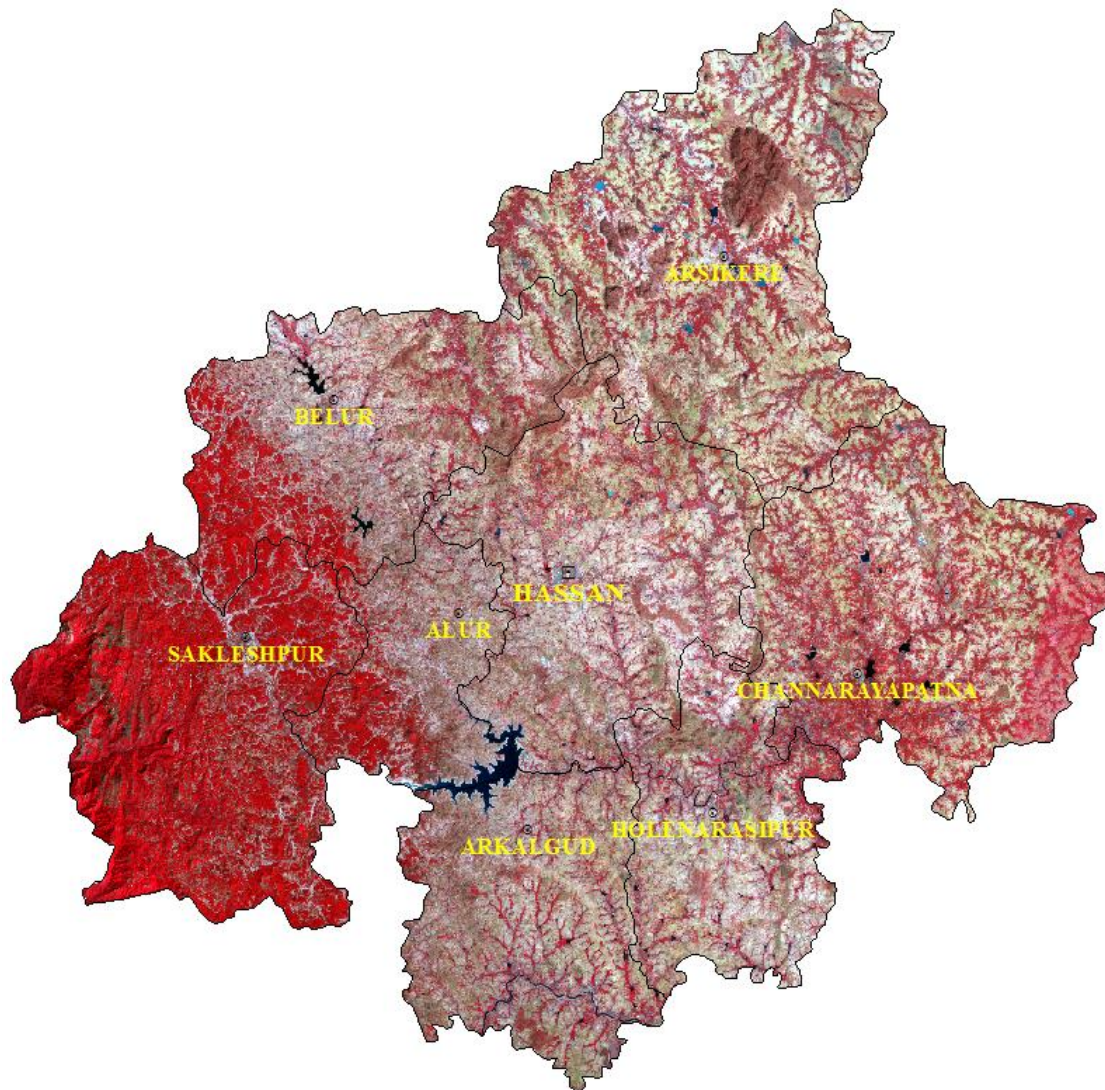


# SOIL RESOURCE BASED LAND USE OF HASSAN DISTRICT (KARNATAKA)



National Bureau of Soil Survey & Land Use Planning  
(Indian Council of Agricultural Research)

Nagpur - 440 033, Maharashtra, India



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## Meta Data for Soil Reports of Hassan District, Karnataka

| Sr.No.          | Elements                   | Scheme                               | Value   |
|-----------------|----------------------------|--------------------------------------|---|
| 1.              | Identification Information | Name of the Dataset                  | Soil Resource Based Land Use of Hassan District (Karnataka)   |
|                 |                            | Contents                             | Soil Survey Reports, Maps and Imagery   |
|                 |                            | Keywords                             | Soil Survey Report  |
|                 |                            | Report/Map Language                  | English   |
|                 |                            | Map Scale                            | 1:63,360  |
|                 |                            | Survey Year                          | 1975 - 1981   |
|                 |                            | Imprint Year                         | 1987  |
|                 |                            | Edit Year                            | -   |
|                 |                            | Value-addition Year                  | 2013  |
|                 |                            | Purpose of Value-addition            | To Create Interactive Maps and Reports and Disseminate to the End-User Agencies.  |
|                 |                            | Access Constraints                   | Permission Required   |
| Use Constraints | Permission Required        |                                      |   |
| 2.              | Contact Information        | Generating Agency                    | NBSS & LUP, Nagpur  |
|                 |                            | Contact Person                       | Director, NBSS & LUP, Nagpur  |
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|                 |                            | City/Locality                        | Nagpur, Amarabati Road  |
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|                 |                            | Contact Email                        | director@nbsslup.ernet.in   |
| 3.              | Spatial Domain             | Bound Left                           | 75d33'36.6947"E   |
|                 |                            | Bound Right                          | 76d38'01.0481"E   |
|                 |                            | Bound Top                            | 13d32'48.5741"N   |
|                 |                            | Bound Bottom                         | 12d30'41.0981"N   |
|                 |                            | Area/Coverage                        | 6780 sq.km  |
|                 |                            | Projection                           | UTM   |
|                 |                            | Datum                                | WGS 1984  |
|                 |                            | Unit                                 | Meter   |
| 4.              | Citation                   | Administrative Location              | State: Karnataka, District: Hassan  |
|                 |                            | Data Prepared By                     | NBSS & LUP, Bangalore (Regional Centre)   |
|                 |                            | Associated Project                   | C.S. Harindranath   |
|                 |                            | Associated Value- additions          | -   |
|                 |                            | Associated Publications              | -   |
| 5.              | Storage                    | Coordinator Value- added Publication | -   |
|                 |                            | Data Format                          | PDF/GeoPDF  |
|                 |                            | Data File Size                       | 44.4 MB   |
|                 |                            | Data Physical Location               | \\GIST6\D:\GeoPDF Mapping Project _2013\Hassan  |
| 6.              | Quicklook                  | Download Location                    | -   |
|                 |                            | Graphic file in jpg format           | Y   |
| 7.              | Image Data                 | Name of the Satellite                | Landsat   |
|                 |                            | Sensor                               | ETM+  |
|                 |                            | Date of Image                        | 29 March 2002 and 27January 2003  |
|                 |                            | File Format                          | TIFF  |
|                 |                            | Spatial Resolution                   | 30 m  |
|                 |                            | Image Downloaded From                | <a href="http://earthexplorer.usgs.gov/">http://earthexplorer.usgs.gov/</a>   |
| 8.              | Rights                     | Credit                               | USGS  |
|                 |                            | Copyright                            | NBSS & LUP, Nagpur  |
|                 |                            | Distributor Contact                  | Director, NBSS & LUP, Nagpur  |

## CONTRIBUTORS

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| Soil survey interpretation and<br>Technical editing             | : | J.L.Sehgal<br>L.R.Hirekerur<br>V.A.K.Sarma                                       |

## **FOREWORD**

Soils differ greatly in their edaphic, morphological, physico-chemical and mineralogical properties because of assorted combination of soil forming factors and processes which act on the parent rock to form them.

Soil Scientists study soils to identify units that can be grouped according to their morphology and properties into classification units that can be delineated on maps. Different kind of soils can be interpreted for a variety of technical uses, including technology transfer.

Since it is practically difficult to make detailed investigations and conduct fertility experiments on several soils, it becomes imperative to make predictions, based on soil survey and correlation data. The present bulletin on the soils of Hassan district (Karnataka) is an endeavour of the Staff of National Bureau of Soil Survey and Land Use Planning in this direction wherein efforts have been made to map soil resources of the district, highlight the problems and potentials for developing better land use plans. The bulletin covers various aspects of the soils of the districts, including a separate chapter on Soil Survey Interpretation and suitability of soils for major crops grown in the area. The results obtained may prove useful in transferring soil-based agro-technology to other areas having similar soil-site characteristics.

It is hoped that this bulletin will be exploited by agronomists, planners, extension workers of different departments for making rational land use recommendations.

Director

## ACKNOWLEDGEMENT

The soil survey of Hassan district is a collective effort of many persons in the Bureau. However, the following deserve a special mention for their help and guidance in realizing the project.

- Sri Naga Bhushana, S.R. and Shri Barde, N.K., the Regional Heads at the time of the project and field review.
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- Staff members of the Regional Centre, Bangalore and Headquarters, Nagpur in cartography and laboratory in various stage of the project.
- Sri Abraham, P.K. for map reduction and printing section headed by Sri S. Pandey for printing.



# 1.

## INTRODUCTION

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Soil is the basic resource for meeting the needs of all life. Since no two soils are similar in their inherent characteristics and behavior, a proper understanding of their properties is imperative for developing optimum land use plan. Soil surveys and maps provide information of the soil resource of an area. Interpretation of Soil data lead to predictions.

