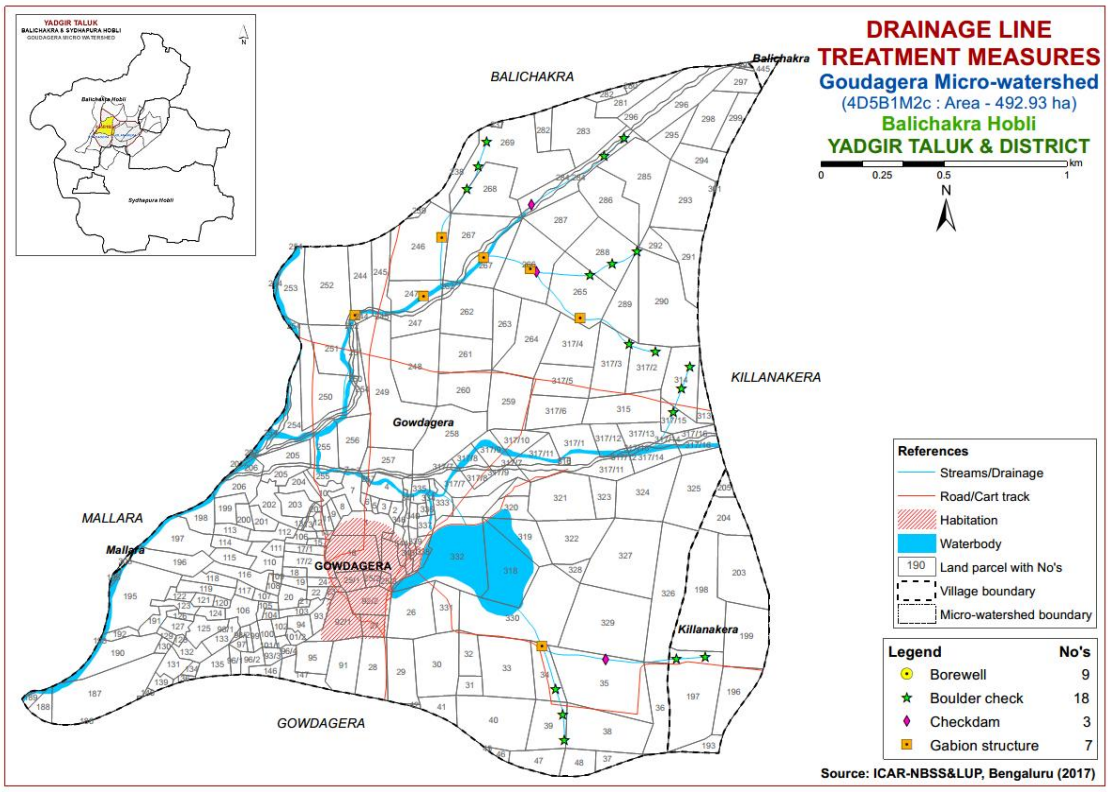


Fig. 9.1 Drainage line treatment measures map of Goudagera Microwatershed.

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. 9.2) showing soil and water conservation plan with different kinds of structures recommended has been prepared which shows the spatial distribution and extent of area. An area of about 267 ha (54%) needs Graded Bunding, 118 ha (24%) requires Trench cum Bunding and 71 ha (14%) requires strengthening of existing bunds.

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.

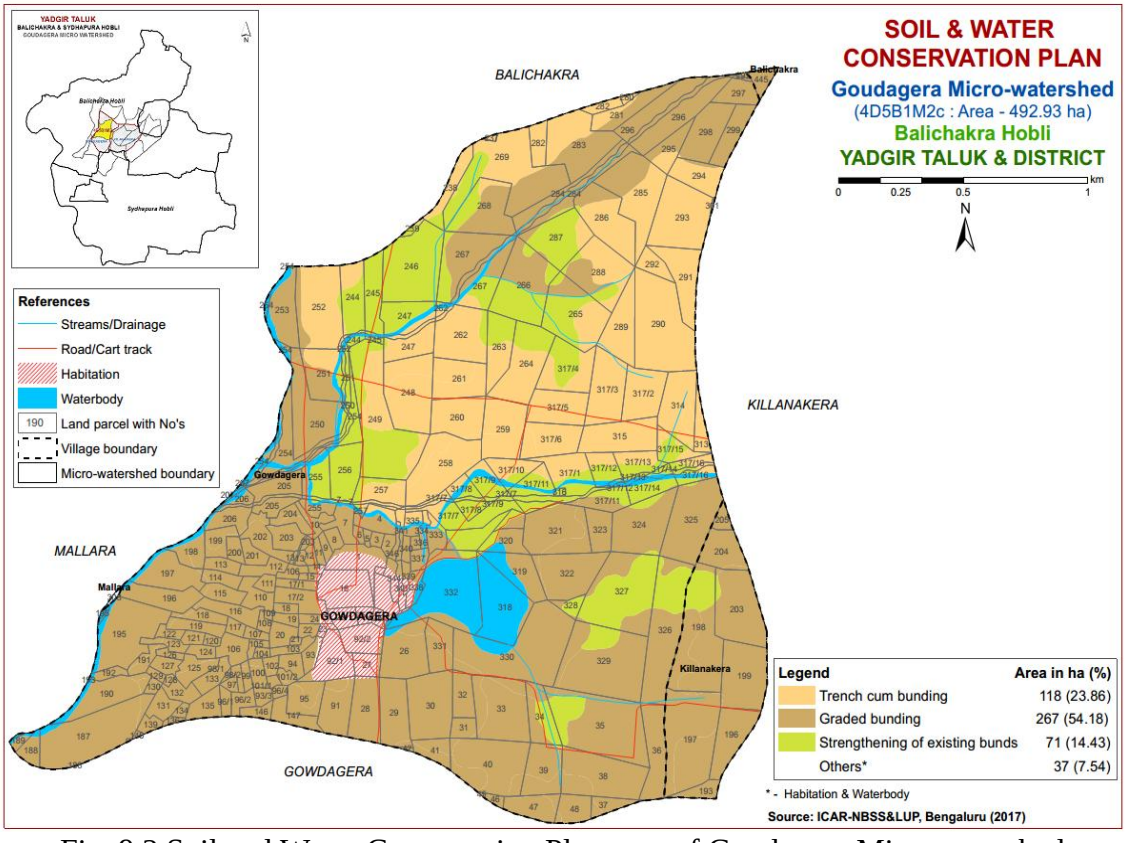


Fig. 9.2 Soil and Water Conservation Plan map of Goudagera Microwatershed

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

Goudagera Microwatershed

Soil Phase Information

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Balichakra	445	0.72	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Not Available (NA)	Not Available	IIws	Graded bunding
Gowdagera	1	2.16	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	2	0.35	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	3	0.28	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	4	1.45	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	5	0.18	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	6	0.25	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	7	1.21	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	8	0.48	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	9	0.34	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	10	0.7	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Not Available (NA)	Not Available	IIws	Graded bunding
Gowdagera	11	0.3	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	12	0.31	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	13	0.28	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	14	0.21	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	15	0.25	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	16	2.98	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	17/1	0.59	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	17/2	1.49	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	18	0.39	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	19	0.44	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	20	0.87	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	21	0.13	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	22	0.41	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	23	0.23	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	24	0.48	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	25/1	0.79	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	25/2	0.42	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	25/3	0.29	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	26	3.73	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	27	0.94	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	28	2.85	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	1 Bore Well	IIws	Graded bunding
Gowdagera	29	3.02	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	30	4.44	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	31	0.81	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	32	1.48	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	33	5.16	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	34	2.27	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	35	8.46	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	36	3.02	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	37	0.9	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	38	5.25	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	39	2.86	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	40	5.84	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	41	1.23	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	42	0.07	ANRbB3	LMU-2	Deep (100-150 cm)	Loamy sand	Very gently sloping (1-3%)	Severe	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIIes	Graded bunding
Gowdagera	45	0.02	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	46	0.28	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	47	1.85	ANRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	48	1.44	TMKbB3	LMU-1	Very deep (>150 cm)	Loamy sand	Very gently	Severe	Non gravelly	Very high	Groundnut (Gn)	Not Available	IIIws	Graded

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
							sloping (1-3%)		(<15%)	(>200 mm/m)				bunding
Gowdagera	91	2.59	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	92/1	2.44	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	92/2	1.77	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	93	0.66	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	93/3	0.45	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	94	0.71	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	95	1.76	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	96/1	0.47	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	96/2	0.7	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy+Cotton (Pd+Ct)	Not Available	IIws	Graded bunding
Gowdagera	96/4	0.27	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	97	0.3	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	98/1	0.09	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	98/2	0.33	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	99	0.38	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	100	0.66	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	101/1	0.21	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	101/2	0.36	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	102	0.42	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	103	0.63	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	104	0.26	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	105	0.35	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	106	1.69	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	107	0.39	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	108	0.33	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	109	0.11	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently	Moderate	Non gravelly	Very high	Paddy (Pd)	Not Available	IIws	Graded

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
							sloping (1-3%)		(<15%)	(>200 mm/m)				bunding
Gowdagera	110	1.19	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	111	0.47	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	112	0.91	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	113	0.73	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	114	0.8	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	115	1.01	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	116	1.42	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	117	0.42	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	118	0.86	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	119	1.04	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	120	0.27	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	121	0.44	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	122	0.44	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	123	0.63	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	124	0.54	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	125	1.25	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	126	0.3	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	127	0.66	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	128	0.14	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	129	0.24	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	130	0.3	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	131	1.01	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	132	0.88	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	133	1	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently	Moderate	Non gravelly	Very high	Paddy (Pd)	Not Available	IIws	Graded

