

# GoK-CGIAR INITIATIVE FOR IMPROVING RURAL LIVELIHOODS IN KARNATAKA

## Characterisation of Benchmark Sites



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# **GoK-CGIAR Initiative for Improving Rural Livelihoods in Karnataka**

## **Bijapur District**

### **District Profile**

Bijapur district is located in the northern part of Karnataka state. It lies between two major rivers namely the Krishna and the Bhima. The district is bounded on the North by Sholapur district of Maharashtra State, on the West by Belgaum district, on the East by Gulbarga district and on the South by Bagalkot district of Karnataka. Bijapur district is land locked district and is accessible both by rail and road. Bijapur town is the headquarters of the district. The district has a total geographical area of 10,541 sq kms. The district has been divided into five taluks for administrative convenience viz. Basavana Bagewadi, Bijapur, Indi, Muddebial and Sindagi taluks. The population and density of the district as per the 2001 Census is 18,06,918 and 245 km<sup>-2</sup> respectively.

### **Soil and Climatic**

The district is occupied by three types of soils viz. black soils, red sandy soils and mixed soils. Black soils derived from basaltic bedrock. These soils in upland areas are shallow and are deep in valley portions. The infiltration characteristics are poor to moderate. These soils are alkaline in nature, low in potassium and nitrogen. Black cotton soils with high clay and humus content in low-lying areas. They have high moisture holding capacity and on drying up these soils develop open cracks. Red soils, which are sandy in nature derived from granites, gneisses and sandstones, are found in southern part of Muddebial taluk of the district. Mixed soils are derived from the fringe areas of Deccan traps and granites, gneisses, limestones and sandstones in Muddebial and Basavana Bagewadi taluks of Bijapur district. These are dark greyish brown and dark brown to dark reddish brown in colour. Their texture varies from loam to clay.

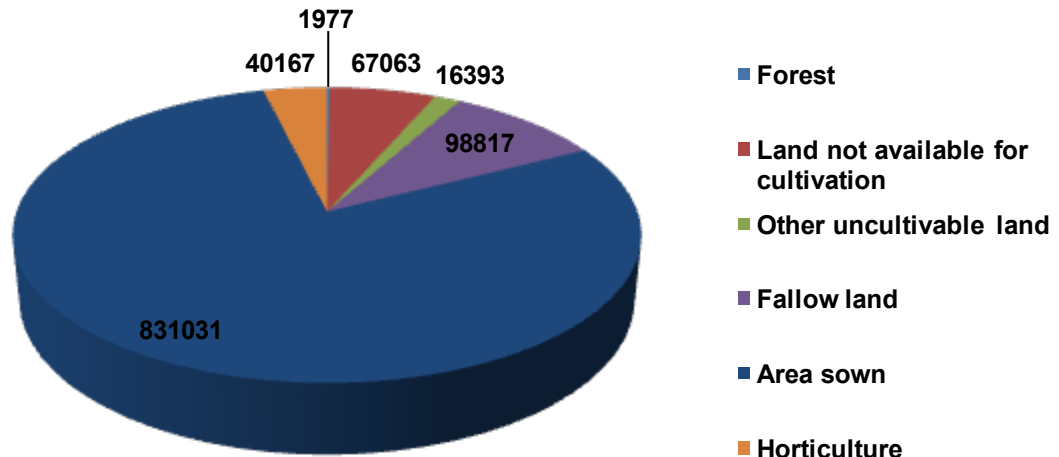


Figure 1. Land use area (ha) in Bijapur district.

The district experiences semi-arid climate with extreme summers. It enjoys a climate with hot summers and chilly winters. Incidence of drought occurs due to inadequate and erratic distribution of rainfall in space and time. The dust storms and severe heat waves are common during April and May months. The district receives an average annual rainfall of 578 mm. The normal rainfall of the district received is varied from 569 to 595 mm and the normal rainy days also varied from 36.5 to 39.5 mm in a year. Rainfall for last 12 years is shown in Figure 2.

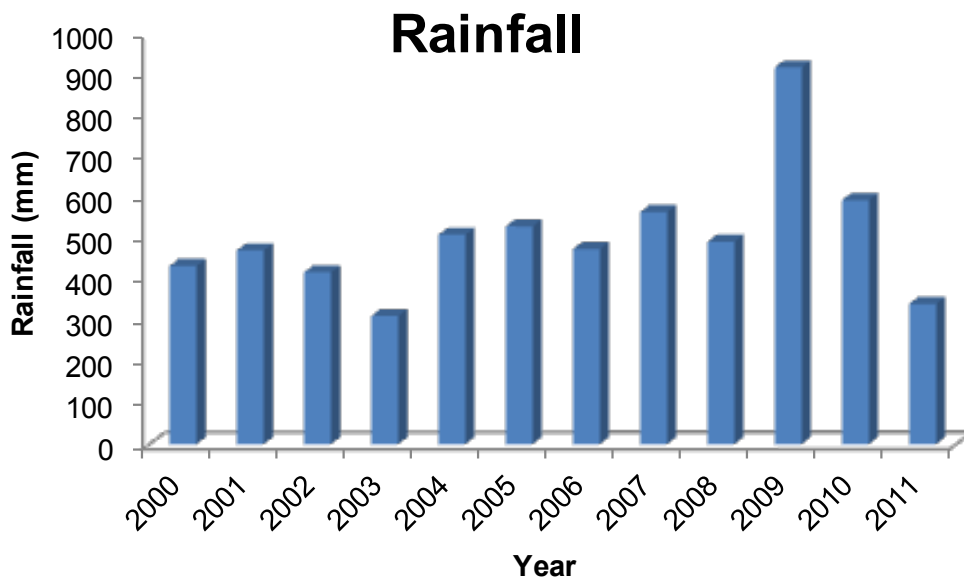


Figure 2. Rainfall in Bijapur district during 2000 to 2011.

## Agriculture Scenario

Bijapur district is a predominantly agricultural district. The soil is fertile. Paddy, Kodo-Kutki, sorghum and maize are the main agricultural crops sown by farmers in the district. Blackgram (urad) is the main pulse crop and lentil crop is also sown by farmers. Mustard is the main oil seed crop.

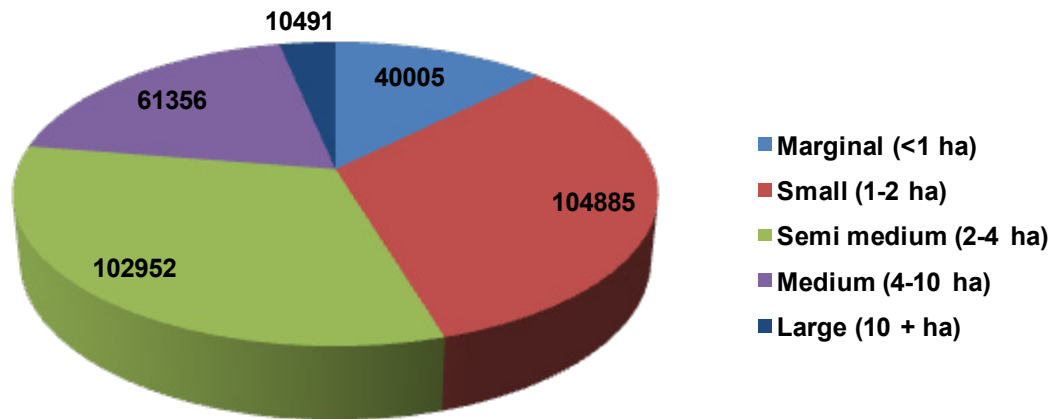


Figure 3. Numbers of farmers with respect to landholding classification

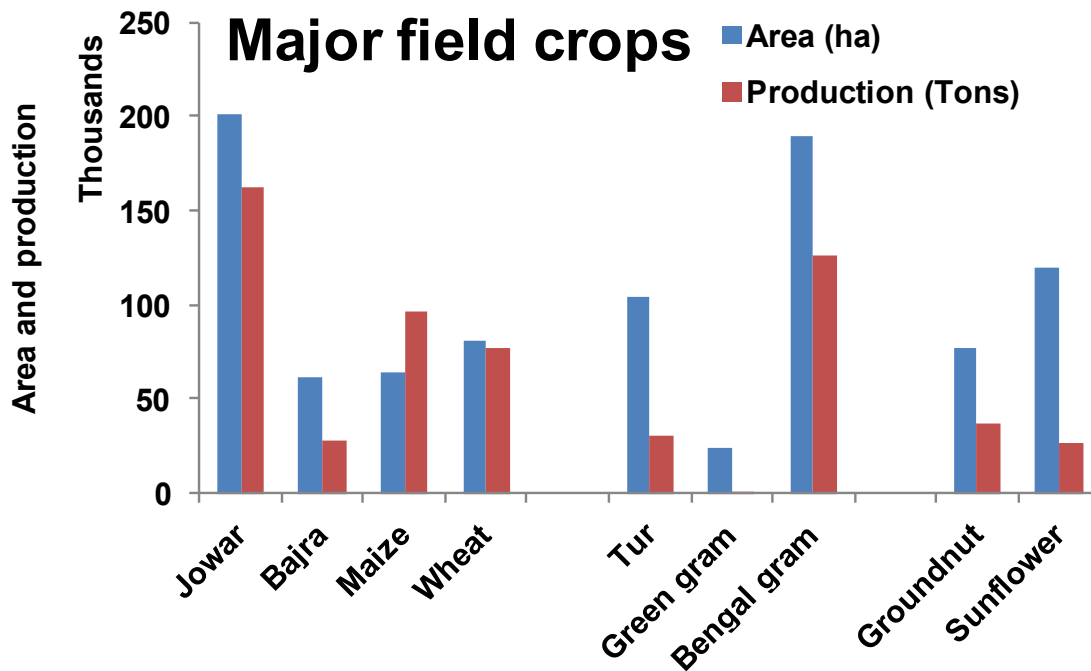


Figure 4. Area and production of main agricultural crops grown in Bijapur district

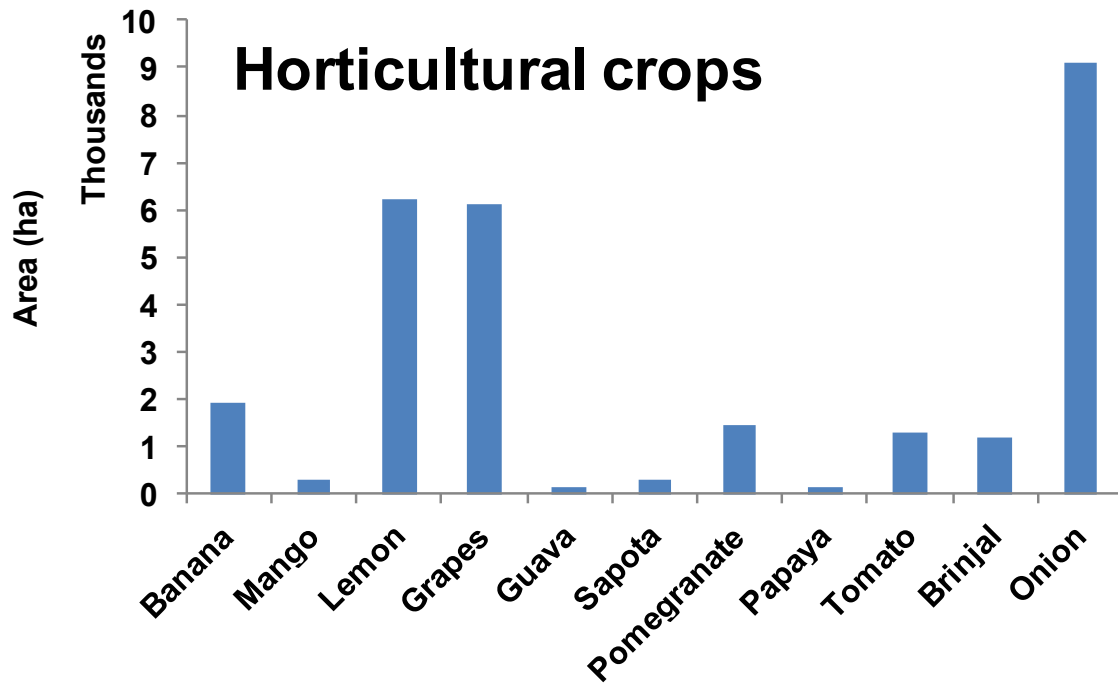


Figure 5. Area under different horticultural crops grown in Bijapur district.

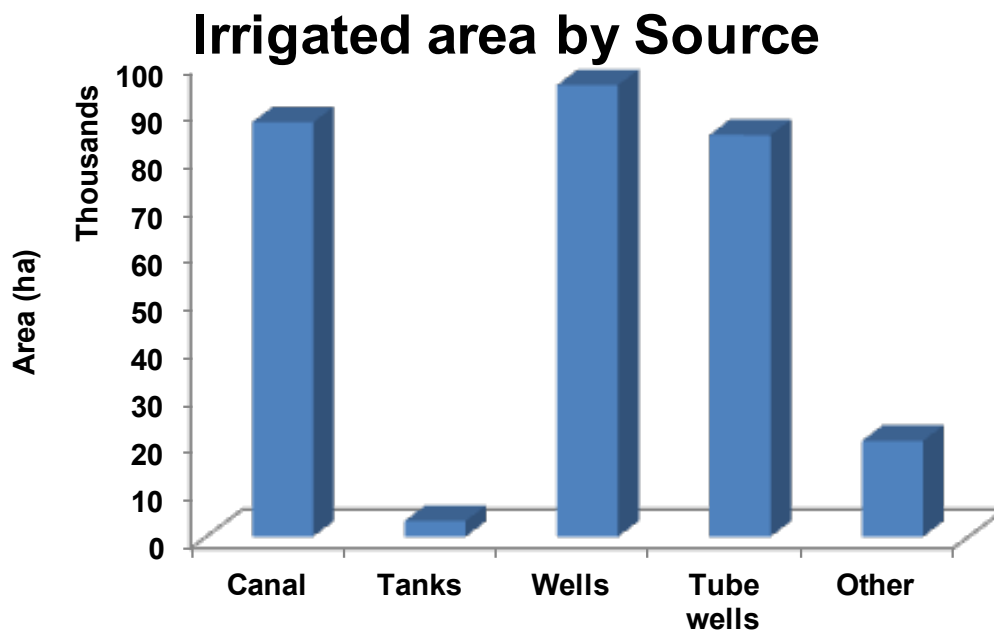


Figure 6. Irrigated area in Bijapur district from different sources.

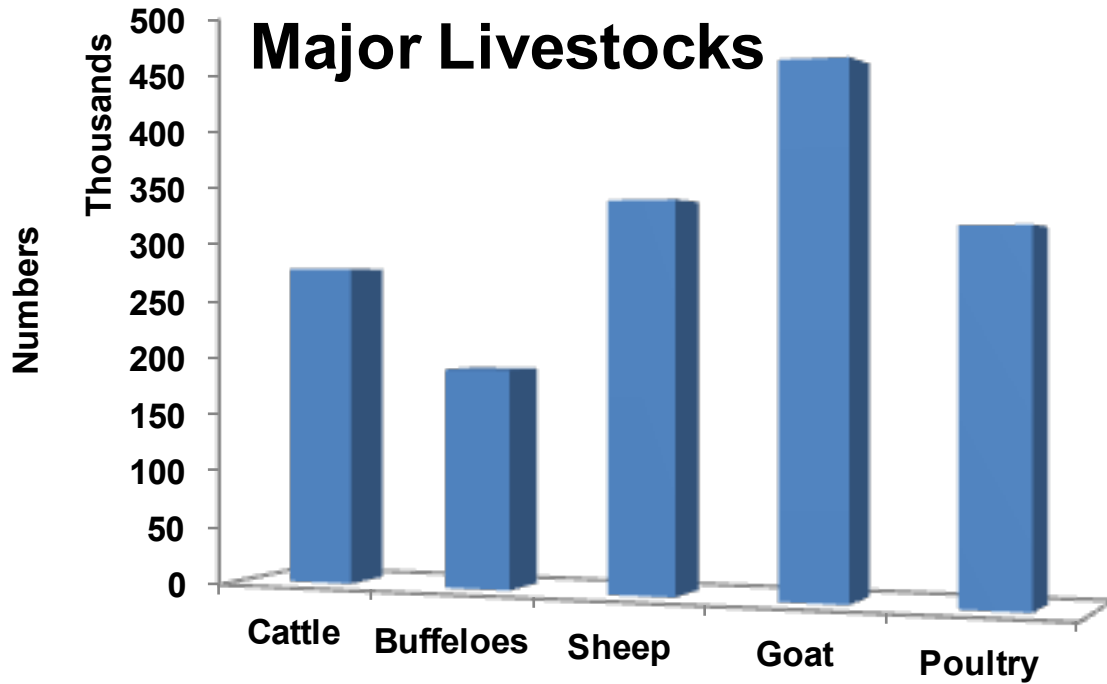


Figure 7. Number of livestock and poultry birds in Bijapur district.

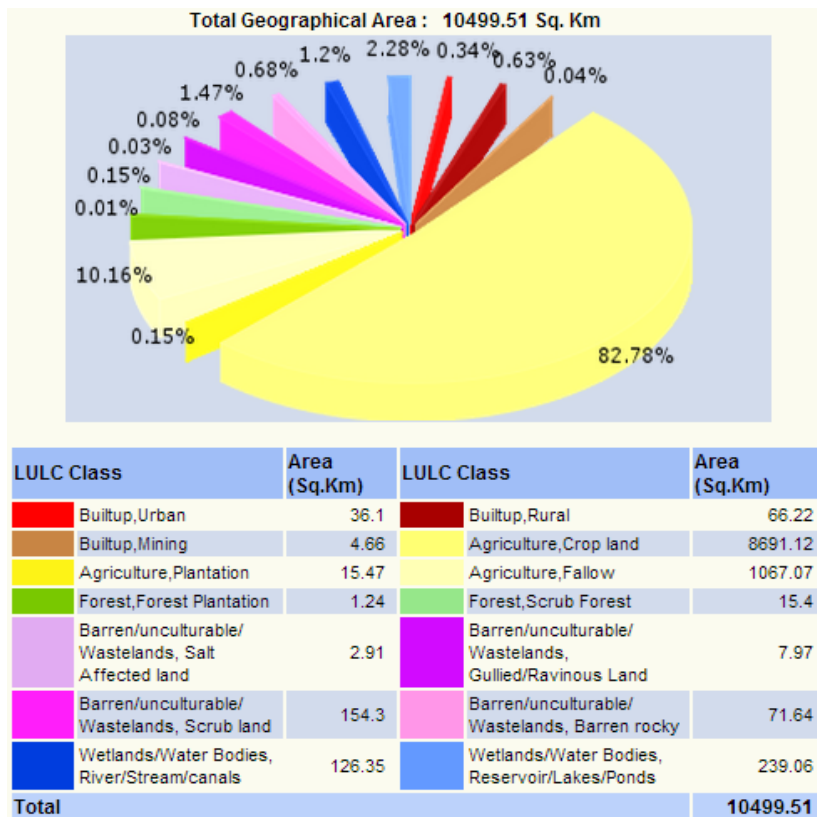


Figure 8. Major land use of Bijapur district

## Profile of benchmark site

**Table 1A. Household statistics and cultivable area under rainfed and irrigation for the five selected villages (first year of the project) in Bijapur**

Villages	Household size			Geographical area (ha)	Cultivable area (ha)	Rainfed area	Irrigated
	Small	Medium	Other			ha	
Kadlewada	112	48	113	697	671	553	113
Chikkarugi	452	125	530	3354	3227	2604	500
Hitnalli	262	88	450	2242	2142	2007	135
Atharga	780	359	843	5403	5105	4451	654
Tennelli	168	90	235	1380	1338	720.1	618.4
Total	1774	710	2191	13076	12483	10335.1	2020.4

**Table 1B. Area to be cover in second year (2014-2015)**

Taluk	Village	Geographical area (ha)	Cultivable are in (ha)
Bijapur	Aheri	3633	3423
	Jambagi	3898	3441
	Honnalli	1419	1309
	Nagathan	4520	4122
	Hunsyal	959	921
Total		14429	13207

**Table 1C. Area to be cover in third year (2015-2016)**

Taluk	Village	Geographical area (ha)	Cultivable are in (ha)
Indi	Masali B.K.	3229	3011
	Masali K.D.	873	834
	Banthnal	6202	839
	Tamba	870	839
Sindagi	Balaganur	5860	5815
	Chandakavate	5361	4873
Total		22.395	21.259



**Table 1D. Area to be cover in fourth year (2016-2017)**

Taluk	Village	Geographical area (ha)	Cultivable are in (ha)
Bijapur	Honnutagi	2257	1882
	Kumtagi	2488	2416
	Kavalgi	1398	1238
	Hadagali	3899	3495
	Kaggod	2081	1868
	Shivangi	6487	6038
	Ankalgi	2968	2784
Indi	Tadavalga	5610	5161
	Rajnal	2216	2095
	Lingadalli	2877	2764
	Shirkanalli	1250	1198
Sindagi	Chattarki	3424	3359
	Bandal	2430	2323
	Harnal	1336	1281
	Othihal	989	759
	Hatchyal	1398	1365
Total		43107	40076

## Constraints and strategies

**Table 2. Constraints and strategies for improving rural livelihood in Bijapur district based on the stakeholder analysis**

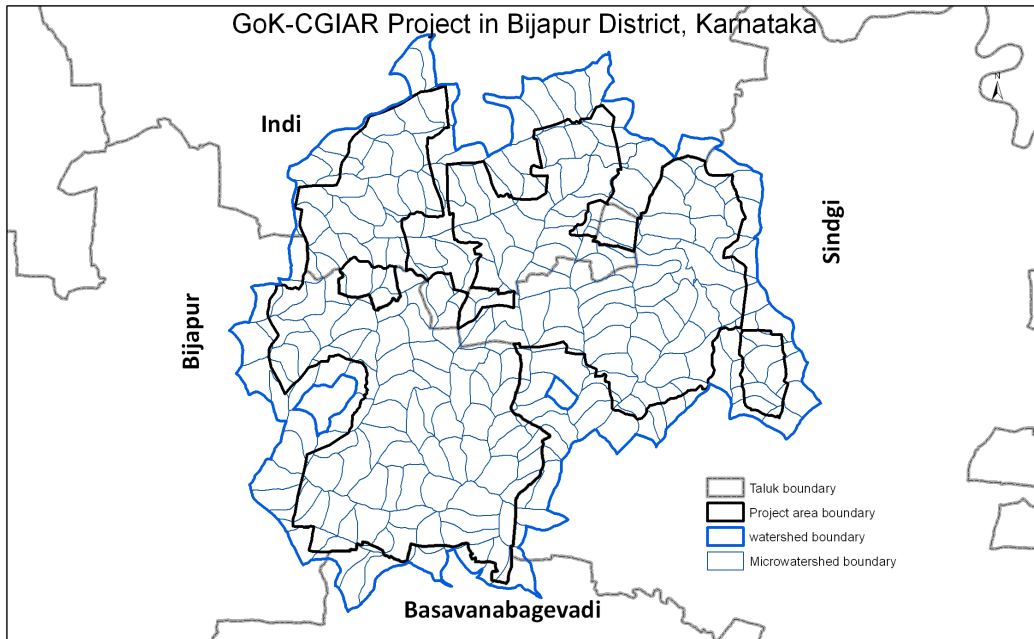
	Constrains	Strategies
Water	<ul style="list-style-type: none"> <li>• Erratic rainfall</li> <li>• Groundwater depletion</li> <li>• Groundwater quality is poor</li> </ul>	<ul style="list-style-type: none"> <li>• Recharging of groundwater through diverting runoff water into open well and bore well.</li> <li>• Counter bunding, check dams, and percolation tank.</li> <li>• Tank filling for recharging groundwater</li> <li>• Lift irrigation projects to divert river water to interior part of Bijapur</li> <li>• Desiltation of tanks</li> </ul>
Field crops	<ul style="list-style-type: none"> <li>• Low yield level</li> <li>• Mono cropping</li> <li>• Low yields in intercropping</li> <li>• 2.5 ha of agriculture land is barren and unsuitable for agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• High yielding variety</li> <li>• Soil test based fertilizer management</li> <li>• In situ moisture conservation methods (ridge and furrows, compartmental bunding, etc)</li> </ul>

		<ul style="list-style-type: none"> <li>• Organic farming</li> <li>• Micro-irrigation</li> </ul>
Horticulture	<ul style="list-style-type: none"> <li>• Cold storage facility</li> <li>• Processing plant for lemon</li> <li>• Policy for Wine industries</li> </ul>	<ul style="list-style-type: none"> <li>• Lined farm ponds or community tanks</li> <li>• High yielding variety seed</li> <li>• Protected cultivation (Greenhouse)</li> <li>• Gravel and shallow soil: Jamun, Amla, Custard apple</li> <li>• Cold storage, warehouses, and market in each taluk</li> <li>• Minimum support price for grapes and lemons</li> </ul> <p>Wine industries should included as food industries</p>
Livestock	<ul style="list-style-type: none"> <li>• Reluctant to adopt Cross bred animal</li> <li>• Not growing green fodder</li> <li>• Concentrate feed is less used</li> </ul>	<ul style="list-style-type: none"> <li>• Goat rearing</li> <li>• Back yard poultry</li> <li>• Cross bred and indigenous animals</li> </ul>
Fishery	<ul style="list-style-type: none"> <li>• Water scarcity</li> </ul>	<ul style="list-style-type: none"> <li>• Fish farming in water storage ponds</li> <li>• Rearing of finger lings</li> </ul>
Farm/ Agro forestry		<ul style="list-style-type: none"> <li>• Fruit yielding, non timber forest product yielding, and bio-fuel species may be proposed for planting on barren land</li> <li>• Planting of above species on field bunds and along the river belts</li> </ul> <p>Recommended species: Pongamia, Simaruba, Amla, Sandal, Jamun, etc.</p>

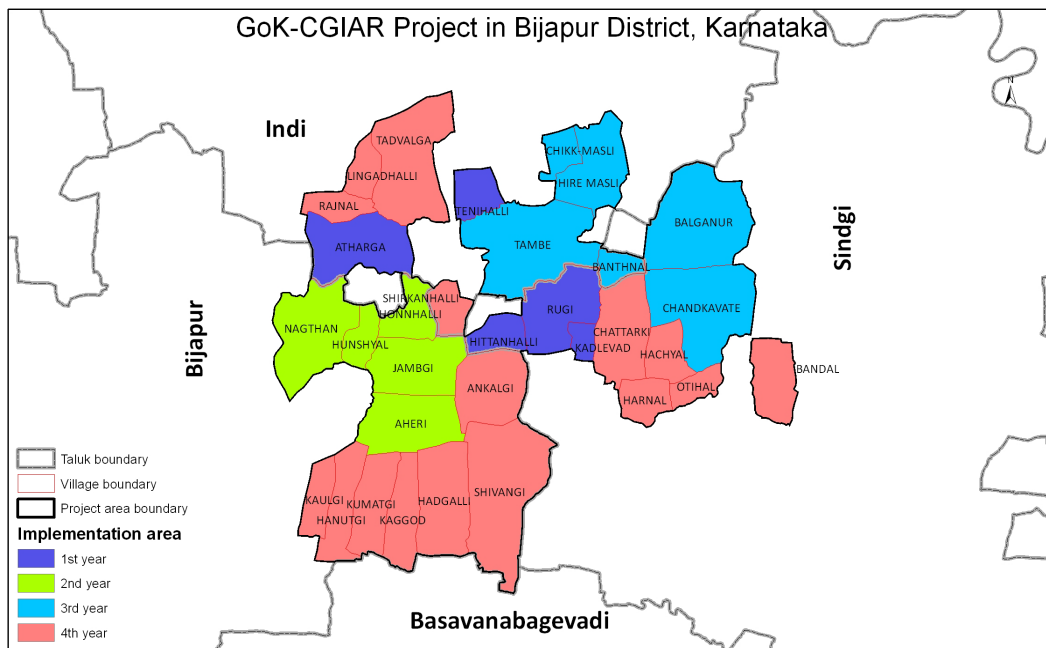
**Table 3. Schemes under different departments**

Capacity building	1. ATMA
Field crops	1. Bhoochetana
Horticulture	1. National Horticultural Mission 2. Comprehensive horticulture development 3. Subsidy for resins making unit 4. Subsidy for mechanisation 5. Subsidy for INM and IPM 6. Subsidy for model nursery
Livestock	
Fishery	
Watershed	1. Desert development program (424) 2. River valley project (17) 3. Integrated watershed program (1) 4. National water development program for rainfed areas (15)
Major and Minor irrigation	1. Lift irrigation schemes
Farm/ Agro forestry	1. Hasiruhonnu

**Soil biophysical, chemical, nutrient status, landuse details, watershed development activities in selected GoK-CGIAR villages in Bijapur district**