In view of this, a semi-detailed reconnaissance soil survey of the District Hassan (Karnataka) was undertaken with the following objectives:

- to prepare a soil resource map of the district, delineating soil series and/or soil series associations with phases within each soil series association,
- to characterize the soils and highlight their problems and potentials,
- to correlate and classify the soils according to Soil Taxonomy, and
- to prepare interpretative maps based on soil-site characteristics and their limitations for developing optimum land use plans.

## 2.

**GEOGRAPHICAL SETTING**

The total geographical area of the district is 6.78 lakh hectares. It is, situated between 12°31' and 13°33' North latitude and 75°33' and 76°38' East longitude and lies in the south western part of the state of Karnataka. It is bounded on the north by Chikmagalur district, on the east by Tumkur and Mandya districts, on the south by Mysore and Kodagu districts and on the west by South Kanara district. The Hassan district comprises eight talukas (Fig. 1).

The major rock formations in the area are granites, gneisses, schist and quartzite (Fig.2).

The Hassan district is a part of the Karnataka plateau. Most of the plateau is peneplain in various stages of denudation. It has gently to rolling surface with occasional monadnocks. In the geological past, the raising of the Western Ghats resulted in the tilting of the plateau and brought about a change in climate from humid to semi-arid. There are two distinct erosional surfaces:

1. The high hilly region popularly called 'Malnad' and
2. The plain region, popularly known as 'Maidan'

The district may be divided into the following physiographic zones: (map-1)

1. Hilly region covered with forest (southern 'malnad')
2. Hillocks on the plain region
3. Undulating to rolling lands (semi-'malnad' and high lands 'maidan')
4. Gently sloping pediments (southern 'maidan')
5. Valleys (river valleys and tank command areas)

The Sakaleshpur taluk of the district rests on the brow of the Western Ghats and comprises some of the most beautiful scenery in Karnataka State. The elevation ranges from 1000 to 1715 metres above the mean sea level. Apart from these hill peaks, there are low ranges of granite hills found in all the other taluks.

The area is drained by three important rivers viz. the Cauvery, Hemavathi and Yagachi. Most of the district lies within the Hemavati basin.

In the hilly region ('malnad'), there are number of small check dams and pickups constructed across the rivers during the 19<sup>th</sup> Century which till to date are being used for irrigation. In the undulating plain ('maidan') tank irrigation is common. Of the total net sown area, about 16 per cent is irrigated by different sources; the details are:

|                                 |                       |
|---------------------------------|-----------------------|
| Total net sown area             | : 3.5 lakh ha.        |
| Total area irrigated            | : 0.56 lakh ha. (16%) |
| Area irrigated by canals        | : 10749 ha.           |
| Area irrigated by tanks         | : 34083 ha.           |
| Area irrigated by wells         | : 1717 ha.            |
| Area irrigated by other sources | : 9797 ha.            |

# LOCATION MAP

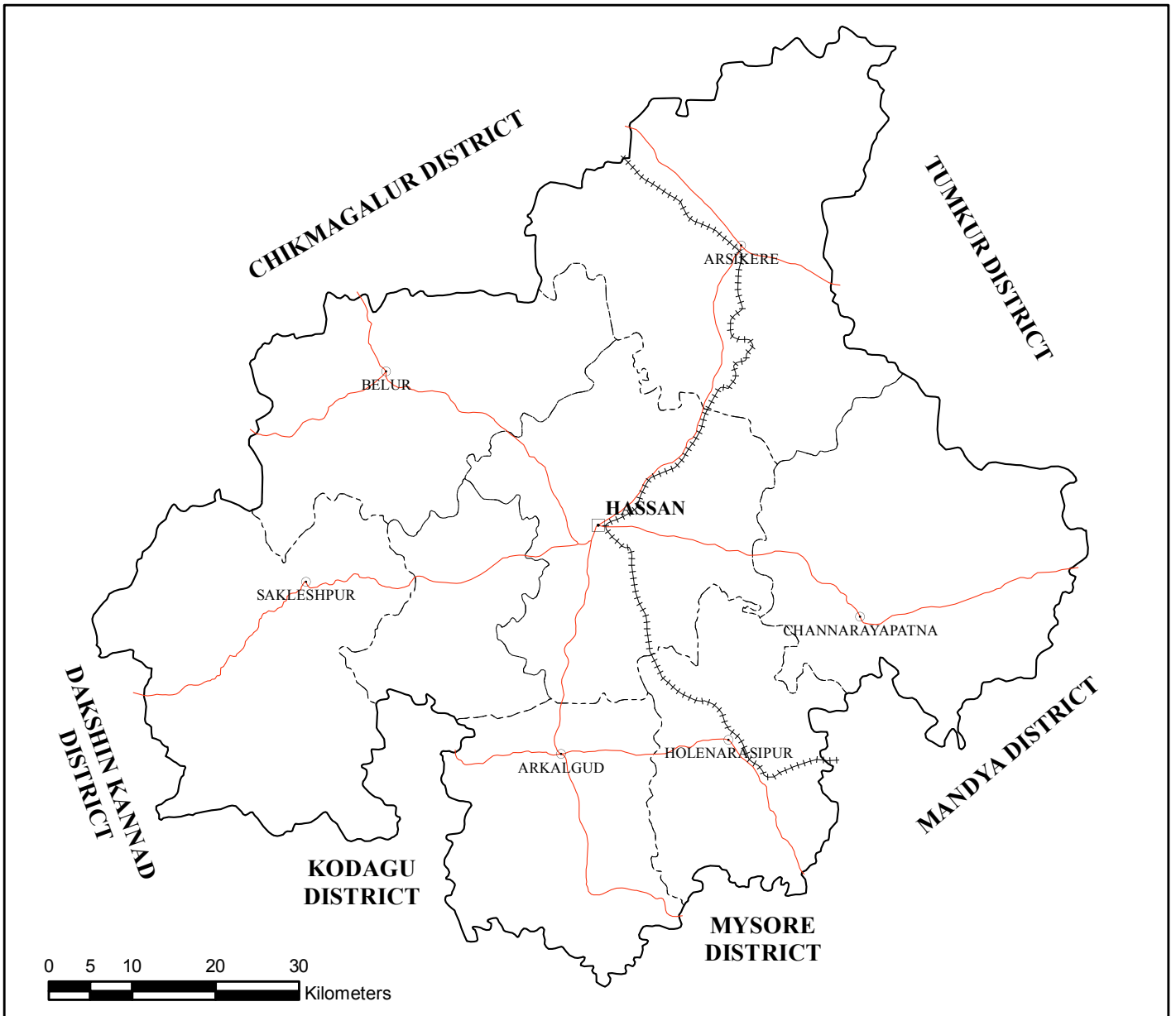
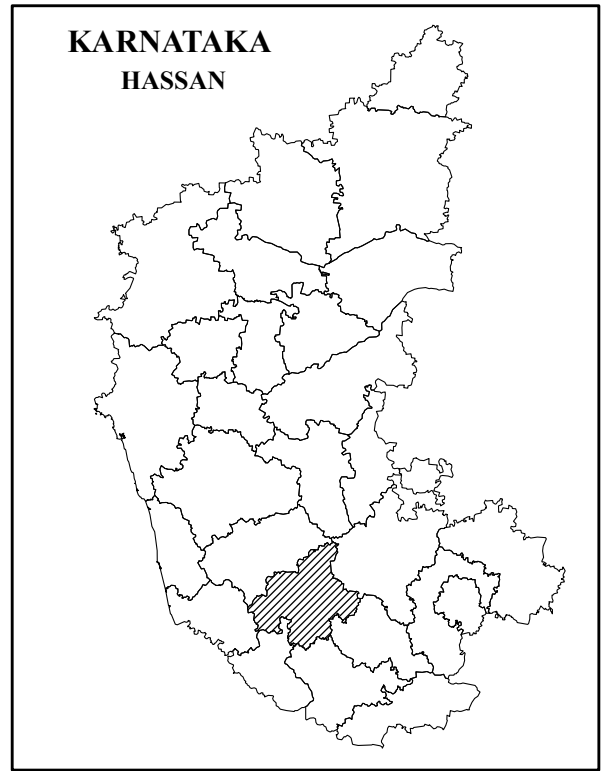
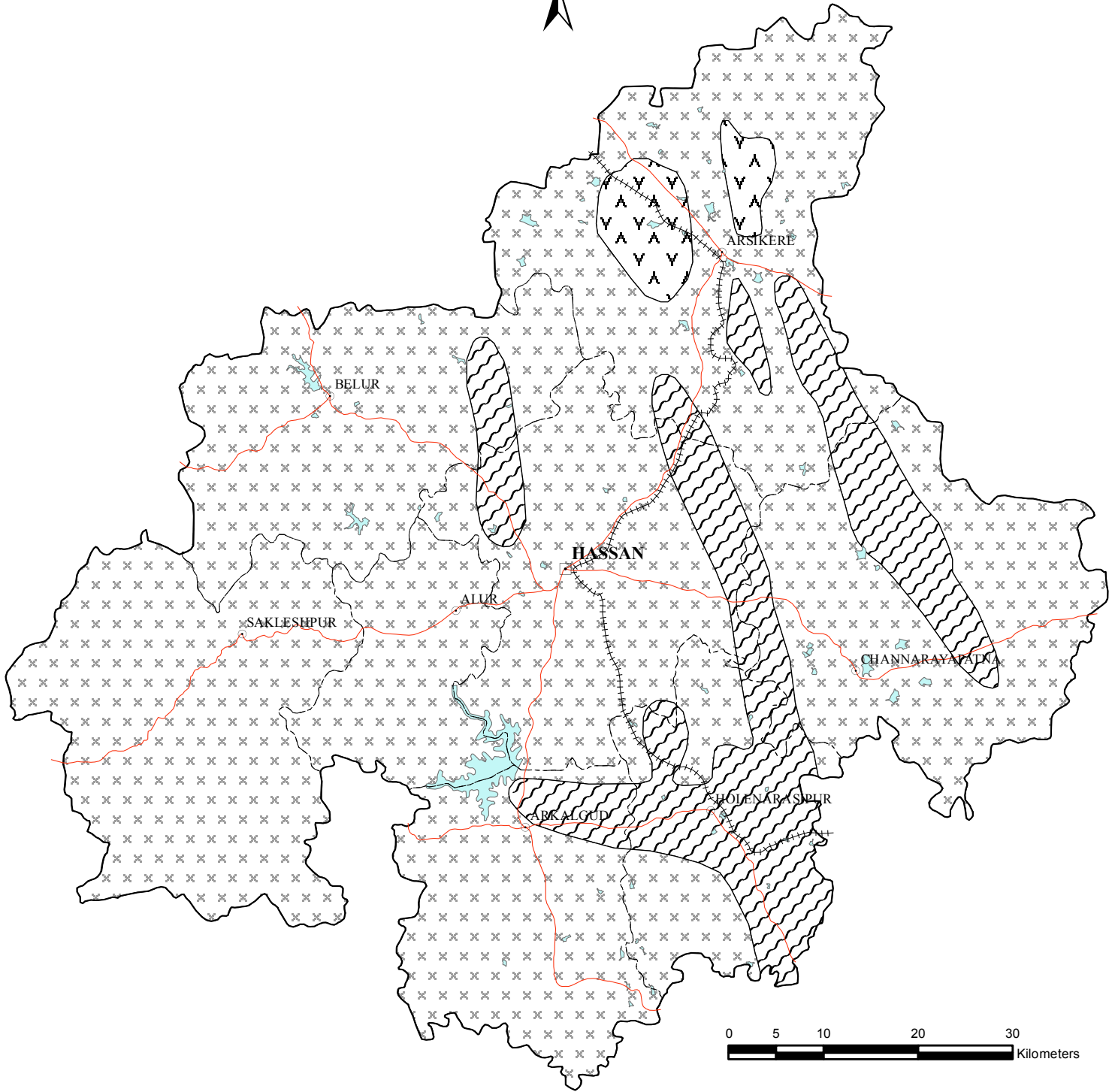