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
						loam	sloping (1-3%)		(<15%)	(>200 mm/m)				bunding
Gowdagera	134	0.26	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	135	1.21	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	Not Available	IIws	Graded bunding
Gowdagera	136	0.19	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	139	0.49	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	140	0.1	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIe	Graded bunding
Gowdagera	146	0.59	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	147	1.22	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	186	0.02	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIe	Graded bunding
Gowdagera	187	7.09	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIe	Graded bunding
Gowdagera	188	0.84	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIe	Graded bunding
Gowdagera	189	0.32	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Not Available (NA)	Not Available	IIe	Graded bunding
Gowdagera	190	3.26	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIe	Graded bunding
Gowdagera	191	0.77	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	192	0.51	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIe	Graded bunding
Gowdagera	193	0.01	Waterbody	Others	Others	Others	Others	Others	Others	Others	Not Available (NA)	Not Available	Others	Others
Gowdagera	195	5.48	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIe	Graded bunding
Gowdagera	196	2.38	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Scrub land (Sl)	Not Available	IIe	Graded bunding
Gowdagera	197	2.9	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIe	Graded bunding
Gowdagera	198	1.42	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	199	1.16	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	200	0.59	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	201	0.74	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Gowdagera	202	1.63	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	203	1.34	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	204	0.95	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	205	2.3	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	206	1.78	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	207	0.12	Waterbody	Others	Others	Others	Others	Others	Others	Others	Redgram (Rg)	Not Available	Others	Others
Gowdagera	237	0.09	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	238	1.55	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	239	0.21	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	244	2.77	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	245	2.29	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	246	6.13	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	247	4.21	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Cotton (Ct)	1 Bore Well	IVes	Trench cum bunding
Gowdagera	248	5.17	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	249	8.61	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	1 Bore Well	IIws	Field bunds
Gowdagera	250	4.69	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIe	Graded bunding
Gowdagera	251	3.31	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIe	Graded bunding
Gowdagera	252	5.73	DSBiB2	LMU-5	Shallow (25-50 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Gowdagera	253	2.9	DSBcB2	LMU-5	Shallow (25-50 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Barren land (Bl)	Not Available	IIIes	Graded bunding
Gowdagera	254	4.53	MDRiB2	LMU-2	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Barren land (Bl)	Not Available	IIe	Graded bunding
Gowdagera	255	2.45	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Field bunds
Gowdagera	256	2.53	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Field bunds
Gowdagera	257	2.13	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Cotton (Ct)	Not Available	IVes	Trench cum bunding
Gowdagera	258	5.14	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Redgram (Rg)	Not Available	IVes	Trench cum bunding
Gowdagera	259	3.72	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	260	3.13	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	261	3.11	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	262	4.32	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Redgram (Rg)	2 Bore Well	IVes	Trench cum bunding
Gowdagera	263	2.6	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	264	4.53	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	265	5.18	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	266	5.57	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	1 Check Dam	IIws	Field bunds
Gowdagera	267	6.51	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	1 Bore Well	IIws	Graded bunding
Gowdagera	268	4.04	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	269	8.2	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	280	0.17	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	281	1.93	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	282	1.63	YLRiB2	LMU-4	Moderately shallow (50-75 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	283	5.08	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	284	2.59	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	Not Available	IIws	Graded bunding
Gowdagera	285	5.37	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	286	4.18	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	287	3.8	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Field bunds
Gowdagera	288	4.57	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	289	3.02	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	290	7.62	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	291	2.98	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	292	0.98	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	293	5.21	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	294	2.05	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	295	1.55	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	296	5.35	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	297	1.45	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	298	3.01	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	299	1.82	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Graded bunding
Gowdagera	301	0.05	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	313	0.96	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	314	3.56	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	315	3.6	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	316	0.13	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Not Available (NA)	Not Available	IIws	Field bunds
Gowdagera	317/1	2.62	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	No Crop (Nc)	Not Available	IIes	Trench cum bunding
Gowdagera	317/10	1.53	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	No Crop (Nc)	Not Available	IVes	Trench cum bunding
Gowdagera	317/11	3.4	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	Not Available	IIws	Field bunds
Gowdagera	317/12	1.43	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	317/13	1.61	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	317/14	1.49	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	Not Available	IIws	Field bunds
Gowdagera	317/15	1.37	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Field bunds
Gowdagera	317/16	1.33	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	317/2	2.96	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Cotton (Ct)	Not Available	IIes	Trench cum bunding
Gowdagera	317/3	3.73	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	1 Bore Well	IIes	Trench cum bunding
Gowdagera	317/4	3.56	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	317/5	2.95	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Trench cum bunding
Gowdagera	317/6	2.87	YLRbB2	LMU-4	Moderately shallow (50-75 cm)	Loamy sand	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	1 Bore Well	IIes	Trench cum bunding
Gowdagera	317/7	2.65	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	1 Bore Well	IIws	Field bunds
Gowdagera	317/8	1.43	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	No Crop (Nc)	Not Available	IIws	Field bunds

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	317/9	1.37	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Not Available (NA)	Not Available	IIws	Field bunds
Gowdagera	318_TANK	4.78	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Gowdagera	319_TANK	2.52	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	320	1.43	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	321	4.62	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	322	4.05	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	323	1.53	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Gowdagera	324	4.61	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	325	5.33	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	326	6.75	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	327	7.55	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Field bunds
Gowdagera	328	0.61	TMKcB2	LMU-1	Very deep (>150 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIws	Field bunds
Gowdagera	329	8.61	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Cotton (Ct)	Not Available	IIes	Graded bunding
Gowdagera	330_TANK	9.22	TMKiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram+Cotton (Rg+Ct)	Not Available	IIws	Graded bunding
Gowdagera	331	1.99	SGRhB2	LMU-1	Very deep (>150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Redgram (Rg)	Not Available	IIws	Graded bunding
Gowdagera	332_TANK	7.31	Waterbody	Others	Others	Others	Others	Others	Others	Others	Waterbody	Not Available	Others	Others
Gowdagera	333	0.86	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	334	0.4	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	335	0.63	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Paddy (Pd)	Not Available	IVes	Trench cum bunding
Gowdagera	336	0.2	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	337	0.55	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	338	0.74	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Habitation	Not Available	IIws	Graded bunding
Gowdagera	339	0.34	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Habitation	Not Available	IIws	Graded bunding
Gowdagera	340	0.33	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Paddy (Pd)	Not Available	IIws	Graded bunding
Gowdagera	341	0.41	DSBhB2	LMU-5	Shallow (25-50 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very low (<50 mm/m)	Groundnut (Gn)	Not Available	IVes	Trench cum bunding

Village	Sy No.	Area (ha)	Soil Phase	LMU	Soil Depth	Surface Soil Texture	Slope	Soil Erosion	Soil Gravelliness	Available Water Capacity	Current Land Use	WELLS	Land Capability	Conservation Plan
Gowdagera	343	0.42	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	344	0.61	Habitation	Others	Others	Others	Others	Others	Others	Others	Habitation	Not Available	Others	Others
Gowdagera	346	0.29	SGRiB2	LMU-1	Very deep (>150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIws	Graded bunding
Kilanakera	193	0.84	JNKcB2	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Groundnut+No crop (Gn+Nc)	Not Available	IIes	Graded bunding
Kilanakera	196	2.95	JNKcB2	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Groundnut+No crop (Gn+Nc)	Not Available	IIes	Graded bunding
Kilanakera	197	7.57	ANRhB2	LMU-2	Deep (100-150 cm)	Sandy clay loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Groundnut (Gn)	Not Available	IIes	Graded bunding
Kilanakera	198	7.38	JNKcB2	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Kilanakera	199	4.47	JNKcB2	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Kilanakera	203	4.98	JNKcB2	LMU-3	Moderately shallow (50-75 cm)	Sandy loam	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Low (51-100 mm/m)	Redgram (Rg)	Not Available	IIes	Graded bunding
Kilanakera	204	2.28	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Jowar (Jw)	Not Available	IIes	Graded bunding
Kilanakera	205	0.54	KDRiB2	LMU-2	Deep (100-150 cm)	Sandy clay	Very gently sloping (1-3%)	Moderate	Non gravelly (<15%)	Very high (>200 mm/m)	Jowar (Jw)	Not Available	IIes	Graded bunding
Mallara	308	0.13	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody

Appendix II

Goudagera Microwatershed

Soil Fertility Information

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Balichakra	445	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	2	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	3	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	4	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	5	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	6	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	7	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	8	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	9	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	10	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	11	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	12	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	13	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	14	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	15	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	16	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	17/1	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	17/2	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	18	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	19	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	20	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	21	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	22	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	23	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	24	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	25/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	25/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	25/3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	26	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	27	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	28	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	29	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	30	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	31	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	32	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	33	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	34	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	35	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	36	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	37	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	38	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	39	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	40	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	41	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	42	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 (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	45	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	46	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	47	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	48	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	91	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	92/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	92/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	93	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	93/3	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	94	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	95	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	96/1	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	96/2	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	96/4	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	97	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	98/1	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	98/2	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	99	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	100	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	101/1	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	101/2	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	102	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	103	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	104	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	105	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	106	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	107	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	108	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	109	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	110	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	111	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	112	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	113	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	114	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	115	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	116	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	117	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	118	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	119	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	120	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	121	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	122	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	123	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	124	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	125	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	126	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	127	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	128	Slightly acid (pH 6.0 –	Non saline (<2	Medium (0.5 -	Medium (23 - 57	Medium (145 -	Medium (10 -	Medium (0.5 -	Sufficient (>	Sufficient (>	Sufficient (>	Deficient (<