**Figure 9. Location of selected GoK-CGIAR villages in Bijapur district**



**Figure 10. Year wise GoK-CGIAR project implementation in selected GoK-CGIAR villages**

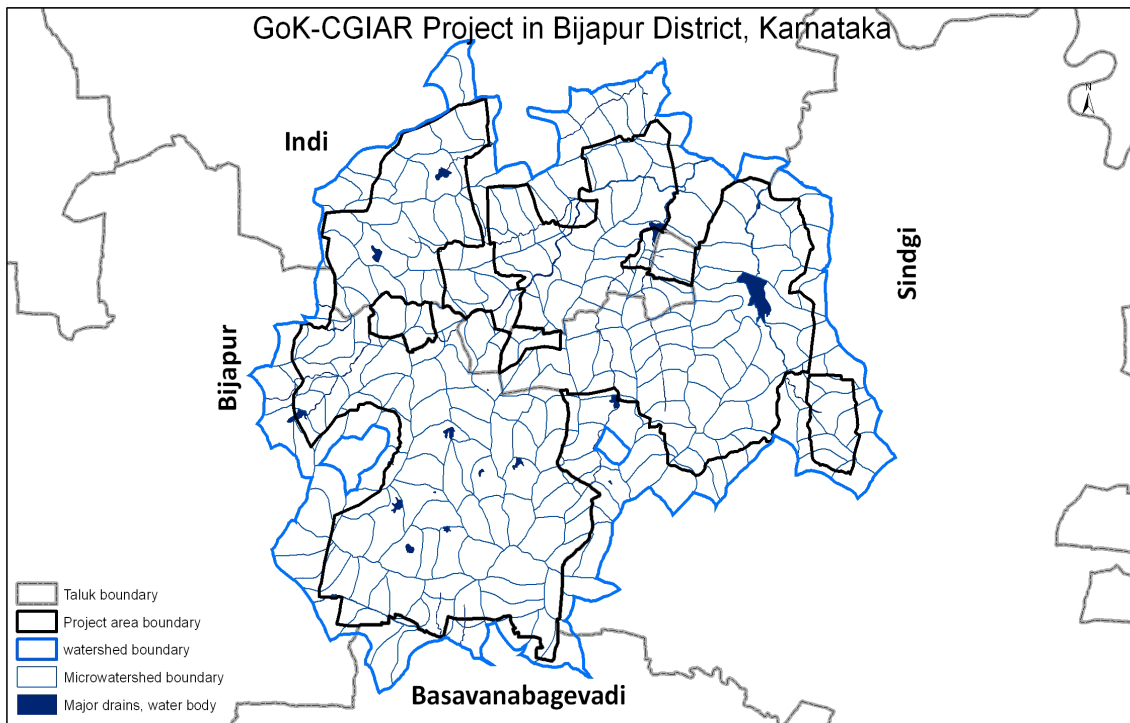


Figure 11. Micro-watersheds, major drains and water bodies

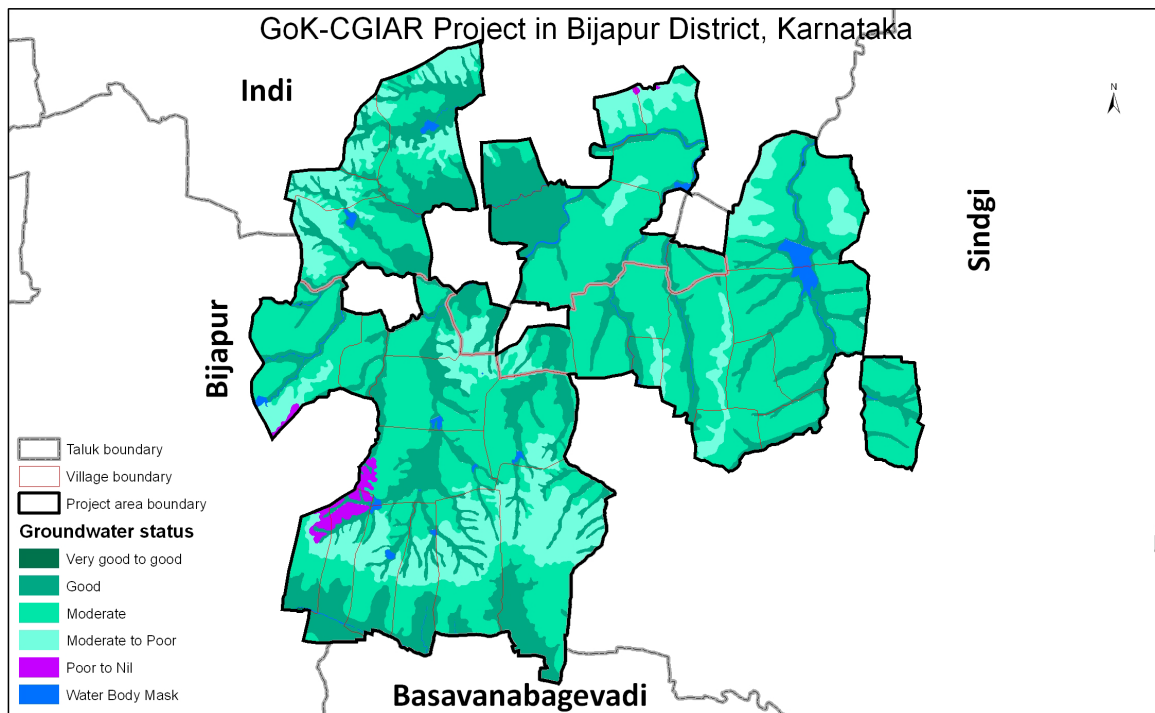
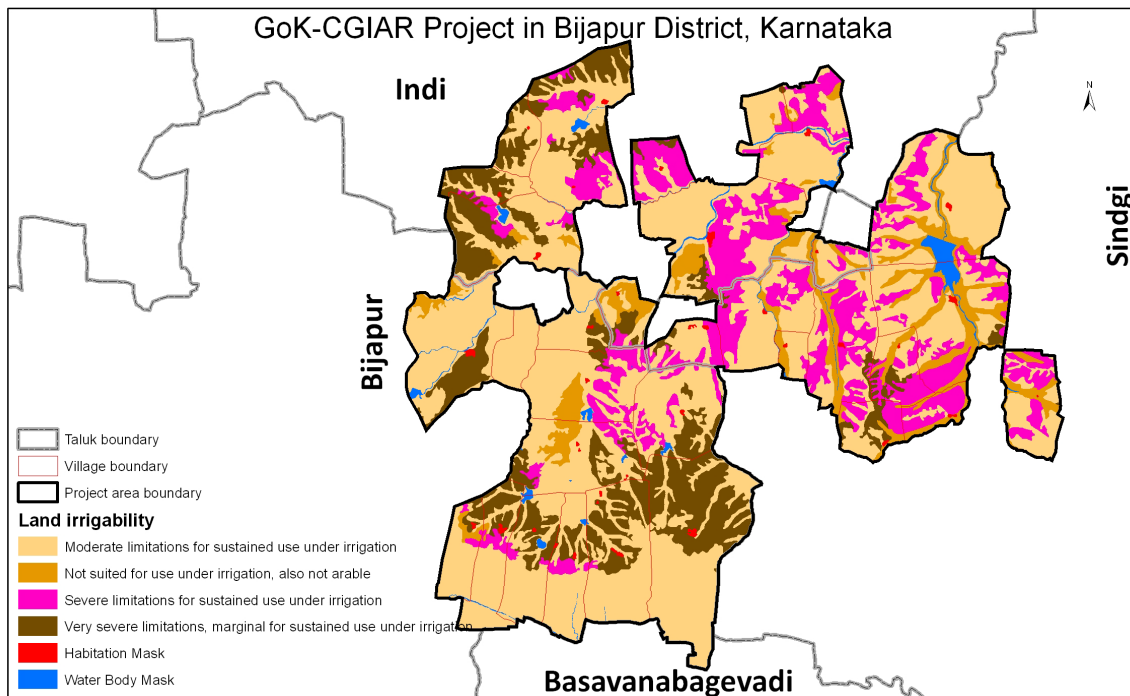
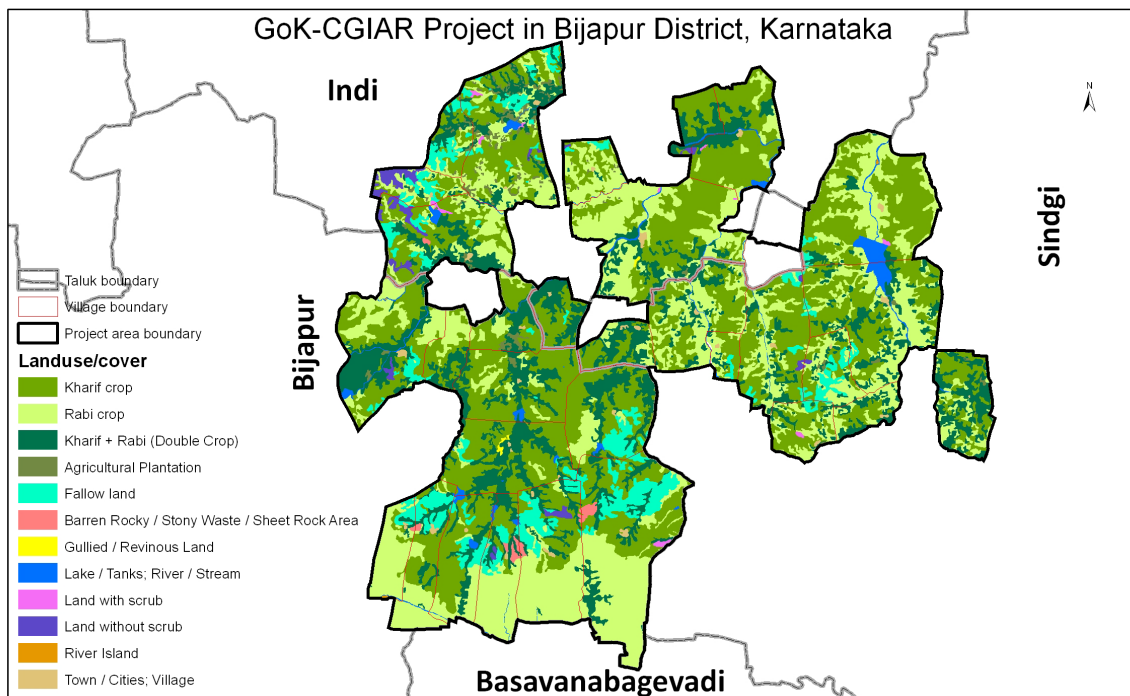


Figure 12. Groundwater status of selected Gok-CGIAR villages



**Figure 13. Potential agricultural land for irrigation purpose**



**Figure 14. Major land use cover in selected GoK-CGIAR villages**

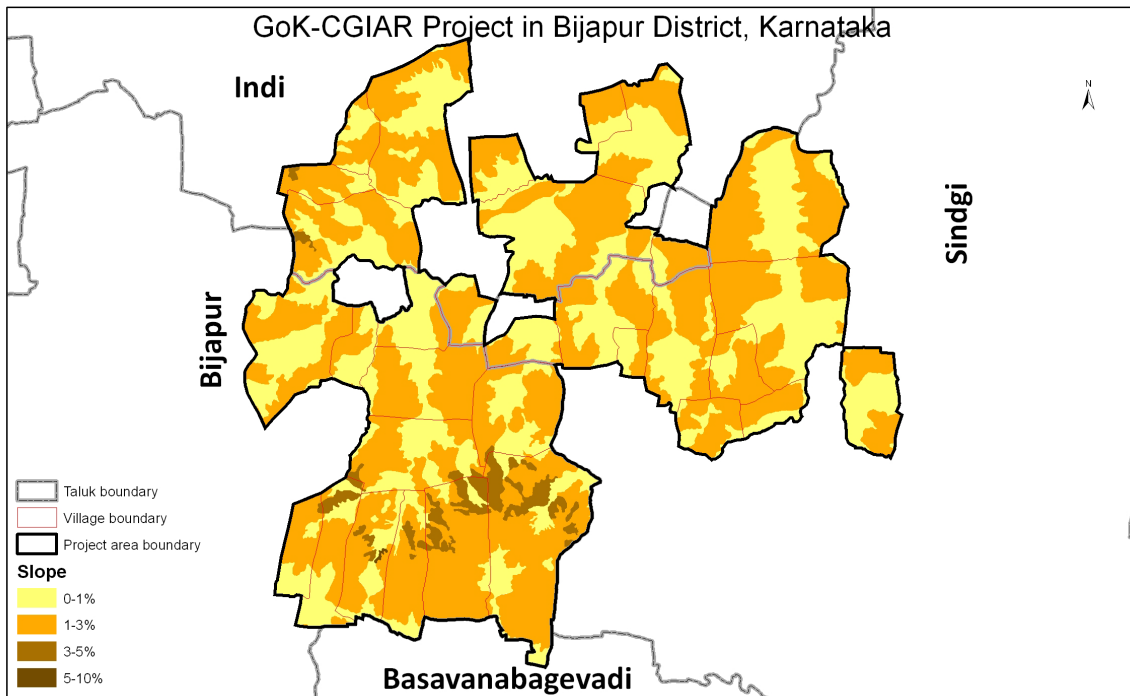


Figure 15. Average land slope in selected GoK-CGIAR project villages

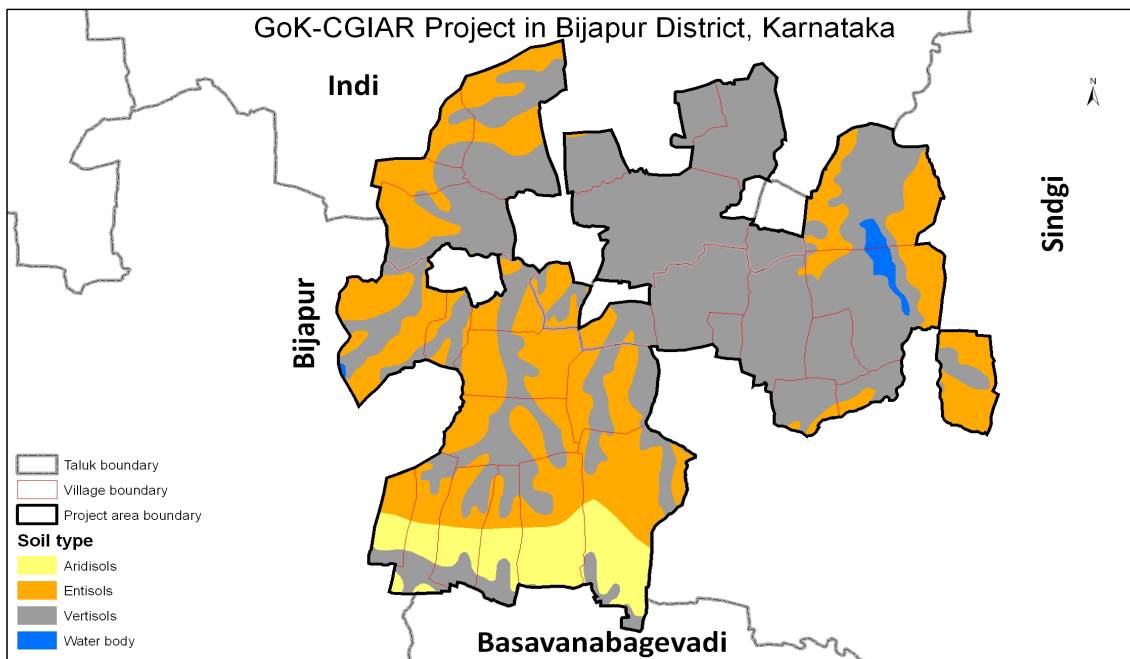
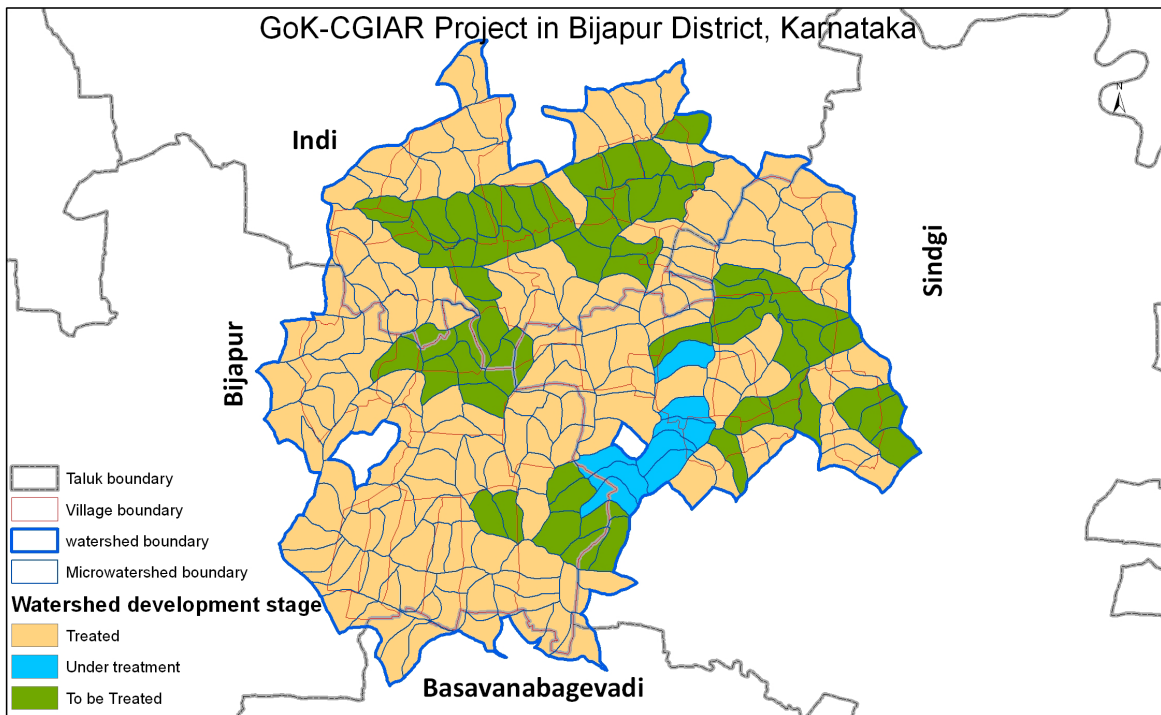
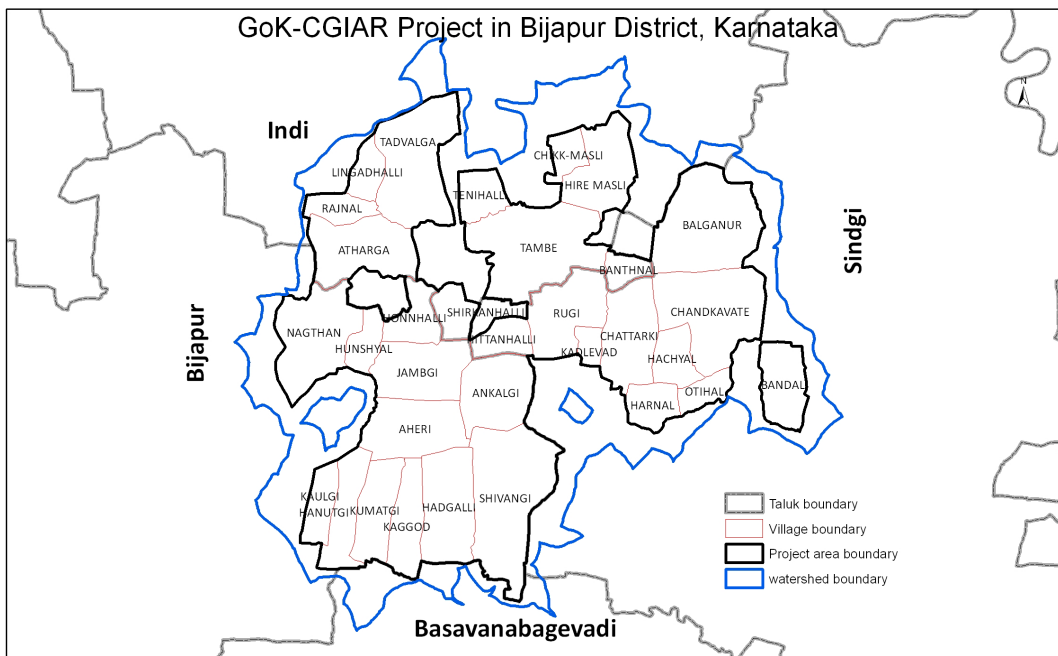


Figure 16. Major soil type in selected GoK-CGIAR project villages



**Figure 17. Stage of watershed development interventions in selected GoK-CGIAR project villages**



**Figure 18. Political and hydrological boundary of selected GoK-CGIAR project villages**



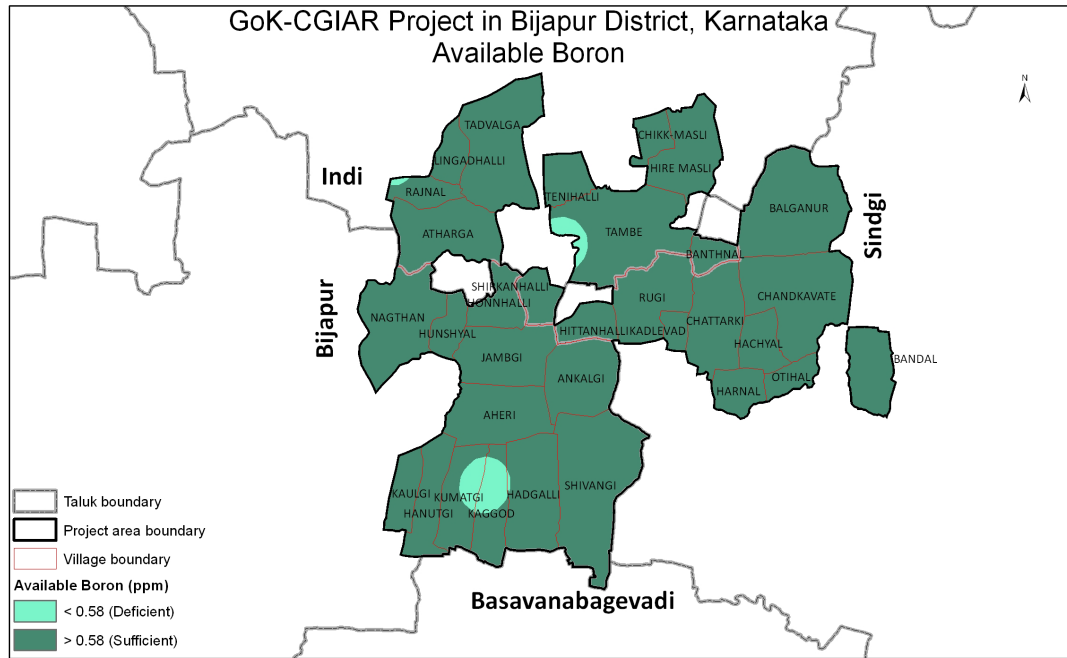


Figure 19. Available Boron status in soils of selected Gok-CGIAR villages

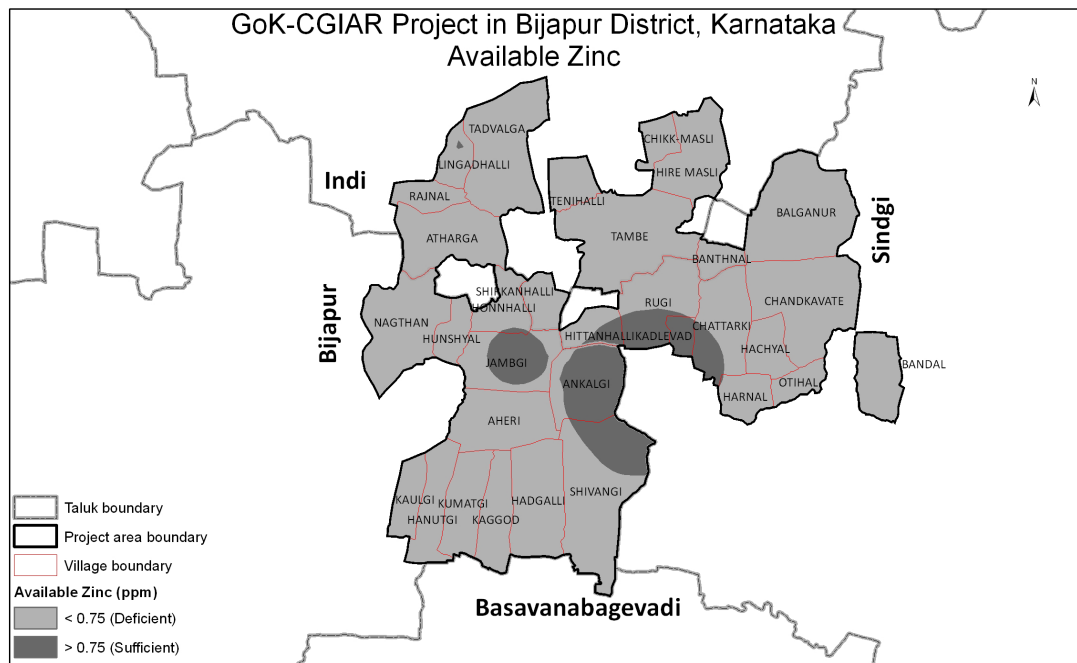
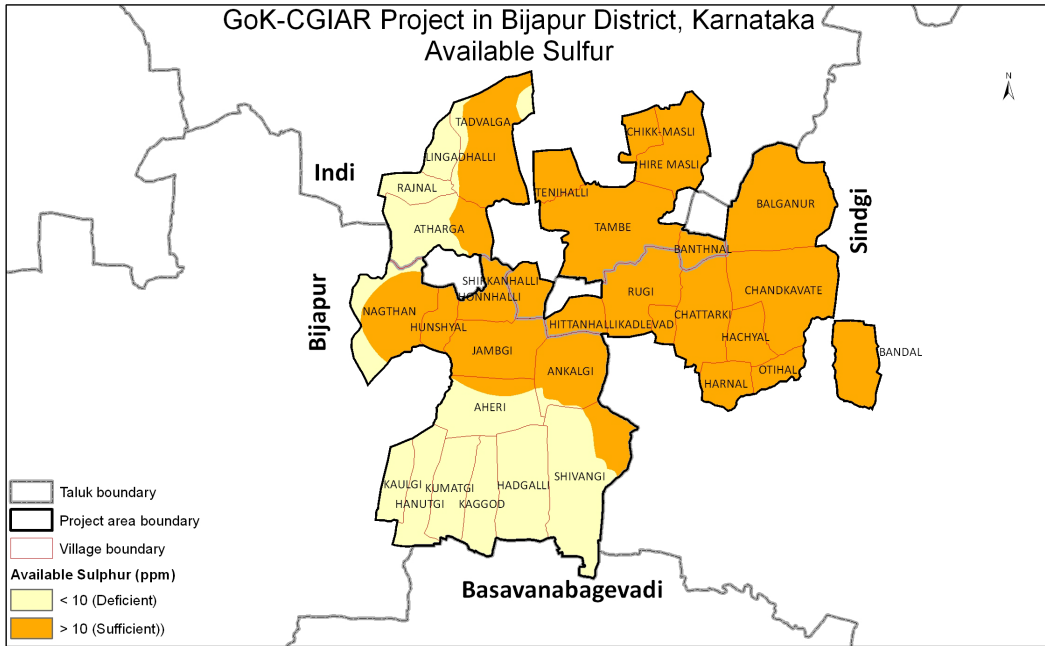
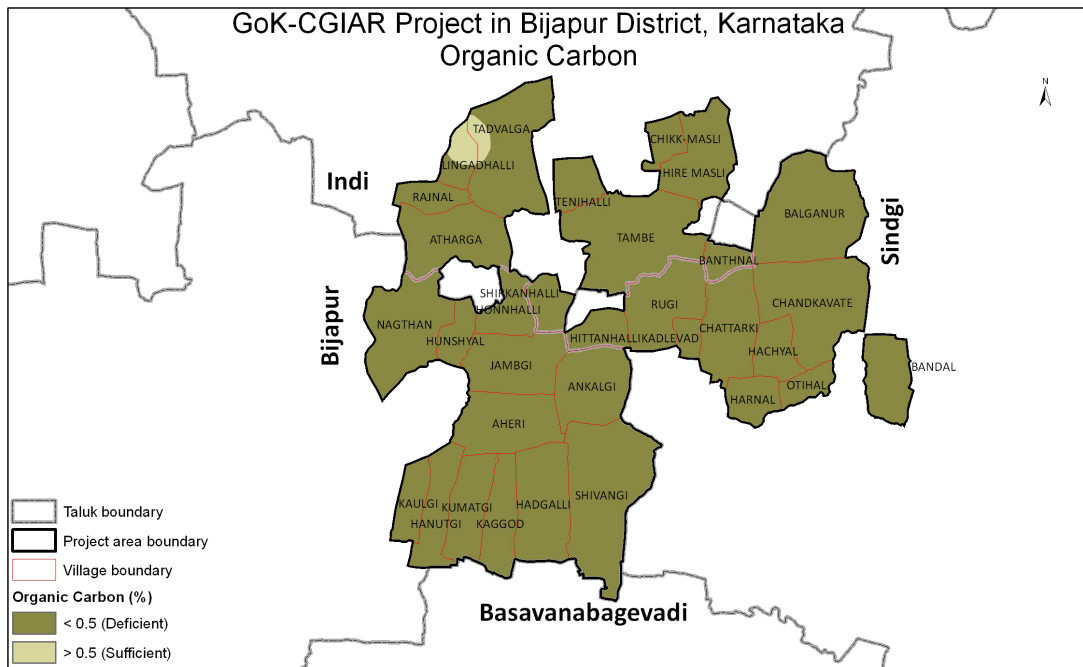


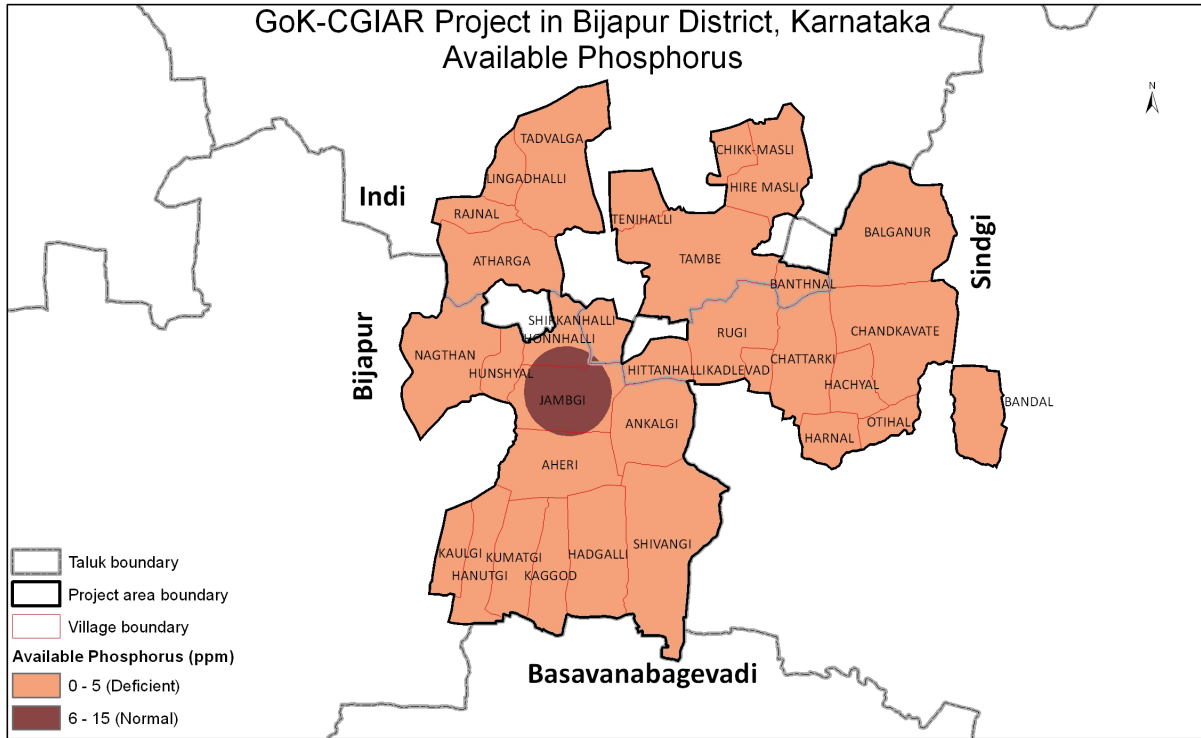
Figure 20. Available Zn status in soils of selected Gok-CGIAR villages



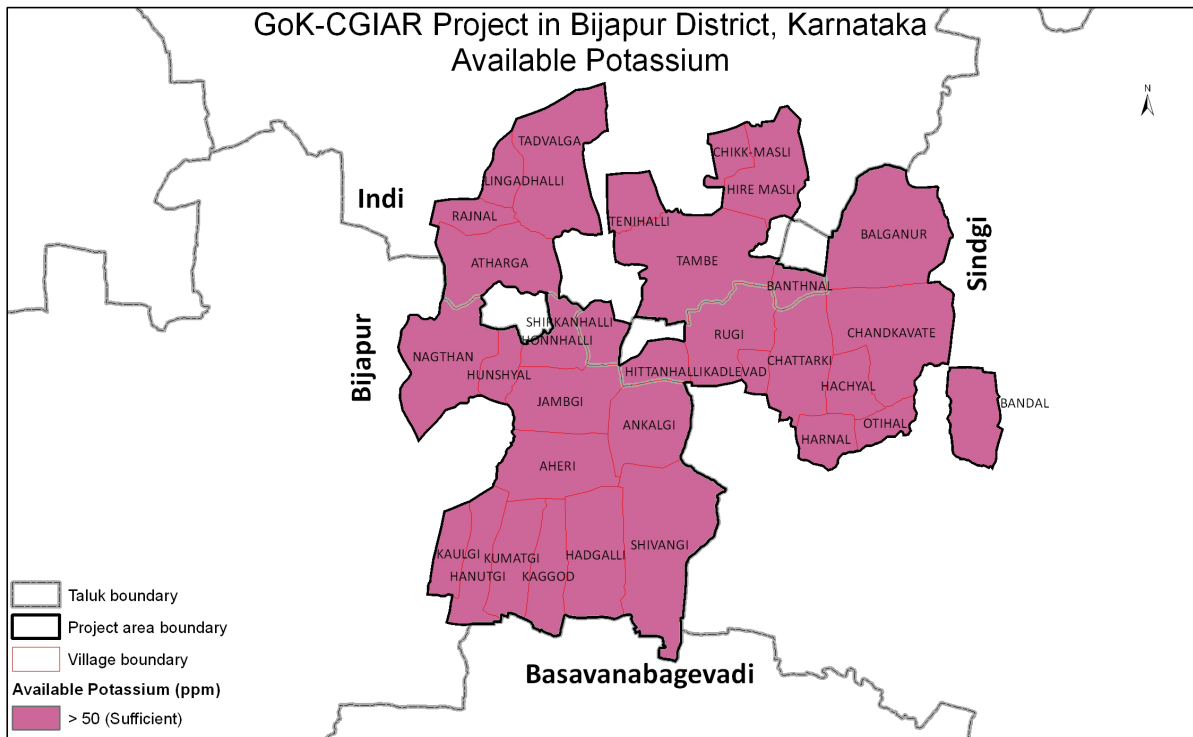
**Figure 21. Sulfur status in soils of selected Gok-CGIAR villages**