Fig: 1 Location Map

# HASSAN GEOLOGY



## Legend

|  |                   |
|--|-------------------|
|  | Dharwars          |
|  | Granite           |
|  | Peninsular gneiss |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Waterbodies       |



The district has equitable climate. The average annual rainfall is 1041 mm. The western part of the district receives heavy rainfall which decreases significantly in the eastern part. A major portion of the rain is received during the southwest monsoon period (May to August). Rains are also received during October to November. The rainfall exceeds potential evapotranspiration for about 120 days in a year (Table 1). The soil moisture control section is likely to remain moist for about 140 days in a year (ustic moisture regime) which permits growing of one kharif crop under rain fed conditions. The mean annual air temperature is 23.3 °C. April is generally the hottest month and December the coldest. The difference between the mean summer and mean winter temperature is less than 5°C. The soil temperature regime is iso-hyperthermic (Fig.3).

Table 1. Climatological data of Hassan district, Karnataka

Station Hassan: 13°00'N 76°09'E, Height 960 m above MSL

(Based on observations from 1931-1960)

|  | Jan  | Feb  | Mar  | Apr  | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov  | Dec  | Annual Average |
|--|------|------|------|------|-------|-------|-------|-------|-------|-------|------|------|----------------|
| <b>Mean Monthly Temperature(°C)</b>      | 21.4 | 23.2 | 25.6 | 26.7 | 25.9  | 23.1  | 21.9  | 22.2  | 22.6  | 23.1  | 22.0 | 20.9 | 23.3           |
| <b>Potential Evapotranspiration (mm)</b> | 111  | 119  | 157  | 149  | 146   | 111   | 110   | 104   | 106   | 105   | 98   | 100  | 1406           |
| <b>Normal Monthly Rainfall (mm)</b>      | 5.0  | 5.4  | 9.1  | 52.7 | 111.3 | 124.9 | 245.5 | 140.7 | 101.6 | 153.9 | 73.7 | 16.9 | 1040.7         |
| <b>Average Number of Rainy Days</b>      | 0.4  | 0.4  | 0.7  | 3.6  | 7.1   | 8.9   | 13.8  | 10.6  | 7.7   | 8.9   | 4.6  | 1.1  | 67.8           |

Source: PET: Report of National Commission of Agriculture Part IV (1976)

Temp. & Rainfall : Gazetteer of India, Hassan district 1971 Rainfall.

The flora of the area is rich and varies from scrub forest (*Acacia* and *Lanterna* spp.) in the eastern sector to evergreen forests (*Terminalia* spp.) in the western sector.

The economy of the district is primarily dependent on agriculture which is the chief occupation of the people. Of the total geographical area, about 50 per cent is under cultivation. Efforts are being made to increase the irrigation potential of the area and bring more area under cultivation (Table 2) (Fig.4).

The major crops grown in the area are: Finger millet (Ragi), sorghum, rice (cereal), horsegram, pigeonpea, *Dolichos* ('Avare') green gram, black gram and chickpea (pulses), groundnut and coconut (oil seed). Coffee and cardamon plantations are grown in the 'malnad' region (Table 3) (Fig.5).