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
		6.5)	dsm)	0.75 %)	kg/ha)	337 kg/ha)	20 ppm)	1.0 ppm)	4.5 ppm)	1.0 ppm)	0.2ppm)	0.6 ppm)
Gowdagera	129	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	130	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	131	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	132	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	133	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	134	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	135	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	136	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	139	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	140	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	146	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	147	Slightly acid (pH 6.0 – 6.5)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	186	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	187	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	188	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	189	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	190	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	191	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	192	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	193	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	195	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	196	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	197	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	198	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	199	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	200	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	201	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	202	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	203	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	204	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	205	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	206	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	207	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	237	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	238	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	239	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	244	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	245	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	246	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	247	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	248	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	249	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	250	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	251	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	252	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	253	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	254	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	255	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	256	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	257	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	258	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	259	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	260	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	261	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	262	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	263	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	264	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	265	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	266	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	267	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	268	Strongly alkaline (pH 8.4 – 9.0)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Low (< 23 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	269	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	High (> 1.0 ppm)	Deficient (< 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	280	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	281	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	282	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	283	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	284	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	285	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	286	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	287	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	288	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	289	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	290	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	291	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	292	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	293	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	294	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	295	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	296	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	297	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	298	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	299	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	301	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	313	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	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 (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	314	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	315	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	316	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/1	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/10	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/11	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/12	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/13	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/14	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	317/15	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/16	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/2	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/3	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Low (<10 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/4	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/5	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/6	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/7	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/8	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	317/9	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	318_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	319_TANK	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	320	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	321	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	322	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	323	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	Low (< 0.5 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	324	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	325	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	326	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	327	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	328	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	329	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	330_TANK	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)

Village	Survey Number	Soil Reaction	Salinity (EC)	Organic Carbon	Available Phosphorus	Available Potassium	Available Sulphur	Available Boron	Available Iron	Available Manganese	Available Copper	Available Zinc
Gowdagera	331	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	332_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	333	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	334	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	335	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	336	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	337	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	338	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	339	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	340	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	341	Moderately alkaline (pH 7.8 – 8.4)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Gowdagera	343	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	344	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	346	Slightly alkaline (pH 7.3 – 7.8)	Non saline (<2 dsm)	High (>0.75 %)	Medium (23 - 57 kg/ha)	High (> 337 kg/ha)	Medium (10 - 20 ppm)	Low (< 0.5 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	193	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Low (< 145 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	196	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	197	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	Medium (23 - 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	198	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	199	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	203	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	204	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	High (> 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Kilanakera	205	Neutral (pH 6.5 – 7.3)	Non saline (<2 dsm)	Medium (0.5 - 0.75 %)	High (> 57 kg/ha)	Medium (145 - 337 kg/ha)	Medium (10 - 20 ppm)	Medium (0.5 - 1.0 ppm)	Sufficient (> 4.5 ppm)	Sufficient (> 1.0 ppm)	Sufficient (> 0.2ppm)	Deficient (< 0.6 ppm)
Mallara	308	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody	waterbody

Appendix III

Goudagera Microwatershed

Suitability Information

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Balichakra	445	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	2	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	3	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	4	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	5	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	6	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	7	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	8	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	9	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	10	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	11	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	12	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	13	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	14	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	15	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	16	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	17/1	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	17/2	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	18	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	19	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	20	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	21	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	22	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	23	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	24	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	25/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	25/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	25/3	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	26	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	27	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	28	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	29	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	30	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	31	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	32	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	33	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	34	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	35	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	36	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	37	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	38	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	39	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	40	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	41	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	42	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	45	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	46	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	47	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	48	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	91	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	92/1	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	92/2	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	93	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	93/3	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	94	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	95	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	96/1	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	96/2	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	96/4	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	97	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	98/1	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	98/2	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	99	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	100	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	101/1	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	101/2	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	102	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	103	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	104	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	105	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	106	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	107	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	108	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	109	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	110	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	111	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	112	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	113	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	114	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	115	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	116	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	117	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	118	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	119	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	120	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	121	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	122	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	123	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	124	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	125	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	126	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	127	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	128	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	129	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	130	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	131	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	132	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	133	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	134	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	135	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	136	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	139	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	140	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	146	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	147	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	186	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	187	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	188	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	189	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	190	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	191	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	192	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	193	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	195	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	196	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	197	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	198	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	199	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	200	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	201	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	202	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	203	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	204	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	205	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	206	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	207	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	237	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	238	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	239	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	244	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	245	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	246	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	247	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	248	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	249	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	250	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	251	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	252	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	253	N1r	S3r	N1r	S3r	N1r	S3r	N1r	N1r	S3rt	N1r	S3r	S3r	N1r	S3r	N1rt	N1r	N1r	S3rt	S3r	S3r	S3r	S3r	N1r	S3r	N1r	N1r
Gowdagera	254	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	255	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	256	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	257	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	258	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	259	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	260	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	261	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	262	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	263	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	264	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	265	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	266	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	267	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	268	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	269	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	280	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	281	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	282	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	283	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	284	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	285	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	286	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	287	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	288	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	289	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	290	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	291	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	292	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	293	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	294	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	295	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	296	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	297	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	298	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	299	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	301	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	313	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	314	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	315	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	316	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/1	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	317/10	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	317/11	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/12	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/13	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/14	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/15	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/16	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/2	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/3	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/4	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/5	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/6	N1r	S2r	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	S3r	S3r	S3r	S2r	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Gowdagera	317/7	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/8	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	317/9	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	318_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	319_TANK	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	320	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	321	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	322	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Gowdagera	323	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Gowdagera	324	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Gowdagera	325	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Gowdagera	326	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	327	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	328	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	329	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Gowdagera	330_TANK	S3tw	S3tw	S3tw	S2wz	S3tw	S2wz	S2tw	S2zw	S2wz	S2rw	S2tw	S2zw	S3tw	S2zw	N1tz	S2tw	S2wz	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	331	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	332_TANK	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	333	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	334	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	335	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	336	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	337	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	338	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	339	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	340	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Gowdagera	341	N1rg	S3rg	N1rg	S3rg	N1rg	S3rg	N1rg	N1rg	S3rg	N1rg	S3rg	S3rg	N1rg	S3rg	N1rt	N1rg	N1rg	S3rg	S3rg	S3rg	S3rg	S3rg	N1rg	S3rg	N1rg	N1rg
Gowdagera	343	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	344	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others	Others
Gowdagera	346	S3tw	S3tw	S3tw	S2w	S3tw	S1	S2tw	S2w	S1	S2w	S3tw	S2w	S3tw	S2w	N1tw	S2tw	S2w	S3tw	S2tw	S3tw	S2tw	S2tw	S2tw	S2tw	S2tw	S3tw
Kilanakera	193	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Kilanakera	196	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Kilanakera	197	S3tz	S3tw	S3t	S2zw	S3t	S2z	S2t	S2z	S2z	S2zw	S2tw	S2t	S3t	S2z	N1t	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tz	S2tw	S3tw
Kilanakera	198	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r

Village	Survey No	Mango	Maize	Sapota	Sorgham	Guava	Cotton	Tamarind	Lime	Bengalgram	Sunflower	Redgram	Amla	Jackfruit	Custard-apple	Cashew	Jamun	Musambi	Groundnut	Chilly	Tomato	Marigold	Chrysanthemum	Pomegranate	Bajra	Drumstick	Mulberry
Kilanakera	199	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Kilanakera	203	N1r	S2t	S3r	S2r	S3r	S2r	N1r	S3r	S2r	S3r	S3r	S2r	S3r	S2r	N1rt	S3r	S3r	S3t	S2r	S2r	S2r	S2r	S3r	S2r	S3r	S3r
Kilanakera	204	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Kilanakera	205	S3t	S3tw	S3t	S2wz	S3t	S2wz	S2t	S2z	S2wz	S2rw	S2tw	S2z	S3t	S2z	N1tz	S2t	S2z	S3tw	S2tw	S3tw	S2tw	S2tw	S2t	S2tw	S2tw	S3tw
Mallara	308	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body	water body

PART-B

SOCIO-ECONOMIC STATUS OF FARM HOUSEHOLDS

CONTENTS

LIST OF TABLES

Chapter 1

FINDINGS OF THE SOCIO-ECONOMIC SURVEY

- *The survey was conducted in Goudagera is located at North latitude 16^0 39' 31.328" and 16^0 38' 0.861" and East longitude 77^0 15' 4.974" and 77^0 13' 17.424" covering an area of about 492.85 ha coming under Gowdagera and Killanakera Villages of Yadagiri taluk.*
- *Socio-economic analysis of Goudagera micro watersheds of Nagalapur sub-watershed, yadgir taluk & District indicated that, out of the total sample of 36 total respondents, 6 (16.67 %) were marginal, 10 (27.78%)were small, 10 (27.78 %) were Semi medium and 5 (13.89 %) were medium farmers.*
- *The population characteristics of households indicated that, there were 99 (48.53%) men and 105 (51.47 %) were women.*
- *Majority of the respondents (42.16%) were in the age group of 16-35 years.*
- *Education level of the sample households indicated that, there were 57.35 per cent illiterates, 40.19 per cent pre university education and 1.47 per cent attained graduation.*
- *About, 83.33 per cent of household heads practicing agriculture and 16.67 per cent of the household heads were engaged as agricultural labourers.*
- *Agriculture was the major occupation for 51.96 per cent of the household members.*
- *In the study area, 97.22 per cent of the households possess katcha house.*
- *The durable assets owned by the households showed that, 83.33 per cent possess TV, 5.56 per cent possess mixer grinder, 91.67 per cent possess mobile phones and 13.89 per cent possess motor cycles.*
- *Farm implements owned by the households indicated that, 47.22 per cent of the households possess plough, 2.78 per cent possess tractor, 41.67 per cent possess bullock cart and 16.67 per cent possess sprayer.*
- *Regarding livestock possession by the households, 33.33 per cent possess local cow and 33.33 per cent possess buffalo.*
- *The average labour availability in the study area showed that, own men and women labour availability in the micro watershed was 11.68 each, while the hired labour (men) availability was 2.13.*
- *Further, 2.78 per cent of the households opined that hired labour was inadequate during the agricultural season.*
- *Out of the total land holding of the sample respondents 58.10 per cent (51.19 ha) of the area is under dry condition and the remaining 41.90 per cent area is irrigated land.*
- *There were 11.00 live bore wells and 2.00 dry bore wells among the sampled households.*