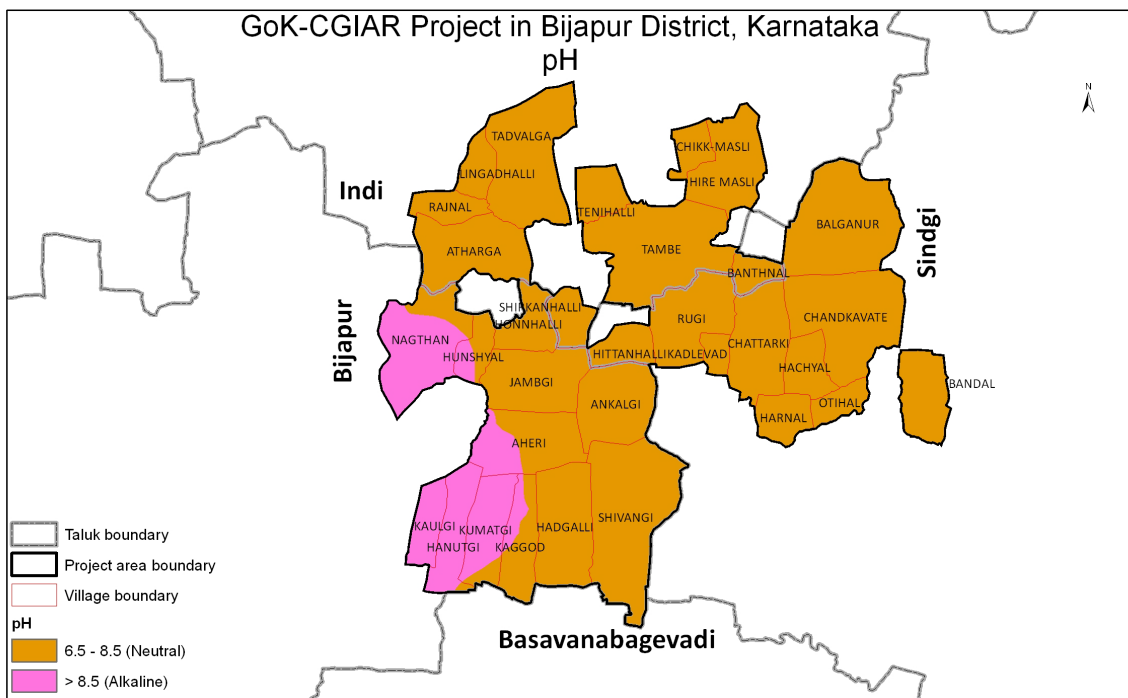
**Figure 22. Soil Organic Carbon status in selected Gok-CGIAR villages**



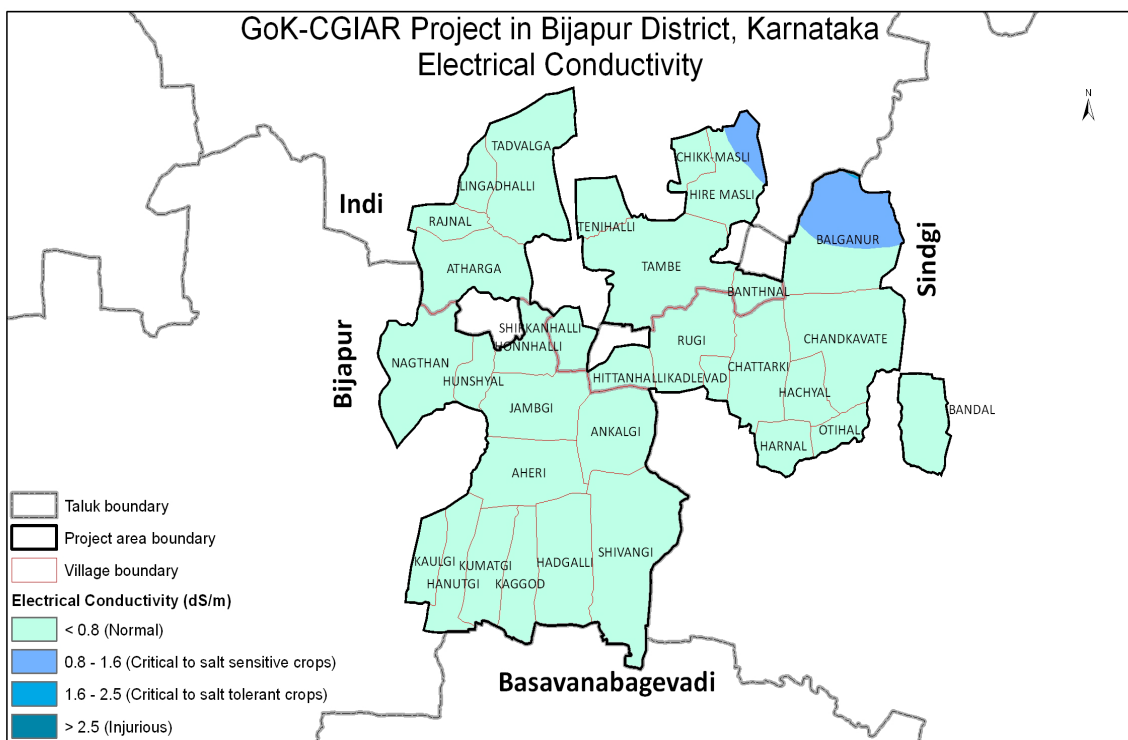
**Figure 23. Available Phosphorus status in soils of selected Gok-CGIAR villages**



**Figure 24. Available Potassium status in soils of selected Gok-CGIAR villages**



**Figure 25. Soil pH status in selected Gok-CGIAR villages**



**Figure 26. Soil electrical conductivity (EC) status in selected Gok-CGIAR villages**

# **Raichur District**

## **Introduction**

Raichur district belongs to North Eastern Dry Zone (Raichur, Manvi and Deodurga taluks) and Northern dry zone (Zone 3, Sindhanur and Lingasugur taluks) of Karnataka comprising five taluks, 808 villages, 164 gram panchayats and 8 towns with a total population of 16.69 lakh and a density of 200 persons/ sq.km. About 70 per cent of the geographical area (8356 sq.km) is under net cultivation and only 4 per cent of it is classified as forest.

## **Agriculture**

Agriculture is the backbone of the districts economy. About 42 per cent of the net cropped area in the district is irrigated. There are 0.57 lakh marginal holdings covering an area of 0.35 lakh ha, about 0.79 lakh small holdings covering an area of 1.17 lakh ha, 0.70 lakh semi-medium holdings covering an area of 1.93 lakh ha., 0.38 lakh medium holdings covering an area of 2.28 lakh ha and 0.071 lakh large holdings covering an area of 1.04 lakh ha. Overall there are 2.53 lakh holdings covering an area of 6.78 lakh ha.

The following thrust areas have been identified for the productivity and production of paddy, cotton under irrigation and *Rabi* jowar, bajra, sunflower and groundnut under rainfed situation.

1. Soil health improvement through better organic farming
2. Integrated pest and disease management
3. Integrated farming system
4. Strengthening of extension work at panchayat and hobli levels.

As far as technology exchange is concerned, measures will be taken to reduce the existing gap between laboratory and land. Even though, the region is well positioned in agriculture, land and supporting activities, it has several weakness and constraints which make the district to reel under very poor socio-economic conditions. To overcome these lacunae, based on the Karnataka Agriculture Policy, 2006, innovative schemes have been identified and the growth drivers of the district have been recognized. Improvement of soil fertility by growing green manuring crops, bio-fertilizer, vermicompost, micronutrient applications, water use efficiency, supply of good quality inputs and providing market avenues etc., are taken care of.

In dry land areas of the district, the limited development activities with respect to soil and water conservation and water harvesting have resulted in the inefficient use of these resources. The soil degradation is another important problem responsible for low crop productivity. The proposed project aims at empowering the farmers with knowledge and skills, besides providing best quality seeds of important crops and by holding demonstrations on predominant crops at panchayat level. Also, by providing facilities at different levels in the fields of animal husbandry, marketing, sericulture, fisheries which would help the farmers to prosper in the right direction.

## **Horticulture**

The total area under major fruit crops is 2299 ha, while the minor fruit crops like guava, lime and fig occupy 417 ha. The major vegetables grown in the district are tomato (451 ha), brinjal (290 ha) and chilli (1158 ha). However, the area under flower crops, aromatic and medicinal plants is very meager, and there is a lot of scope to increase the area under these crops.

### **Thrust areas**

1. Area expansion programme for fruit crops.
2. Supply of quality planting materials
3. Encouraging organic farming
4. Post harvest processing units.
5. Storage and value addition
6. Popularisation of medicinal and aromatic plants

## **Animal husbandry**

The district has 3.906 lakh cattle, 1.523 lakh buffaloes, 3.786 lakh sheep, 2.374 lakh goats, and 2.779 poultry. The forest area is only 4 per cent of the total geographical area. The land unfit for cultivation is 2,00,898 ha (24%) and uncultivated wasteland is 20,084 ha, apart from cultivable wasteland of 10712 ha. Thus, the total comes to 231694 ha (27.70 %) 15.75 % (District statistical officer, report of 2002-03). The District has a state highway of 505 km & main district level roads of 634 km & village roads 1145 km apart from 5 km Forest roads and irrigation department roads of 593 km and Railway line of 51 km.

**Thrust Areas:**

1. Encouraging Integrated Farming System (IFS)
2. Encouraging poultry farming
3. Sheep and goat rearing for wool production
4. Promotion of biogas
5. Introduction of rabbit rearing

**Fisheries**

“Fisheries” is one of the important sectors in the district. The two perennial rivers, Krishna and Tungabhadra, flow through the district. Water spread area is around 192 km. And the network of irrigation canals which render vast tracts of waterlogged condition can be tapped for fish culture.

**Thrust Areas:**

- Exploitation of saline and waterlogged areas.
- Introduction of new breeds
- Strengthening market avenues

**Sericulture**

Sericulture is an important sector in the district. Presently this industry is concentrated mainly in the dry land belt of Deodurga and Lingasugur talukas and it can be encouraged in the other potential regions of the district.

**Thrust Areas:**

- Introduction of new mulberry varieties
- Strengthening of extension activities

**Watershed**

Soil and water management through watershed approach requires holistic efforts of all development departments. The departments should focus on the following aspects.

1. Soil and water conservation measures.
2. Encouraging silvi-horticulture in dry land
3. Water harvesting structures
4. Groundwater recharge

## **Command area development authority (CADA) (Tungabhadra Project)**

Tungabhadra Command Area in Raichur district is 2,07, 371 hectares, of which, 85 per cent is black cotton soil and 15 per cent of the area is under red soil. Construction of farm ponds, check dams, nalas, bunds and other drainage structures is necessary. An effective and suitable drainage system is necessary to dispose off harmful water from the soil, and in increasing the productivity of the command area. The measures include:

1. Adopting sub surface drainage system.
2. Field drainage system
3. Land reclamation measures with suitable amendments
4. Scientific rotation of crops

## **Forestry**

The district has only about 4 per cent of its geographical area under forestry. Natural vegetation mainly consists of dry deciduous xerophytes and scrub types with stunted growth, and open canopy mostly restricted to hilly terrain and hill slopes of the district. In the recent past, villagers are showing keen interest in forestry work because of the Village Forest Committees (VFCs). The measures propose include:

1. Introduction and exploitation of biofuel plants.
2. Farm forestry
3. Road/ block planting
4. Canal side planting and other social forestry
5. Strengthening of village forest committees (VFCs).

## **Agro-based Industries**

The important crops of the district such as paddy, cotton, sunflower and groundnut have provided avenues for the establishment of agro-based industries for these produce in the district. Similarly, the expansion of area under oil palm and horticultural crops has been creating need for strengthening the agro-processing units in the district. Once the agriculture product processing units are established in the district, they not only help the farmers to get handsome returns for their produce, but also create an opportunity for the employment of rural youths. This will prevent the forced out-migration of rural youth to urban areas.



**Thrust Areas:**

1. Strengthening of agro-processing units
2. Awareness/ Training programmes

**Statistics of the District****Table 1. Raichur District Statistics**

Sl. No.	Details	Area in ha	Percentage
1.	Geographical area	<b>8,35,843</b>	
2.	Net area sown	5,81,413	(70%)
3.	Total cropped area	6,68,100	(80%)
4.	Area sown more than once	86,687	(10%)
5.	Forest	18,167	(2.17%)
6.	Land not available for cultivation		
	a) Land put to non-agriculture uses	20,563	(4.86%)
	b) Barren and uncultivable land	20,084	
7.	Cultivable waste	10,710	(1.28%)
8.	Uncultivated land excluding fallow land		
	a) Permanent pastures and other grazing land	19,816	(4%)
	b) Miscellaneous tree crops, groves	13,680	
9.	Fallow land		
	a) Current fallows	1,13,619	(18.1%)
	b) Other fallow land	37,789	
	<b>Total</b>	<b>8,35,843</b>	
10.	Net irrigated area		
	a) Canals	2,21,124	
	b) Tanks	3,540	
	c) Open wells	11,340	
	d) Bore wells	32,040	
	e) Lift irrigation	1,100	
	<b>Total</b>	<b>2, 69,144</b>	<b>(46.3%)</b>

**Explanation:**

Net area sown is around 70% of the total geographical area of the district. The net irrigated area is 46.3% of total gross cropped area.

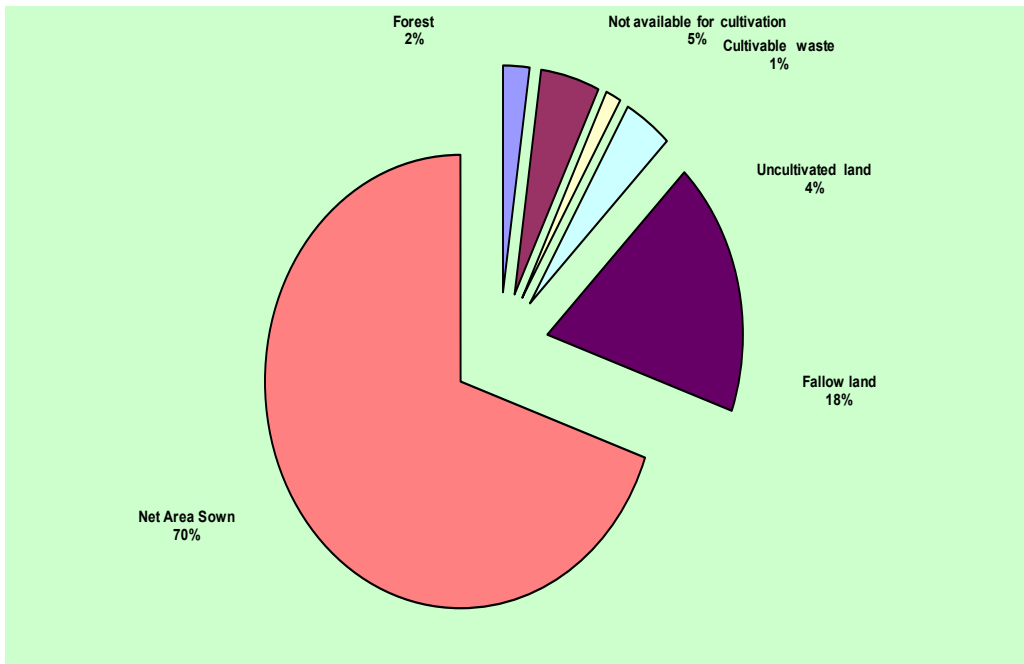


Figure 1. Agricultural land use pattern in Raichur District

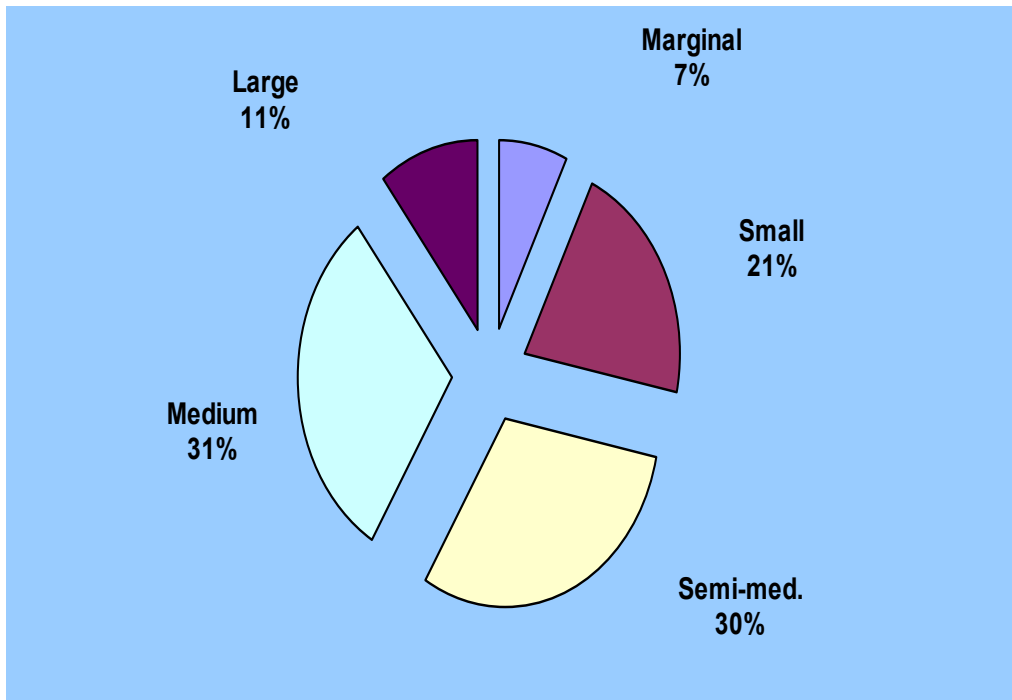


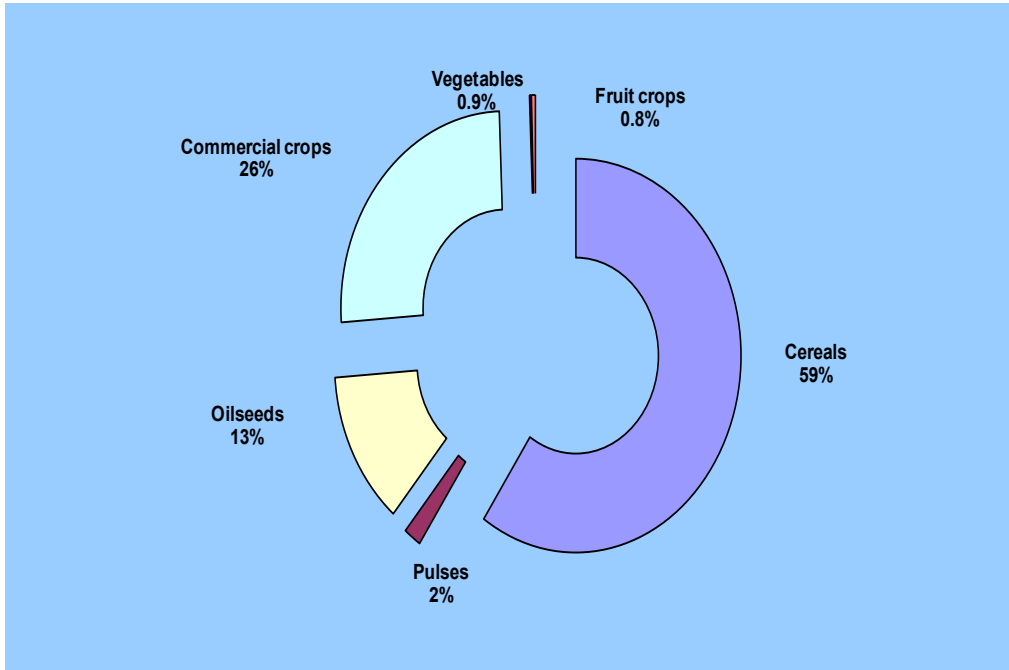
Figure 2. Agricultural land holding area in Raichur District

## Crop diversity

Cereals	: Sorghum, Paddy, Bajra
Pulses	: Redgram, Bengalgram, Horsegram, Cowpea, Green gram
Oilseeds	: Sunflower, Groundnut, Safflower, Castor, Sesamum
Commercial crops	: Cotton
Vegetables	: Brinjal, Bhendi, Chilli, cucumber, Gourds, Leafy vegetables
Animal husbandry	: Cattle, Sheep, Goat, Poultry
Kharif	: Paddy, Redgram, Greengram, Bajra, Sunflower, Groundnut, Sesamum, Cotton, Millets, Cowpea, Castor, Sorghum
Rabi	: Sunflower, Sorghum, Bengalgram, Hybrid Sorghum, Safflower, Niger, Cotton, Wheat, Tobacco
Summer	: Paddy, Cotton, Maize, Bajra, Groundnut, Sunflower

**Table 2. Area under different crops**

Crops	Area (in ha)
Cereals	376315
Pulses	10912
Oilseeds	80094
Commercial crops	161901
Vegetables	1204
Fruit crops	2460
<b>Total</b>	<b>632886</b>



**Figure 3. Area under different crops in Raichur**

## **Climate**

In Raichur, there is an average maximum temperature of 45°C whereas minimum of 18°C whereas the average Relative humidity varies from 55-95 %. The rainfall is highest in the month of September and it is spread from May to November so that two crops can be taken up especially in black soils.

### **Average Rainfall pattern:**

- Pre-Monsoon : April and May - 51.60 mm
- Southwest Monsoon : June To September - 448.5 mm
- Northeast Monsoon : October to December - 112.8 mm
- Summer : January to March - 8.2 mm

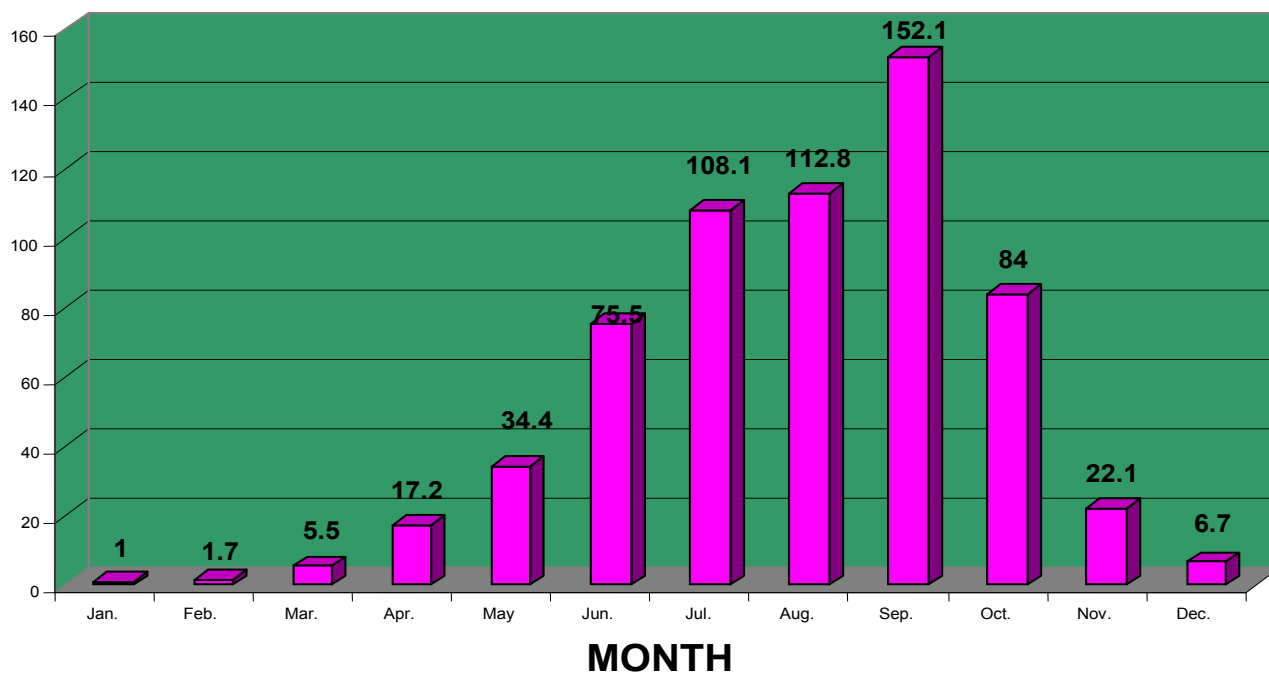


Figure 4. Normal month wise rainfall (mm)

Table 3 Land capability of soils of Raichur district

Land capability class	Description
II	Good cultivatable lands having minor problems of soil texture, drainage and erosion
III	Moderately good cultivatable lands having moderate erosion, slope, drainage and soil problems*
IV	Fairly good cultivatable lands having severe erosion, drainage, climate and soil problems*
VI	Land well suited for grazing and forestry having severe erosion, topography and soil problems*
VII	Lands suitable only for wild life

\*Soil problems: Depth, texture, gravelliness, surface crusting compaction, salinity and sodicity.

**Table 4. Soil types and cropping intensity of Selected pilot area for CGIAR Project in Raichur district for 2012-13**

<b>Major Soils (common names like shallow red soils etc.)</b>	<b>Area ('000 ha)</b>	<b>Percent (%) of total</b>
Deep black calcareous clayey soils	259.0	30.6
Medium deep red gravelly clay soils	168.3	20.0
Deep black clayey soils	135.2	16
Shallow red loamy soils	89.3	10.5
Very shallow red gravelly clay soils	30.1	3.6
Others (specify):	-	-
<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
Net sown area	560.2	124.1
Area sown more than once	135.0	
Gross cropped area	695.1	

**Table 5. Villages Selected for CGIAR Project in Raichur District for the year 2012-13**

<b>Sl NO</b>	<b>Taluk</b>	<b>Hobli</b>	<b>Village</b>	<b>Survey No</b>	<b>Geographical Area (Ha)</b>	<b>Area covered for CGIAR Project(ha)</b>	<b>Remarks</b>
1	Raichur	Gillesugur	Idapnur	1-926	3744	3600	Rainfed
		Yeregera	Pucchaldinni	1-154	678	660	
			Midgaldinni	1-188	539	539	
				Total Area		4760	
2	Manvi	Neermanvi	Haravi	1.230	144.82	1400	Irrigated
			Govindoddi	1-47	322	300	
			Sangapur	1.176	1067.26	600	
				Total Area		2300	
3	Manvi	Mallat	Kurukunda	1-214	1511.7	1500	Rainfed
			Wadavatti	1-133	903.17	880	
			Patakamdoddi	1-118	855.5	825	
				Total Area		3205	
<b>District total</b>						<b>10265</b>	

**Table 6. GOK-CGIAR Selected pilot site Watershed in Raichur District for 2013-14**

Sl No	Name of the taluk	Irrigated Area (Ha)			Dryland Area (Ha)		
		Total Geographical Area	Watershed Area available for treatment	Micro-catchment Area	Total Geographical Area	Watershed Area available for treatment	Micro catchment Area
1	Manvi	2265.28	2150	2559.75	3270.37	3165	3179.59
2	Raichur	-	-	-	4961	4760	4955.13
Sub total		2265.28	2150	2559.75	8231.37	7925	8134.72
<b>Grand Total</b>		<b>Irrigated Area (Ha)</b>		<b>Dryland Area (Ha)</b>		<b>Total</b>	
		<b>2150</b>		<b>7925</b>		<b>10075</b>	

**Table 7. GOK-CGIAR Selected pilot site for 4 years in Raichur District (2013-17)**

2013-14							
Sl No	Taluk	Irrigated Area (Ha)			Dryland Area (Ha)		
		Total Geographical Area	WS Area available for treatment	Micro catchment Area	Total Geographical Area	WS Area available for treatment	Micro catchment Area
1	MANVI	2265.28	2150	2559.75	3270.37	3165	3179.59
2	RAICHUR	-	-	-	4961	4760	4955.13
Sub total		2265.28	2150	2559.75	8231.37	7925	8134.72
<b>Grand Total = 10075</b>		<b>2150</b>			<b>7925</b>		
2014-15							
1	SINDHANUR	2261.03	2200		-	-	
2	LINGASUGUR	1283.97	1200		2181.14	2160	
3	MANVI	-	-		3547.31	3500	
4	RAICHUR	-	-		1039.33	940	
Sub total		3545	3400		6767.78	6600	
<b>Grand Total= 10000</b>		<b>3400</b>			<b>6600</b>		
2015-16							

1	SINDHANUR	4193.77	4000		–	–	
2	LINGASUGUR	3119.59	3000		3201.3	3160	
3	MANVI	–	–		–	–	
4	RAICHUR	–	–		5300.36	5200	
5	DEVADURGA	–	–		4931.37	4810	
	Sub total	7313.36	7000		13433.03	13170	
<b>Grand Total = 20170</b>		<b>7000</b>			<b>13170</b>		
<b>2016-17</b>							
1	SINDHANUR	5670.22	5300		3726	3000	
2	LINGASUGUR	4698.03	3681		8991.72	8500	
3	MANVI	–	–		8336.76	8200	
4	RAICHUR	–	–		4189.05	4000	
5	DEVADURGA	5251.06	5000		3557.51	3300	
	Sub total	15619.31	13981		28801.04	27000	
<b>Grand Total= 40981</b>		<b>15619.31</b>			<b>28801.04</b>		
<b>Grand Total Irrigated for 4 years (2013-2017)</b>			<b>26531</b>	<b>Grand total Dryland for 4 years (2013-2017)</b>		<b>54695</b>	
<b>Grand Total area for 4 years 2013-2017 = 81226Ha</b>							

## Constraints identified

### Rainfed area

- Erratic rainfall and uncertain cropping plan
- Single/Mono crop system
- Low cropping intensity
- Climate change effects
- Improper mechanization/ value chain machinery
- Low farm profitability
- Fodder- Quality/quantity issues
- Water scarcity
- High temperature
- Labour scarcity



- Poor soil and water management
- Poor groundwater quality
- Acute power shortage
- Poor infrastructure

#### **Irrigated area**

- Delayed canal supply/ unequal distribution
- Poor groundwater availability
- Poor groundwater quality
- Monotonous cropping pattern-lack of diversity
- Salinity/ water logging
- High cost of production & low farm profitability
- Labour shortage
- Residue removal/burning
- Improper mechanization
- Imbalance plant nutrient-high doses-leaching-NO<sub>3</sub> contamination in ground water