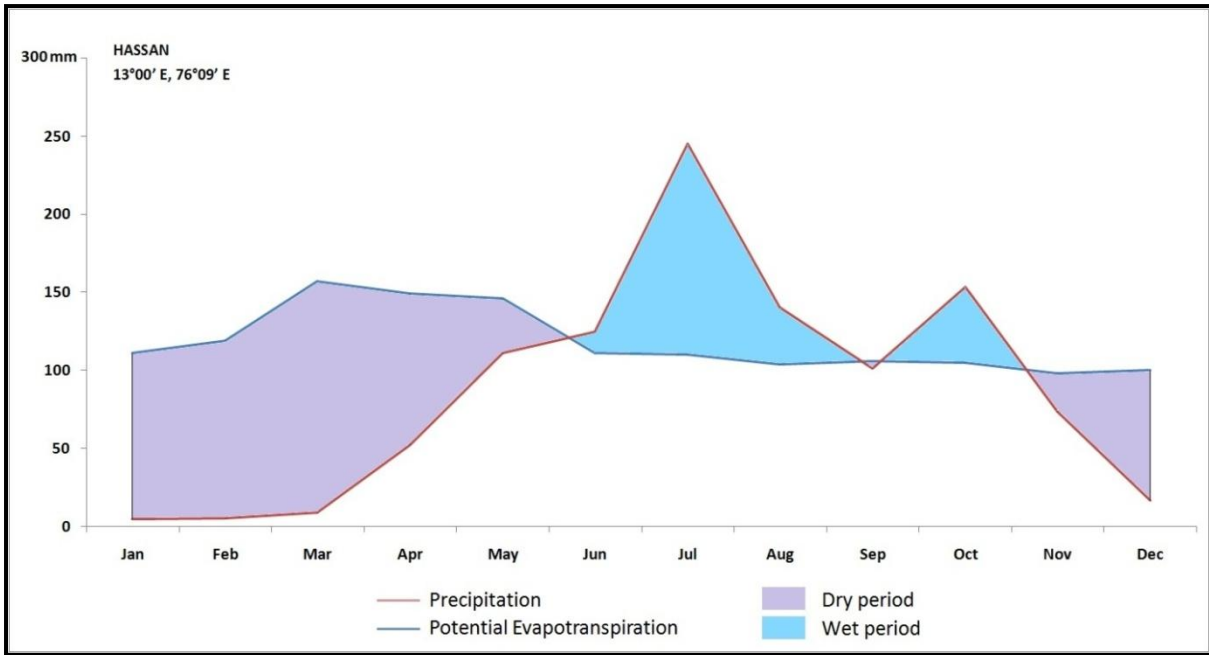


Fig.3a. Precipitation and Water Balance

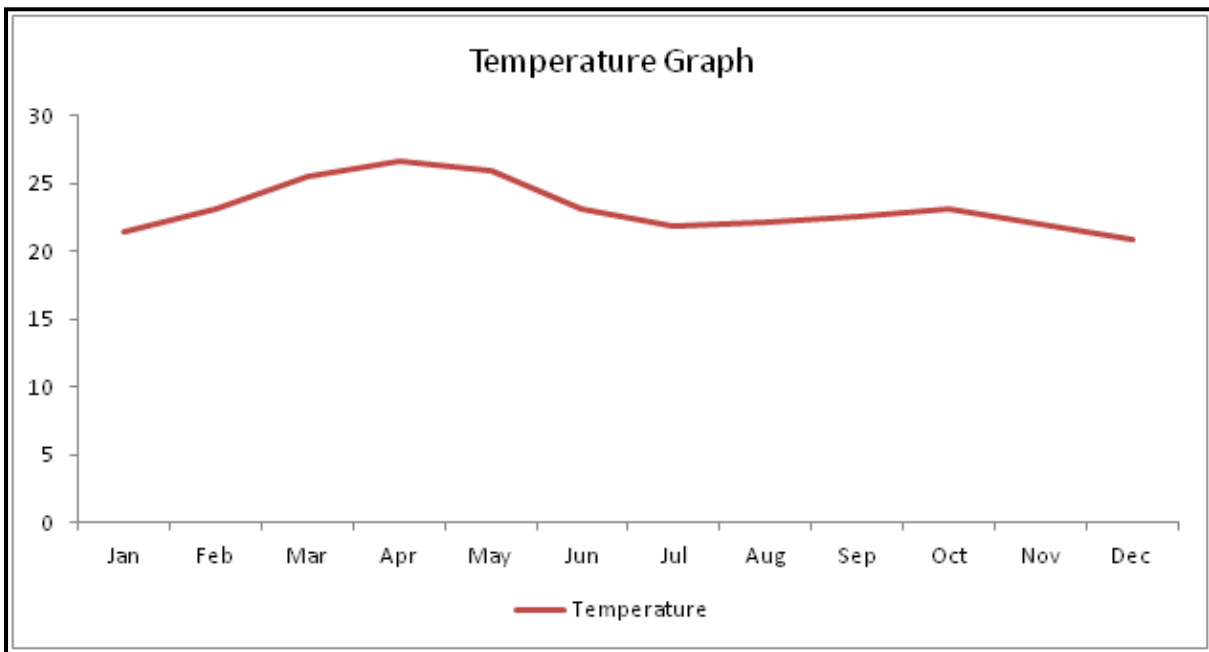


Fig.3b. Temperature

Table 2. Land use of Hassan district, Karnataka (1978-79)

(Area in ha.)

| Taluks            | Total Geographical-          |                                 | Forests      | Land not available for cultivation | Other un-cultivated land exclusive of fallow land | Fallow land  | Net area cultivated | Net area Irrigated |
|-------------------|------------------------------|---------------------------------|--------------|------------------------------------|---|--------------|---------------------|--------------------|
|                   | District Gaz. (1971) Sq. Km. | As per Revenue record (1978-79) |              |                                    |   |              |                     |                    |
| Arasikere         | 1242                         | 124059                          | 15050 (12.1) | 13542 (10.9)                       | 16725 (13.5)                                      | 5117 (4.1)   | 73625 (59.3)        | 1591 (1.3)         |
| Channarayapattana | 1048                         | 104635                          | 697 (0.7)    | 14879 (14.2)                       | 20119 (19.2)                                      | 5125 (4.9)   | 63815 (81.0)        | 4505 (4.3)         |
| Hassan            | 935                          | 92464                           | 1912 (2.1)   | 27085 (29.3)                       | 12548 (13.6)                                      | 6416 (6.9)   | 44502 (43.1)        | 8001 (8.6)         |
| Holenarasipur     | 609                          | 60088                           | 1213 (2.0)   | 12799 (21.3)                       | 9109 (15.1)                                       | 9228 (15.3)  | 27739 (46.2)        | 4885 (8.1)         |
| Arakalgud         | 690                          | 68633                           | 2155 (3.1)   | 8012 (11.7)                        | 12340 (18.0)                                      | 3368 (4.9)   | 42758 (62.3)        | 7239 (10.5)        |
| Alur              | 435                          | 42476                           | 484 (1.1)    | 7917 (18.6)                        | 11675 (27.5)                                      | 5494 (12.9)  | 16906 (36.8)        | 6570 (15.5)        |
| Belur             | 813                          | 80290                           | 6022 (7.5)   | 9008 (11.2)                        | 16622 (20.7)                                      | 8949 (11.1)  | 39689 (49.4)        | 9928 (12.3)        |
| Sakaleshpur       | 1053                         | 105414                          | 26169 (24.8) | 6011 (5.7)                         | 20098 (19.6)                                      | 14247 (13.5) | 38889 (36.9)        | 10703 (10.1)       |
| TOTAL             | 6826                         | 678059                          | 53703 (7.9)  | 99253 (14.6)                       | 119236 (17.6)                                     | 57944 (8.5)  | 347923 (51.3)       | 53422 (7.9)        |

Figures in parenthesis indicate percent to total geographical area according to revenue record.

Source: Bureau of Economics and Statistics, Govt. of Karnataka.

TABLE 3. Distribution of major crops in Hassan district (Taluk-wise) (1978-79)

(Area in ha.)

| Crops               | Arasikere | Channarayapattana | Hassan | Holenarasipur | Arakalgud | Alur | Belur | Sakaleshpur | Total  |
|---------------------|-----------|-------------------|--------|---------------|-----------|------|-------|-------------|--------|
| Rice                | 2284      | 4539              | 5622   | 4378          | 6142      | 7116 | 11085 | 17324       | 58490  |
| Finger millet(Ragi) | 27888     | 29310             | 26378  | 16084         | 17130     | 5311 | 14655 | 225         | 136981 |
| Sorghum             | 4551      | 2242              | 2469   | 832           | 1158      | 10   | 1943  | -           | 13205  |
| Coconut             | 12182     | 11382             | 529    | 486           | 362       | -    | 1012  | -           | 25953  |
| Coffee              | -         | -                 | -      | -             | 180       | 2607 | 6277  | 20280       | 29344  |
| Cotton              | 3700      | 30                | 40     | 20            | 1320      | 45   | 1250  | -           | 6405   |
| Groundnut           | 1125      | 555               | 260    | 440           | 562       | 45   | 298   | -           | 3285   |
| Pulses              | 15337     | 14818             | 8067   | 10221         | 12739     | 1800 | 5460  | 229         | 68671  |
| Chillies            | 1345      | 518               | 410    | 322           | 550       | 30   | 400   | 12          | 3587   |
| Cardamom            | -         | -                 | 96     | -             | -         | 45   | -     | 8326        | 8467   |

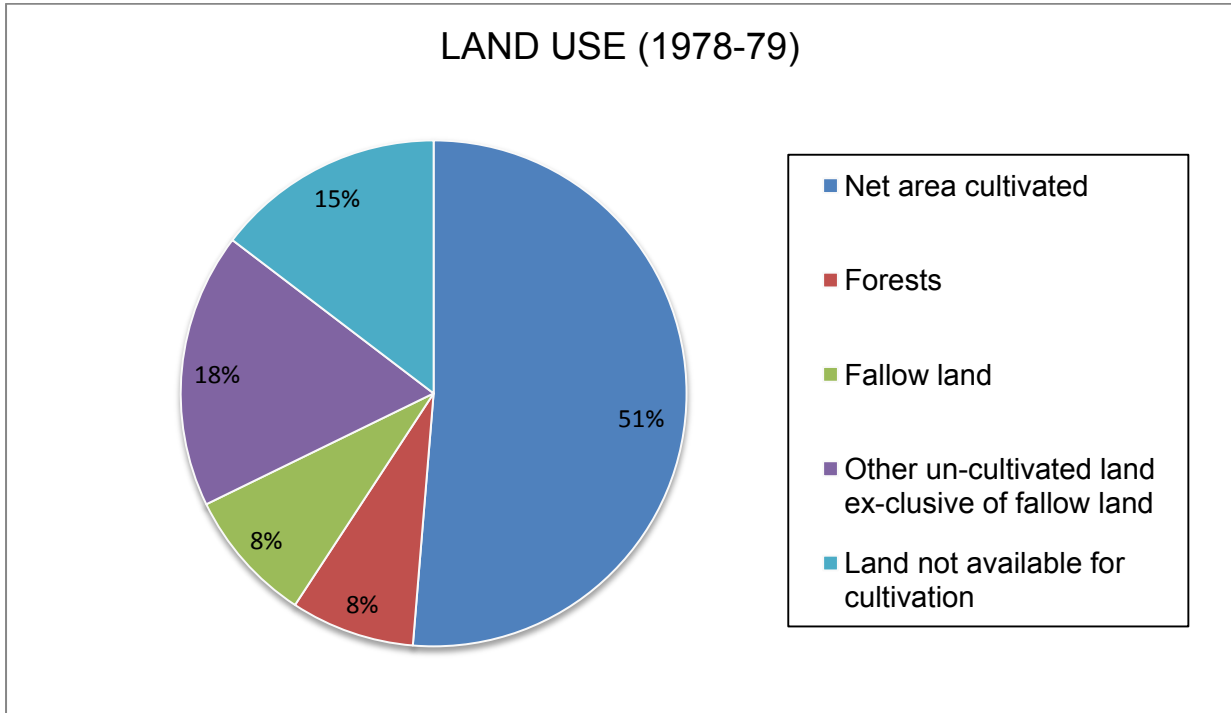


Fig.4. LandUse (1978-79)