- *Bore/open well was the major source of irrigation for 30.56 per cent of the households.*
- *The major crops grown by sample farmers are Redgram, Cotton, Greengram, Sorghum and Greengram and cropping intensity was recorded as 97.56 per cent.*
- *The per hectare cost of cultivation for Redgram, Cotton, Greengram, Sorghum and Greengram was Rs.27664.31, 39010.47, 28479.44, 25585.40 and 28479.44 with benefit cost ratio of 1:1.50, 1: 2.50, 1: 0.90, 1: 0.50 and 1:0.90 respectively.*
- *Further, 50.00 per cent of the households opined that dry fodder was adequate and 50.00 per cent of the households have opined that the green fodder was adequate.*
- *The average annual gross income of the farmers was Rs. 139136.11 in micro-watershed, of which Rs. 60108.33 comes from agriculture.*
- *Sampled households have grown 83 horticulture trees and 185 forestry trees together in the fields and back yards.*
- *Regarding marketing channels, 100.00 per cent of the households have sold agricultural produce to the local/village merchants.*
- *Further, 100.00 per cent of the households have used tractor for the transport of agriculture commodity.*
- *Fire was the major source of fuel for domestic use for 102.78 per cent of the households.*
- *Piped supply was the major source for drinking water for 97.22 per cent of the households.*
- *Electricity was the major source of light for 100.00 per cent of the households.*
- *In the study area, 100.00 per cent of the households possess toilet facility.*
- *Regarding possession of PDS card, 105.71 per cent of the households possessed BPL card.*
- *Households opined that, the requirement of cereals (100.00%), pulses (19.44%) and oilseeds (8.33%) are adequate for consumption.*
- *Farming constraints experienced by households in the micro watersheds were lower fertility status of the soil (86.11%) wild animal menace on farm field (5.56%), frequent incidence of pest and diseases (77.78%), high cost of fertilizers and plant protection chemicals (75.00%), high rate of interest on credit (5.56%), low price for the agricultural commodities (80.56%), lack of marketing facilities in the area (83.33%), inadequate extension services (2.78%) and lack of transport for safe transport of the agricultural produce to the market (80.56%).*

Chapter 2

INTRODUCTION

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

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

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

Scope and importance of survey

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

Chapter 3

METHODOLOGY

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

1. Description of the study area

Yadgir 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. Yadgir town is the administrative headquarters of the district. The district comprises of 3 taluks namely, Shahapur, Yadgiri 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.

Yadgir 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 Yadgir 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%. Yadgir has a sex ratio of 984 females for every 1000 males, and a literacy rate of 52.36%.

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

The study was conducted in Goudagera micro-watershed (Nagalapur sub-watershed, Yadgir taluk & District) is located at North latitude 16^0 39’ 31.328” and 16^0 38’ 0.861” and East longitude 77^0 15’ 4.974” and 77^0 13’ 17.424”covering an area of about 492.85 ha bounded by under Gowdagera and Killanakera Villages.

3. Selection of the respondents for the study

The micro-watershed is marked with 320 square meters grids. One farmer from every alternate grid in the micro-watershed was selected for the study and interviewed for socio-economic data. Totally 36 households were interviewed for the survey.

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

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

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

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

5. Development of interview schedule and data collection

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

6. Tools used to analyze the data

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

Abbreviations used in the report

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

Chapter 4

FINDINGS OF THE SURVEY

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

Households sampled for socio-economic survey: The data on households sampled for socio economic survey in Goudagera Micro watershed is presented in Table 1 and it indicated that 36 farmers were sampled in Goudagera micro-watershed among households surveyed 6 (16.67%) were marginal, 10 (27.78%) were small, 10 (27.78 %) were semi medium and 5 (13.89 %) were medium farmers. 5 landless farmers were also interviewed for the survey.

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

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Farmers	5	13.9	6	16.7	10	27.8	10	27.8	5	13.9	36	100

Population characteristics: The population characteristics of households sampled for socio-economic survey in Goudagera Micro watershed is presented in Table 2. The data indicated that, there were 99 (48.53%) men and 105 (51.47%) were women.

Table 2. Population characteristics in Goudagera micro-watershed

Sl. No.	Particulars	LL (20)		MF (36)		SF (63)		SMF (58)		MDF (27)		All (204)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Men	9	45	19	53	33	52	24	41.4	14	51.9	99	48.5
2	Women	11	55	17	47	30	48	34	58.6	13	48.2	105	51.5
Total		20	100	36	100	63	100	58	100	27	100	204	100

Age wise classification of population: The age wise classification of household members in Goudagera Micro watershed is presented in Table 3. The indicated that, 61 (29.90%) of population were 0-15 years of age, 86 (42.16%) were 16-35 years of age, 41(20.10%) were 36-60 years of age and 16 (7.84 %) were above 61 years of age.

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

Sl.No.	Particulars	LL (20)		MF (36)		SF (63)		SMF (58)		MDF (27)		All (204)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-15 years of age	3	15	13	36.1	18	28.6	21	36.21	6	22	61	29.9
2	16-35 years of age	9	45	14	38.9	28	44.4	24	41.38	11	41	86	42.16
3	36-60 years of age	6	30	6	16.7	11	17.5	11	18.97	7	26	41	20.1
4	> 61 years	2	10	3	8.33	6	9.52	2	3.45	3	11	16	7.84
Total		20	100	36	100	63	100	58	100	27	100	204	100

Education level of household members: Education level of household members in Goudagera Micro watershed is presented in Table 4. The results indicated that, there were 57.35 per cent of illiterates, 19.61 per cent of them had primary school education, 2.94 per

cent middle school education, and 6.86 per cent high school education, 5.39 per cent of them had PUC education, 1.47 per cent attained graduation, and 5.88 them had other education.

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

Sl.No.	Particulars	LL (20)		MF (36)		SF (63)		SMF (58)		MDF (27)		All (204)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Illiterate	15	75	21	58.3	38	60.3	24	41.4	19	70.37	117	57.4
2	Primary School	2	10	5	13.9	11	17.5	20	34.5	2	7.41	40	19.6
3	Middle School	0	0	2	5.56	2	3.17	2	3.45	0	0	6	2.94
4	High School	1	5	1	2.78	6	9.52	5	8.62	1	3.7	14	6.86
5	PUC	1	5	0	0	3	4.76	3	5.17	4	14.81	11	5.39
6	ITI	0	0	0	0	0	0	1	1.72	0	0	1	0.49
7	Degree	0	0	1	2.78	1	1.59	1	1.72	0	0	3	1.47
8	Others	1	5	6	16.7	2	3.17	2	3.45	1	3.7	12	5.88
Total		20	100	36	100	63	100	58	100	27	100	204	100

Occupation of head of households: The data regarding the occupation of the household heads in Goudagera Micro watershed is presented in Table 5. The results indicate that, 83.33 per cent of households heads were practicing agriculture, 16.67 per cent of the household heads were agricultural Labour and housewife (2.78%).

Table 5: Occupation of heads of households in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	0	0	5	83	9	90	10	100	6	120	30	83.33
2	Agricultural Labour	5	100	1	17	0	0	0	0	0	0	6	16.67
3	Housewife	0	0	0	0	1	10	0	0	0	0	1	2.78
Total		5	100	6	100	10	100	10	100	6	100	37	100

Occupation of the members of the household: The data regarding the occupation of the household members in Goudagera Micro watershed is presented in Table 6. The results indicate that, agriculture was the major occupation for 51.96 per cent of the household members, 8.33 per cent were agricultural labour, 0.98 per cent were general labour,23.04 per cent were working in pursuing education, 9.31 per cent were involved as housewife, and 5.88 per cent were childrens.

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

Sl.No.	Particulars	LL (20)		MF (36)		SF (63)		SMF (58)		MDF (27)		All (204)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Agriculture	1	5	16	44.4	35	55.56	31	53.45	23	85	106	52
2	Agricultural Labour	12	60	5	13.9	0	0	0	0	0	0	17	8.33
3	General Labour	0	0	0	0	2	3.17	0	0	0	0	2	0.98
4	Trade & Business	0	0	0	0	0	0	0	0	1	3.7	1	0.49
5	Student	4	20	8	22.2	15	23.81	19	32.76	1	3.7	47	23
6	Housewife	2	10	1	2.78	9	14.29	6	10.34	1	3.7	19	9.31
7	Children	1	5	6	16.7	2	3.17	2	3.45	1	3.7	12	5.88
Total		20	100	36	100	63	100	58	100	27	100	204	100

Institutional Participation of household members: The data regarding the institutional participation of the household members in Goudagera Micro watershed is presented in Table 7. The results show that, out of the total family members in the households rest were not participating in any of the institutions.