#### **Livelihood issues**

- High agrarian population
- No regular income
- No small scale enterprises
- No value addition facility
- Low literacy

#### **Institutional and infrastructure issues**

- Poor access to input/output market
- Tenent system (Lack of easy credit facility)
- Less women involvement in decision making
- Non availability of livestock development centre
- Lack of fodder bank
- Lack of Seed systems
- Lack of information/knowledge about government schemes

#### **Potential interventions in rainfed systems**

- Develop contingent cropping system modules
- Intensification by intercropping-cotton, Tur

- Cropping system optimization with resilient crop, varieties and component technologies
- Agro-Forestry/ Dryland horticulture
- Circumstance specific IFS
- In-situ moisture conservation
- Rainwater management/harvesting and use for Supplemental irrigation with micro irrigation systems
- Value chain mechanization
- Capacity building at different scales and levels

#### **Potential interventions in irrigated systems**

- Diversification/ Optimizing cropping system
- Micro-irrigation
- Laser land leveling in flood irrigation systems
- Mechanization-planting to processing
- Conservation Agriculture
- Protected agriculture/ High value horticulture crops
- Balanced plant nutrient application
- Capacity building at different scales and levels

#### **Potential interventions for improving livelihoods**

- Small scale entrepreneurship
- Capacity building
- Value addition
- IFS modules-site-specific and farmer circumstance-specific
- Seed growers/ associations
- Service windows
- Promoting agro-forestry
- Empowering educated rural youth for animal husbandry (A.I. etc), agri-clinics

**Table 8 List of different schemes/ project in the district**

Department of Agriculture	Department of Animal Husbandry	Department of Horticulture	Watershed Development Department
<ul style="list-style-type: none"> <li>✓ Rashtriya Krishi Vikas Yojane (RKVY)</li> <li>✓ Crop insurance scheme</li> <li>✓ Compensation for farmers' suicides</li> <li>✓ Subsidies for crop loan</li> <li>✓ ISOFOM</li> <li>✓ Maize production scheme</li> <li>✓ Bhoochetana programme</li> <li>✓ Seeds distribution</li> <li>✓ Plant protection programme</li> <li>✓ Soil testing</li> <li>✓ Programme for popularizing bio-fertilizer</li> <li>✓ Programme for increasing soil fertility</li> <li>✓ New agricultural promotion scheme (processing agricultural produces)</li> <li>✓ ATMA</li> <li>✓ Awards for farmers' production</li> <li>✓ Farm mechanization</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Farmers' helpline centers</li> <li>✓ Krishi Utsav</li> </ul>	<ul style="list-style-type: none"> <li>✓ SCP - Cattle/ Buffalo Unit</li> <li>✓ TSP - Cattle/ Buffalo Unit</li> <li>✓ Rastriya Krishi Vikasa Yojane - Piggery Unit</li> <li>✓ Fodder Seeds Distribution - Perennial / Single Cut</li> <li>✓ Fodder Tree Plots Development</li> <li>✓ Azolla Units</li>   <li>✓ Chaff-Cutter Distribution (to the Selected Beneficiaries)</li> </ul>	<ul style="list-style-type: none"> <li>✓ National Horticultural Mission</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Integrated Horticultural Development schemes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Integrated Watershed Management Programme (IWMP)</li> <li>✓ Jalasiri</li> <li>✓ Special Component Plan (SCP) for Scheduled caste</li> <li>✓ Tribal Sub Plan (TSP) for Scheduled tribes</li> </ul>

GOK-CGIAR Watershed Selected in Raichur District  
2013-14

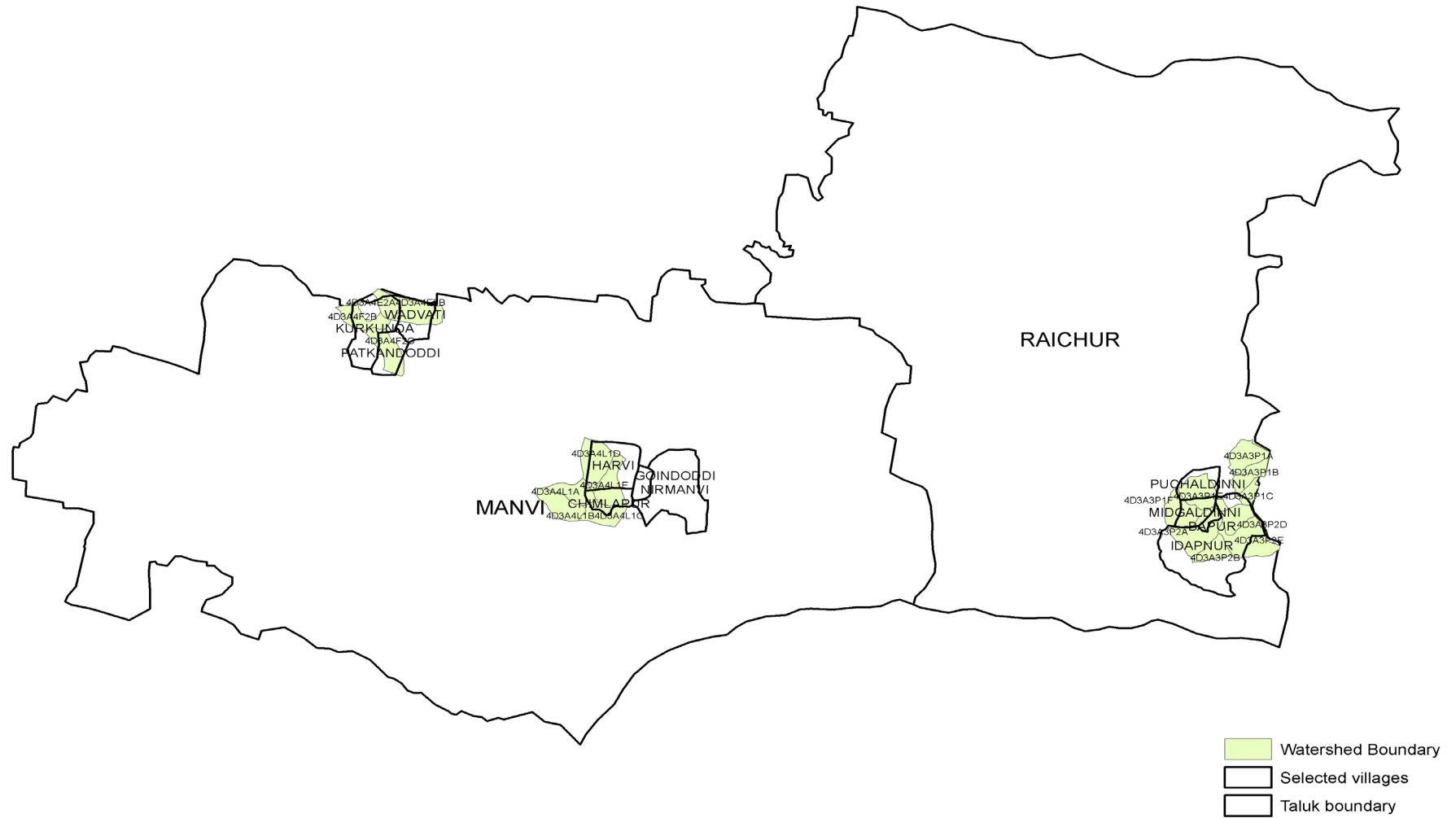


Figure 5. GOK- CGIAR selected watershed in Raichur district during 2013-14

# Soils Classification

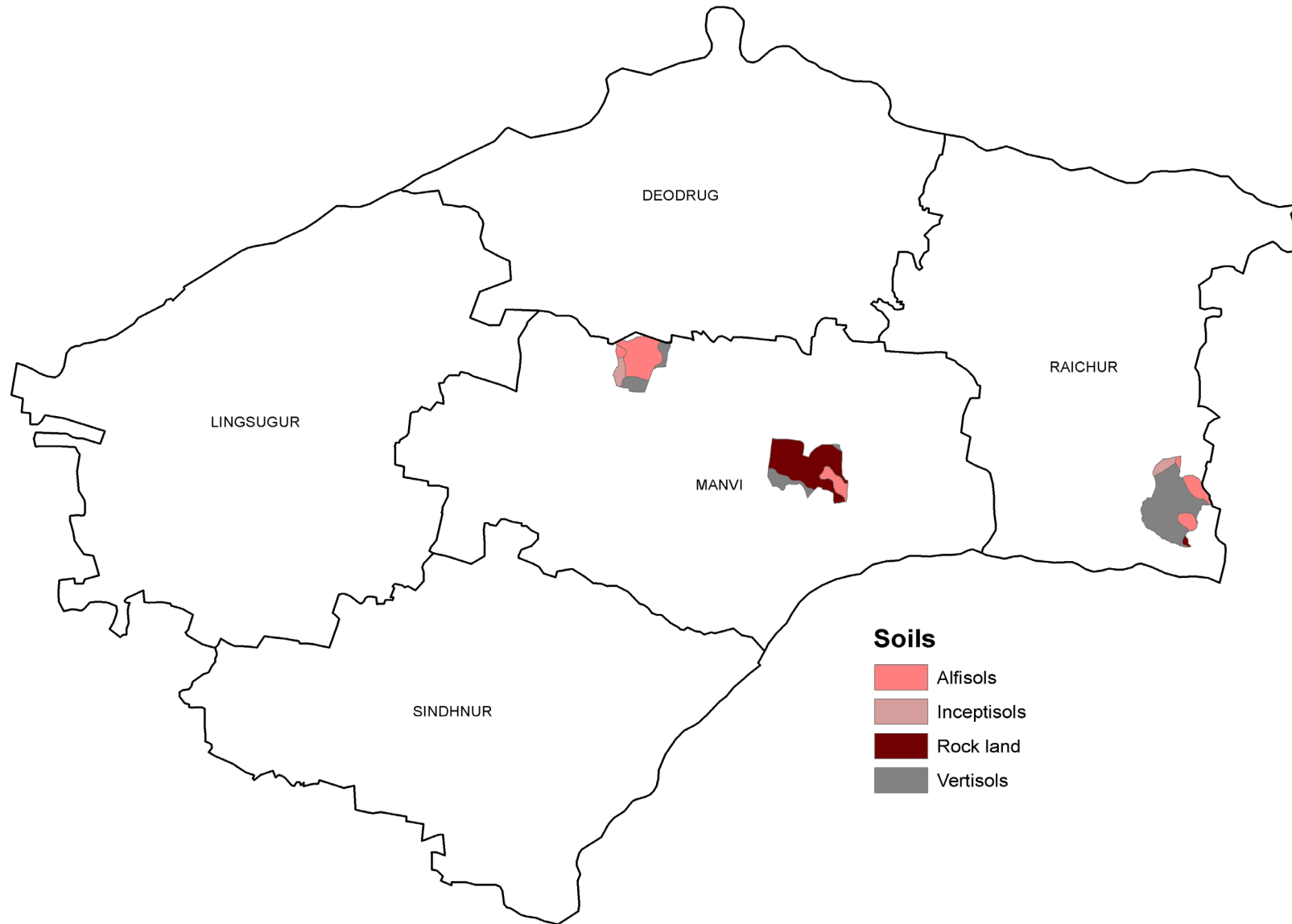


Figure 6. Soils classification in Raichur district

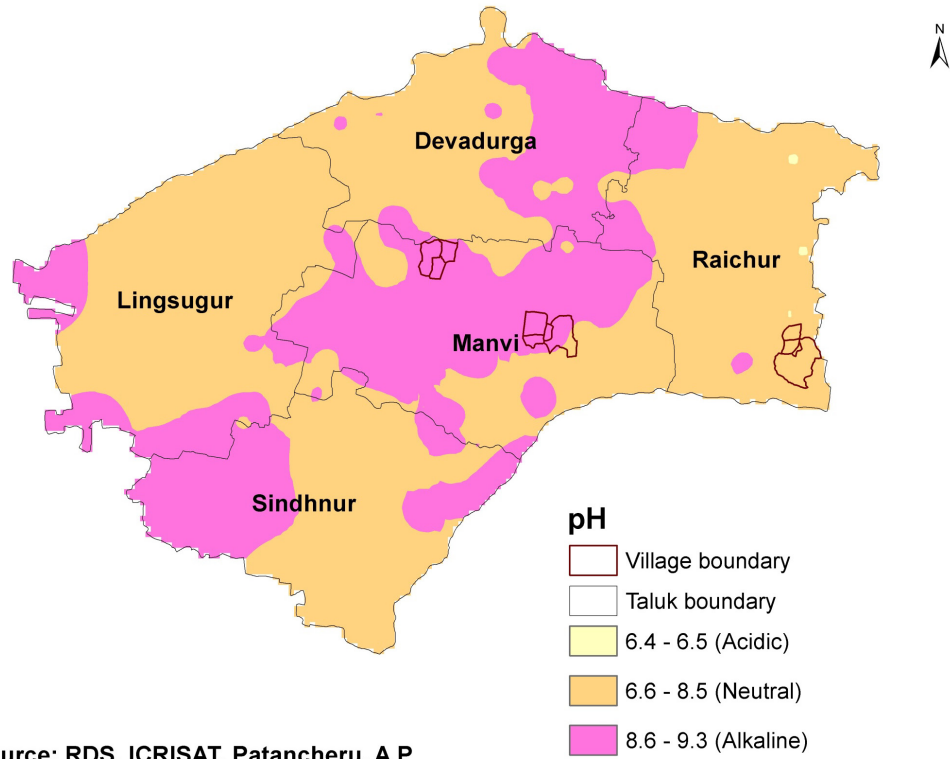


Figure 7. Status of soil pH in targeted pilot sites in Raichur district

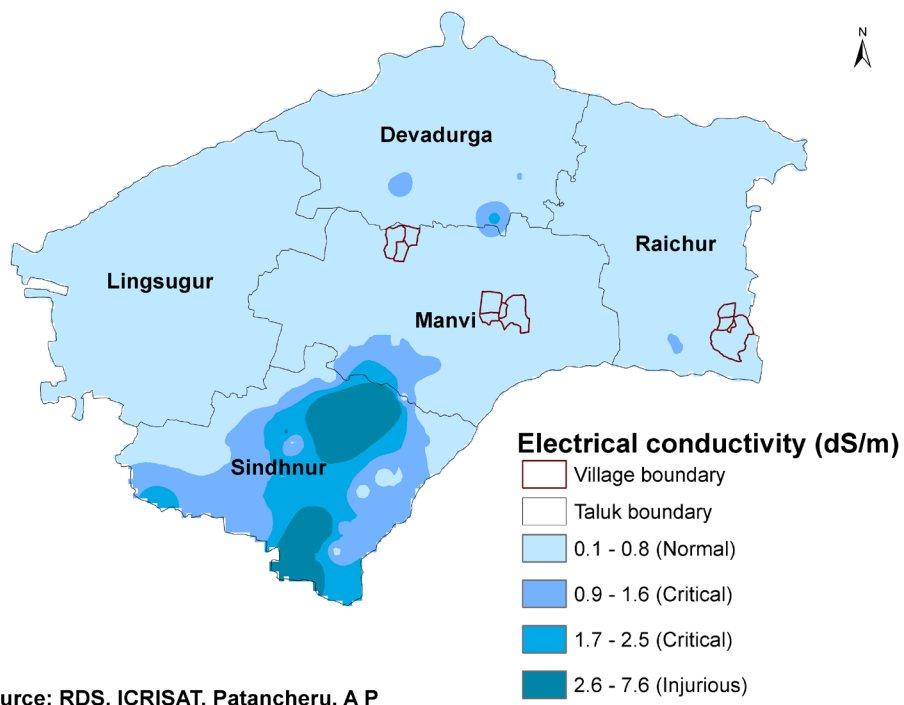
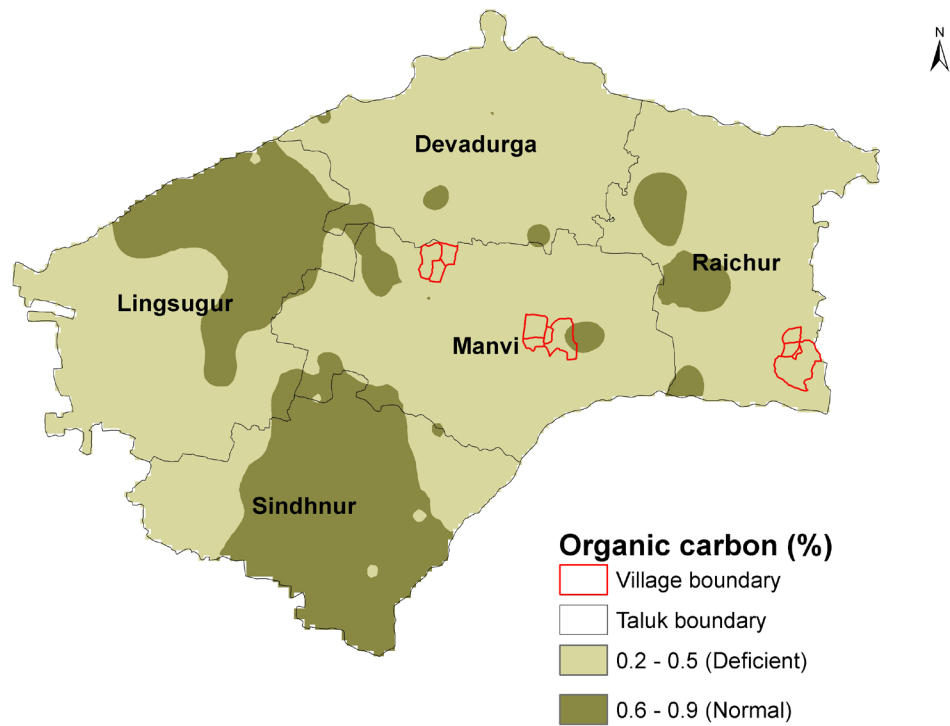
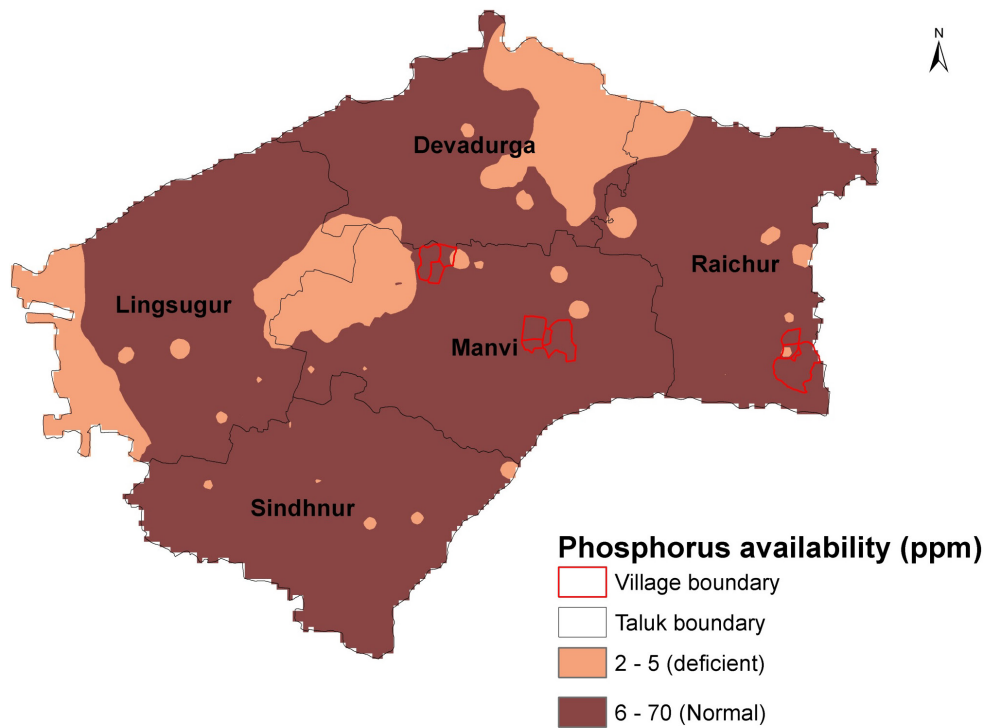


Figure 8. Electrical conductivity in targeted pilot sites in Raichur district



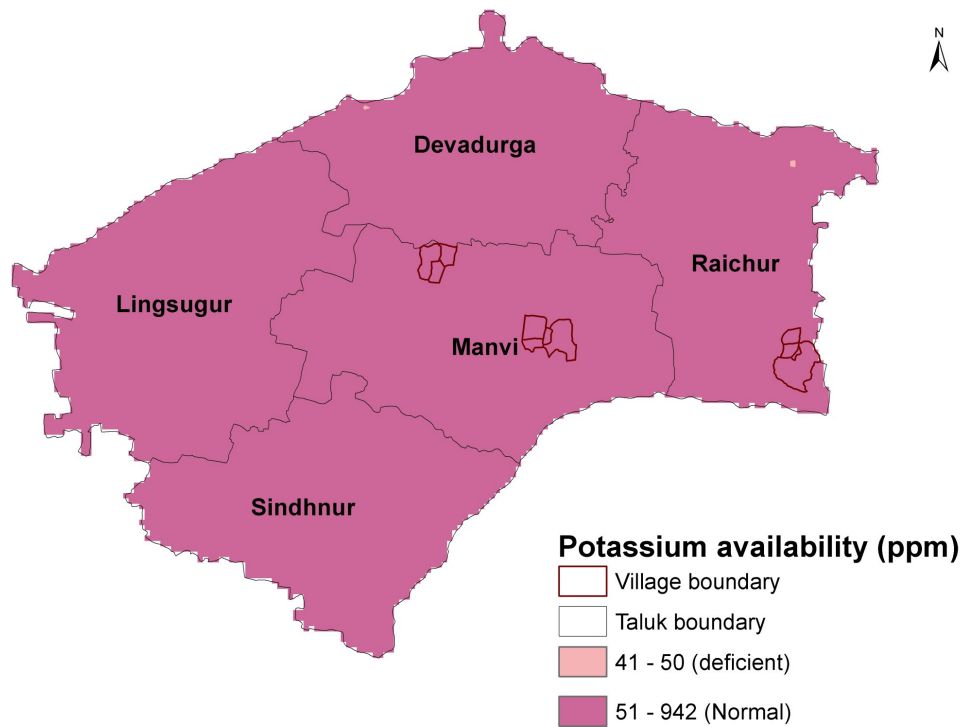
Source: RDS, ICRISAT, Patancheru, A P

Figure 9. Organic carbon in targeted pilot sites in Raichur district



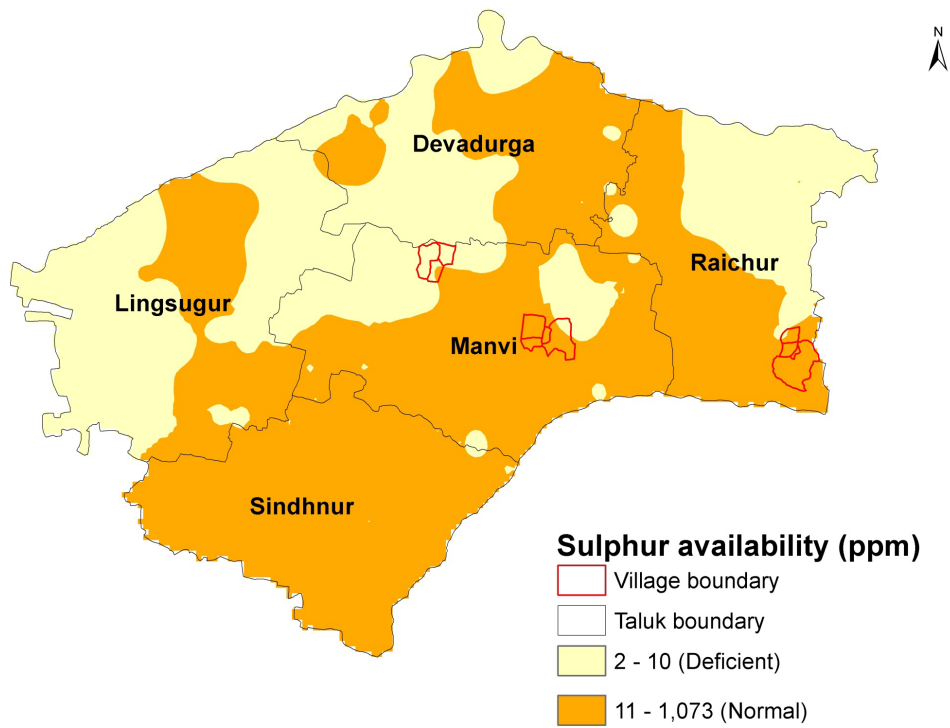
Source: RDS, ICRISAT, Patancheru, A P

Figure 10. Phosphorus availability in targeted pilot sites in Raichur district



Source: RDS, ICRISAT, Patancheru, A P

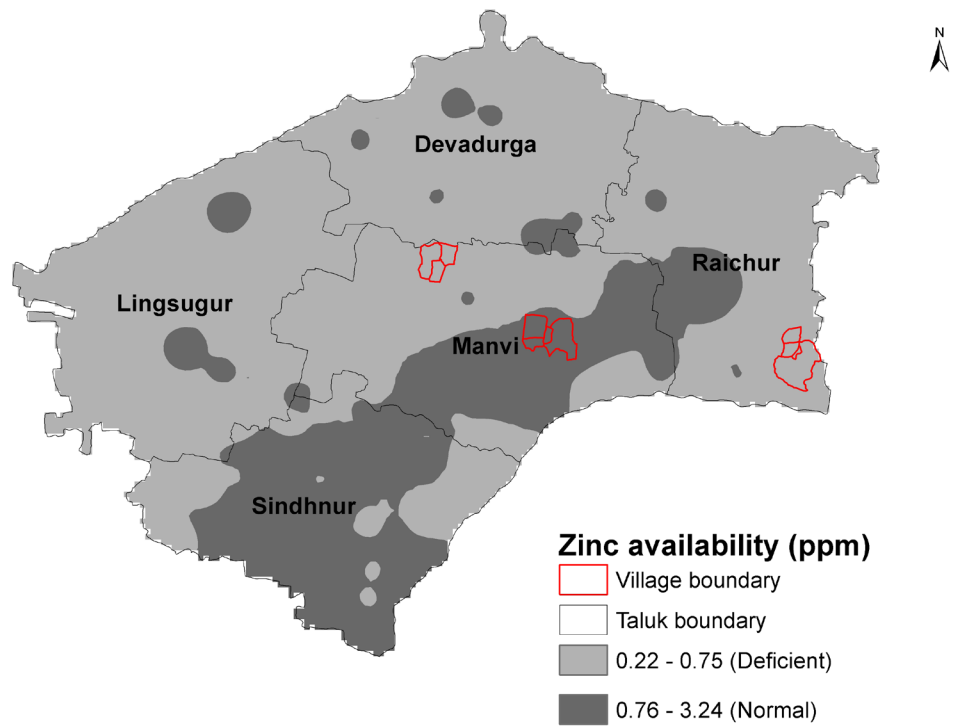
Figure 11. Potassium availability in targeted pilot sites in Raichur district



Source: RDS, ICRISAT, Patancheru, A P

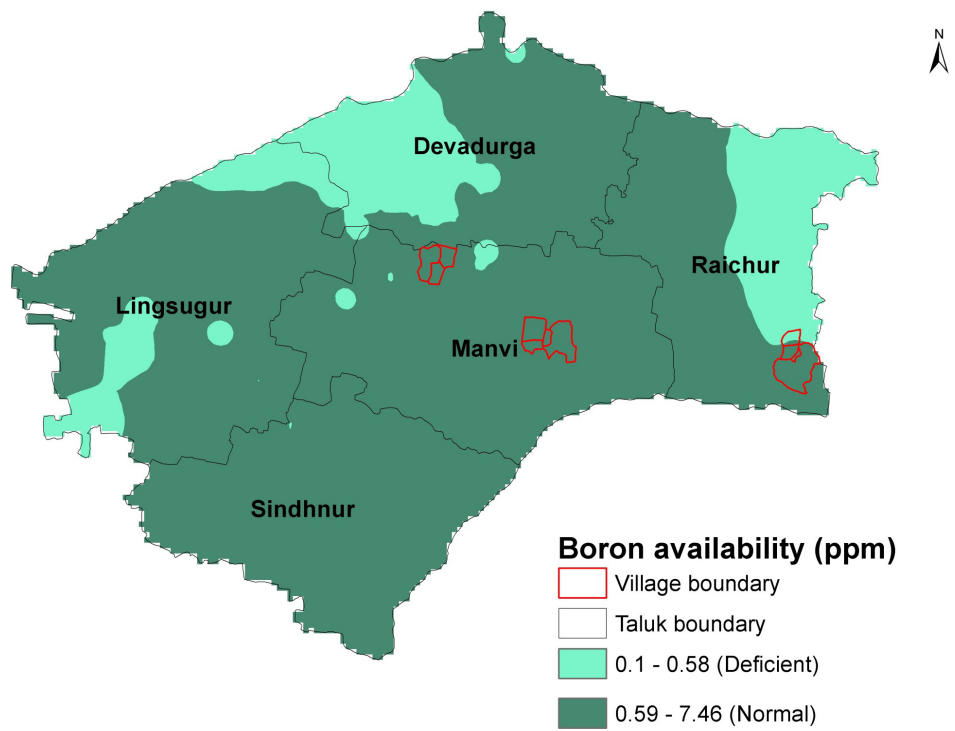
Figure 12. Sulphur availability in targeted pilot sites in Raichur district





Source: RDS, ICRISAT, Patancheru, A P

Figure 13. Zinc availability in targeted pilot sites in Raichur district



Source: RDS, ICRISAT, Patancheru, A P

Figure 14. Boron availability in targeted pilot sites in Raichur district

# Tumkur District

## District Profile

Tumkur is one of the 30 administrative districts of Karnataka state, located North-west of Bangalore at a distance of about 70 kms. The district is bounded by Mandya District in the South; Chitradurga and Hassan districts in the West; Chikkamangalore in the Northeast and Anantapur District of Andhra Pradesh state in the Southeast direction. The district occupies an area of 10,598 km<sup>2</sup> and had a population of 2,584,711 of which 19.62% were urban as of 2001. The district consists chiefly of elevated land intersected by river valleys. The district is famous for its iron ores.