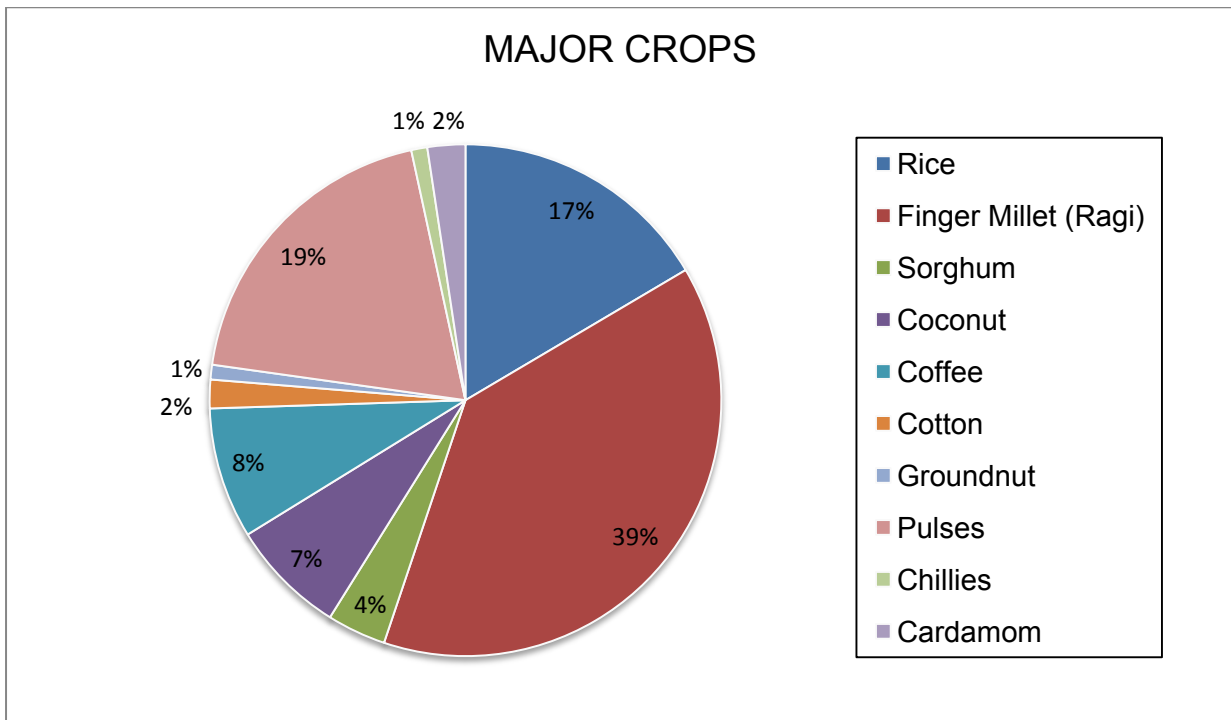


Fig.5. Major Crops



3.

**SOIL SURVEY TECHNIQUES**

Semi-detailed and reconnaissance soil survey and mapping of the Hassan district were carried out during 1975 to 1981 using 1 inch to 1 mile (1:63,360) scale Survey of India toposheets as base, and the standard soil survey procedure as stipulated in the Soil Survey Manual (IARI 1970). The field investigations included study of several sample strips cutting across major physiographic units and developing correlation between physiography and soils (Figs. 6 and 7). At random field checking was undertaken in the rest of the area to supplement the correlation established. The soil mapping units are the soil series, and association of soil series. A Soil map showing soil series (association) has been prepared. In all 33 soil series were identified and mapped as 30 soil mapping units. The 30 soil mapping units have inclusions of other soils to the tune of 15 to 20%. Based on the soil map, several interpretative maps like land capability, irrigability, problems and potential, land use present and suggested, and crop suitability have been prepared.

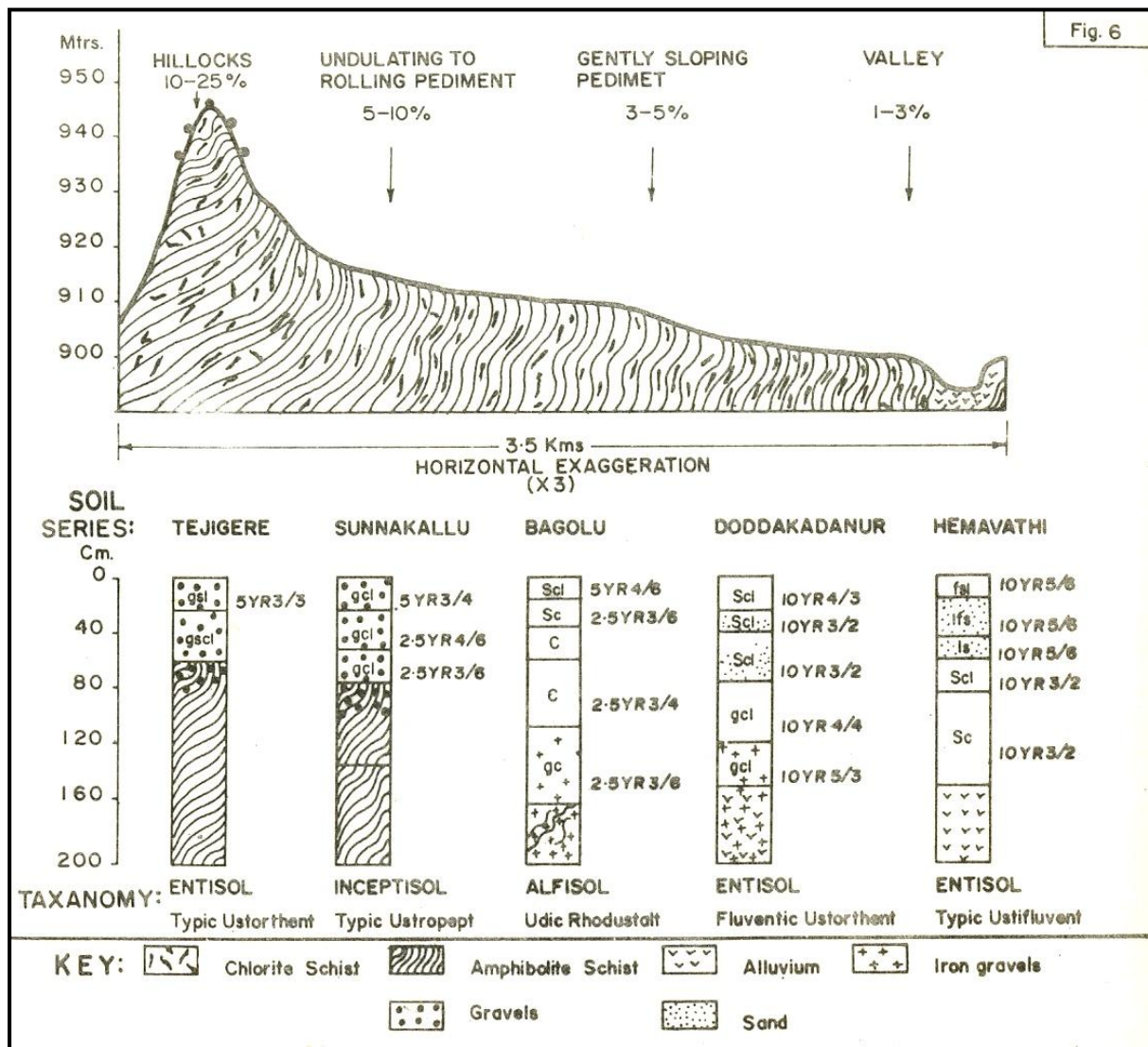


Fig.6. Physiography and Soil Relationship

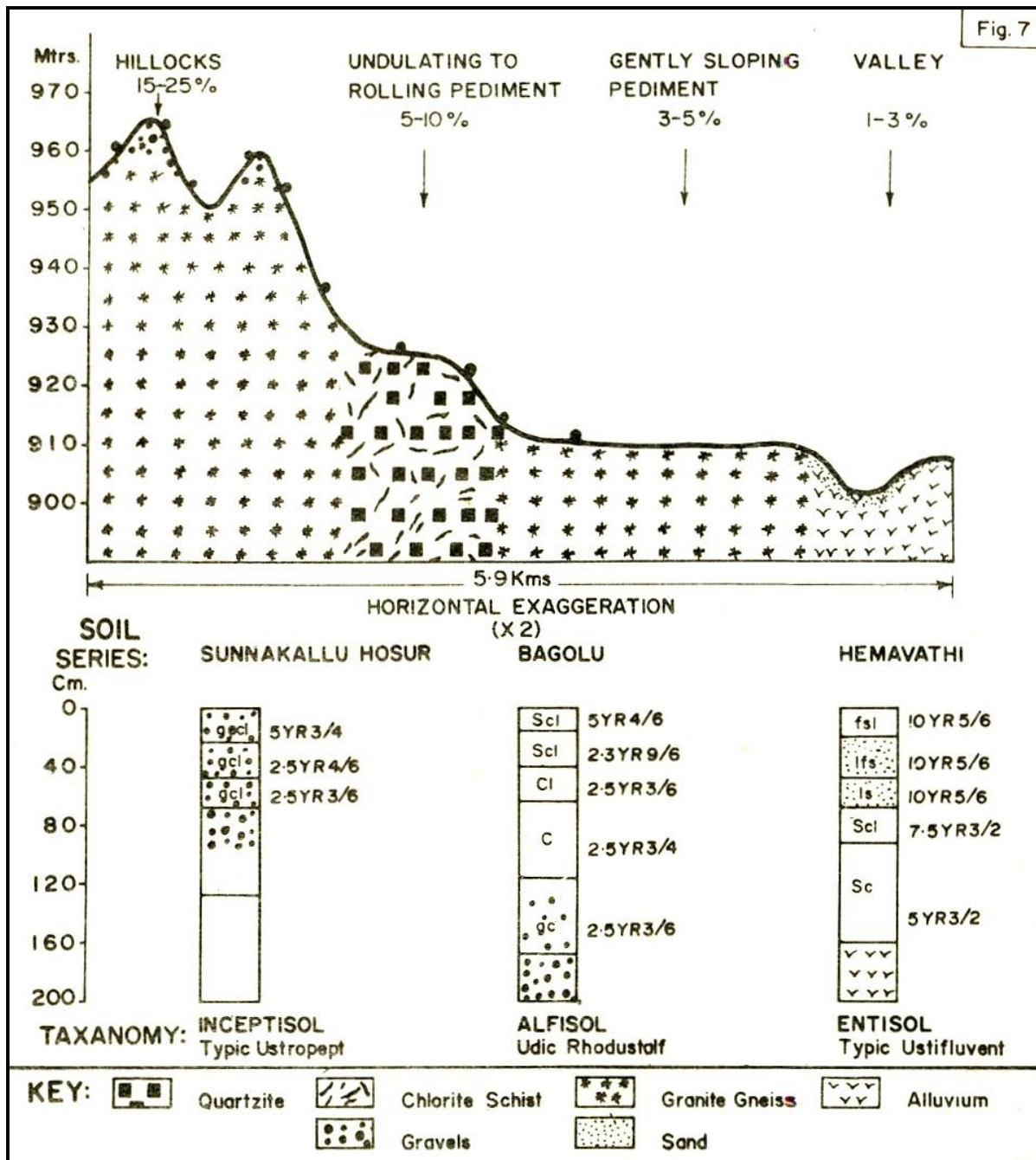


Fig.7. Physiography and Soil Relationship

## 4.

### THE SOILS

---

The soils of Hassan district occur in different physiographic units such as hilly region, hillocks, undulating to rolling lands, gently sloping pediments, and valleys. In the development of these soils, climate, vegetation and relief have played a dominant role. The influence of parent material is realized in the undulating plain areas where vegetation is of scrub type.