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

Sl.No.	Particulars	LL (20)		MF (36)		SF (63)		SMF (58)		MDF (27)		All (204)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	No Participation	20	100	36	100	63	100	58	100	27	100	204	100
Total		20	100	36	100	63	100	58	100	27	100	204	100

Type of house owned: The data regarding the type of house owned by the households in Goudagera Micro watershed is presented in Table 8. The results indicate that, 2.78 percent possess thatched house and 97.22 per cent of the households possess katcha house.

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

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Thatched	1	20	0	0	0	0	0	0	0	0	1	2.78
2	Katcha	4	80	6	100	10	100	10	100	5	100	35	97.22
Total		5	100	6	100	10	100	10	100	5	100	36	100

Durable assets owned by the households: The data regarding the Durable Assets owned by the households in Goudagera Micro watershed is presented in Table 9. The result shows that, 83.33 per cent possess TV, 5.56 per cent possess mixer grinder, 13.89 per cent possess motor cycle, 5.56 per cent possess Landline Phone and 91.67 per cent possess mobile phones.

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

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Television	5	100	5	83	8	80	7	70	5	100	30	83.33
2	Mixer/Grinder	0	0	1	17	1	10	0	0	0	0	2	5.56
3	Motor Cycle	1	20	0	0	2	20	1	10	1	20	5	13.89
4	Landline Phone	1	20	0	0	0	0	1	10	0	0	2	5.56
5	Mobile Phone	4	80	6	100	9	90	9	90	5	100	33	91.67

Average value of durable assets: The data regarding the average value of durable assets owned by the households in Goudagera Micro watershed is presented in Table 10. The result shows that, the average value of television was Rs.9033.00, mixer grinder was Rs.2000.00, motor cycle was Rs. 138600.00, Landline Phone was Rs. 4000.00 and mobile phone was Rs.3765.00.

Farm implements owned: The data regarding the farm implements owned by the households in Goudagera Micro watershed is presented in Table 11. About 41.67 per cent of the households possess Bullock Cart, 47.22 per cent possess plough and 2.78 per cent

possess Seed/Fertilizer Drill and Sprinkler, 16.67 per cent possess Sprayer, 2.78 per cent possess tractor and 2.78 per cent possess Sprinkler.

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

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
1	Television	9000	9000	9000	9142	9000	9033
2	Mixer/Grinder	0	2000	2000	0	0	2000
3	Motor Cycle	500000	0	47500	48000	50000	138600
4	Landline Phone	2000	0	0	5000	0	4000
5	Mobile Phone	4000	3666	2882	4500	4350	3765

Table 11. Farm implements owned in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock Cart	1	20	2	33.3	6	60	4	40	2	40	15	41.67
2	Plough	1	20	2	33.3	7	70	5	50	2	40	17	47.22
3	Seed/Fertilizer Drill	0	0	0	0	1	10	0	0	0	0	1	2.78
4	Irrigation Pump	0	0	0	0	1	10	2	20	2	40	5	13.89
5	Power Tiller	0	0	0	0	1	10	0	0	0	0	1	2.78
6	Tractor	0	0	0	0	1	10	0	0	0	0	1	2.78
7	Sprayer	2	40	2	33.3	0	0	0	0	2	40	6	16.67
8	Sprinkler	0	0	0	0	0	0	0	0	1	20	1	2.78
9	Blank	3	60	2	33.3	3	30	3	30	1	20	12	33.33

Average value of farm implements: The data regarding the average value of farm Implements owned by the households in Goudagera Micro watershed is presented in Table 12. The results show that the average value of plough was Rs.1636.00, bullock Cart was Rs.15937.00, seed/fertilizer drill was Rs.1683.00, sprayer and sprinkler was Rs. 1428.00 and tractor Rs. 400000.

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

Average Value (Rs.)

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
1	Bullock Cart	14000	17000	14000	19250	16000	15937
2	Plough	12000	1200	1200	842	1200	1636
3	Seed/Fertilizer Drill	0	0	45000	0	0	45000
4	Irrigation Pump	0	0	20000	30000	13500	21400
5	Power Tiller	0	0	100000	0	0	100000
6	Tractor	0	0	400000	0	0	400000
7	Sprayer	1850	1700	0	0	1500	1683
8	Sprinkler	0	0	0	0	1428	1428

Livestock possession by the households: The data regarding the Livestock possession by the households in Goudagera Micro watershed is presented in Table 13. The results indicate that, 36.11 per cent of the households possess bullocks, 33.33 per cent possess local cow, 33.33 per cent possess buffalo, 5.56 per cent possess sheep and 2.78 per cent possess goat.

Table 13. Livestock possession by households in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bullock	0	0	2	33	6	60	3	30	2	40	13	36.11
2	Local cow	0	0	3	50	2	20	3	30	4	80	12	33.33
3	Buffalo	0	0	4	67	1	10	3	30	4	80	12	33.33
4	Sheep	0	0	1	17	0	0	0	0	1	20	2	5.56
5	Goat	0	0	0	0	0	0	1	10	0	0	1	2.78
9	blank	5	100	0	0	4	40	4	40	1	20	14	38.89

Average Labour availability: The data regarding the average labour availability in Goudagera Micro watershed is presented in Table 14. The indicated that, own labour men available in the micro watershed was 9.68, women available in the micro watershed was 2.00, hired labour (men) available was 2.13 and hired labour (women) available was 11.45.

Table 14. Average labour availability in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		N	N	N	N	N	N
1	Hired labour Female	0	7.5	12.5	9.5	7	9.68
2	Own Labour Female	0	1.83	2.33	1.7	2.2	2
3	Own labour Male	0	2.17	2.44	1.8	2.2	2.13
4	Hired labour Male	0	8.33	14	12	9	11.45

Adequacy of hired labour: The data regarding the adequacy of hired labour in Goudagera Micro watershed is presented in Table 15. The results indicate that, 83.33 per cent of the household opined that hired labour was adequate, 2.78 per cent of the household opined that hired labour was Inadequate.

Table 15. Adequacy of hired labour in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate	0	0	6	100	10	100	9	90	5	100	30	83.3
2	Inadequate	0	0	0	0	0	0	1	10	0	0	1	2.78

Distribution of land (ha): The data regarding the distribution of land (ha) in Goudagera Micro watershed is presented in Table 16. The results indicate that, 29.75 ha (58.10%) of dry land and 21.45 ha (41.90 %) of irrigated land.

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

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Dry	0	0	4.86	100	10.32	86.44	9.71	52.17	4.86	30.8	29.75	58.1
2	Irrigated	0	0	0	0	1.62	13.56	8.9	47.83	10.93	69.2	21.45	41.9
Total		0	100	4.86	100	11.94	100	18.62	100	15.78	100	51.19	100

Average value of land (ha): The data regarding the average land value (Rs./ha) in Goudagera Micro watershed is presented in Table 17. The results show that the average value of dry land was Rs.285646.26 and the average value of irrigated land was Rs.288943.40.

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

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		N	N	N	N	N	N
1	Dry	0	267583.3	309960.8	277875	267583.3	285646.3
2	Irrigated	0	0	617500	280681.8	247000	288943.4

Status of bore wells: The data regarding the status of bore wells in Goudagera Micro watershed is presented in Table 18. The results indicate that, there were 2 De-functioning bore wells and 11 functioning bore wells among the sampled households in micro watershed.

Table 18. Status of bore wells in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		N	N	N	N	N	N
1	De-functioning	0	0	2	0	0	2
2	Functioning	0	0	1	6	4	11

Source of irrigation: The data regarding the source of irrigation in Goudagera Micro watershed is presented in Table 19. The results that bore well were major source of irrigation for 30.56 per cent of the households and for per cent of the households.

Table 19. Source of irrigation in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Bore Well	0	0	0	0	1	10	6	60	4	80	11	30.56

Depth of water (Avg. In meters): The data regarding the depth of water in Goudagera Micro watershed is presented in Table 20. The results revealed that, the depth of bore well was 32.18 meter.

Table 20. Depth of water (Avg. In meters) in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		N	N	N	N	N	N
1	Bore Well	0	0	10.7	64.01	82.3	32.18

Irrigated Area (ha): The data regarding the irrigated area (ha) in Goudagera Micro watershed is presented in Table 21. The results indicate that, the availability of irrigation water was used for kharif crops was 20.24 ha.

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

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
1	Kharif	0	0	1.62	8.91	9.72	20.24
Total		0	0	1.62	8.91	9.72	20.24

Cropping pattern: The data regarding the cropping pattern in Goudagera Micro watershed is presented in Table 22. The results indicate that, farmers have grown Kharif - Red gram (togari) (21.46 ha), Kharif - Greengram (6.38 ha), Kharif - Sorghum (4.86 ha), Kharif - Cotton (4.45 ha), Kharif - Paddy (4.45 ha), Kharif - Groundnut (3.24 ha) and Rabi - Sorghum (2.53 ha).

Table 22. Cropping pattern in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
1	Kharif - Red gram (togari)	0	2.43	5.67	8.5	4.86	21.46
2	Kharif - Greengram	0	1.62	0.61	2.53	1.62	6.38
3	Kharif - Sorghum	0	0	2.43	2.43	0	4.86
4	Kharif - Cotton	0	0.81	1.21	2.43	0	4.45
5	Kharif - Paddy	0	0	0.81	1.21	2.43	4.45
6	Kharif - Groundnut	0	0	0	0.4	2.83	3.24
7	Rabi - Sorghum	0	0	0	0.91	1.62	2.53

Cropping intensity: The data regarding the cropping intensity in Goudagera Micro watershed is presented in Table 23. The results indicate that, the cropping intensity was 97.56 per cent.