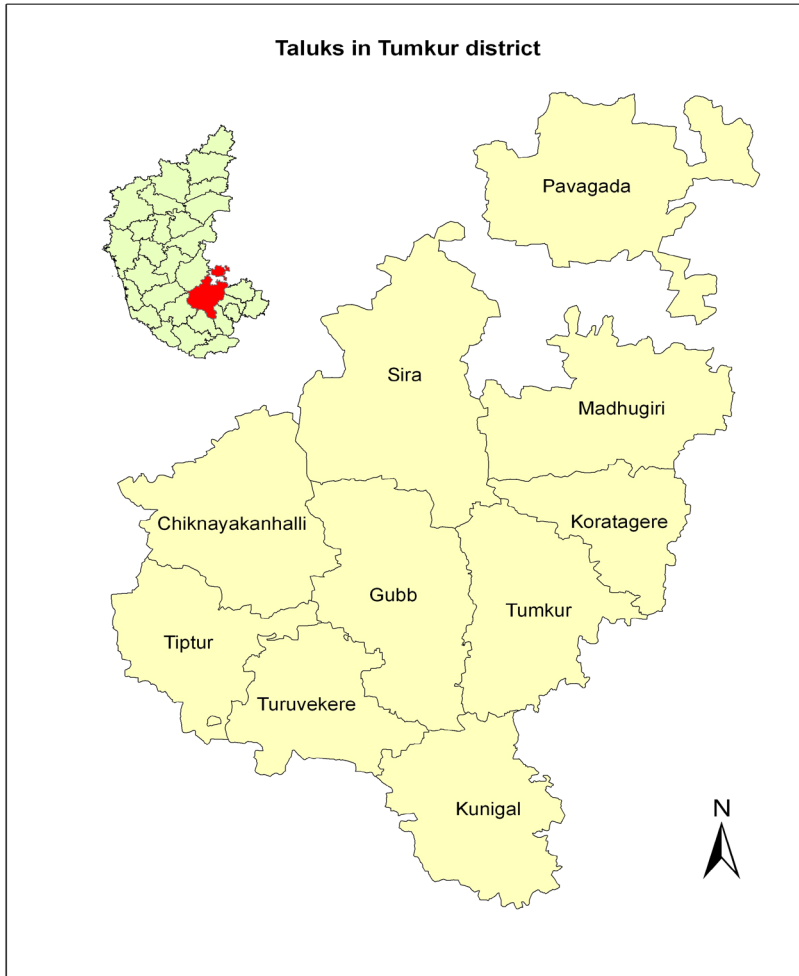


Figure 1. Location of Tumkur district in Karnataka state, India

## **Soil and Climatic**

The District is one of “Maidan” (plain) districts of the State. The open part of the District maintains generally even level above the sea; but Pavagada and Sira are at a considerably lower level than the rest. The Eastern of the District is occupied by narrow range of Granite hills. Their average width is about 20 miles and run North and South in the District. The western parts of the District are occupied by long ranges of hills running approximately in a South East direction.

Total geographical area of Tumkur District 1064755 ha, Out of which area suitable for cultivation is 5,63,421 ha. Detailed land use and land cover statistics is shown in Figure 1. Tumkur district comprises of 3 agricultural zones namely Agriculture zones-4 - Central dry zone, (Madhugiri, Pavagada, Sira, Koratagere, Tiptur and C.N. Halli) Agriculture zone-5- Eastern dry zone (Tumkur and Gubbi) and Agriculture zone 6-Southern dry zone (Turuvekere and Kunigal). Annual rainfall of the district is 593 mm and soil types ranges from red sandy loam to little Black Soil area.

## **Agriculture Scenario**

Dryland agriculture surpasses the wet and Horticulture. Agriculture is the backbone of the economy of this district. About 1/3 income accrues from agriculture (118582:351845). There are no major rivers flow in the district. Borewells and dugwells are dug throughout the district- the yield is fairly good. These are the potentials for the wetland agriculture. Major agriculture crops of the district are Ragi, Ground nut, Maize, Paddy, Red gram, Green gram and Horse gram. Out of total Kharif targeted crop area of 479950, rainfed crop covers 442850 ha., and remaining 37100 is irrigated area, Cereals constitutes of 217251 ha, Pulses-58688 ha, Oilseeds-160209 ha, fruits 1865 ha, and sugarcane 509 ha.

Total Fertilizer requirement for the year is 144150 tones, urea is 44900 tones, DAP-32000 tones, Muriate of Potash is 18850 tones and total complex requirement is 48400 tones, out of which for Kharif season (June to October) total requirement is 88650 tones. viz., Urea 27900 tones, DAP 25000 tones, Muriate of Potash 8850 tones and Complex fertilizer 26900 tones.

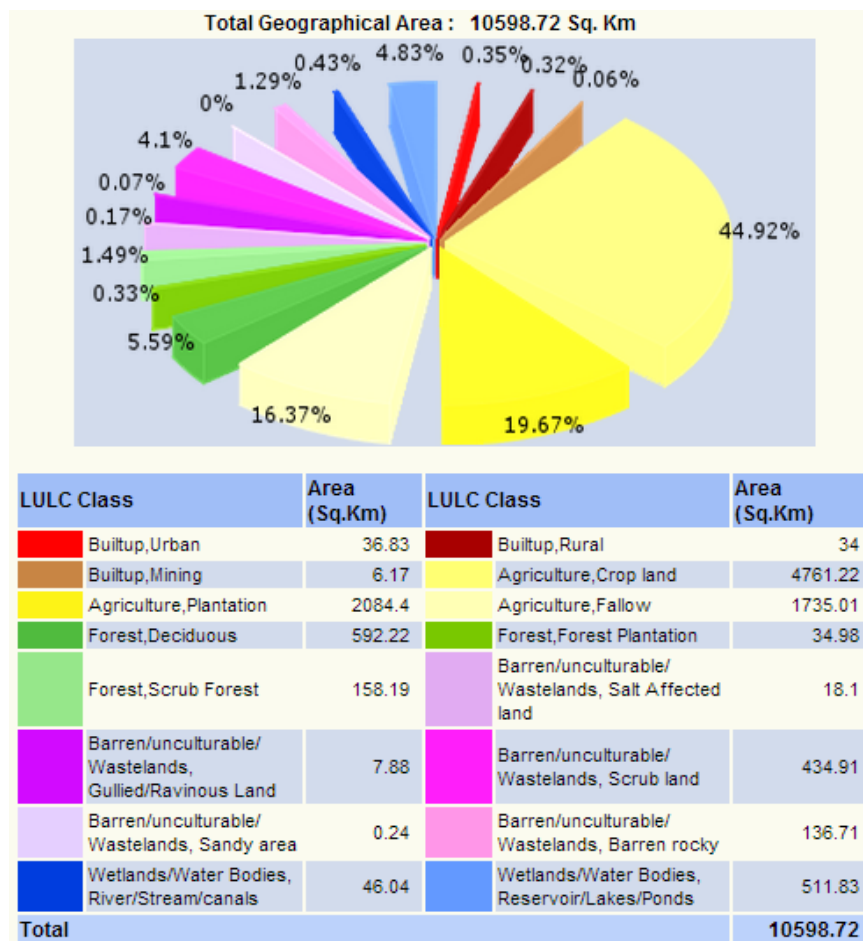


Figure 2. Land use and land cover classification of Tumkur district [Source: NRSC/ISRO]

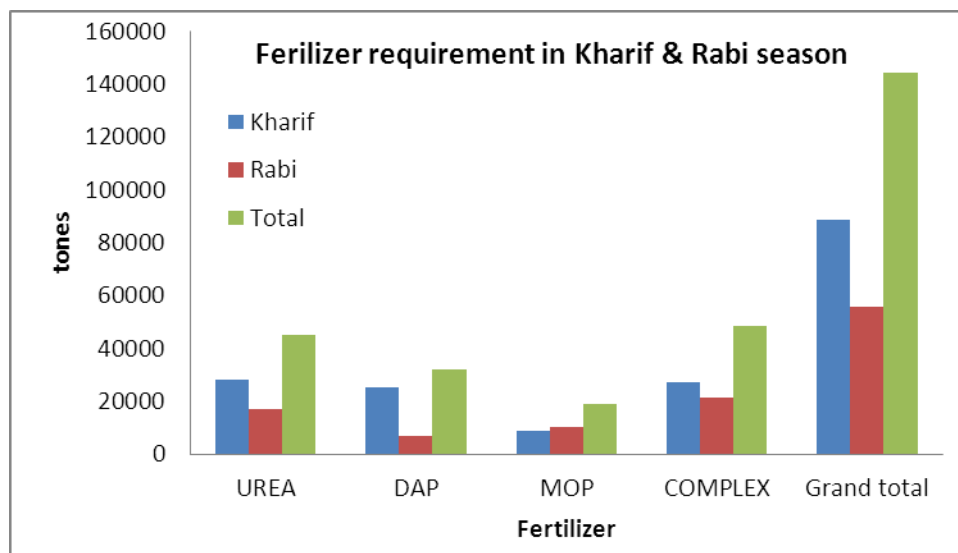


Figure 3. Annual fertilizer consumption in Tumkur district

## Profile of benchmark site

Three benchmark areas were selected based on three major cropping systems: coconut based system, coconut with vegetables, and groundnut based system. Villages and are

**Table 1. Coconut based cropping system**

Taluk	Hobli	Village	Area (ha)
Titpur	Honnavalli	Hosahalli	489.91
		Baluvaneralu	491.38
		Muddenahalli	453.08
		Rudrapura	479.15
		Hosuru-II	657.49
		Hosuru-I	492.15
		Mudda naykana Palya	402.00
		Rangapura	450.15
		Gollarahatti	476.13
		Mayagonda nahalli	395.20
		Basavarajapura	405.21
		Marisiddaiahnapalya	574.21
		Kodigenahalli	416.35
		Adhinayakanahalli-II	590.15
		Adhinayakanahalli-I	460.81
		Kallakere	623.90
		Madhikki kere	404.52
		Ramanahalli	568.33
		Gatakinakere	415.47
		Halkurike	512.96
		Halenahalli	523.07
		Kuppuru Doddarahatti	531.47
		Harachanahalli	640.36
		Byranaykana Halli	536.35
		Aluru	436.57
		Geddhalahalli	537.74
Misethimmanahalli	489.42		
Virupakshapura	461.34		
Nelagondanahalli	451.87		
Parvagondanahalli	531.14		

		Chowlihalli	553.60
C.N. Halli	Handhana kere	Kengalapura Palya	425.87
		Banjarahalli	344.00
		Kengalapura	499.19
		Kanakere	617.19
		Handhanakere-I	510.12
		Handhanakere-II	528.31
		Ramaghatta	488.39
		Thimlapura	814.78
		Gungurabaagi	726.58
		Ramalinganapalya	429.99
		Sabbenahalli	544.24
		Chowlakatte-I	672.58
		Chowlakatte-II	441.69
		Mysore Appanapalya-I	375.83
		Mysore Appanapalya-II	473.40
		Malligere	474.51
Bandhrehalli	609.97		
Total			24428.12

**Table 2. Coconut with vegetable based cropping system**

Taluk	Hobli	Village	Area (ha)
Tumkur	Hebbur	Bidanagere	400.00
		Nidvalalu	500.00
		Sanglapura	400.00
		Hebburukere	350.00
		Sasalinpalya	200.00
		Hanumanthana Palya	300.00
		Thondigere Kaval	250.00
		Thondigere	440.00
		Siddanayakana Palya	450.00
		Gangonahalli	550.00
		Puradhakatte	600.00
		Kemba Valagere Kavlkere	650.00
		Rayapura	600.00
		Bannikuppe	400.00
		Ramakrishna Pura	200.00
		Garagadakuppe	500.00
		Kalyanapura	600.00
		Hebburu A.K.Halla	500.00
		Kankuppe	550.00
		Vaddarahatti	450.00
		Bommanahalli	500.00
		Ragimuddanahalli	550.00
		Lingapura	150.00
		Ramakrishnapura	600.00
		Kudavanakunte	500.00
		Dommanakuppe	550.00
		Vaddarahatti	550.00
Maknahalli	550.00		
Ariyur	650.00		
Sambranahalli	300.00		
Ariyur Palya	450.00		

		Chennigappana palya	500.00
		Gulaganji halli	650.00
Gubbi	C.S.Pura	Arivesandra	599.27
		Indiskere	469.73
		Indiskere Kawal	784.94
		Kenchamaranahalli	440.21
		B.Kodigehalli	510.20
		Mavinahalli	406.53
		Hanumanthana Pura	418.33
		C.S.Pura Kaval	420.17
		Ungra	378.78
		Manikuppe	615.97
		C.S.Pura	593.80
		C.S.Pura Amanikere	508.99
		Kenchamaranahalli	610.10
		Channenahalli-I	510.20
		Channenahalli-II	508.80
		Channenahalli-III	512.20
		Idaguru	594.96
		Adikekere	540.20
		Naranahalli	403.82
		Appanakuppe	405.11
		Boramaranahalli	610.81
		Ankala koppa	406.21
		Matthikere	345.60
		Chengavi	387.66
		Avarehalli	317.78
		Nettikere	540.73
		Chengavi Kaval	157.87
		Buksagara	309.24
		Total	28698.21



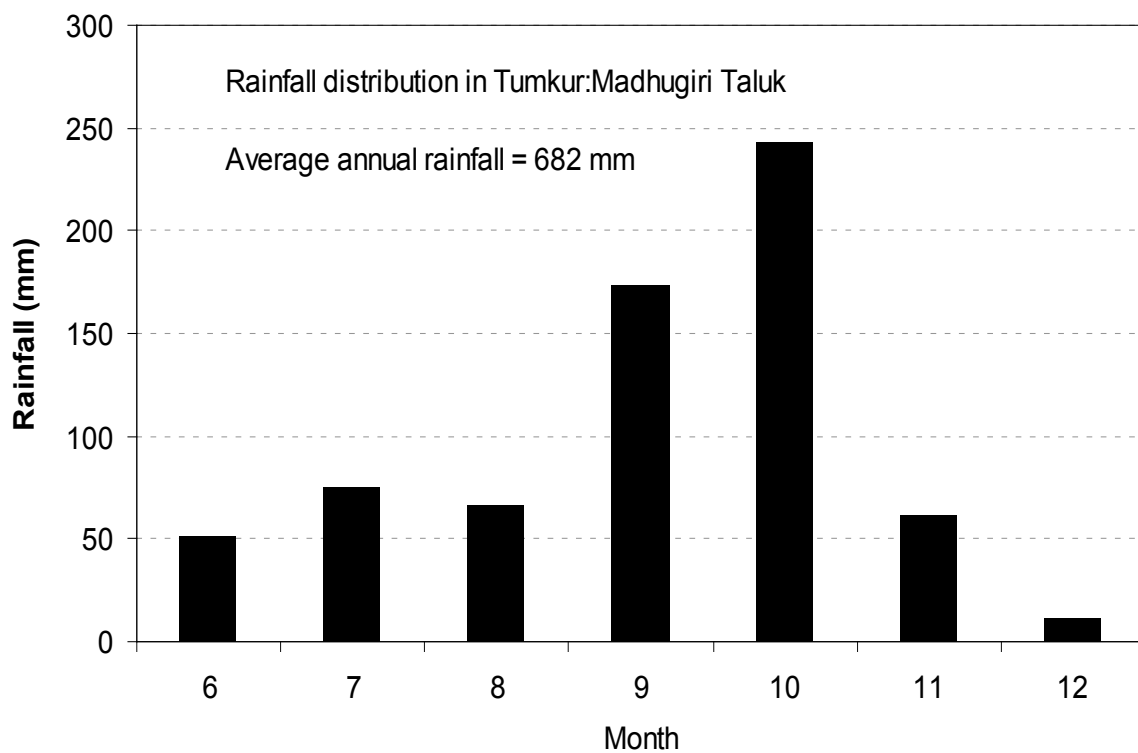
**Table 3. Groundnut based cropping system**

Taluk	Hobli	Village	Area (ha)
Madugiri	I.D.Halli	Obalapura	477.94
		Doddadalavata	694.10
		Chikkadalavata	397.34
		Thondoti	791.03
		Hale Ittakaloti	475.45
		Hosa Ittakaloti	530.73
		Janakaloti	562.42
		Thippapura	861.80
		Daaragondanahalli	569.76
		Chikkadalavata	397.34
		Chikkayalkur	183.67
		Huvinahalli	197.29
		Yaragunte	442.41
		Muddaneralekere	718.33
		Brahmasamudhra	551.00
		Brahmasamudhra	552.00
		Shobenahalli	538.24
		Chilana Halli	275.71
		Thaadi	923.11
		Saadharahalli	297.26
		Srinivasapura	429.10
		Pulamachi	645.97
		Doddayalkuru	515.19
		Channamallenahalli	544.06
		Nallahalli	183.04
	Kamagondanahalli	512.20	
Shaanaganahalli	153.65		
Thumbulu	124.72		
Vitalapura	326.41		
	Midagesi	Channamllanahalli	444.06

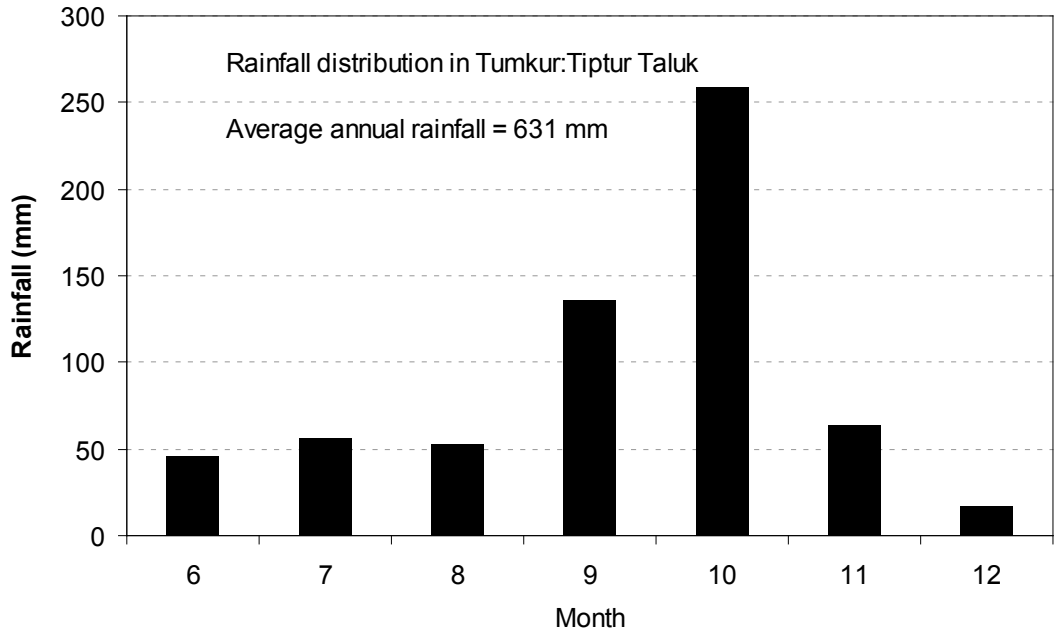
	Belanahalli	275.71
	Thippagondanahalli	388.34
	Shobenahalli	538.24
	Neelihalli	186.12
	Krishnapura	75.09
	Nallagudlahalli (Gondhi)	102.06
	Chi.Na.Na.Palya	185.82
	Hanumanthapura	588.15
	Appenahalli	201.04
	Emmethimmanahalli	94.00
	Shravanagudi	171.44
	Bedathoor	649.74
	Nallekamanahalli	314.14
	Srinivasapura	497.14
	Adavinagenahalli	649.24
	Midagesi-I	614.20
	Midagesi-II	597.20
	Bidharekere	423.68
	Nerekaval	467.42
	Chinnenahalli	420.84
	Hosakere	659.79
	Basavanahalli	219.43
	Awargal	705.35
	Godadhimmanahalli	338.48
	Dasenahalli	468.18
	Neralekere-I	508.10
	Neralekere-II	509.20
	Bramhadevarahalli Kaval	541.44
	Kasapura	357.07
	R.Gollahalli	494.11
	Reddihalli	425.16
	Mallanayakanahalli Kaval	402.40

	Mallanayakanahalli	475.77
	Shettigenahalli	357.26
	Lakshmipura	235.55
	Hosahalli	196.17
	Devagondanahalli	298.82
	Katagondanahalli	213.19
	Daasenahalli	468.18
Total		29628.59

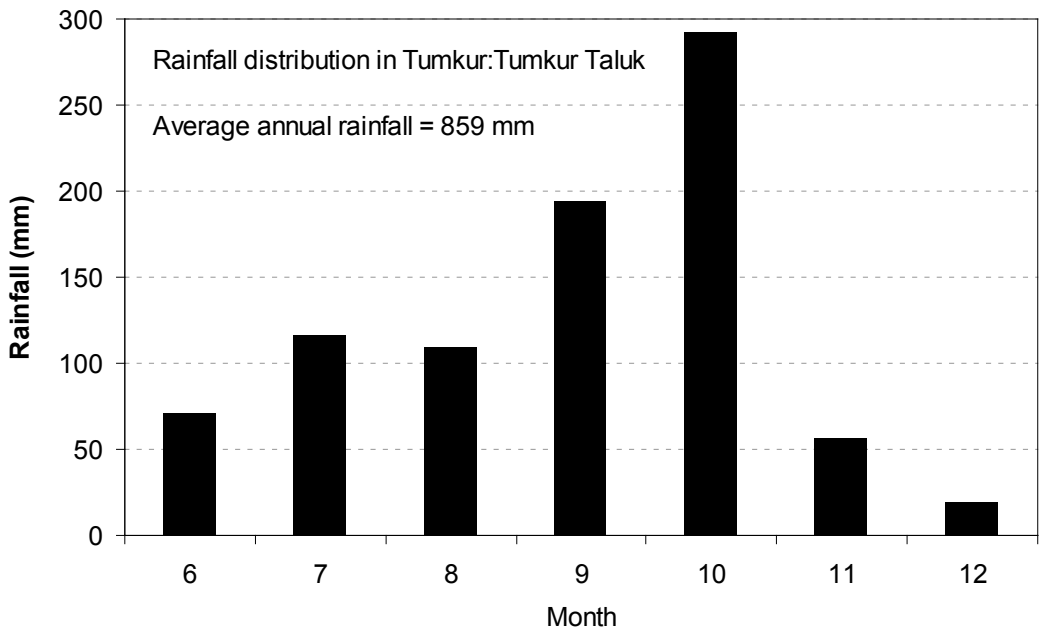
**Rainfall and its distribution:** Rainfall in Tumkur district varies from 600 to 1000 mm annually. Average annual rainfall in Mudhugiri, tiptur and tumkur taluk is 682 mm, 631 mm and 859 mm, respectively.



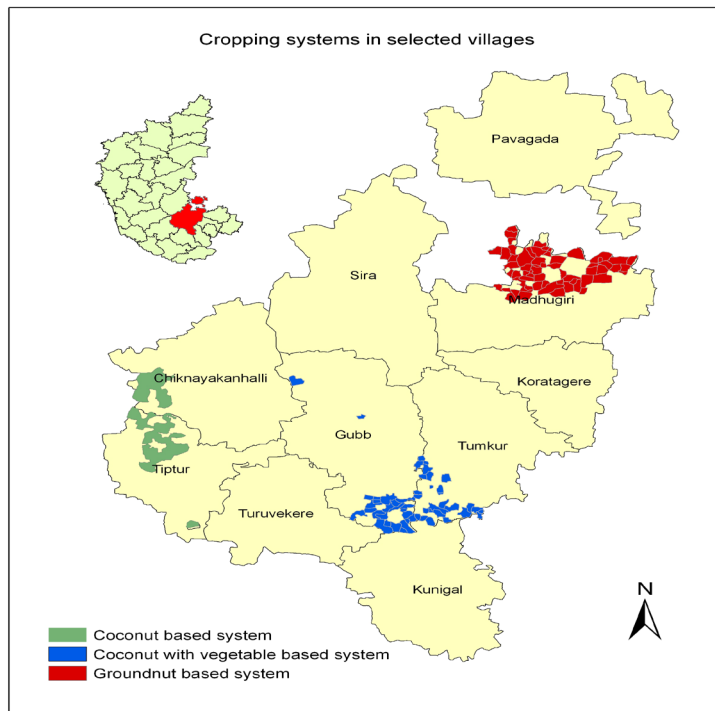
**Figure 4. Monthly average rainfall of Madhugiri taluk in Tumkur district between June and December**



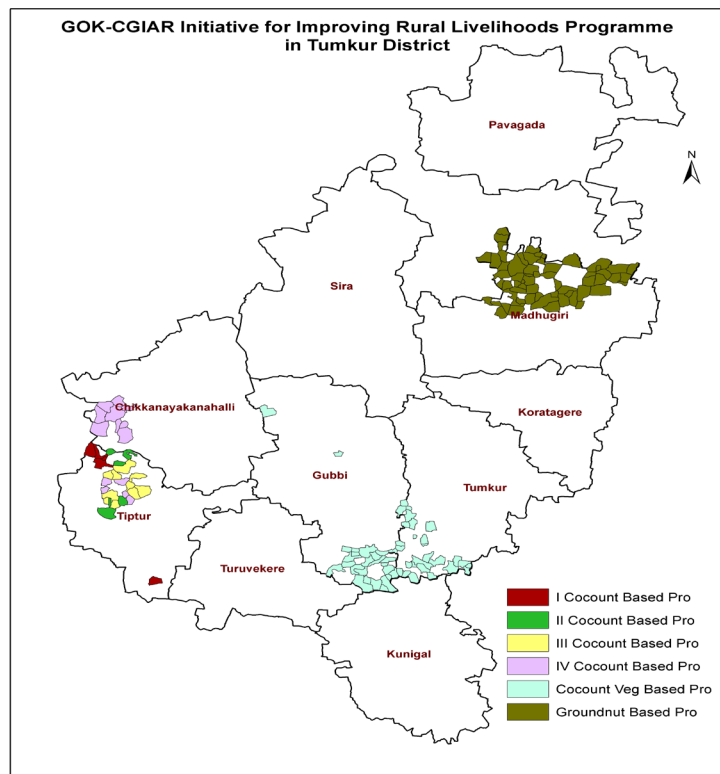
**Figure 5. Monthly average rainfall of Tiptur taluk in Tumkur district between June and December**