Brief descriptions of soil series observed on different physiographic positions, along with classification are given in Table 4. The soils representative of dominant series were collected and analyzed for their physical and chemical properties and presented in Table 5.

The soils of the hill ranges are very deep, loamy skeletal, clayey skeletal or clayey. Mostly, they are dark brown and yellowish red and occasionally red to dark red in colors. They have soft kaolin underlying the solum. The soils show structural and textural 'B' horizons. The soils in the valleys are very deep, grayish, clayey and stratified; lime may or may not be present. The soils of the undulating plains are shallow to very deep and gravelly to stony with rock outcrops.

The identified soils (33 Soil Series) have been classified according to Soil Taxonomy (USDA, 1975) (Table 6). The data show that the studied soils belong to 3 orders (Alfisols, Inceptisols and Entisols), 4 sub orders (Ustalf, Tropept, Orthent and Fluvent), 5 Great groups (Rhodustalf, Haplustalf, Ustropept, Ustorthent and Ustifluent), 14 Sub groups and 23 Families.

The Fig.8 show that Alfisols are the dominant soils, occupying 34.4% followed by Entisols occupying 28.9% and Inceptisols occupy 15.5% of the total geographical area of the district.

## Soil Resource Based Land Use of Hassan District (Karnataka)

Table 4. Physiography and soils of Hassan district (KARNATAKA)

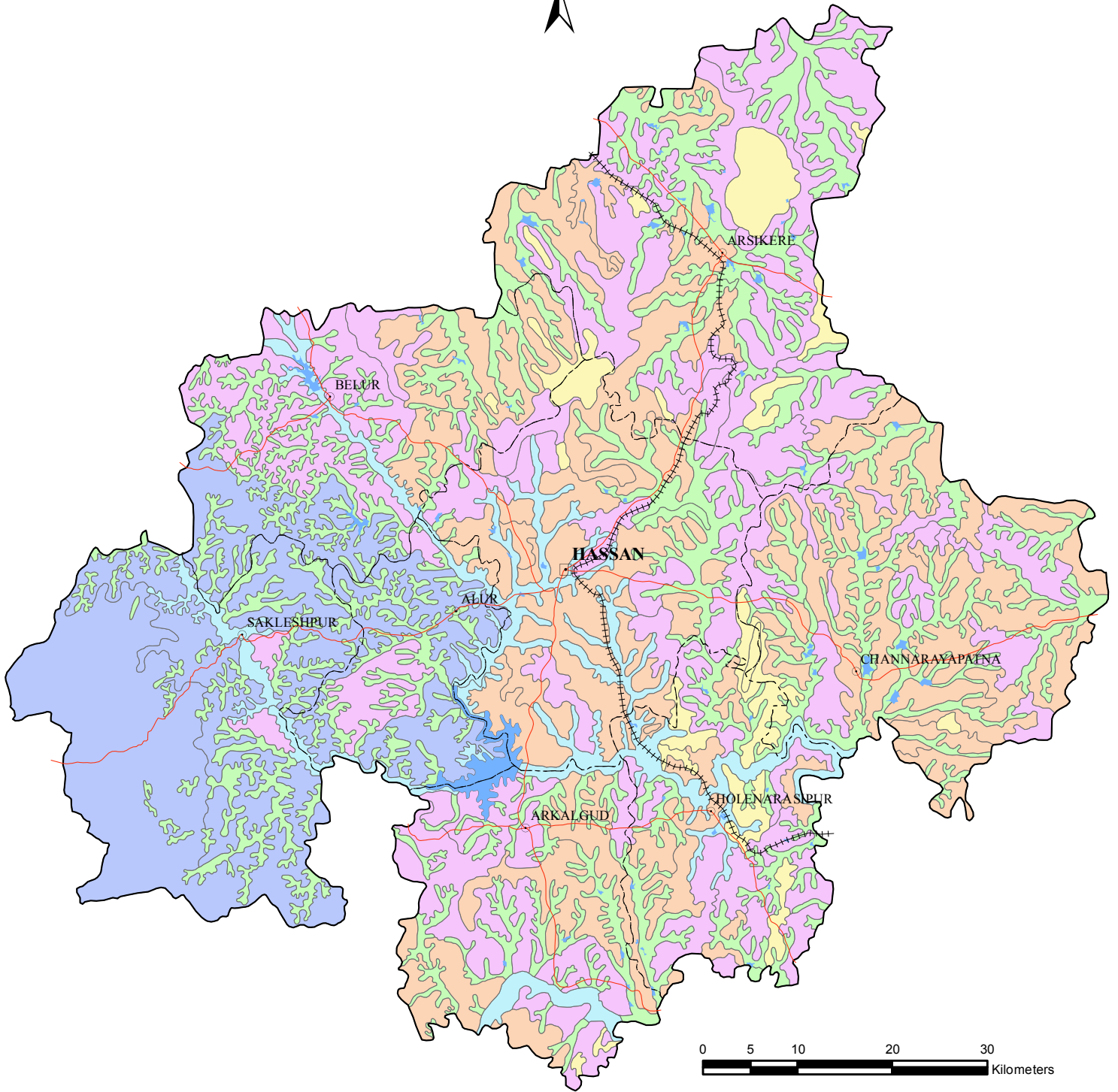
| Physiography   | Soil Map Symbol | Dominant series  | Brief Description   | Soil Classification*             | Area   |      |
|--|-----------------|------------------|---|----------------------------------|--------|------|
|  |                 |                  |   |                                  | ha.    | %    |
| <b>I. HILLY REGION</b>   |                 |                  |   |                                  |        |      |
| Moderately to Steeply-sloping Hills  | 24              | Hettur           | Very deep, well drained, dark brown to yellowish red, clay loam with e2-e3 erosion                    | Fine loamy Typic Ustropept       | 54245  | 8.0  |
|  |                 | Kogaravalli      | Very deep, well drained, red to dark red, gravelly clay with e2-e3 erosion                            | Clayey skeletal Oxic Rhodustalf  |        |      |
|  |                 | Arehalli         | Deep, well drained, brown to dark brown, gravelly clay loam with e2-e3 erosion                        | Loamy skeletal Udic Haplustalf   |        |      |
| Foot-hills & Valleys   | 25              | Idenahalli       | Very deep, well drained, yellowish brown, clay with e1 erosion  | Fine Oxic Haplustalf             | 10119  | 1.5  |
|  | 28              | Adagur           | Very deep, moderately well drained, grayish brown, clay water table (within 1.5m) with e1 erosion     | Fine Typic Ustropept             | 41438  | 6.1  |
|  | 29              | Yagachi          | Very deep, moderately well drained, yellowish brown, stratified with e1-e2 erosion                    | Fine loamy, Typic Ustifluent     | 7713   | 1.1  |
| <b>II. Plain Region</b>  |                 |                  |   |                                  |        |      |
| Hillocks   | 1               | Rock Outcrops    | Bare rock exposures   | -                                | 12940  | 1.9  |
|  | 18              | Tejigers         | Moderately deep excessively drained, dark red gravelly sandy clay loam with e2-e3 erosion             | Loamy skeletal, Typic Ustorthent | 4976   | 0.7  |
|  | 20              | Ydegonda-Nahalli | Shallow, excessive drained, calcareous, gravelly clay loam with e2-e3 erosion                         | Loamy skeletal Lithic Ustorthent | 1410   | 0.2  |
| Undulating to rolling Pediments  | 13              | Machenahalli     | Shallow to moderately deep, well drained, yellowish red to red gravelly loamy sand with e2-e3 erosion | Loamy skeletal Lithic Ustorthent | 56734  | 8.4  |
|  | 8               | Honnavalli       | Deep, well drained, yellowish red to red, gravelly clay loam with e2-e3 erosion                       | Loamy skeletal Typic Ustropept   | 35201  | 5.2  |
|  | 23              | Koratakere       | Deep, well drained, yellowish brown, gravelly clay loam with e2-e3 erosion                            | Loamy skeletal Oxic Ustropept    | 36661  | 5.4  |
|  | 4               | Banavara         | Very deep, well drained, red to dark red, gravelly, clay loam, e1-e2 erosion                          | Loamy skeletal Udic Rhodustalf   | 19077  | 2.8  |
| Gently sloping Pediments   | 5               | Chalya           | Deep, well drained yellowish red to red gravelly, sandy clay loam with e2-e3 erosion                  | Loamy skeletal Udic Haplustalf   | 41970  | 6.2  |
|  | 10              | Kallenahalli     | Very deep, well drained yellowish red to red, calcareous, clay loam with e1-e2 erosion                | Fine loamy Typic Haplustalf      | 1410   | 0.2  |
|  | 9               | Kadabagere       | Very deep, well drained, red to dark red, clay with e1-e2 erosion                                     | Fine Oxic Rhodustalf             | 37374  | 5.5  |
|  | 2               | Bagolu           | Very deep, well drained, red to dark red, clay with e1-e2 erosion                                     | Fine Udic Rhodustalf             | 41110  | 6.1  |
| Valleys  | 6               | Doddakadanur     | Very deep, moderately well drained, strong brown stratified with e1 erosion                           | Fine loamy Fluventic Ustorthent  | 14366  | 2.1  |
|  | 11              | Kanatur          | Very deep, imperfectly drained, dark gray, calcareous, clay with e1 erosion                           | Fine Typic Ustorthent            | 54179  | 8.0  |
|  | 15              | Nuggihalli       | Very deep, imperfectly drained, dark gray, calcareous, clay with e1 erosion (with 1.5m)               | Fine Aquic Ustropept             | 4893   | 0.7  |
|  | 7               | Hemavathi        | Very deep, moderately well drained, dark yellowish brown, stratified with e1 erosion                  | Fine loamy Typic Ustifluent      |        |      |
| Tanks and Reservoir Water bodies   |                 |                  |   |                                  | 9881   | 1.4  |
| Other associated soil, less representative of the area (for details Report on Hassan District) |                 |                  |   |                                  | 177017 | 26.1 |