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

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
1	Cropping Intensity	0	100	100	93.82	100	97.56

Cost of Cultivation of Redgram: The data regarding the cost of cultivation (Rs/ha) of Redgram in Goudagera micro watershed is presented in Table 24.a. The results indicate that, the total cost of cultivation (Rs/ha) for Redgram was Rs. 27664.31. The gross income realized by the farmers was Rs. 41576.37. The net income from Redgram cultivation was Rs.13912.05, thus the benefit cost ratio was found to be 1:1.50.

Table 24 (a). Cost of Cultivation of Redgram in Goudagera micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	48.82	7924.58	28.65
2	Bullock	Pairs/day	2.54	1523.17	5.51
3	Tractor	Hours	4.94	3952	14.29
4	Machinery	Hours	0.69	548.89	1.98
5	Seed Main Crop (Establishment and Maintenence)	Kgs (Rs.)	13.58	1945.13	7.03
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.5	299.93	1.08
8	Fertilizer + micronutrients	Quintal	2.39	2336.35	8.45
9	Pesticides (PPC)	Kgs / liters	0.82	823.33	2.98
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	624.64	2.26
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				
16	Interest on working capital			648.69	2.34
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			20629.99	74.57

III	**Cost B2**					
18	Rental Value of Land				200	0.72
19	**Cost B2 = (Cost B1 + Rental value)**				20829.99	75.3
IV	**Cost C1**					
20	Family Human Labour			18.47	4318.38	15.61
21	**Cost C1 = (Cost B2 + Family Labour)**				25148.37	90.91
V	**Cost C2**					
22	Risk Premium				1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**				25149.37	90.91
VI	**Cost C3**					
24	Managerial Cost				2514.94	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**				27664.31	100
VII	**Economics of the Crop**					
a.	Main Product	a) Main Product (q)		8.55	41576.37	
		b) Main Crop Sales Price (Rs.)			4863.33	
b.	Gross Income (Rs.)				41576.37	
c.	Net Income (Rs.)				13912.05	
d.	Cost per Quintal (Rs./q.)				3235.99	
e.	Benefit Cost Ratio (BC Ratio)				1:1.5	

Cost of Cultivation of Cotton: The data regarding the cost of cultivation (Rs/ha) of Cotton in Goudagera micro watershed is presented in Table 24.b. The results indicate that, the total cost of cultivation (Rs/ha) for Cotton was Rs. 39010.47. The gross income realized by the farmers was Rs. 98113.89. The net income from Cotton cultivation was Rs.59103.42, thus the benefit cost ratio was found to be 1:2.50.

Table 24(b). Cost of Cultivation of Cotton in Goudagera micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	48.44	7862.83	20.16
2	Bullock	Pairs/day	6.86	4253.89	10.9
3	Tractor	Hours	4.25	3293.33	8.44
4	Machinery	Hours	0	0	0
5	Seed Main Crop (Establishment and Maintenence)	Kgs (Rs.)	5.35	5084.08	13.03
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.37	274.44	0.7
8	Fertilizer + micronutrients	Quintal	6.59	6553.73	16.8
9	Pesticides (PPC)	Kgs / liters	0.82	823.33	2.11
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	183.06	0.47
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				
16	Interest on working capital			1528.39	3.92
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			29860.39	76.54

III	**Cost B2**				
18	Rental Value of Land			333.33	0.85
19	**Cost B2 = (Cost B1 + Rental value)**			30193.73	77.4
IV	**Cost C1**				
20	Family Human Labour		22.09	5269.33	13.51
21	**Cost C1 = (Cost B2 + Family Labour)**			35463.06	90.91
V	**Cost C2**				
22	Risk Premium			1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			35464.06	90.91
VI	**Cost C3**				
24	Managerial Cost			3546.41	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			39010.47	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	10.7	98113.89	
		b) Main Crop Sales Price (Rs.)		9166.67	
b.	Gross Income (Rs.)			98113.89	
c.	Net Income (Rs.)			59103.42	
d.	Cost per Quintal (Rs./q.)			3644.7	
e.	Benefit Cost Ratio (BC Ratio)			1:2.5	

Cost of Cultivation of Greengram: The data regarding the cost of cultivation (Rs/ha) of Greengram in Goudagera micro watershed is presented in Table 24.c. The results indicate, the total cost of cultivation (Rs/ha) for Greengram was Rs.28479.44. The gross income realized by the farmers was Rs. 24876.89. The net income from Greengram cultivation was Rs. -3602.55, thus the benefit cost ratio was found to be 1:0.90.

Table 24(c). Cost of Cultivation of Greengram in Goudagera micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	40.7	6367.4	22.36
2	Bullock	Pairs/day	4.5	2701.33	9.49
3	Tractor	Hours	2.4	1919.17	6.74
4	Machinery	Hours	0.51	411.67	1.45
5	Seed Main Crop (Establishment and Maintenence)	Kgs (Rs.)	16.92	2931.45	10.29
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.87	374.75	1.32
8	Fertilizer + micronutrients	Quintal	2.92	2563.27	9
9	Pesticides (PPC)	Kgs / liters	1.07	1074.1	3.77
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	171.1	0.6
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				

16	Interest on working capital			833.35	2.93
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			19350.88	67.95
III	**Cost B2**				
18	Rental Value of Land			333.33	1.17
19	**Cost B2 = (Cost B1 + Rental value)**			19684.21	69.12
IV	**Cost C1**				
20	Family Human Labour		27.61	6205.19	21.79
21	**Cost C1 = (Cost B2 + Family Labour)**			25889.4	90.91
V	**Cost C2**				
22	Risk Premium			1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			25890.4	90.91
VI	**Cost C3**				
24	Managerial Cost			2589.04	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			28479.44	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	4.95	24876.89	
		b) Main Crop Sales Price (Rs.)		5025	
b.	Gross Income (Rs.)			24876.89	
c.	Net Income (Rs.)			-3602.55	
d.	Cost per Quintal (Rs./q.)			5752.7	
e.	Benefit Cost Ratio (BC Ratio)			1:0.9	

Cost of Cultivation of Sorghum: The data regarding the cost of cultivation (Rs/ha) of Sorghum in Goudagera micro watershed is presented in Table 24.d. The results indicate that, the total cost of cultivation (Rs/ha) for Sorghum was Rs. 25585.40. The gross income realized by the farmers was Rs.13133.41. The net income from Sorghum cultivation was Rs. -12452.00, thus the benefit cost ratio was found to be 1:0.50.

Table 24(d). Cost of Cultivation of Sorghum in Goudagera micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	32.01	5067.22	19.81
2	Bullock	Pairs/day	2.85	1710.2	6.68
3	Tractor	Hours	5.39	4311.94	16.85
4	Machinery	Hours	1.23	988	3.86
5	Seed Main Crop (Establishment and Maintenence)	Kgs (Rs.)	10.24	1602.88	6.26
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.78	356.29	1.39
8	Fertilizer + micronutrients	Quintal	1.99	1823.14	7.13
9	Pesticides (PPC)	Kgs / liters	0.84	836.08	3.27
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	164.48	0.64
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				

16	Interest on working capital			554.33	2.17
17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			17417.84	68.08
III	**Cost B2**				
18	Rental Value of Land			333.33	1.3
19	**Cost B2 = (Cost B1 + Rental value)**			17751.18	69.38
IV	**Cost C1**				
20	Family Human Labour		23.5	5507.28	21.53
21	**Cost C1 = (Cost B2 + Family Labour)**			23258.46	90.91
V	**Cost C2**				
22	Risk Premium			1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			23259.46	90.91
VI	**Cost C3**				
24	Managerial Cost			2325.95	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			25585.4	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	3.65	13133.41	
		b) Main Crop Sales Price (Rs.)		3600	
b.	Gross Income (Rs.)			13133.41	
c.	Net Income (Rs.)			-12452	
d.	Cost per Quintal (Rs./q.)			7013.22	
e.	Benefit Cost Ratio (BC Ratio)			1:0.5	

Cost of Cultivation of Groundnut: The data regarding the cost of cultivation (Rs/ha) of Greengram in Goudagera micro watershed is presented in Table 24.e. The results indicate that, the total cost of cultivation (Rs/ha) for Greengram was Rs.28479.44. The gross income realized by the farmers was Rs. 24876.89. The net income from Groundnut cultivation was Rs. -3602.55, thus the benefit cost ratio was found to be 1:0.90.

Table 24(e). Cost of Cultivation of Groundnut in Goudagera micro-watershed

Sl.No	Particulars	Units	Phy Units	Value(Rs.)	% to C3
I	**Cost A1**				
1	Hired Human Labour	Man days	40.7	6367.4	22.36
2	Bullock	Pairs/day	4.5	2701.33	9.49
3	Tractor	Hours	2.4	1919.17	6.74
4	Machinery	Hours	0.51	411.67	1.45
5	Seed Main Crop (Establishment and Maintenence)	Kgs (Rs.)	16.92	2931.45	10.29
6	Seed Inter Crop	Kgs.	0	0	0
7	FYM	Quintal	1.87	374.75	1.32
8	Fertilizer + micronutrients	Quintal	2.92	2563.27	9
9	Pesticides (PPC)	Kgs / liters	1.07	1074.1	3.77
10	Irrigation	Number	0	0	0
11	Repairs		0	0	0
12	Msc. Charges (Marketing costs etc)		0	0	0
13	Depreciation charges		0	171.1	0.6
14	Land revenue and Taxes		0	3.29	0.01
II	**Cost B1**				
16	Interest on working capital			833.35	2.93

17	**Cost B1 = (Cost A1 + sum of 15 and 16)**			19350.88	67.95
III	**Cost B2**				
18	Rental Value of Land			333.33	1.17
19	**Cost B2 = (Cost B1 + Rental value)**			19684.21	69.12
IV	**Cost C1**				
20	Family Human Labour		27.61	6205.19	21.79
21	**Cost C1 = (Cost B2 + Family Labour)**			25889.4	90.91
V	**Cost C2**				
22	Risk Premium			1	0
23	**Cost C2 = (Cost C1 + Risk Premium)**			25890.4	90.91
VI	**Cost C3**				
24	Managerial Cost			2589.04	9.09
25	**Cost C3 = (Cost C2 + Managerial Cost)**			28479.44	100
VII	**Economics of the Crop**				
a.	Main Product	a) Main Product (q)	4.95	24876.89	
		b) Main Crop Sales Price (Rs.)		5025	
b.	Gross Income (Rs.)			24876.89	
c.	Net Income (Rs.)			-3602.55	
d.	Cost per Quintal (Rs./q.)			5752.7	
e.	Benefit Cost Ratio (BC Ratio)			1:0.9	

Adequacy of fodder: The data regarding the adequacy of fodder in Goudagera Micro watershed is presented in Table 25. The results indicate that, 50.00 per cent of the households opined that dry fodder was adequate, With respect to green fodder availability, 50.00 percent of them opined it was sufficient.