**Figure 6. Monthly average rainfall of Tumkur taluk in Tumkur district between June and December**



**Figure 7. Cropping systems in selected cluster villages**



**Figure 8. Year wise Development plan for cluster-1**

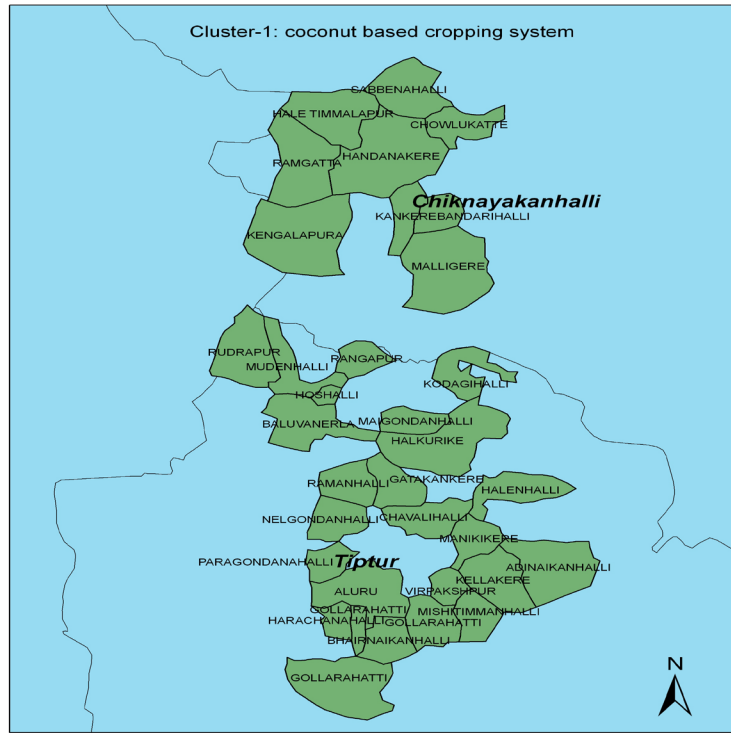


Figure 9. Villages (Cluser-1) having coconut based cropping system

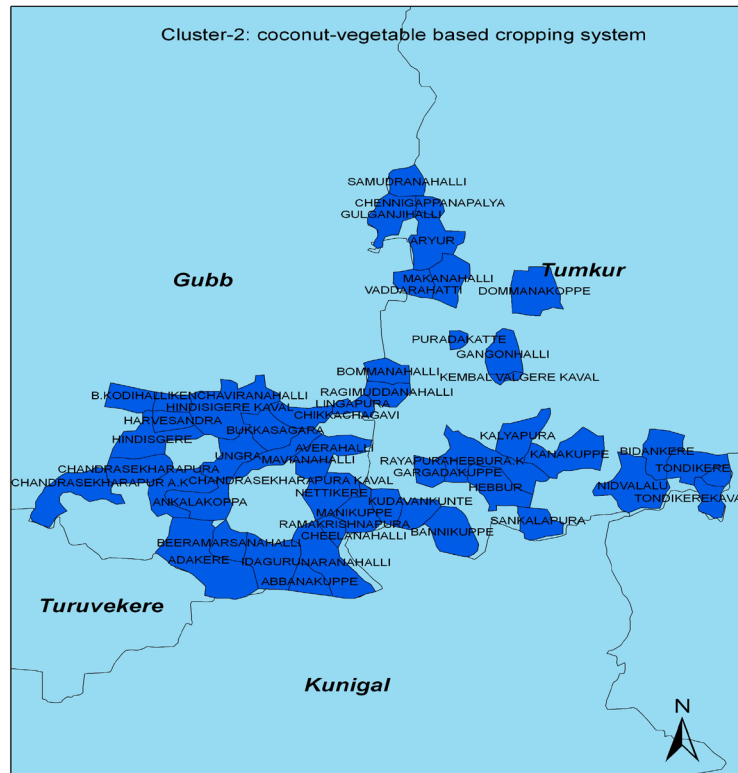


Figure 10. Villages (Cluser-2) having coconut-vegetable based cropping system



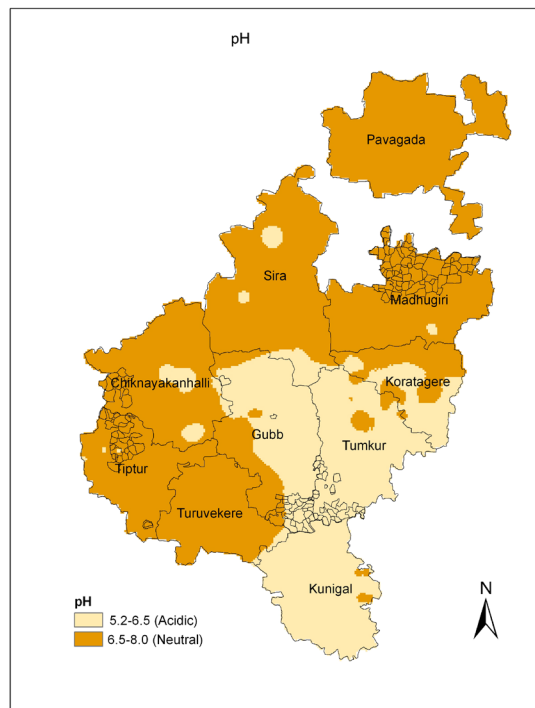


Figure 13. Soil pH in Tumkur district and Gok-CGIAR selected villages

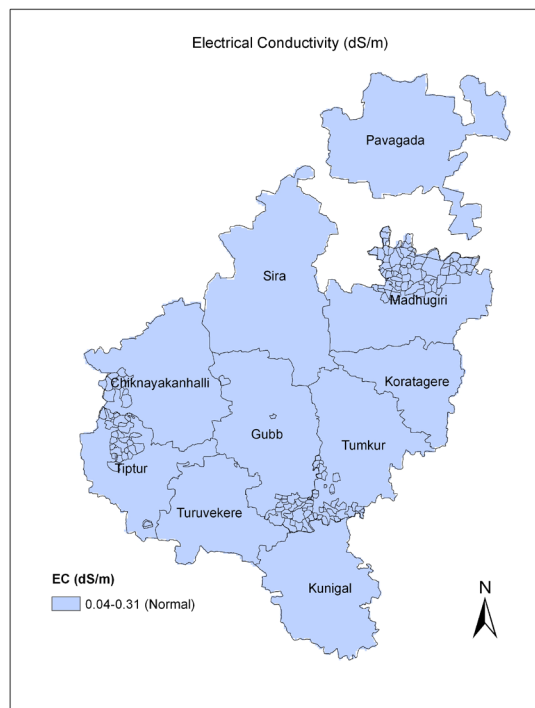


Figure 14. Soil EC in Tumkur district and Gok-CGIAR selected villages



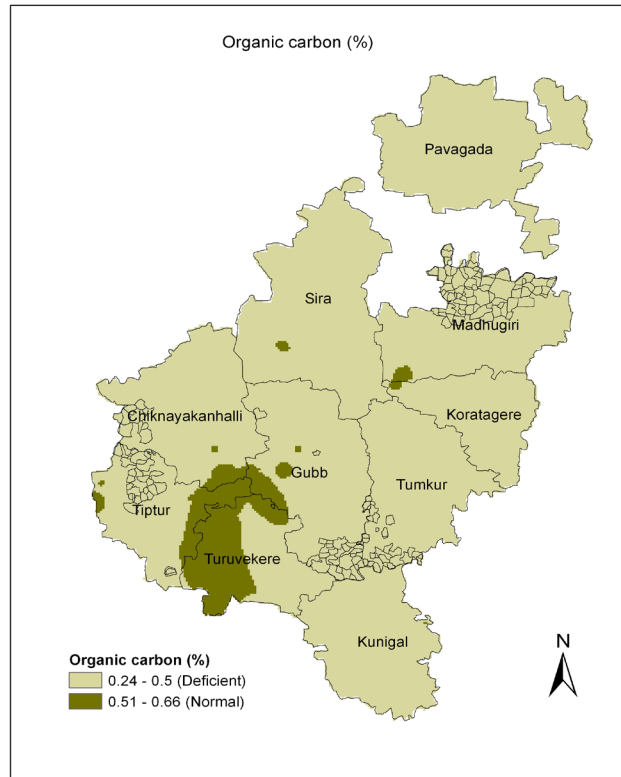


Figure 15. Organic Carbon in Tumkur district and Gok-CGIAR selected villages

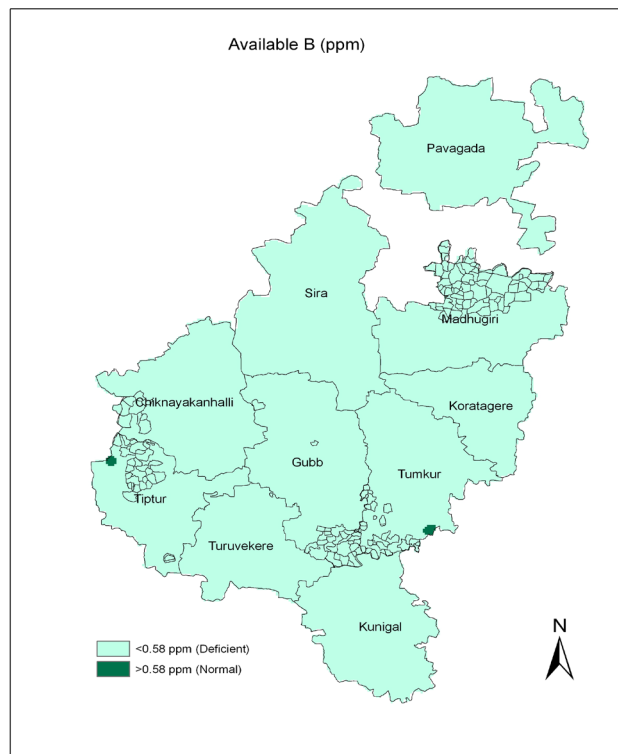


Figure 16. Available B status in Tumkur district and Gok-CGIAR selected villages

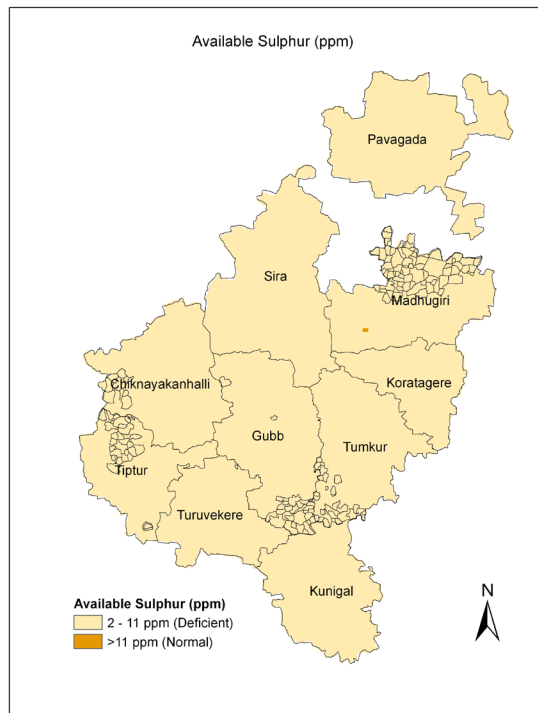


Figure 17. Available Sulphur status in Tumkur district and Gok-CGIAR selected villages

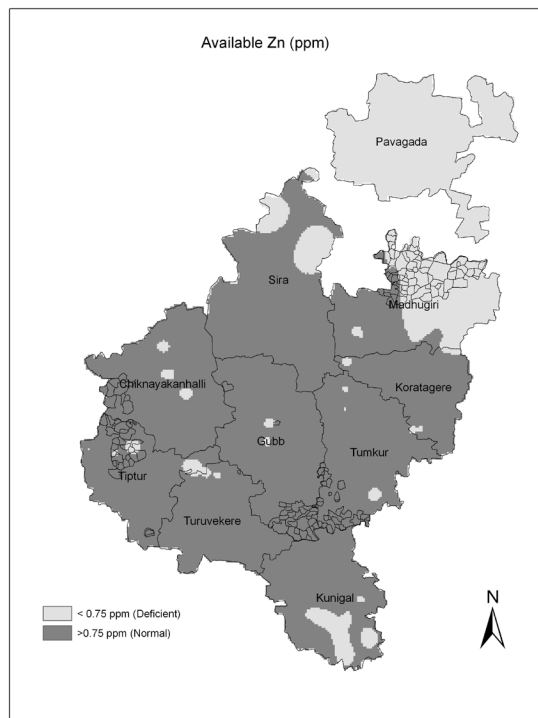


Figure 18. Available Zn status in Tumkur district and Gok-CGIAR selected villages

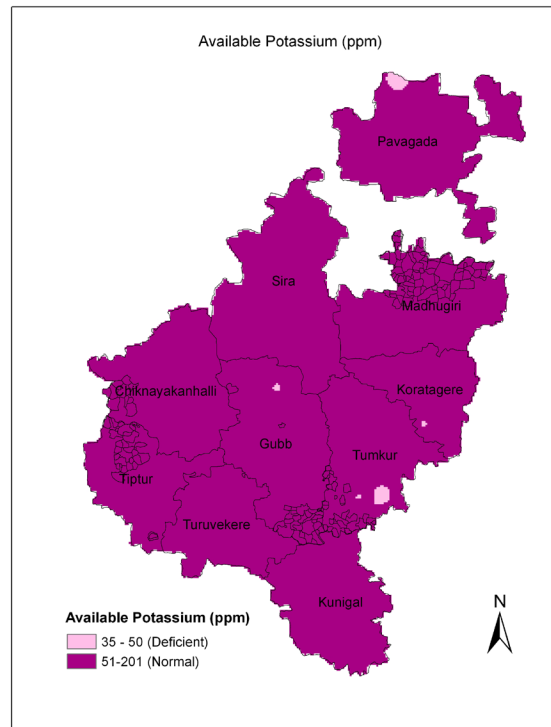


Figure 19. Available K status in Tumkur district and Gok-CGIAR selected villages

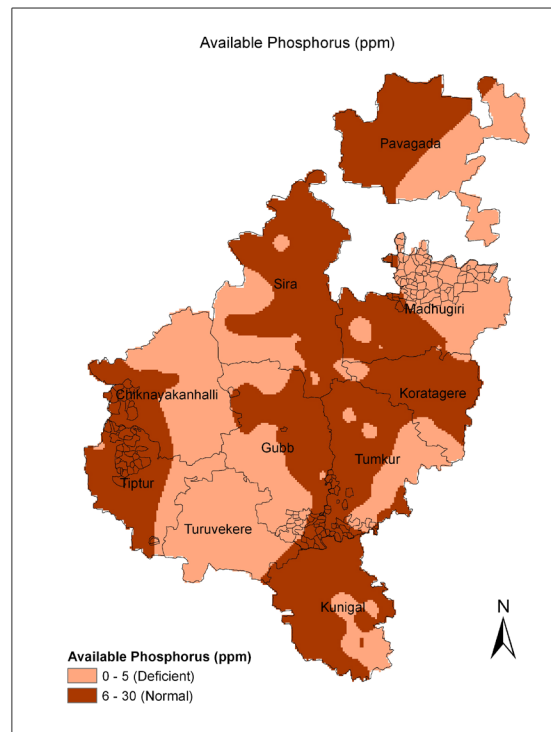


Figure 20. Available Phosphorus status in Tumkur district and GoK-CGIAR selected villages

## **Constraints identified:**

- Dry land farming system
  - Soil erosion and poor fertility
  - Uncertain and low rainfall
  - Low crop yield in major crops (e.g. cereals, groundnut, pigeon pea, coconut, pomegranate) - pest problem
  - Fodder scarcity
  - Large extent of fallow lands
  - Lack of improved cattle breeds and ruminants
  - Labor problem
  - Lack of multipurpose equipments

### Major Issues irrigated areas

- Irrigated areas
  - Water, labour shortages
  - Low cropping intensity
  - Climate change effects
  - Pests
  - Low farm profitability
  - Market linkages
  - Cold storage facilities for fruits and vegetables
  - Low access to credit
  - Lack of storage, processing, value addition, packing and marketing

## Potential interventions

### 1. *Crop diversification/intensification/cropping system optimization*

**Coconut based system:** Intercropping with diverse crops (e.g., turmeric, ginger, nutmeg), green manure crops, tapioca, fodder grass, legumes, cocoa, flowers, vegetables, banana)

#### **Cereal / groundnut based system**

Maize-legumes and Rice-legumes

Short duration suitable crop varieties (e.g. Mung bean)

CA based crop establishment (Direct seeded rice, zero tillage etc)

Crop varieties suitable as animal fodder

### 2. *Micro-irrigation:* Drip and sprinkler irrigation for coconut/horticultural and high value cropping systems

### 3. *Mechanization*

Land leveling (laser aided leveling)

Seed-cum-ferti drill and planters for multi crops/zero till planters

Power sprayers and other agriculture m/c

### 4. *Agronomic interventions*

Balance nutrients management, INM

Weed management

IPM, IDM,

Increasing the cropping intensity

**Table 4. List of on-going Programme/schemes in different departments**

Department of Agriculture	Department of Horticulture	Watershed Development Department
<ul style="list-style-type: none"> <li>✓ Rashtriya Krishi Vikas Yojane (RKVY)</li> <li>✓ Crop insurance scheme</li> <li>✓ Compensation for farmers' suicides</li> <li>✓ Subsidies for crop loan</li> <li>✓ ISOFOM</li> <li>✓ Maize production scheme</li> <li>✓ Bhoochetana programme</li> <li>✓ Suvarnabhomi (Agri)</li> <li>✓ Plant protection programme</li> <li>✓ Soil testing</li> <li>✓ Programme for popularizing bio-fertilizer</li> <li>✓ Programme for increasing soil fertility</li> <li>✓ New agricultural promotion scheme (processing agricultural produces)</li> <li>✓ ATMA</li> <li>✓ Awards for farmers' production</li> <li>✓ Farm mechanization</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Farmers' helpline centers</li> <li>✓ <b>MNREGA</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ National Horticultural Mission</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Integrated Horticultural Development schemes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Integrated Watershed Management Programme (IWMP)</li> <li>✓ Jalasiri</li> <li>✓ Special Component Plan (SCP) for Scheduled caste</li> <li>✓ Tribal Sub Plan (TSP) for Scheduled tribes</li> </ul>



## **Soil and Climatic Conditions**

The Malnad Taluks of the district have the soil type of red sandy loam with acidic in nature (pH 4.5 – 6.0) It has very low water holding capacity. Because of undulating topography the soil is prone to erosion. The dry and transitional tract of the district (Tarikere and Kadur) has fertile red and black soil with salinity occurring in the patches (pH 6.8 – 8.7).

Chikmagalur district has humid weather with maximum temperature of 35 degree Celsius in summer and 8-10 degree Celsius in winter. Normal rainfall of the district 1904 mm, spread in 89 days. Shringeri receives highest rainfall (3864mm) and lowest in Kadur (592mm). In Chikmagalur taluk 871mm, Mudigere 2318mm, Koppa 3063mm, NR pura 1699mm and in Tarikere 924mm rainfall received.

## **Agriculture Scenario**

Net sown area of the district is 2.99 Lakh hectares with hardly 12% having irrigation facilities. Cropping intensity is 110% with 30684 ha. sown more than once. Cropping Pattern reveals 38% of the area under Cereals, 8% Pulses, 7% Oilseeds and 5%. Nonfood crops excluding plantation and horticulture crops. The District is known for Coffee with a total area of 87038 hectares. Coconut and Arecanut are also grown.

Total annual agriculture crop coverage is 1, 89,140 ha. (Kharif-169730ha., Rabi-23220ha. and Summer-4190ha.) Cereals are grown in 1.30 lakh hectares, pulses in 0.31 lakh hectares and oilseeds in 0.24 lakh hectares. Among cereals in addition to paddy and ragi, maize is gaining popularity in maidan tracts and in some parts of malnad due to rising demand for poultry industry. The productivity of paddy remained static over the years due to decline in the soil fertility, improper water management and scarcity of labours.

Agriculture is the major occupation of the district, which comprises of horticulture and Animal husbandry. The District also has following industries: Mica, Magnesium, chromites, Manganese and food processing Industries. Among the Agro based industries coffee processing, Rice Industries, Fruit Processing Industries, (Banana and Jack) are the major one.



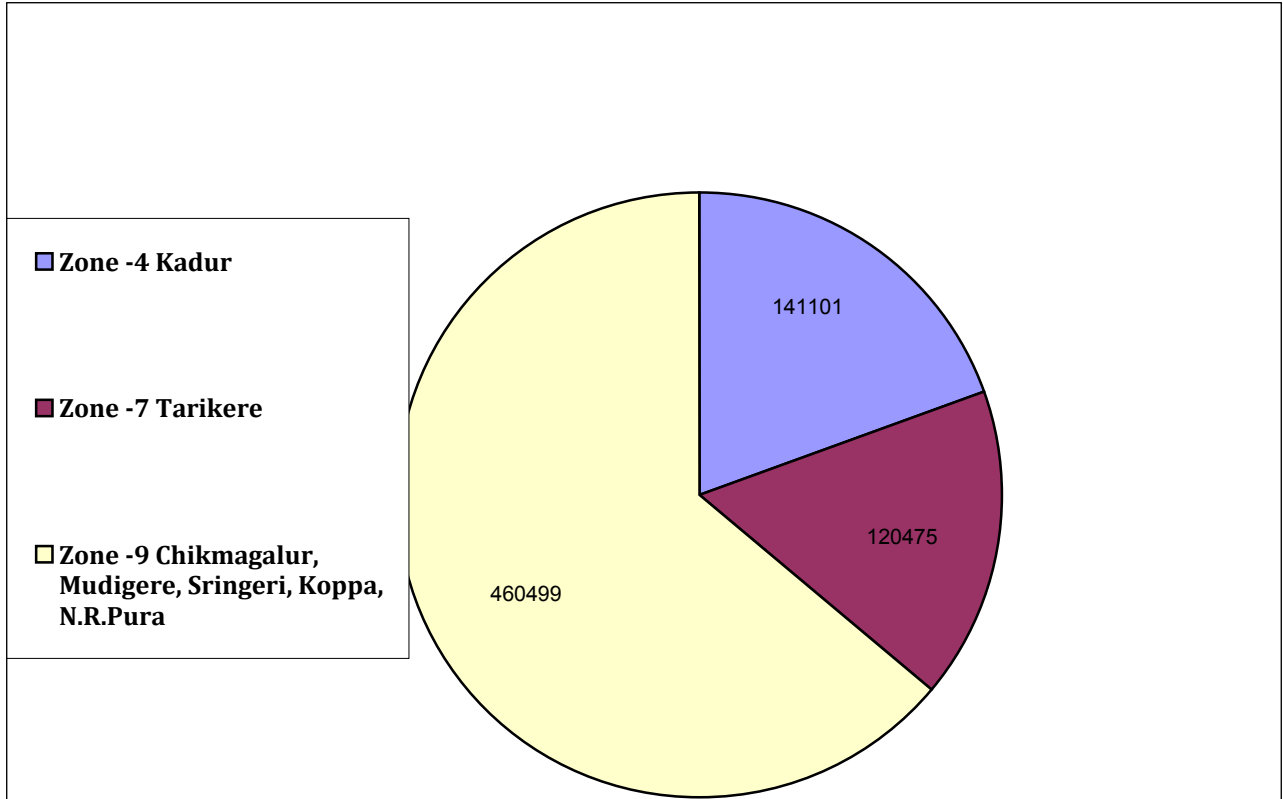


Figure 2. Agro-climatic Zones of the Chikmagaluru district

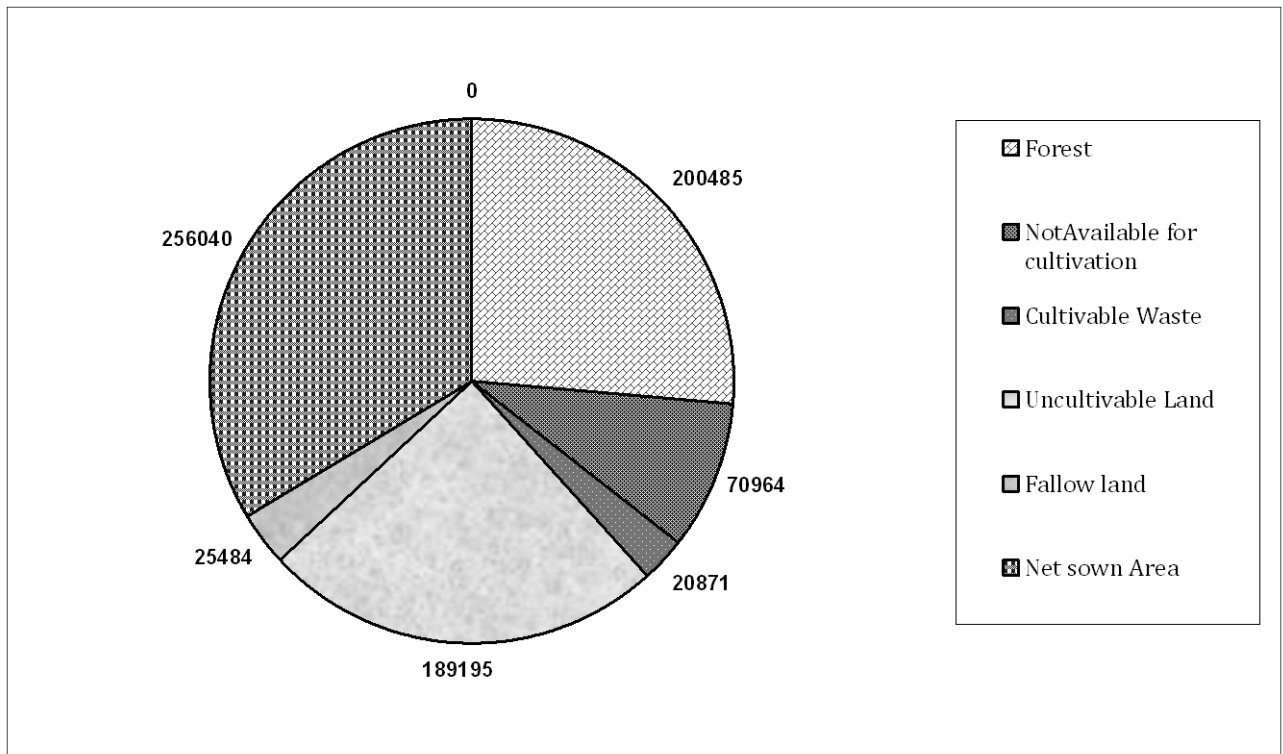


Figure 3. Land use classification in Chikmagaluru district

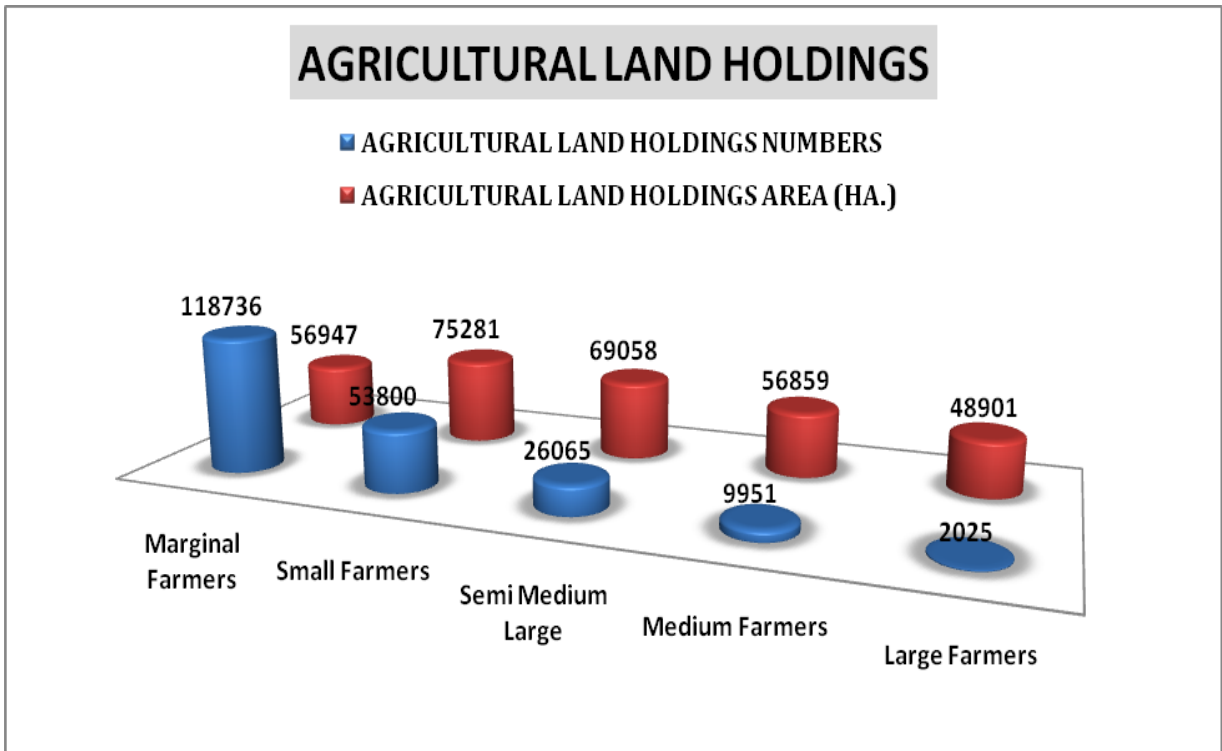


Figure 4. Agricultural landholding status in Chikmagaluru district

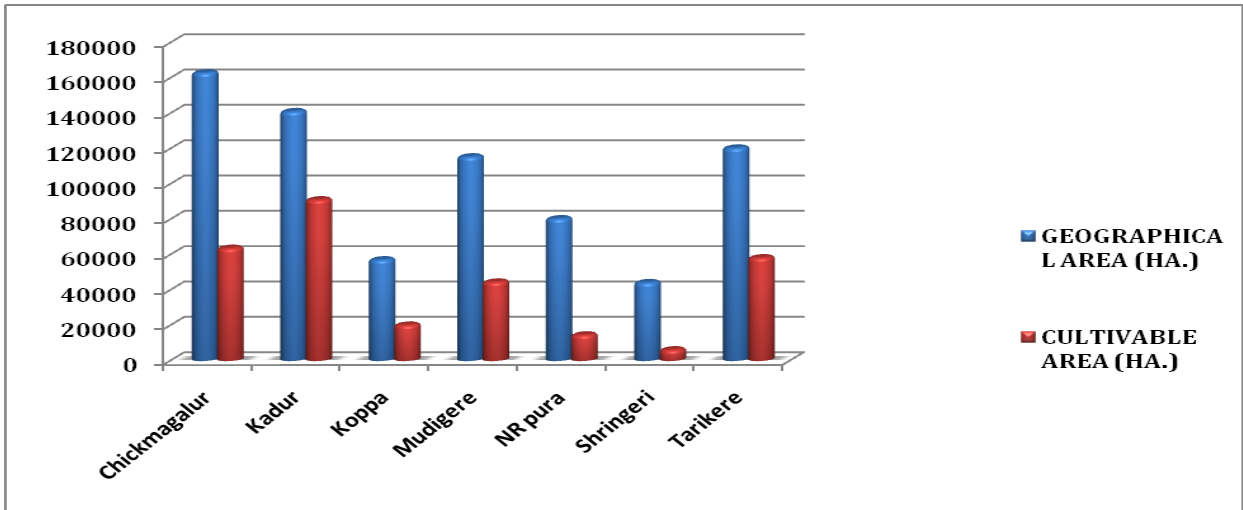


Figure 5. Taluk-wise geographical and cultivable area in Chikmagaluru district

## Profile of benchmark sites

Four benchmark sites are selected in Chickmagalurur district based on the agro-ecological situation, cropping system and livelihood pattern. Table 1 provides details about benchmark sites.

**Table 1. Brief profile of selected benchmark sites in Chikmagaluru district**

Benchmark locations (Taluks)	Name of the hobli	Average rainfall (mm)	Major crops	Soil type	Sources of irrigation	Major livestock population
Kadur	Birur	590	Maize, Ragi, Jowar, Sunflower, vegetables	Black soil, red soil	Borewell, tanks	Sheep, goat, cattle
Tarikere	Ajjampura	525	Groundnut, maize, Horsegram, Paddy, Ragi, Rabi Jowar, Bengal Gram	Black soil, Red sandy soil	Borewell	Cattle, Buffaloes, Sheep, Goat
Chikmagaluru	Lakya	800	Maize, Ragi, Jowar, Sunflower, Vegetables	Red soil, red sandy soil, black soil	Borewell	Cattle, sheep, goat, buffaloes
Koppa	Kasaba	3000	Paddy, Arecanut, Coffee	Clay loam	Borewell	Cattle, Buffaloes

Area of operation for 2013-14 in the district is 10000 ha. Of which 3000 ha will be covered in Tarikere, 3000 ha in Kadur, 2000 ha in Chikmagalur and 2000 ha in Koppa taluk (Table 2).

**Table 2. Area coverage during first year of project implementation**

Sl.No	Taluk	Area (ha.)	Hobli Selected for intervention
01	Tarikere	3000	Ajjampura
02	Kadur	3000	Birur
03	Chikmagalur	2000	Lakya
04	Koppa	2000	Kasaba
<b>Total</b>		<b>10000</b>	

### Selected village-wise details of crops and livestock

Sl. No	Villages	Total Geogrpahical area (ha)	Cultivable area (ha)	Area under major crops								Vegetables	
				Maize		Ragi		Jowar		Sunflower			
				Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)
1	Lakkummanahalli	511.2	322.4	42	5000	28	1500	15	600	14	500	32	15000
2	Kunnalu	366.92	258.4	28	4000	31	1700	10	800	18	600	24	15000
3	Sirabadige	692.2	269.32	19	4200	29	1400	10	700	11	500	25	15000
4	Uddeboranahalli	186.01	146.1	36	4300	26	1400	10	800	1	600	21	15000
5	Kurichikkanahalli	214.4	108	39	4200	12	1500	5	700	4	600	15	15000
6	Kengenahalli	81.6	67.33	19	4500	18	1800	10	800	6	500	10	15000
7	Karisiddanahalli	181.2	113.7	36	4400	14	1700	10	600	9	500	21	15000
8	Karehalli	78.4	64.8	16	5000	5	1800	10	700	2	600	15	15000
	<b>Total area (ha)</b>	<b>2311.93</b>	<b>1350.05</b>	<b>235</b>	<b>35600</b>	<b>163</b>	<b>12800</b>	<b>80</b>	<b>5700</b>	<b>65</b>	<b>4400</b>	<b>163</b>	<b>120000</b>

**Table 4. Chikmagaluru Taluk: Lakya Hobli - Livestock**

Sl. No	Villages	Livestock details							
		Cattle	Buffaloes	Sheep	Goat	Others	Total Livestock	Poultry	Milk production of the village (Lit/day)
1	Lakkummanahalli	350	77		508		935		150
2	Kunnalu	1209	170		207		1586	4 sheds	200
3	Sirabadige	795	110	127	80		1112		250
4	Uddeboranahalli	1031	102				1133	3 sheds	200
5	Kurichikkanahalli	211	90	233	252		786		50
6	Kengenahalli	135	14	61	145		355		100
7	Karisiddanahalli	328	7	11	384		730		50
8	Karehalli	18					18		

**Table 5. Kadur Taluk: Birur Hobli - Major crops**

Sl. No	Villages	Total Geographical area (ha)	Cultivable area (ha)	Major crops			
				Maize	Ragi	Grondnuts	Sunflower
				Area (ha)	Area (ha)	Area (ha)	Area (ha)
1	Balliganuru	1391	790	300	400		
2	Huvinahalli	828	340	250	90		
3	B. Kodihalli	280	779		170	100	
4	Aladahalli	690	342	200	140		
5	Vagarehalli	1824	603	200	400		
6	Birur village	470	274	100	150		
7	Hiriyangala	1175	952		500		
8	B. Hosalli	81	75		75	50	
9	Ramanahalli	60	56		50		
10	Nagadevanahalli	143	130	50	70		
11	Devarahalli	120	73	20	50		
12	Bagaytu	119	88				
13	Hullehalli	928	777.2	200	500	200	400
14	Yarehalli	386	310.4	10	300	100	200
15	Dogihalli	206.4	163.95	40	120	40	80
16	Bygadehalli	122.4	96.6		96	45	50
17	U. Kodihalli	107.6	87	40	45	25	20
18	Linglapura	105.6	96.6				
19	Biruru kavalu	1909	682	250	400	200	200
20	Ullinagaru	404.8	366.8	150	200	50	50

21	Joditimpapura	389.6	310.8	50	250	150	100
22	Karehalli	156.8	122.46	20	100	50	50
23	Doddaghatta	395	271.4	70	200	100	100
24	Horitimmanahalli	205.5	108	10	100	150	50
25	Galihalli	292.8	224.4	50	150	100	50
26	Inglaranahalli	56.4	48.4	20	20		20
27	Hanumapura	365	178	50	120	58	70
28	Chikkangala	762	586.8	200	300	30	50
29	Haralaghatta	189.7	76.5	20	50		20
30	Outanahalli	162.4	149.5				
31	K. Timmanahalli	92.8	88.8	30	50	30	
32	Gollarahalli	160.8	151.2	50	100	50	
33	Kannenahalli	153.5	128	50	70	20	
34	Emmedoddi	8557	1607.3	1000	600		
35	Sakunipura	56	47.6	20	27		
	Total area (ha)	<b>23346.1</b>	<b>11181.71</b>	<b>3450</b>	<b>5893</b>	<b>1548</b>	<b>1510</b>