\*Most soils qualify for mixed mineralogy and isohyperthermic temperature and ustic moisture regimes

| <u>Depth classes</u> | <u>Erosion</u>                 |
|----------------------|--------------------------------|
| Shallow              | 7.5 to 22.5 cm<br>e1 slight    |
| Moderately deep      | 22.5 to 45.0 cm<br>e2 moderate |
| Deep                 | 45.0 to 90.0 cm<br>e3 severe   |
| Very deep            | 90 cm                          |

# HASSAN

## Physiography



### Legend

|  |                                       |
|--|---------------------------------------|
|  | Hill ranges                           |
|  | Hillocks                              |
|  | Undulating to rolling pediments       |
|  | Narrow valleys and tank command areas |
|  | Gently sloping pediments              |
|  | River flood plains                    |

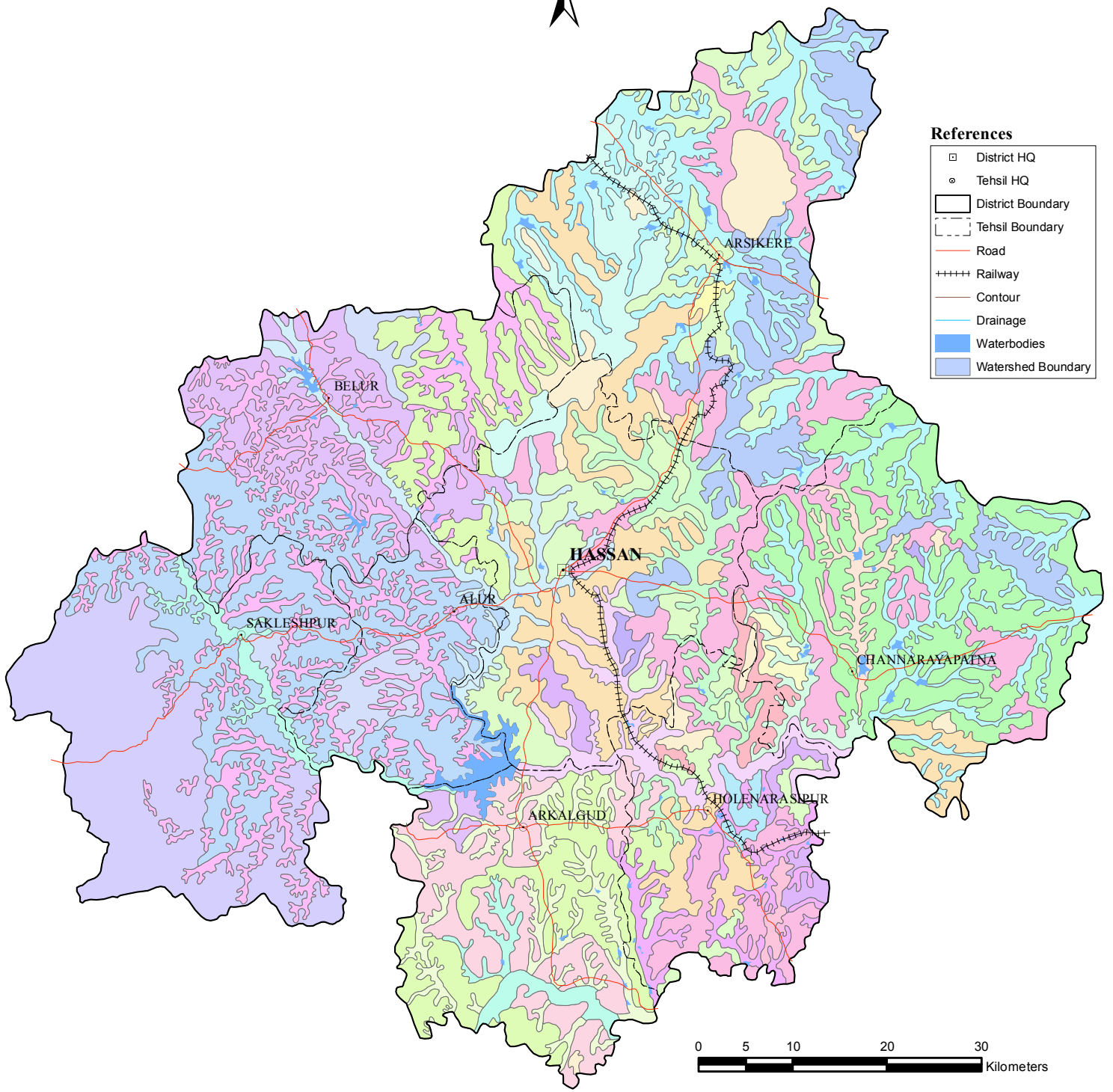
### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN

## Soil Series Association



- References**
- District HQ
  - Tehsil HQ
  - ▭ District Boundary
  - - - Tehsil Boundary
  - Road
  - ++++ Railway
  - Contour
  - Drainage
  - Waterbodies
  - Watershed Boundary



**Legend**

|                                   |                                      |                           |
|-----------------------------------|--------------------------------------|---------------------------|
| Adagar-Mavinakere                 | Hemavathi-Konanur-Adagur             | Nuggahalli                |
| Bagolu                            | Hettur-Kogaravalli-Arehalli          | Rock Outcrop              |
| Banankere                         | Honnavalli                           | Srinavasapura             |
| Banavar                           | Kadabagere                           | Sunnakalluhosuru          |
| Basawanahalli-Arahalli-Koratakere | Kallenahalli                         | Tejigere                  |
| Bellur-Idanahalli                 | Kanatur                              | Velembige                 |
| Biccodu-Hetture-Arehalli          | Kodigehalli                          | Yagechi-Adagar-Mavinakere |
| Chalya                            | Konmur-Srinivasapura-Naradanahalli   | Yedegunanahalli           |
| Chalya-Bagolu-Machenahalli        | Machenahalli                         |                           |
| Doddakadanur                      | Machenahalli-Ramnathpura-Madanahalli |                           |
| Hemavathi                         | Mavinakere                           |                           |