Table 25. Adequacy of fodder in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Adequate-Dry Fodder	0	0	5	83.33	6	60	3	30	4	80	18	50
2	Adequate-Green Fodder	0	0	5	83.33	6	60	3	30	4	80	18	50

Average annual gross income: The data regarding the annual gross income in Goudagera Micro watershed is presented in Table 26. The results indicate that, the farmers have annual gross income of Rs. 139136.11 in micro-watershed, of which Rs. 60108.33 is from agriculture itself.

Table 26. Average annual gross income in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Wage	59000	88333.3	73000	91000	76000	79027.8
2	Agriculture	0	48583.3	65490	67800	107900	60108.3
Income(Rs.)		59000	136917	138490	158800	183900	139136

Average annual Expenditure: The data regarding the average annual expenditure in Goudagera Micro watershed is presented in Table 27. The results indicate that, the farmers have annual gross expenditure of Rs. 475608.33 in micro-watershed, of which Rs. 37638.89 is from agriculture itself.

Table 27. Average annual Expenditure in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)	MF (6)	SF (10)	SMF (10)	MDF (5)	All (36)
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Wage	44800	60833.3	67875	64000	48000	55888.9
2	Agriculture	0	31800	36600	44300	77400	37638.9
Total		44800	92633.3	104475	108300	125400	475608

Horticulture species grown: The data regarding horticulture species grown in Goudagera Micro watershed is presented in Table 28. The results indicate that, the total number of horticultural trees grown (both field and backyard) by the sampled households were coconut (20), Lemon (20) and Mango (43).

Table 28. Horticulture species grown in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Coconut	0	0	0	0	0	0	0	0	20	0	20	0
2	Lemon	0	0	0	0	0	0	0	0	20	0	20	0
3	Mango	0	0	5	0	27	0	11	0	0	0	43	0

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

Forest species grown: The data regarding forest species grown in Goudagera Micro watershed is presented in Table 29. The results indicate that, households have planted 173 neem trees, 11 tamarind trees and 1 banyan trees together in both field and backyard.

Table 29. Forest species grown in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		F	B	F	B	F	B	F	B	F	B	F	B
1	Neem	0	0	14	0	64	2	61	1	31	0	170	3
2	Tamarind	0	0	1	0	0	0	1	0	9	0	11	0
3	Banyan	0	0	0	0	0	0	1	0	0	0	1	0

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

Marketing of agricultural produce: The data regarding marketing of the agricultural produce in Goudagera Micro watershed is presented in Table 30. The results indicated that, 100.00 percent of output of Bajra was sold in the market with average price of Rs. 1200.00; 100.00 percent of output of Cotton was sold in the market with average price of Rs. 45500.00; 100.00 percent of output of Greengram was sold in the market with average price of Rs. 15150.00; 100.00 percent of output of Groundnut was sold in the market with average price of Rs. 36250.00 and 100.00 percent of output of Paddy was sold in the market with average price of Rs. 23475.00; 100.00 percent output of Redgram was sold in the market with average price of Rs.9453 and 100.00 percent output of Sorghum was sold in the market with average price of Rs.3600.

Marketing channels used for sale of agricultural produce: The data regarding marketing channels used for sale of agricultural produce in Goudagera Micro watershed is presented in Table 31. The results indicated that, 100.00 cent of the households have sold agricultural produce to the local/village merchants.

Table 30. Marketing of agricultural produce in Goudagera micro-watershed

Sl.No	Crops	Output obtained (q)	Output sold (q)	Output sold (%)	Avg. Price obtained (Rs/q)
1	Bajra	4	0	100	1200
2	Cotton	44	0	100	45500
3	Greengram	36	0	100	15150
4	Groundnut	35	00	100	36250
5	Paddy	205	0	100	23475
6	Redgram	168	0	100	9453
7	Sorghum	27	0	100	3600

Table 31. Marketing channels used for sale of agricultural produce in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Local/village Merchant	0	0	6	100	11	110	13	130	6	120	36	100

Mode of transport of agricultural produce: The data regarding mode of transport of agricultural produce in Goudagera Micro watershed is presented in Table 32. The results indicated that, 100.00 cent of the households have used tractor.

Table 32. Mode of transport of agricultural produce in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Tractor	0	0	6	100	11	110	13	130	6	120	36	100

Usage pattern of fuel for domestic use: The data on usage pattern of fuel for domestic use in Goudagera Micro watershed is presented in Table 33. The results indicated that, firewood was the major source of fuel for domestic use for 102.78 per cent of the households.

Table 33. Usage pattern of fuel for domestic use in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Fire Wood	5	100	6	100	10	100	10	100	6	120	37	102.8

Source of drinking water: The data on source of drinking water in Goudagera Micro watershed is presented in Table 34. The results indicated that, piped waters supply of water was the major source for drinking water for 97.22 per cent of the households.

Table 34. Source of drinking water in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Piped supply	5	100	6	100	10	100	10	100	4	80	35	97.22

Source of light: The data on source of light in Goudagera Micro watershed is presented in Table 35. The results indicated that, electricity was the major source of light for 100.00 per cent of the households.

Table 35. Source of light in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Electricity	5	100	6	100	10	100	10	100	5	100	36	100

Existence of sanitary toilet facility: The data on availability of toilet facility in Goudagera Micro watershed is presented in Table 36. The results indicated that, 100.00 per cent of the households possess toilets.

Table 36. Existence of sanitary toilet facility in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sanitary toilet facility	5	100	6	100	10	100	10	100	5	100	36	100

Possession of PDS card: The data regarding possession of PDS card in Goudagera Micro watershed is presented in Table 37. The results indicated that, 105.71per cent of the households possessed BPL card.

Table 37. Possession of PDS card in Goudagera micro-watershed

Sl.No.	Particulars	LL (4)		MF (5)		SF (12)		SMF (11)		MDF (1)		All (35)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	BPL	4	100	5	100	14	116.7	11	100	1	100	37	100

Adequacy of food items: The data regarding adequacy of food items in Goudagera Micro watershed is presented in Table 38. The results indicated that, the extent of adequacy of food items for cereals, pulses, Oilseeds and vegetables were 100.00, 19.44, 8.33, 91.67 per cent respectively, similarly for milk (100.00%), Egg (100.00%), and Meat (100.00%).

Table 38. Adequacy of food items in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cereals	5	100	6	100	10	100	10	100	5	100	36	100
2	Pulses	1	20	3	50	2	20	0	0	1	20	7	19.44
3	Oilseed	1	20	0	0	0	0	2	20	0	0	3	8.33
4	Vegetables	5	100	5	83.3	10	100	8	80	5	100	33	91.67
5	Milk	5	100	6	100	10	100	10	100	5	100	36	100
6	Egg	5	100	6	100	10	100	10	100	5	100	36	100
7	Meat	5	100	6	100	10	100	10	100	5	100	36	100

Inadequacy of food items: The data regarding in adequacy of food items in Goudagera Micro watershed is presented in Table 39. The results indicated that, the extent of in adequacy of food items for pulses, Oilseeds and vegetables were 80.56, 91.67 and 8.33 per cent respectively, similarly for fruits (100.00%).

Table 39. Inadequacy of food items in Goudagera micro-watershed

Sl.No.	Particulars	LL (5)		MF (6)		SF (10)		SMF (10)		MDF (5)		All (36)	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Pulses	4	80	3	50	8	80	10	100	4	80	29	80.56
2	Oilseed	4	80	6	100	10	100	8	80	5	100	33	91.67
3	Vegetables	0	0	1	16.7	0	0	2	20	0	0	3	8.33
4	Fruits	5	100	6	100	10	100	10	100	5	100	36	100

Farming constraints: The data regarding farming constraints experienced by households in Goudagera Micro watershed is presented in Table 40. The results indicated that, lower fertility status of the soil was the constraint experienced by (86.11 %) per cent of the

households, wild animal menace on farm field (5.56%), frequent incidence of pest and diseases (77.78%), inadequacy of irrigation water (0.00%), high cost of fertilizers and plant protection chemicals (75.00%), high rate of interest on credit (5.56%), low price for the agricultural commodities (80.56 %), lack of marketing facilities in the area (83.33%), inadequate extension services (2.78 %) and lack of transport for safe transport of the agricultural produce to the market (80.56%).