**Table 6. Kadur Taluk: Birur Hobli - Livestock**

Sl. No	Villages	Livestock details						
		Cattle	Buffaloes	Sheep	Goat	Others	Total Livestock	Poultry
1	Balliganuru	391	94	0	101	58	644	68
2	Huvinahalli	329	37	0		33	399	0
3	B. Kodihalli	349	280	211	179	0	1019	92
4	Aladahalli	131	0	0	70	36	237	100
5	Vagarehalli	1042	246		258	82	1628	311
6	Birur village	1355	647	491	380	308	3181	340
7	Hiriyangala	50	10	0	0	8	68	22
8	B. Hosalli	0	0	0	0	0	0	-
9	Ramanahalli	0	0	0	0	0	0	-
10	Nagadevanahalli	0	0	0	0	0	0	-
11	Devarahalli	34	-	-	-	-		-
12	Bagaytu	-	-	-	-	-		
13	Hullehalli	433	543	388	113	99	1576	358
14	Yarehalli	211	283	84	35		613	411
15	Dogihalli	168	166	59			393	75
16	Bygadehalli	204	136	272	97		709	
17	U. Kodihalli	-	-	-	-	-		
18	Linglapura						0	
19	Biruru kavalu	152	42	149	105	20	468	556
20	Ullinagaru	48	17			9	74	93



21	Joditimpapura	288	565	210	51		1114	178
22	Karehalli	57	40	21	60		178	83
23	Doddaghatta	194	93	53	83		423	237
24	Horitimmanahalli	124	282	115	73		594	278
25	Galihalli	289	320	170			779	433
26	Inglaranahalli	74	102	2	39		217	69
27	Hanumapura	9	-	-	-	-		
28	Chikkangala	256	152	156	58		622	358
29	Haralaghatta	102	25	58	5	25	215	253
30	Outanahalli	-	-	-	-			
31	K. Timmanahalli	-	-	-	-	-		
32	Gollarahalli	-	-	-	-	-		
33	Kannenahalli	55	25				80	
34	Emmedoddi	3132	284	1003	1038	2089	7546	2055
35	Sakunipura	20	21	9	77	6	133	25

**Table 7. Koppa Taluk: Kasaba Hobli - Major crops**

Sl. No.	Village	Total Geographical Area	Cultivable area	Major Crops		
				Paddy	Areca nut	Coffee
				Area (ha)	Area (ha)	Area (ha)
1	Bintrvalli	703.2	343.2	212	41.2	73.2
2	Talamakki	1040	545.2	279.2	19.6	260.4
3	Kesave	646	188.8	120	22.8	39.2
4	Kelakuli	1518	254.4	226.8	8	4.4
5	Nuggi	1172.8	722.4	230.4	38.4	469.2
7	Harandur	476.8	179.6	131.2	21.6	2.4
8	Gunvanthe	1399.2	295.6	170.4	27.2	58
9	Koppa Rural	656.8	303.6	171.6	24.4	40.8
10	Addada	1293.2	304	227.2	22	14.8
11	Kagga	157.6	64.4	44.8	10.8	4
12	Bomlapura	1120.8	354.8	268.8	49.6	8
13	Bolapura	464	141.2	130	7.2	4
14	Hirekodige	2180.8	231.6	165.6	60.4	4
15	Narasipura	668.4	209.2	149.6	34.4	12
16	Kunchur	608.4	182.8	156.8	21.6	6
17	Marithotlu	863.2	212.8	137.2	40	57.6
18	Somlapura	728	266.4	205.2	20	6.4
19	Tanudi	611.6	15.6	120.8	28.4	139.2
	<b>TOTAL</b>	<b>16308.8</b>	<b>4815.6</b>	<b>3147.6</b>	<b>497.6</b>	<b>1203.6</b>

**Table 8. Koppa Taluk: Kasaba Hobli - Livestock**

Sl. No.	Village	Livestock details (18th Livestock census)					Total Livestock	Poultry
		Cattle	Buffaloes	Sheep	Goat	Others		
1	Bintrvalli	454	84	0	5	377	920	1653
2	Talamakki	856	159	0	62	291	1368	1418
3	Kesave	358	76	0	0	129	564	217
4	Kelakuli	784	141	0	0	306	1231	859
5	Nuggi	442	57	0	5	141	645	764
7	Harandur	480	59	0	0	311	850	217
8	Gunvanthe	682	249	0	1	293	1225	453
9	Koppa Rural	643	139	0	4	232	1018	782
10	Addada	847	182	0	3	184	1216	461
11	Kagga	156	22	0	0	97	275	81
12	Bomlapura	1151	324	0	0	378	1853	447
13	Bolapura	278	126	0	0	49	453	89
14	Hirekodige	676	191	0	0	139	1006	176
15	Narasipura	866	226	0	0	279	1371	493
16	Kunchur	561	148	0	0	134	843	331
17	Marithotlu	385	72	0	0	134	591	257
18	Somlapura	476	70	0	7	155	708	1518
19	Tanudi	272	30	0	0	133	435	607

**Table 9. Benchmark site: Tarikere Taluk: Ajjampura Hobli - Major crops**

S l. N o	Villages	Total Geogr pahical area (ha)	Cultiva ble area (ha)	Area under major crops													
				Groundnut		Maize		Horse gram		Paddy		Ragi		Rabi jowar		Bengal gram	
				Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)	Area (ha)	Yield (kg/ha)
1	<b>Chinnapura</b>	608.09	608.1	50	1600	15	5500	10	900	5	4500	34	2500	40	2500	70	2000
2	Southanahalli	946	779.12	60	1500	10	5500	15	900	6	4400	115	2600	25	2600	30	2100
3	Sollapura	966.2	834.29	35	1600	16	5400	10	1000	5	4600	43	2400	30	2400	60	1900
4	Malenahalli	1210.03	1072.35														
5	Beguru	1515.39	1205.1	122	1600	30	5600	15	900	5	4400	203	2300	60	2400	60	2000
6	Tammathadahalli	415.29	348.02	120	1400	15	5500	30	900	3	4600	55	2500	25	2500	15	2000
7	Mugali	1845.39	1439.34	200	1600	45	5400	50	900	10	4500	140	2500	40	2600	40	2100
8	Katiganere	1242.29	1101.22	90	1500	40	5500	45	1000		4400	100	2400	110	2500	300	2000
9	Gowrapura	1171.27	1049.22	7	1600	10	5400	4	900		4400	10	2400	80	2500	140	2100
	<b>Total</b>	9919.95	8436.76	684	12400	181	43800	179	7400	34	35800	700	19600	410	20000	715	16200

**Table 9. Benchmark site: Tarikere Taluk: Ajjampura Hobli - Livestock**

Sl. No	Villages	Livestock details							Milk production of the village (Lit/day)
		Cattle	Buffaloes	Sheep	Goat	Others	Total Livestock	Poultry	
1	Chinnapura	78	28				106		400
2	Southanahalli	56	11				67		350
3	Sollapura	171	24	6	8	49	258		550
4	Malenahalli						0		
5	Beguru	155	40	6	4	4	209		350
6	Tammathadahalli	31	5				36		300
7	Mugali	208	44	19	5	38	314		350
8	Katiganere	152	10		8	11	181		375-400
9	Gowrapura	70	35			2	107		400

## Rainfall pattern in selected benchmark sites

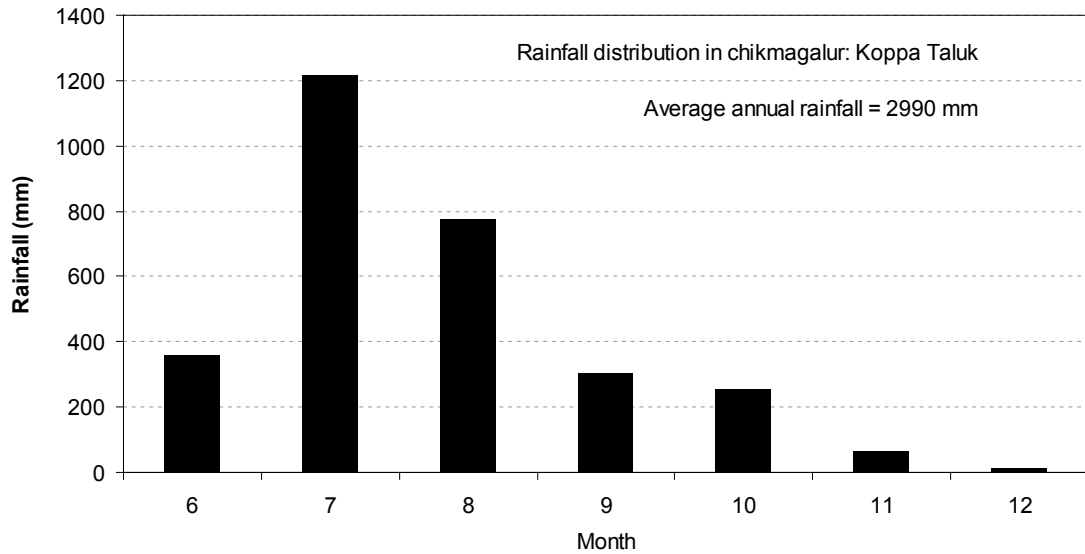


Figure 6. Average monthly rainfall and its distribution between June and December in Koppa taluk

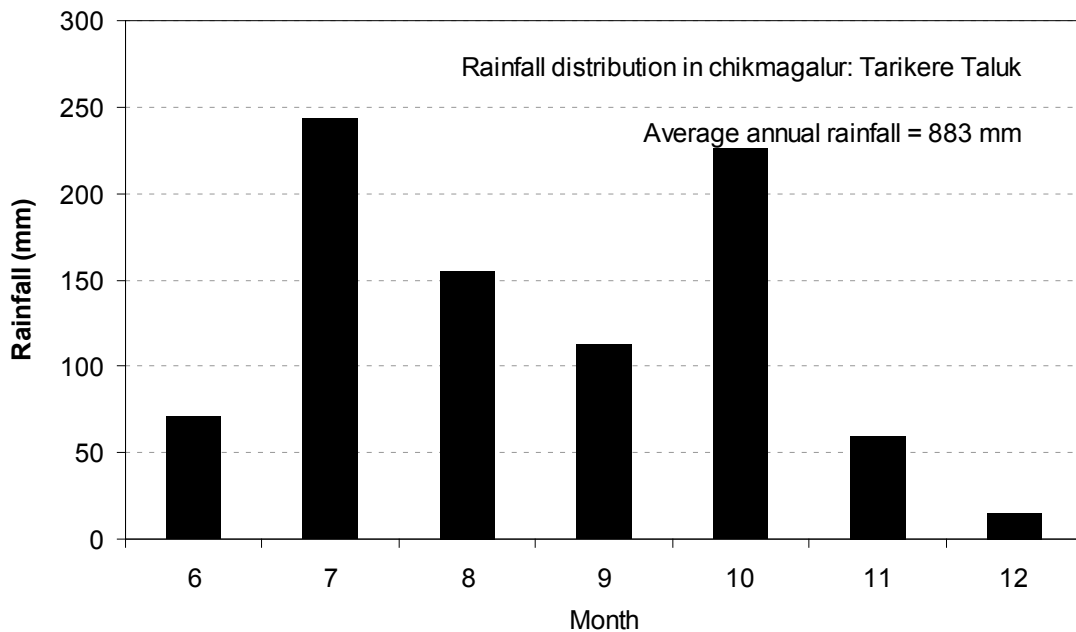


Figure 7. Average monthly rainfall and its distribution between June and December in Tarikere taluk

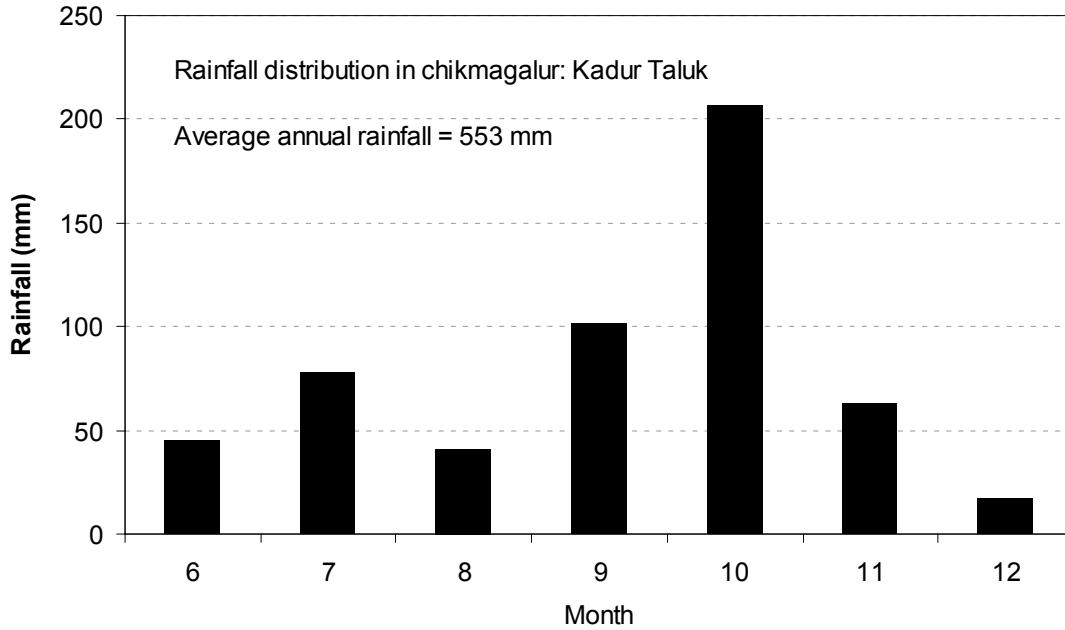


Figure 8. Average monthly rainfall and its distribution between June and December in Kadur taluk

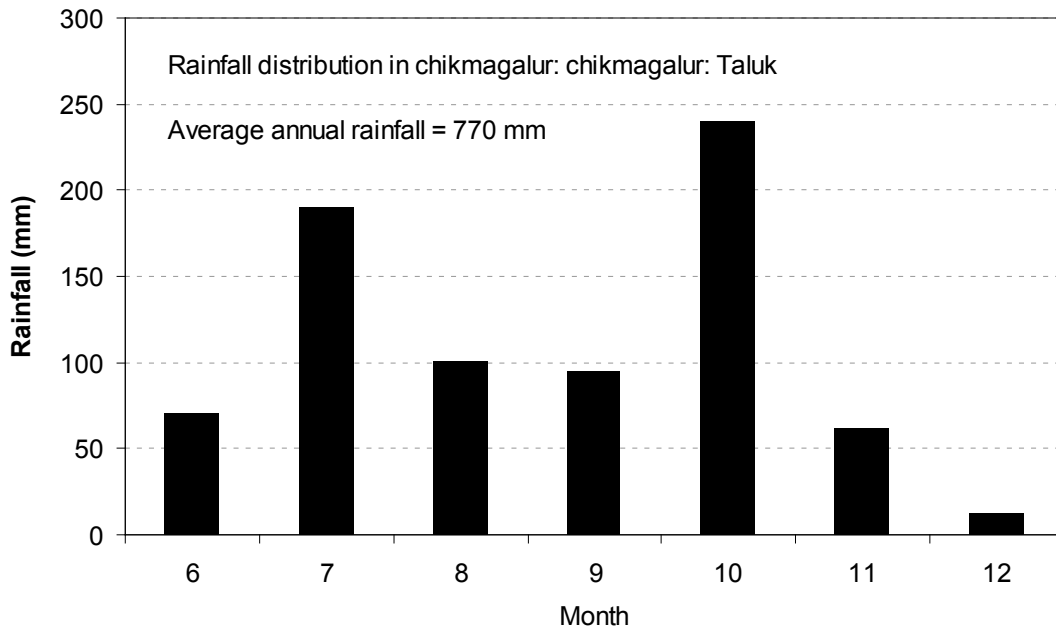


Figure 9. Average monthly rainfall and its distribution between June and December in Chikmagaluru taluk

**Table 10. List of on-going Programme/schemes in different departments**

Department of Agriculture	Department of Animal Husbandry	Department of Horticulture	Watershed Development Department
<ul style="list-style-type: none"> <li>✓ Rashtriya Krishi Vikas Yojane (RKVY)</li> <li>✓ Crop insurance scheme</li> <li>✓ Compensation for farmers' suicides</li> <li>✓ Subsidies for crop loan</li> <li>✓ ISOFOM</li> <li>✓ Maize production scheme</li> <li>✓ Bhoochetana programme</li> <li>✓ Suvarnabhomi (Agri)</li> <li>✓ Plant protection programme</li> <li>✓ Soil testing</li> <li>✓ Programme for popularizing bio-fertilizer</li> <li>✓ Programme for increasing soil fertility</li> <li>✓ New agricultural promotion scheme (processing agricultural produces)</li> <li>✓ ATMA</li> <li>✓ Awards for farmers' production</li> <li>✓ Farm mechanization</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Farmers' helpline centers</li> <li>✓ <b>MNREGA</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ SCP - Cattle/ Buffalo Unit</li> <li>✓ TSP - Cattle/ Buffalo Unit</li> <li>✓ Rastriya Krishi Vikasa Yojane - Piggery Unit</li> <li>✓ Fodder Seeds Distribution - Perennial / Single Cut</li> <li>✓ Fodder Tree Plots Development</li> <li>✓ Azolla Units</li>   <li>✓ Chaff-Cutter Distribution (to the Selected Beneficiaries)</li> </ul>	<ul style="list-style-type: none"> <li>✓ National Horticultural Mission</li> <li>✓ Micro-irrigation scheme</li> <li>✓ Integrated Horticultural Development schemes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Integrated Watershed Management Programme (IWMP)</li> <li>✓ Jalasiri</li> <li>✓ Special Component Plan (SCP) for Scheduled caste</li> <li>✓ Tribal Sub Plan (TSP) for Scheduled tribes</li> </ul>



**Table 11. Major constraints and strategies for different sectors in the district as suggested by line departments**

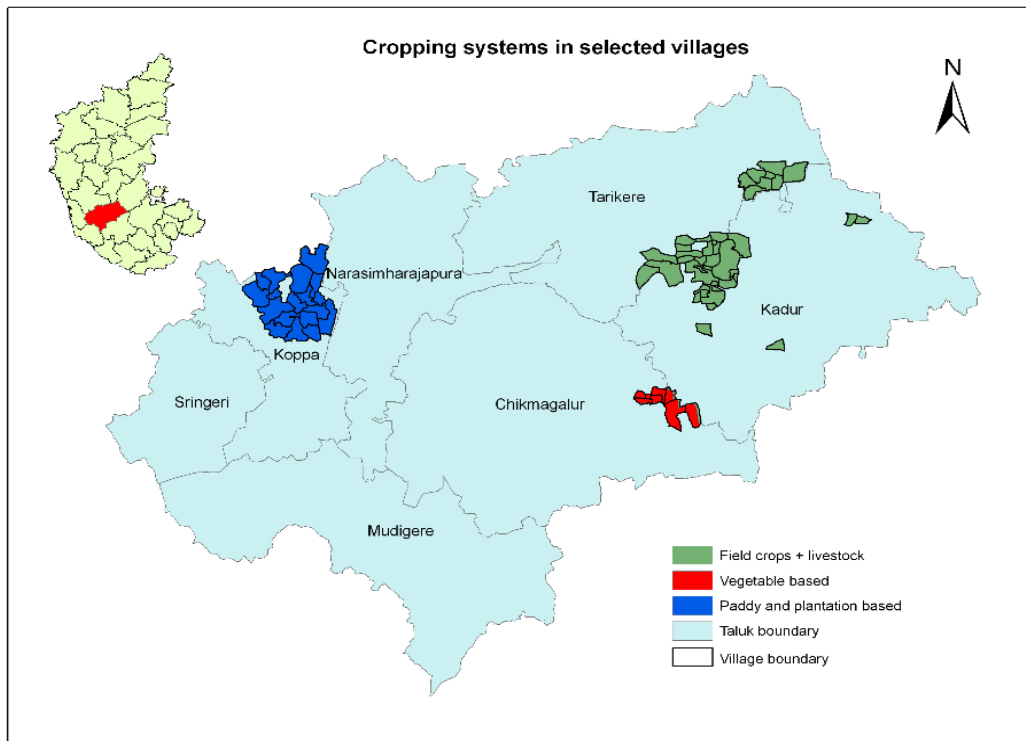
Sector	MAJOR CONSTRAINTS	STRATEGIES
<b>Agriculture</b>	<ul style="list-style-type: none"> <li>• Lack of adoption of Biofertilizers and biopesticides</li> <li>• Less importance was given to maintain soil health</li> <li>• Non adoption of seed treatment</li> <li>• Lack of usage of varieties tolerant to biotic and abiotic stress</li> <li>• Lack of research on breeding drought tolerant genotypes in Oil seeds &amp; pulse crops</li> <li>• Research on in-situ moisture conservation was limited</li> <li>• Non availability of sophisticated electronic/digital devises/Instruments</li> <li>• Insufficient and inaccurate feedback for conducting research</li> <li>• There was a wide gap in transfer of technology from lab to land</li> <li>• Less staff position to carryout extension activities</li> <li>• Weak research-extension linkage</li> <li>• Least importance was given for agro-processing units</li> <li>• Lack of availability of improved processing machines and implements</li> <li>• Less Knowledge regarding processing and value addition</li> <li>• Poor markets facilities for processed products</li> <li>• Inadequate Godowns facilities for stock and storage of agricultural produce</li> <li>• Less number of rural godowns</li> <li>• Technical knowledge on storage of produce was very meagre.</li> <li>• Poor Transport and road facilities</li> <li>• Inadequate Supply chain management</li> <li>• Lack of modern marketing infrastructure facilities</li> <li>• Least importance was given to Raitha Santhe.</li> <li>• Fewer avenues at Raitha Santhe.</li> <li>• No private public partnership</li> <li>• Very high fluctuation in market prices</li> </ul>	<ul style="list-style-type: none"> <li>• Region specific crop selection and use of certified seeds</li> <li>• Reclamation of acidic soils ( Malnad Taluks)</li> <li>• Crop rotation should be followed.</li> <li>• Use of organic manures/ biofertilizer to be encouraged.</li> <li>• Crop diversification (Malnad Taluks)</li> <li>• Adoption of IPM/INM/ICM</li> <li>• Use of micronutrients</li> <li>• Training and demonstration</li> <li>• Mechanization and agro processing</li> <li>• Timely sowing and management of crops</li> <li>• Increase cropping intensity by adopting mixed/intercropping/use of short duration varieties.</li> <li>• Area expansion under irrigation (tail end of irrigation regions &amp; providing sprinklers (Malnad Taluks)</li> <li>• Thrust on Farmers field Schools and clusters</li> <li>• Involvement of NGO's, SHG's and progressive farmers in technology dissemination</li> <li>• More number of FLD's, Farm trials and research at farmers field</li> <li>• Proper feedback from the field functionaries</li> <li>• Krishimelas/exposure visits</li> <li>• Establish a separate TV channel on agricultural and allied activities</li> <li>• Make mandatory for local channel to telecast new technologies, programmes, and recent weather forecast for local region</li> </ul>
<b>Horticulture development</b>	<ul style="list-style-type: none"> <li>• Lack of adoption of biopesticides and botanicals</li> <li>• Less importance was given to maintain soil health</li> <li>• Non adoption of seed treatment</li> <li>• Less usage of organic manure and Biofertilizers</li> <li>• Lack of usage of varieties tolerant to biotic and abiotic stress</li> <li>• Lack of research on precision farming in vegetables and flower crops.</li> <li>• Lack of research on crop diversification based on suitability, new crop varieties and proper planning to produce the commodities as per the need to realize higher returns for the investment made.</li> <li>• Lack of research on disease forecasting and biocontrol.</li> </ul>	<ul style="list-style-type: none"> <li>• Area expansion of major crops like mango, sapota, banana will be taken up under NHM and area expansion of papaya, pomegranate, fig, guava, pineapple are proposed under new district comprehensive agriculture plan .</li> <li>• Establishment of nurseries for production of elite planting materials will be taken up under NHM with the assistance of coconut board.</li> <li>• Promotion of flower crops will be taken up under NHM.</li> <li>• Micro irrigation scheme is implemented</li> </ul>

	<ul style="list-style-type: none"> <li>• Less importance given on organic farming and its certification</li> <li>• Lack of market led extension to create awareness about quality maintenance, post harvest handling and value addition through organizing group meetings, seminars, exhibition, Krishimelas, study tours etc.</li> <li>• Infrastructure lacuna like inadequate logistic support to the extension personnel at gross root level and lack of vehicle for movement.</li> <li>• Establishment of processing units for crops like mango, tomato and other vegetables, banana, spices, Arecanut.</li> <li>• Lack of cold storage facilities to avoid the post harvest losses, avoid market glut and fetch better price in the market.</li> <li>• Need to emphasize for establishment of pack houses, cold chains and controlled atmospheric storages</li> <li>• Inadequate marketing infrastructure like whole sale markets, functional infrastructure for collection, grading and scientific retail market.</li> <li>• Lack of public private partnership to expand regulated markets and to pump in more money for establishment of marketing infrastructure.</li> <li>• Inadequate co-operative marketing system for horticultural produces.</li> <li>• An act on Efficient Use of Water should be enacted.</li> <li>• Lack of strategies to exploit market potential available in the metro cities for organically produced quality food.</li> <li>• Nursery certification can be taken up based on the lines of seed certification to provide Quality planting material.</li> <li>• Price regulation for horticultural crops by providing subsidy during market distress conditions.</li> <li>• Scope is there to establish nurseries to fulfill the requirement of planting material through public private partnership.</li> <li>• There is enough scope to take up PPP approach for expansion of regulated market and to pump in more money for market infrastructure development.</li> <li>• Enough scope is available under contract farming to ensure scientific market price under tie up arrangement with private companies and financial institution.</li> </ul>	<p>utilizing funds provided under micro irrigation scheme of union government along with state scheme.</p> <ul style="list-style-type: none"> <li>• INM/IPM and production of parasites will be met under NHM and under state sector scheme.</li> <li>• Organic farming under NHM</li> <li>• Rejuvenation of old and senile plantations under NHM</li> <li>• Post harvest handling using funds of state government , NHM and district comprehensive plan</li> <li>• Marketing support through NHM and state scheme.</li> <li>• Proper feedback from the field functionaries</li> <li>• Make mandatory telecasting of agricultural and allied activities twice a day during morning and evening hour by all private TV channels</li> <li>• Establish a separate TV channel on agricultural and allied activities</li> <li>• Make mandatory for local channel to telecast new technologies, programmes, and recent weather forecast for local region</li> <li>• Creation of awareness among farming community about market and value addition.</li> <li>• Formation of farmers association at village level to avoid middle men and creating direct linkage to the market entrepreneurs like safal market.</li> <li>• Encouraging the farmers to grow demand driven market produce.</li> <li>• Improvement of logistic and transport network</li> <li>• Creating proper accessible roads between all taluks to transport farm produce easily to district centers.</li> <li>• Requirement of vehicle support to collect the produce from taluks to easen the transportation.</li> <li>• Enough scope is available to utilize funds under national horticulture mission to setup Small scale and large scale processing industries.</li> <li>• Agro climatic conditions of the district are suitable to take up cultivation of export oriented quality cut flowers, spice crops and vegetable crops.</li> </ul>
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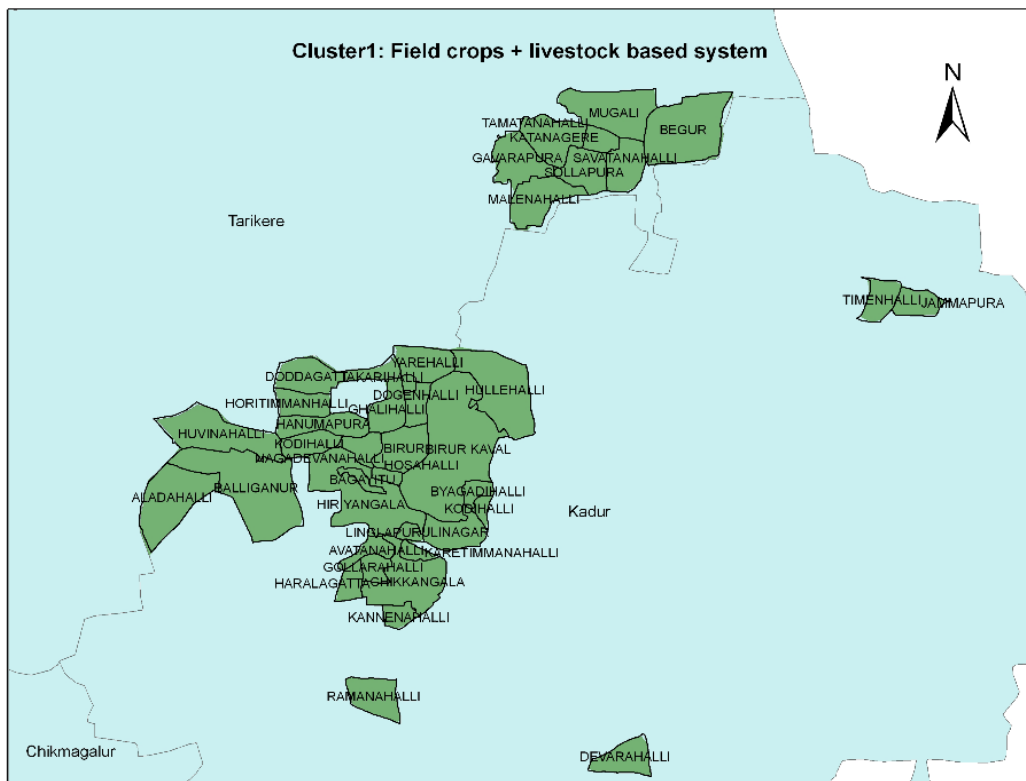
<p><b>Animal Husbandry</b></p>	<ul style="list-style-type: none"> <li>• Due to lack of own buildings it is difficult to provide proper Veterinary Services</li> <li>• Shortage of Veterinary Officers in the district leading to insufficient Veterinary care for animals.</li> <li>• Insufficient budget allocation for drugs &amp; chemicals leading to less coverage of animal care.</li> <li>• Presence of old and unconditioned mobile veterinary clinic vehicles because of which less health coverage of animals.</li> <li>• Lack of marketing network for milk in malnad taluks because of which there is a setback in developing dairy.</li> <li>• Lack of Scientific slaughter houses leading to inability in supplying clean &amp; hygiene meat to the public</li> <li>• Lack of sufficient financial support &amp; scientific knowledge to farmers to take-up dairy, poultry sheep and piggery</li> <li>• Insufficient funds to strengthen livestock forms leading to shortage of Fodder &amp; less encouragement for conservation of Indigenous breeds.</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening of Veterinary services through creation &amp; infrastructure facilities &amp; such as buildings, vehicles.</li> <li>• Induction of CB cows to improve milk production</li> <li>• Providing financial assistance to encourage sheep, poultry, piggery forming with in turn leads to increase in productivity.</li> <li>• Providing financial assistance in the form of minikits for growing fodder.</li> <li>• Strengthening of Livestock forms through formation of Cattle prevention trench &amp; development of land for growing fodder.</li> <li>• Financial assistance for the establishment of cattle breeders association, sheep &amp; poultry Co-operative societies</li> </ul>
<p><b>Watershed Development</b></p>	<ul style="list-style-type: none"> <li>• Lack of farmers and public participation</li> <li>• Insufficient staff and field level workers</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of water harvesting structures in the available area. Each drainage line has to be identified and appropriate treatments must be taken to tackle this problem. This will help in recharging of ground water status.</li> <li>• Reclamation works should be carried out to treat 1060 ha. of waterlogged area.</li> <li>• Recharging of drinking water bore well</li> <li>• As many Farm Ponds may be constructed to collect excess water. Besides this, construction of Check Dams, Nala Bunds and Percolation Tanks should be taken up.</li> <li>• Rainwater harvest structure should be provided</li> <li>• Agro-forestry, Farm Forestry and Block plantation to be taken up to increase green coverage</li> <li>• Lively hood support activities and strengthen of SHG can be taken up. Employment opportunities to be created to stop migration of labours. Introduction of Dry land Horticulture is the right way to tackle this problem.</li> <li>• Public participation must be ensured in all the watershed development programmes. Capacity building programmes like Training, Exposure Visits may be intensified. Involvement of NGOs may be taken up to achieve the target.</li> </ul>

## **Possible interventions suggested by line departments**

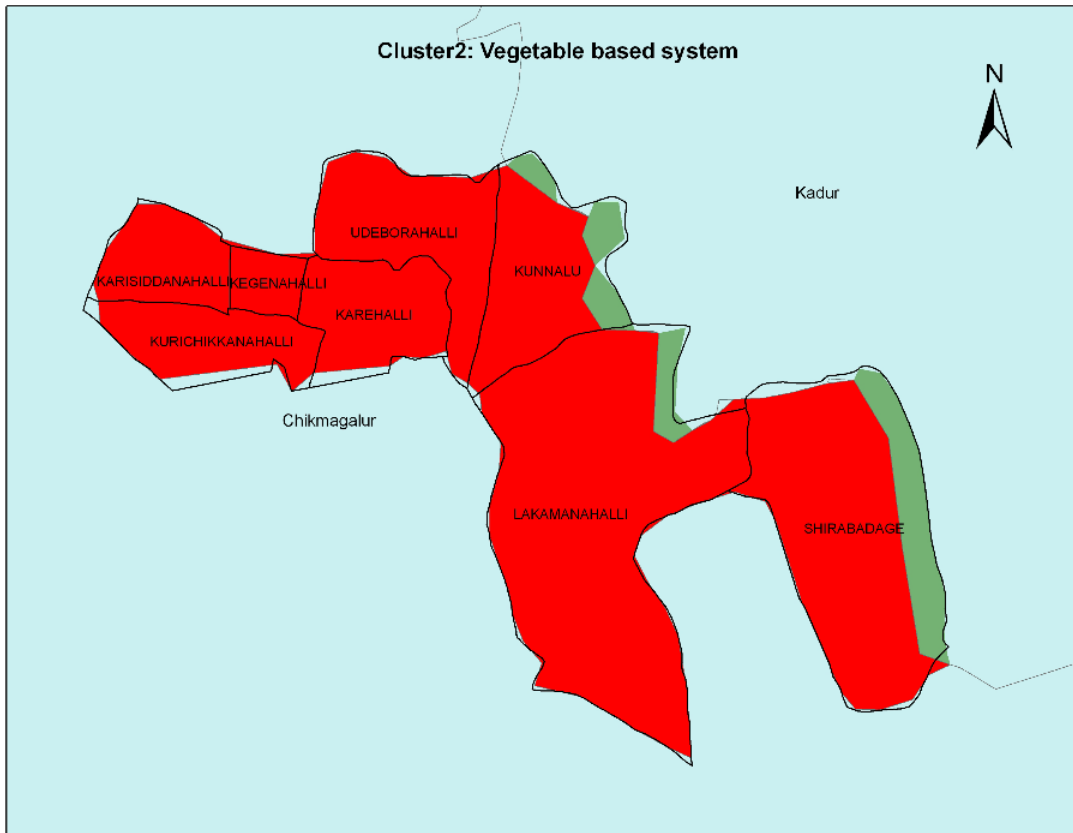
1. Micro-irrigation: Bring more areas under micro irrigation.
2. Integrated watershed development for *insitu* moisture conservation, regulating runoff, water harvesting measures to improve storage and percolation capacity.
3. Construction of borewell recharge pits, rejuvenation of existing water tanks.
4. Encouraging mixed cropping and intercropping practices.
5. Encouraging farmers on soil test based fertilizer application.
6. Production and utilization of bio-fertilizers, bio-pesticides and micro- nutrients at doorsteps of the farmers.
7. Organic farming: Emphasis on quality organic inputs and certification of organic products
8. Farm mechanization: Hi-tech agricultural implements like paddy transplanters, seed-cum- fertilizers drill, harvesters are to be made available at higher subsidy rates.
9. Contract farming: emphasis to bring more agricultural commodities under contract farming
10. Clean milk production: Mechanization of milching
11. Modern fishing equipments: supply of modern fishing equipments at subsidized rates.
12. Encouraging farmers on adopting Integrated farming Systems through extensive extension activities.
13. Encouraging farmers on cultivating high value crops.
14. Establishment of agro-processing units on community basis.
15. Quality Seed production of Green manure and forage crops (napier grass, multicut bajra, multicut jowar etc on farm bunds, waste lands, fallow lands through PPP.



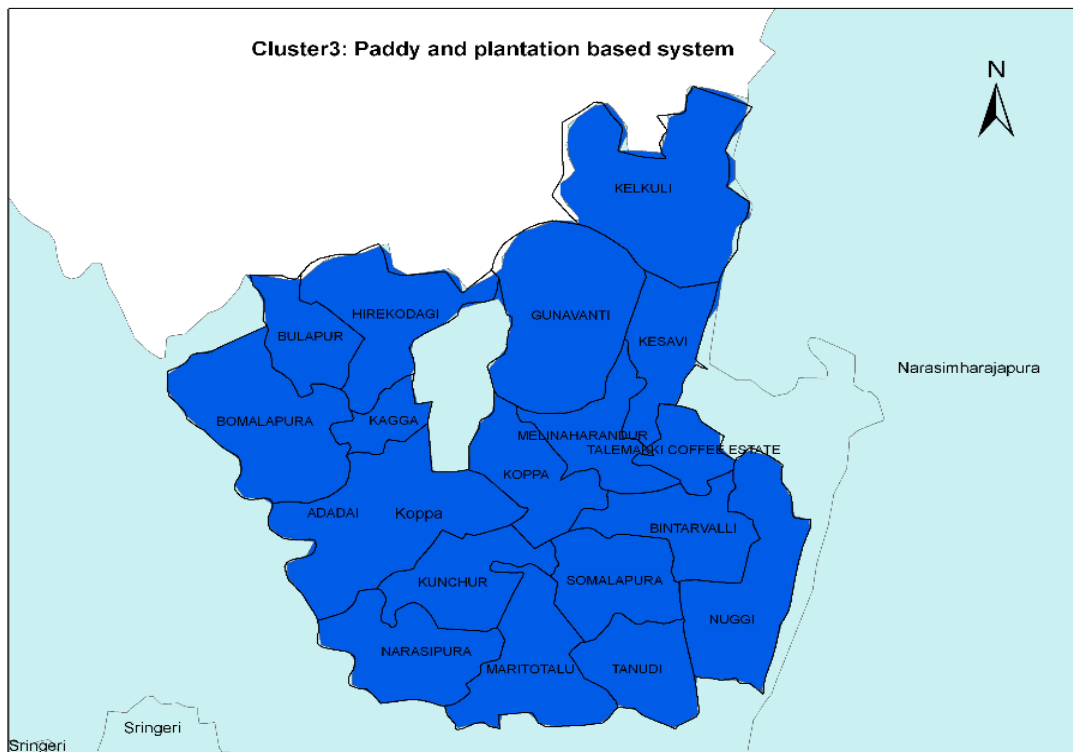
**Figure 10. Cropping system in selected benchmark villages**



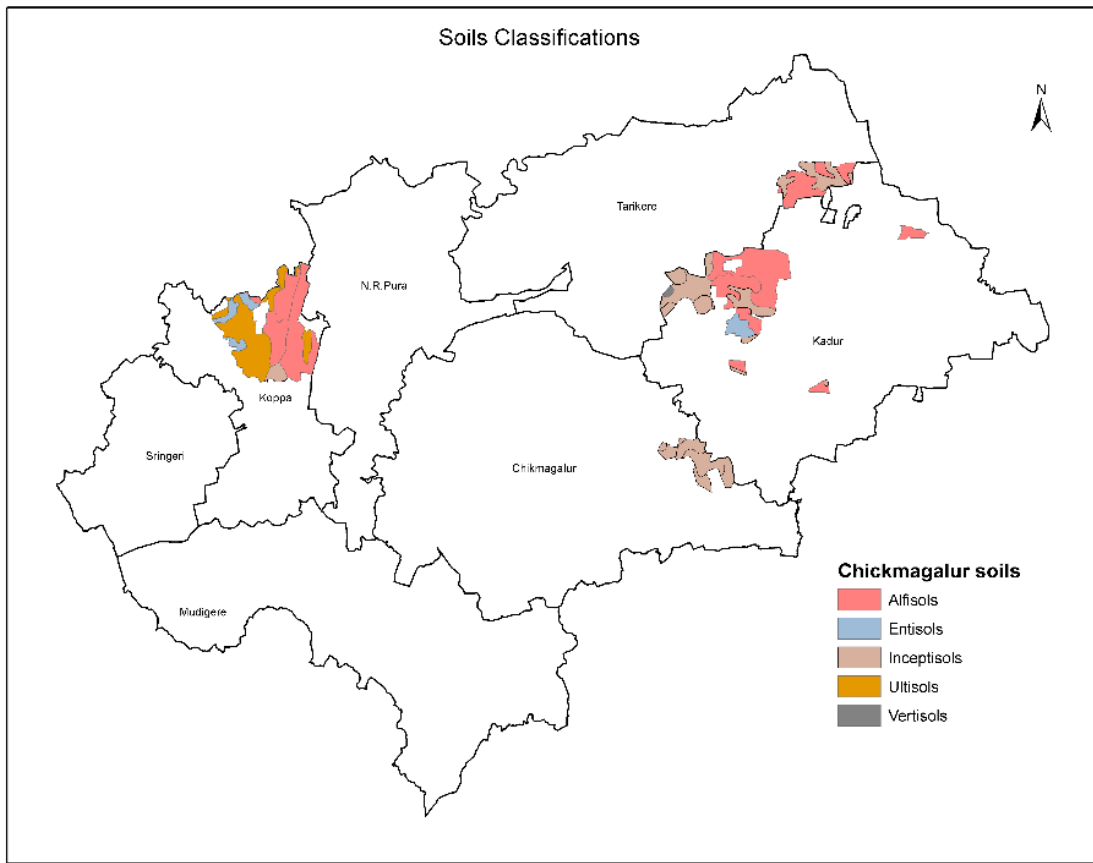
**Figure 11. Villages identified under field crops livestock-based system (Kadur and Tarikere)**



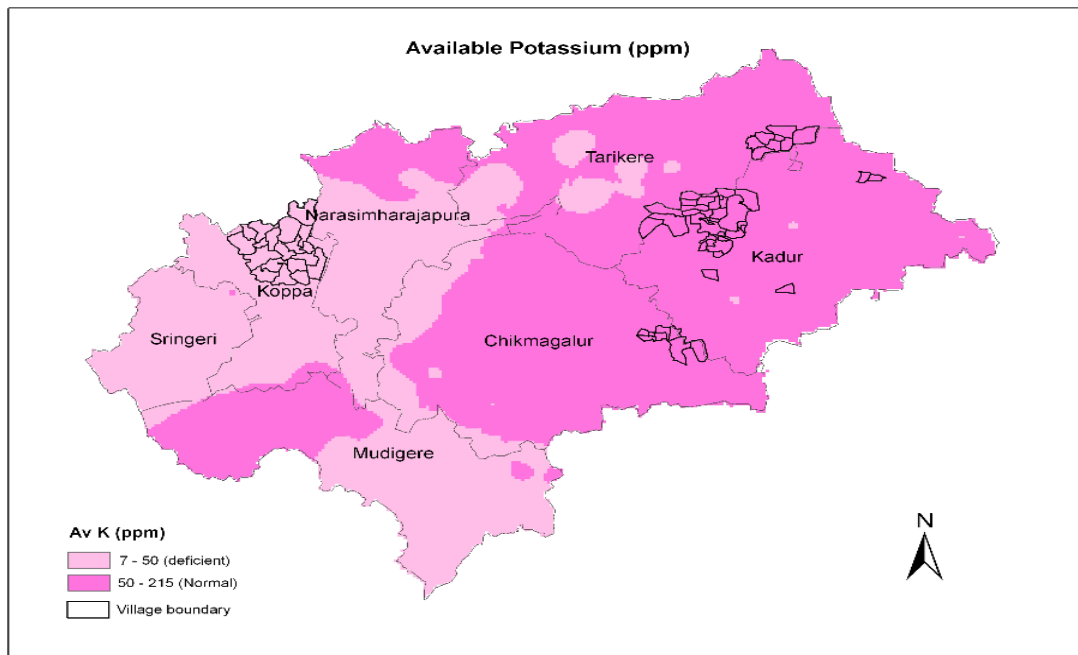
**Figure 12. Villages identified under vegetable-based system (Chikmagaluru)**



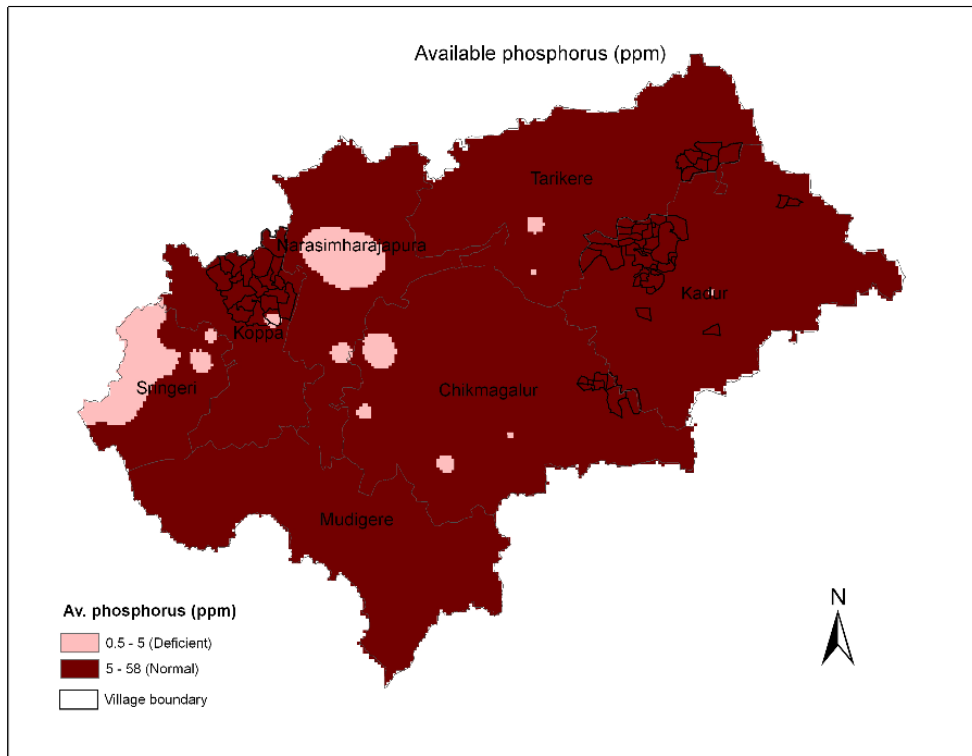
**Figure 13. Villages identified under paddy and plantation based system (Koppa)**



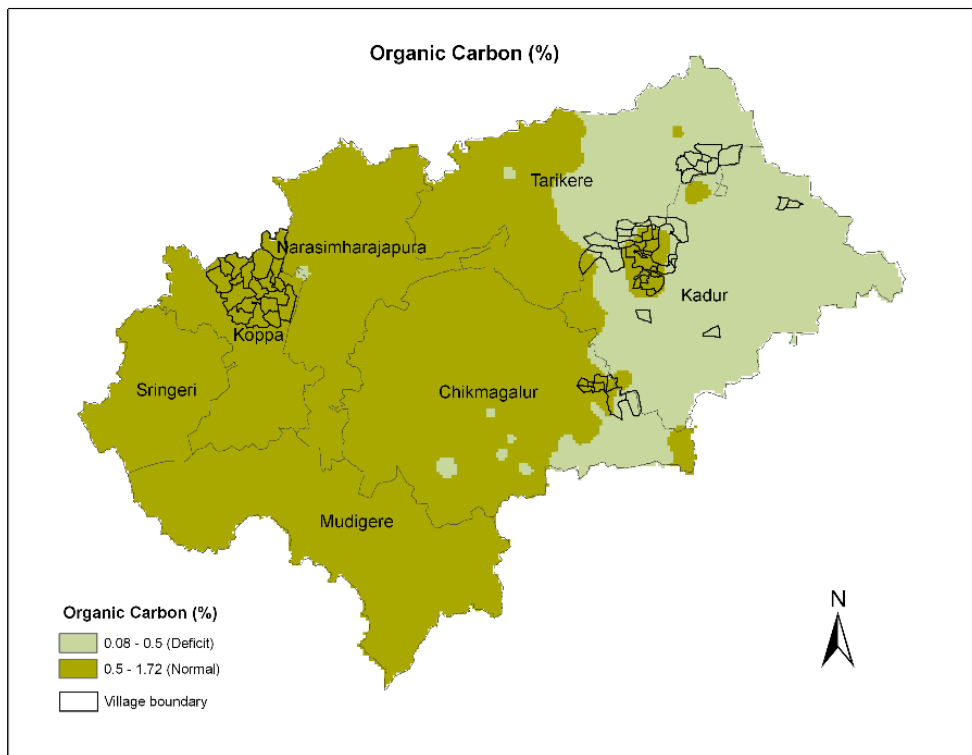
**Figure 14. Soil classification in selected villages**



**Figure 15. Status of available Potassium (ppm) in selected cluster villages**

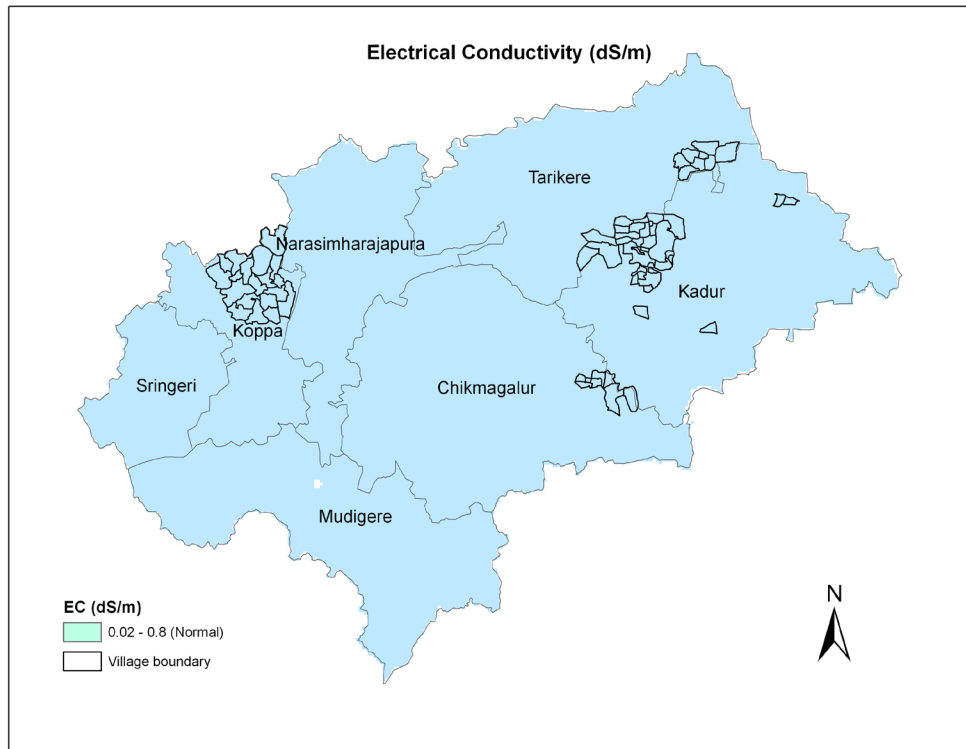


**Figure 16. Status of available phosphorus (ppm) in selected cluster villages**

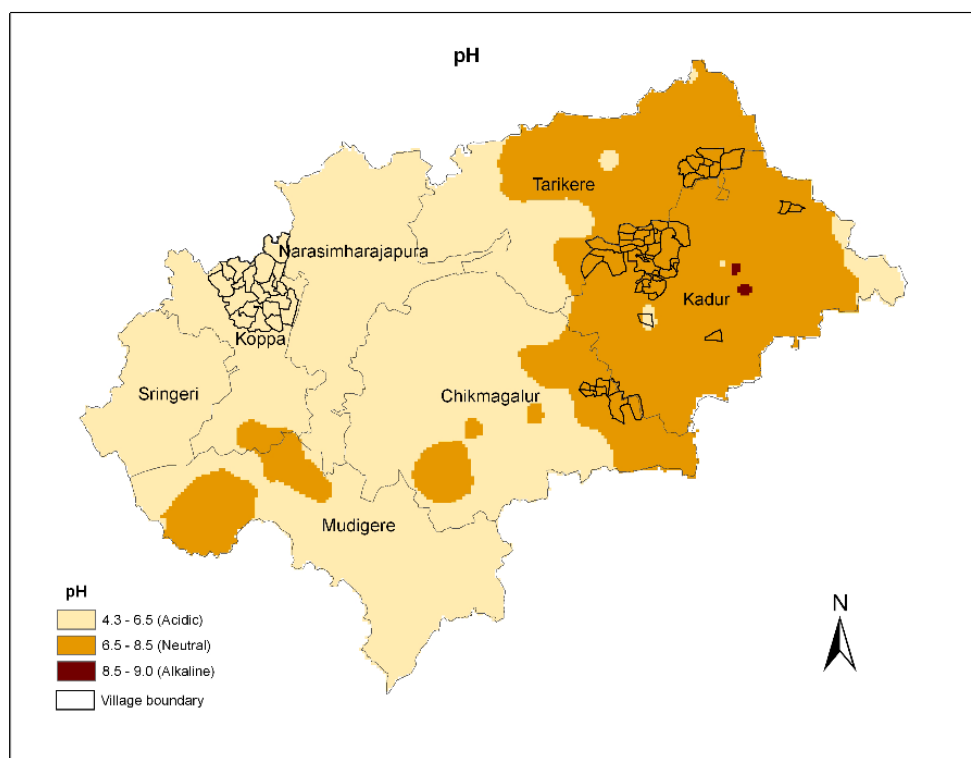


**Figure 17. Status of organic carbon (%) in selected cluster villages**

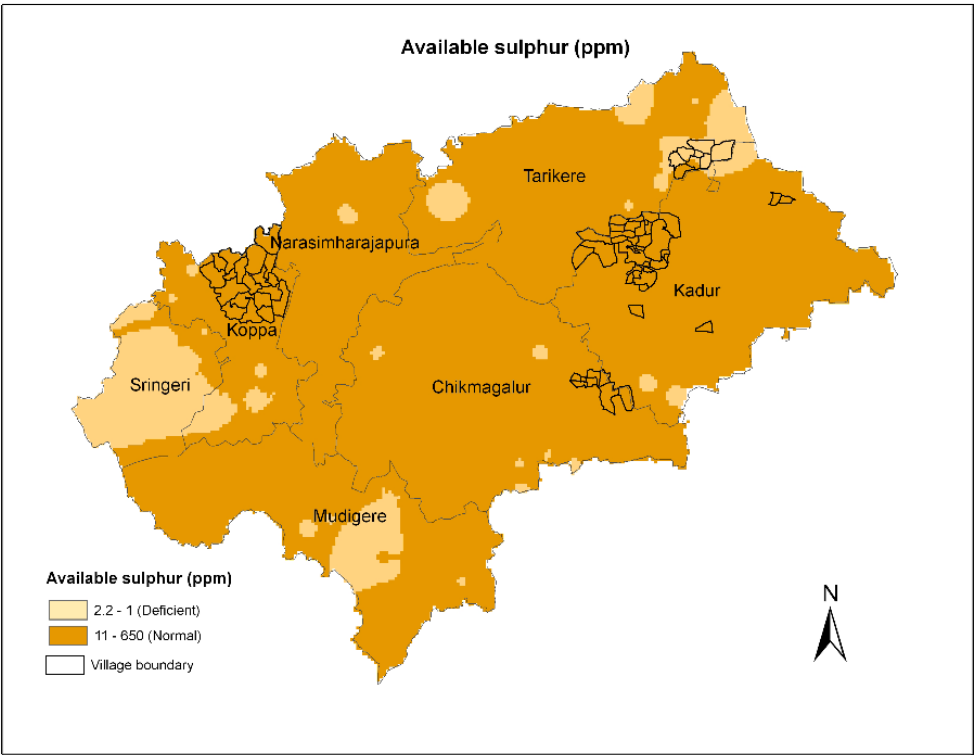




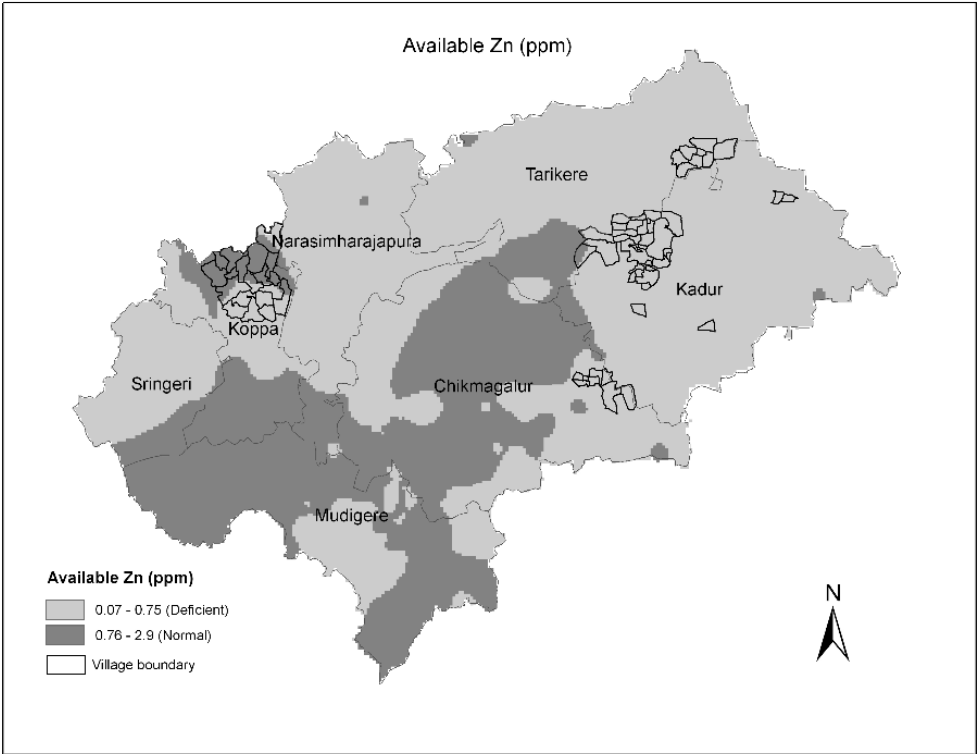
**Figure 18. Soil electrical conductivity (ds/m) in selected cluster villages**



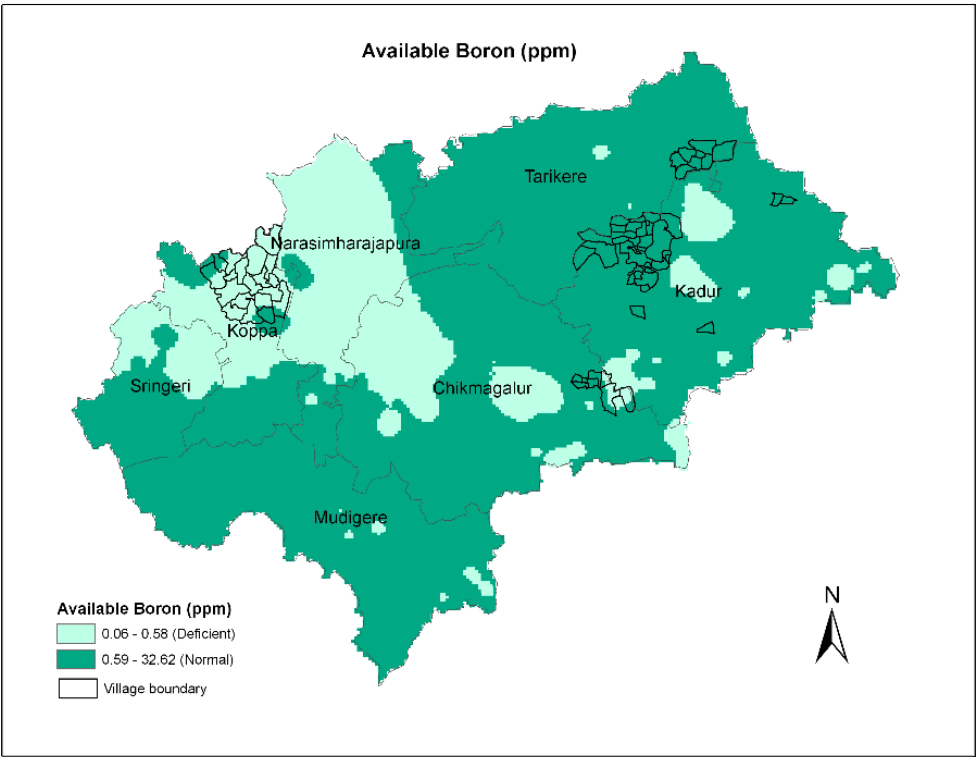
**Figure 19. Soil pH in selected cluster villages**



**Figure 20. Status of available sulphur (ppm) in selected cluster villages**



**Figure 21. Status of available Zn (ppm) in selected cluster villages**



**Figure 22. Status of available Boron (ppm) in selected cluster villages**

**Table 12. Specific constraints identified and possible interventions suggested during kickoff meeting**

Constraints	Possible interventions
Soil and water issue	Integrated Watershed Development (In-situ moisture conservation and runoff water harvesting measures, improvement to enhance the storage and percolation capacity, etc)
Groundwater depletion	<p>Rejuvenation of existing tanks by desilting, bunds strengthening, sluice gate</p> <p>Construction and maintenance of community water bodies (gokatte, local ponds, etc)</p> <p>Borewell recharge pits</p>
Poor water use efficiency	<p>Micro irrigation - Drip and sprinkler to be promoted</p> <p>Water efficient crops and varieties</p>
Low productivity	<p>Mixed cropping with short duration pulses followed by ragi</p> <p>Coconut and mango with cowpea, green gram, horsegram</p>
Poor fertilizer use efficiency	<p>Soil-test based fertilizer application</p> <p>Balanced nutrient application</p> <p>Compost/green manuring/vermicomposting</p>
Labour shortage	<p>Mechanization</p> <p>Customised services</p> <p>Transplanter and combined harvester</p>
Livestock	Strengthening of artificial insemination to improve low yielding breeds of cattle and goats
Fodder scarcity	Napier grass, Multi cut bajra, Multi cut jowar on farm bunds; Suspenia, Jack, drumstick, Leucenia on farm boundary and fallow/waste lands
Pests and diseases	<p>IPM, IDM,</p> <p>Crop rotation</p>

	<p>Summer tillage</p> <p>Trap cropping</p>
<p>Crop diversification and related issues</p>	<p>Site specific diversification to high value crops and building storage facility</p> <p>Agro-processing units on community basis</p> <p>Horticultural crops (pomegranate, amla, mango, jack etc) on fallow lands</p>
<p>Credit constraints</p>	<p>Existing schemes like processing (incentives) to be linked</p> <p>Linking with banks/GoK with subsidy component</p> <p>Credit cooperative societies</p>