Table 40. Farming constraints experienced in Goudagera micro-watershed

SN	Particulars	**LL** (5)		**MF** (6)		**SF** (10)		**SMF** (10)		**MDF** (5)		**All (36)**	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1	Lower fertility status of the soil	0	0	6	100	10	100	10	100	5	100	31	86.11
2	Wild animal menace on farm field	0	0	0	0	2	20	0	0	0	0	2	5.56
3	Frequent incidence of pest and diseases	0	0	5	83.33	9	90	9	90	5	100	28	77.78
4	High cost of Fertilizers and plant protection chemicals	0	0	5	83.33	10	100	8	80	4	80	27	75
5	High rate of interest on credit	0	0	1	16.67	0	0	1	10	0	0	2	5.56
6	Low price for the agricultural commodities	0	0	5	83.33	10	100	9	90	5	100	29	80.56
7	Lack of marketing facilities in the area	0	0	5	83.33	10	100	10	100	5	100	30	83.33
8	Inadequate extension services	0	0	1	16.67	0	0	0	0	0	0	1	2.78
9	Lack of transport for safe transport of the Agril produce to the market.	0	0	5	83.33	9	90	10	100	5	100	29	80.56

Chapter 5

SUMMARY AND IMPLICATIONS

In order to assess the socio-economic condition of the farmers in the watershed 36 households located in the micro watershed were interviewed for the survey. The study was conducted in Goudagera micro-watershed (Nagalapur sub-watershed, yadgir taluk & District) is located at North latitude 16^0 39' 31.328" and 16^0 38' 0.861" and East longitude 77^0 15' 4.974" and 77^0 13' 17.424"covering an area of about 492.85 ha bounded by under Gowdagera and Killanakera Villages.

Socio-economic analysis indicated that, out of the total sample of 36 respondents, 6 (16.67%) were marginal, 10(27.78%) were small and 10 (27.78%) were semi medium and 5 (13.89%) were medium farmers. The population characteristics of households indicated that, there were 99 (48.53%) men and 105 (51.47%) were women. Majority of the respondents (42.16%) were in the age group of 35-60 years. Education level of the sample households indicated that, majority there were 57.35 per cent illiterates and only 1.47 per cent attained graduation. About, 83.33 per cent of household heads practicing agriculture and 16.67 per cent of the household heads were engaged as agricultural labourers. Agriculture was the major occupation for 51.96 per cent of the household members.

In the study area, 97.22 per cent of the households possess katcha house. The durable assets owned by the households showed that, 83.33 per cent possess TV, 5.56 per cent possess mixer grinder and 91.67 per cent possess mobile phones. Farm implements owned by the households indicated that, 47.22 per cent of the households possess plough and only 16.67 per cent sprayer. Regarding livestock possession by the households, 33.33 per cent possess local cow and 33.33 per cent possess buffalo respectively.

The average labour availability in the study area showed that**,** own men and women labour availability in the micro watershed was 11.68 each, while the hired labour (men) availability was 2.13. Further, 2.78 per cent of the households opined that hired labour was inadequate during the agricultural season. In the study area.

Out of the total land holding of the sample respondents (51.19 ha), 58.10 per cent of the area is under dry condition and the remaining 41.90 per cent area is irrigated land. There were 11.00 bore wells. The Bore well was the major source of irrigation for 30.56 per cent of the households. The major crops grown by sample farmers are Redgram, Cotton, Greengram, Sorghum and Greengram and cropping intensity was recorded as 97.56 per cent.

The per hectare cost of cultivation for Redgram, Cotton, Greengram, Sorghum and Greengram was Rs.27664.31 , 39010.47, 28479.44, 25585.40 and 28479.44 with benefit cost ratio of 1:1.50, 1: 2.50, 1: 0.90, 1: 0.50 and 1:0.90 respectively.

Further, 50.00 per cent of the households opined that dry fodder was adequate and 50.00 per cent of the households have opined that the green fodder was adequate.

The average annual gross income of the farmers was Rs. 139136.11 in micro-watershed, of which Rs. 60108.33 comes from agriculture.

Sampled households have grown Mango, Lemon and Coconut trees were also planted in the farm fields. None of the households shown interest to cultivate horticultural crops.

Regarding marketing channels, 100.00 per cent of the households have sold agricultural produce to the local/village merchants and 100.00 per cent of the households have used tractor for the transport of agriculture commodity.

Firewood connection was the major source of fuel for domestic use for 102.78 per cent of the households. Piped supply was the major source for drinking water for 97.22 per cent of the households. Electricity was the major source of light for 100.00 per cent of the households. In the study area, 100.00 per cent of the households possess toilet facility. Regarding possession of PDS card, 105.71 per cent of the households possessed BPL card and Cereals (100.00%), pulses (19.44%), oilseeds (8.33%) were adequate for consumption.

Farming constraints experienced by households in the micro watersheds were lower fertility status of the soil (86.11%) wild animal menace on farm field (5.56%), frequent incidence of pest and diseases (77.78%), high cost of fertilizers and plant protection chemicals (75.00%), high rate of interest on credit (5.56%), low price for the agricultural commodities (80.56%), lack of marketing facilities in the area (83.33%), inadequate extension services (2.78%), lack of transport for safe transport of the agricultural produce to the market (80.56%).

Implications of the survey

- ✓ Result indicated that, there were 57.35 per cent were illiterate hence, extension methodologies such as demonstration, street play, drama, video shows will be effective in dissemination of the technologies in the micro watershed.
- ✓ The data indicate that, 97.22 per cent of the households possess katcha house. Hence, the development department while implementing the watershed plan should focus on agriculture to enhance the productivity of major crops in the area to increase the income of the farmers.
- ✓ Results indicated that the local institutional participation of the household members in the micro watershed is minimal hence, activities like membership campaign, awareness creation about the benefits of membership in local institutions and strengths of organized groups must be conveyed.
- ✓ Majority of the households in the watershed have experience in use of mobile phones, and television hence, these mass media can be effectively utilized for transfer of technology as well as for information dissemination.
- ✓ The farm machinery/implement possession in the micro watershed was found to be minimum the reasons may lack of knowledge or lack of financial ability which can be

addressed through training on use of different farm implements, providing information on different sources of finance for purchase of farm implements.

- ✓ The possession of livestock such as crossbred cow found is less hence, farmers must be made aware of the benefits of crossbred cow in increased milk production.
- ✓ The possession of livestock such as sheep, goat and poultry was found to be low hence, farmers may be informed the role of subsidiary enterprises in enhancing the income and information on financial support for subsidiary activities.
- ✓ The data indicate that, job/work was the reason for all the migrants hence, farmers may be trained on profitable agriculture or self employment such has animal husbandry, plate making, sheep rearing, goat rearing, rabbit rearing with suitable information on sources of financial support.
- ✓ The results indicate that there was a change in quality of life due to migration hence, the developmental departments should take actions to arrest migration and to improve the quality of the life in rural areas.
- ✓ Households possess 29.75ha (58.10 %) of dry land and 21.45ha (41.90 %) of irrigated land hence, the availability of the dryland agricultural technologies such as short duration crops, high yielding drought resistance crop varieties, drip irrigation technology and subsidy information will be helpful for the farmers to enhance the productivity of land and as well as farmers income.
- ✓ Few of the bore well in micro watershed found non functional hence, farmers may be trained on possibility of bore well rejuvenation.
- ✓ Bore well was major source of irrigation for 30.56 per cent of the households. hence, in order to increase the area under irrigation as well as to increase the water use efficiency farmers may trained on drip irrigation and provide the information on subsidy for drip irrigation equipment's along with the information on different agencies which provides the financial assistance for drip irrigation.
- ✓ Farmers have grown 20 coconut, 20 Lemon trees in the fields, Further, 43 mango trees were also planted in the farm fields. Hence, production technologies related to these crops can be made available to the farmers for better adoption.
- ✓ The cropping intensity in the micro watershed was found to be (97.56 %) hence, care must be taken by the implementing agency to bring uncultivated land into cultivation through suitable measures.
- ✓ Many of the household members have borrowed loan from cooperative banks which has higher rate of interest hence, farmers may be sensitized on the different sources of credit with lesser interest rate such SHGs etc.
- ✓ The results indicated the non availability of both green and dry fodder throughout the year hence, fodder development activities can be taken up in the micro watershed.
- ✓ The average annual gross income of the households Rs.60108.33 from agriculture, Rs.0.00 from business and Rs. 79027.78 from wages and. Agriculture was found to be the major source of income for households hence; the development activities should

focus on productivity enhancement, marketing arrangements and agricultural technology dissemination to have a direct impact on the farmers.

- ✓ The cultivation of forest species is found minimal hence, information and production technology related to agro-forestry and integrated farming system.
- ✓ Except summer ploughing the adoption of other soil and water conservation structures is minimum hence, the farmers in the micro watershed should be sensitized on the use of different conservation structures for soil water conservation.
- ✓ Cereals and pulses found be adequate for per cent of the households respectively hence, farm households and the farm women must be trained on importance of balanced nutrition and role of vegetable, milk, egg, meat in balanced diet.
- ✓ Lower fertility status of the soil (86.11%), wild animal menace on farm field (5.56%), frequent incidence of pest and diseases (77.78%), high cost of fertilizers and plant protection chemicals (75.00%), high rate of interest on credit (5.56%), low price for the agricultural commodities (80.56%), lack of marketing facilities in the area (83.33%), inadequate extension services (2.78%), lack of transport for safe transport of the agricultural produce to the market (80.56%) were the major farming constraints experienced hence, these constraints must be addressed immediately for the welfare of the farmers. Awareness to be created among the farmers to approach nearest KVKs/RSKs and other developmental departments for technical and for subsidized inputs and utilize the well established regulated markets, approaching the contract firms, direct markets to avoid the involvement of middlemen.