Fig: 9 Soil Series Association

Table 5. Soil and site characteristics, Hassan district, Karnataka

| Soil Mapping Unit | Series Association                     | Topography (Slope %)                | Drainage              |       | Stoniness |          | Soil Depth | Texture  |                        | pH      |                        | Organic matter (%) | CEC (me/100g) | Base Saturation | Remarks   |
|-------------------|--|-------------------------------------|-----------------------|-------|-----------|----------|------------|----------|------------------------|---------|------------------------|--------------------|---------------|-----------------|---|
|                   |  |                                     | Ground water table(m) | Class | Surface   | Sub soil |            | Surface  | Series central section | Surface | Series central section |                    |               |                 |   |
| 1                 | 2                                      | 3                                   | 4                     | 5     | 6         | 7        | 8          | 9        | 10                     | 11      | 12                     | 13                 | 14            | 15              | 16  |
| 1                 | Rock out crops                         | Hillocks (15-20%)                   | NA                    | D5    | St3-R3    | St3-R3   | Nil        | Nil      | Nil                    | Nil     | Nil                    | Nil                | Nil           | Nil             |   |
| 2                 | Bagolu                                 | Gently slopes (3-5%)                | 10-15                 | D4    | St0       | St0      | 150        | sl-scl   | C                      | NA      | NA                     | NA                 | NA            | NA              | Colour subsoil 2.5 YR 3/6 & 3/4 with textural 'B' |
| 3                 | Banankere                              | Gently slopes (3-5%)                | 8-10                  | D4    | St1       | St0      | 100-120    | sl-scl   | C (40%)                | 6.4     | 6.6-7                  | 0.4                | 20            | 84              | Combic 'B'  |
| 4                 | Banavar                                | Undulating to rolling (5-10%)       | 10-15                 | D4    | St2       | g3       | 80-100     | gsl-gscl | gsc-gc (42%)           | 6.8     | 6.7-7.2                | 0.5-0.2            | 30            | 93              | Control section 2.5YR 3/6 & 3/4 with textural 'B' |
| 5                 | Chalya                                 | Undulating to Gently sloping (3-8%) | 15-20                 | D4    | St2       | g3       | 70-90      | ls-sl    | cl-sc (29%)            | 7.4     | 7.2-7.3                | 0.3-0.2            | 17            | 87              | Textural 'B' highly gravelly                      |
| 6                 | Doddakadanur                           | Vally (0-2%)                        | 3-5                   | D3    | Nil       | Nil      | 150        | sc-scl   | Stratified             | NA      | NA                     | Na                 | Na            | Na              |   |
| 7                 | Hemavathi                              | Vally (0-2%)                        | 3-5                   | D3    | Nil       | Nil      | 150        | fls-fsl  | Stratified             | 6.9-7.4 | 6.3-7.5                | 0.6-0-18           | 6.2-16.4      | 75-85           |   |
| 8                 | Honnavalli                             | Undulating to rolling (5-8%)        | 15-20                 | D4    | St3       | St3      | 40-60      | ls-sl    | gacl-gcl               | 6.1     | 6.5                    | 0.2-0.08           | 14.0          | 85              | Cambic 'B'  |
| 9                 | Kadabagere                             | Gently slopes (3-5%)                | 10-15                 | D4    | St1       | -        | 150        | sl-scl   | sc-c(35-40%)           | 6.7     | 6.1-6.5                | 0.5-0.2            | 9.8-12.6      | 90-76           | Control section 2.5YR 3/5 & 3/4 with textural 'B' |
| 10                | Kallenahalli                           | Gently slopes (3-5%)                | 10-15                 | D4    | St1       | St0      | 120-150    | sl-cl    | cl-c (30%)             | 7.4     | 8.0                    | 0.5-0.4            | 20            | 83-92           | Textural 'B'                                      |
| 11                | Kanatur                                | Vally (0-2%)                        | 3-5                   | D3    | Nil       | Nil      | 150        | sl       | c-sic (50-64%)         | 9.2     | 8.2-9.8                | 0.75-0.3           | 20-30         | 93-00           | Sub-soil calcareous                               |
| 12                | Kodigehalli                            | Vally fringes (0-3%)                | 3-5                   | D3    | Nil       | Nil      | 100-120    | scl-sicl | sic-c                  | NA      | NA                     | NA                 | NA            | NA              | Surface crecks& pressure faces scar.              |
| 13                | Machenahalli                           | Undulating to rolling (10-15%)      | 15-20                 | D4-D5 | St3-R2    | st3      | 20-30      | ls-sl    | ls-sl (17%)            | 6.3     | 6.3                    | 0.4                | 6-7           | 76-80           |   |
| 14                | Navinakere                             | Vally (0-2%)                        | 1.5-3                 | D3    | Nil       | Nil      | 150        | scl      | sl-scl                 | NA      | NA                     | NA                 | NA            | NA              | Calcareous Sub-class                              |
| 15                | Nuggihalli                             | Vally (0-1%)                        | 1-2                   | D2    | Nil       | Nil      | 150        | scl      | c (41-44)              | 8.6     | 7.7-8.2                | 0.7-0.4            | 21-24         | 89-97           | Sub-soil chroma 1                                 |
| 16                | Srinivasapura                          | Vally (0-2%)                        | 3-5                   | D3    | Nil       | St2      | 100-120    | sl-sicl  | sl-gcl (29%)           | 7.3     | 7.9                    | 0.4-0.3            | 16-18         | 80-90           | Stratified sub-class                              |
| 17                | Sunnakalluhosuru                       | Undulating to rolling (8-15%)       | 15-20                 | D4-D5 | st3       | st3      | 60-70      | gscl-gcl | gcl-gsc                | NA      | NA                     | NA                 | NA            | NA              |   |
| 18                | Tejigere                               | Hillocks (10-20%)                   | 20-25                 | D4-D5 | st3-R3    | st3      | 20-40      | gsl-gscl | gscl-gcl               | 7.3     | 6.9                    | 0.3-0.2            | 10-12         | 70-80           |   |
| 19                | Valambige                              | Undulating to rolling (8-15%)       | 20-25                 | D4-D5 | st3-R3    | st3      | 15-20      | gls      | gcl                    | NA      | NA                     | NA                 | NA            | NA              |   |
| 20                | Yedegondanahalli                       | Hillocks (10-20%)                   | 20-25                 | D5    | st4-R4    | st3      | 15-25      | gcl      | gcl                    | NA      | NA                     | NA                 | NA            | NA              | Calcareous sub-soil                               |
| 21                | Chalya-Bagolu-Machenahalli (40-30-20%) | ----- Data already given -----      |                       |       |           |          |            |          |                        |         |                        |                    |               |                 |   |

Soil Resource Based Land Use of Hassan District (Karnataka)

|    |                                   |   |       |       |        |     |         |        |              |     |       |         |      |              |  |
|----|-----------------------------------|---|-------|-------|--------|-----|---------|--------|--------------|-----|-------|---------|------|--------------|--|
| 22 | Machenahalli (40%)                | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
|    | Ramanathpura-(30%)                | Undulating to rolling (8-15%)             | 15-20 | D4-D5 | st3-R2 | st3 | 90-130  | sl-scl | gcl-gc       | NA  | NA    | NA      | NA   | NA           | Combic 'B'                                     |
|    | Mandanahalli (20%)                |   | 15-20 | D4-D5 | st3-R2 | st3 | 15-30   | ls-sl  | scl-cl       | NA  | NA    | NA      | NA   | NA           | Combic 'B'                                     |
| 23 | Basavanahalli-(40%)               | Undulating to rolling (8-15%)             | 10-15 | D4    | st1    | st0 | 90-120  | sl-scl | cl-c         | NA  | NA    | NA      | NA   | NA           | Combic 'B'                                     |
|    | Arehalli-(30%)                    | Undulating to rolling (8-15%)             | 10-15 | D4    | st2    | st3 | 60-80   | scl-cl | gcl-gc       | NA  | NA    | NA      | NA   | NA           | Textural 'B'                                   |
|    | Koratakere-(20%)                  | Undulating to rolling (10-15%)            | 10-15 | D4    | st1    | st3 | 50-60   | ls-sl  | sl-gcl       | NA  | NA    | NA      | NA   | NA           | Combic 'B' with soft kaolin below              |
| 24 | Hettur-(40%)                      | Moderate to steep hill range (10-25)      | 20-30 | D4    | st1    | st2 | 100-120 | scl-cl | cl-gcl       | NA  | NA    | NA      | NA   | NA           | Textural 'B', 2.5 YR & soft kaolin below solum |
|    | Kogaravalli (30%)                 |   | 20-30 | D4    | st1    | st3 | 100-120 | scl-cl | cl-gcl       | NA  | NA    | NA      | NA   | NA           |  |
|    | Arahalli (20%)                    | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
| 25 | Bellur- (50%)                     | Undulating to rolling foot hills (10-15%) | 15-20 | D4    | st1    | st2 | 100-150 | scl-cl | c-gc         | NA  | NA    | NA      | NA   | NA           | Combic 'B' soft kaolin below solum             |
|    | Idenahalli (30%)                  |   |       |       |        |     |         |        |              |     |       |         |      |              |  |
|    | Idenahalli (30%)                  | Undulating to rolling foot hills (8-15%)  | 15-20 | D4    | st0    | st1 | 150     | scl-cl | c-sc(44-48%) | 7.2 | 6.5-7 | 0.7-0.5 | 8-11 | <b>60-80</b> | Textural 'B', soft kaolin below solum          |
| 26 | Bioodu- (40%)                     | Moderate to steep hill range (10-25%)     | 20-30 | D4    | st0    | st0 | 120-180 | cl-c   | c            | NA  | NA    | NA      | NA   | NA           | Textural 'B'                                   |
|    | Hettur- (30%)                     | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
|    | Arahalli (30%)                    | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
| 27 | Kananur- (40%)                    | Valley (0-2%)                             | 1-2   | D2    | st0    | st0 | 150     | cl     | c            | NA  | NA    | NA      | NA   | NA           | Sub-soil chroma 1                              |
|    | Srinivasapura-(30%)               | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
|    | Maradanahalli(20%)                | Valley (0-2%)                             | 1-2   | D2    | Nil    | Nil | 100-120 | sicl-c | c            | NA  | NA    | NA      | NA   | NA           | Surface cracks & pressure faces                |
| 28 | Adagur-(50%)                      | Valley (0-2%)                             | 3-5   | D3    | st0    | st0 | 150     | scl    | sc-c         | NA  | NA    | NA      | NA   | NA           |  |
|    | Mavinakere-(40%)                  | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
| 29 | Hagachi- (40%)                    | Valley (0-2%)                             | 3-5   | D3    | st0    | st0 | 150     | sl-scl | stratified   | NA  | NA    | NA      | NA   | NA           |  |
|    | Adagur- (30%)<br>Mavinakere-(20%) | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
| 30 | Hemavathi- (40%)                  | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |
|    | Konanur- (30%)<br>Adagur- (20%)   | ----- Data already given -----            |       |       |        |     |         |        |              |     |       |         |      |              |  |

Drainage class: D1 = Poorly drained  
D2 = Imperfectly drained  
D3 = Moderately well drained  
D4 = Well drained  
D5 = Excessively drained

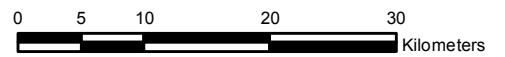
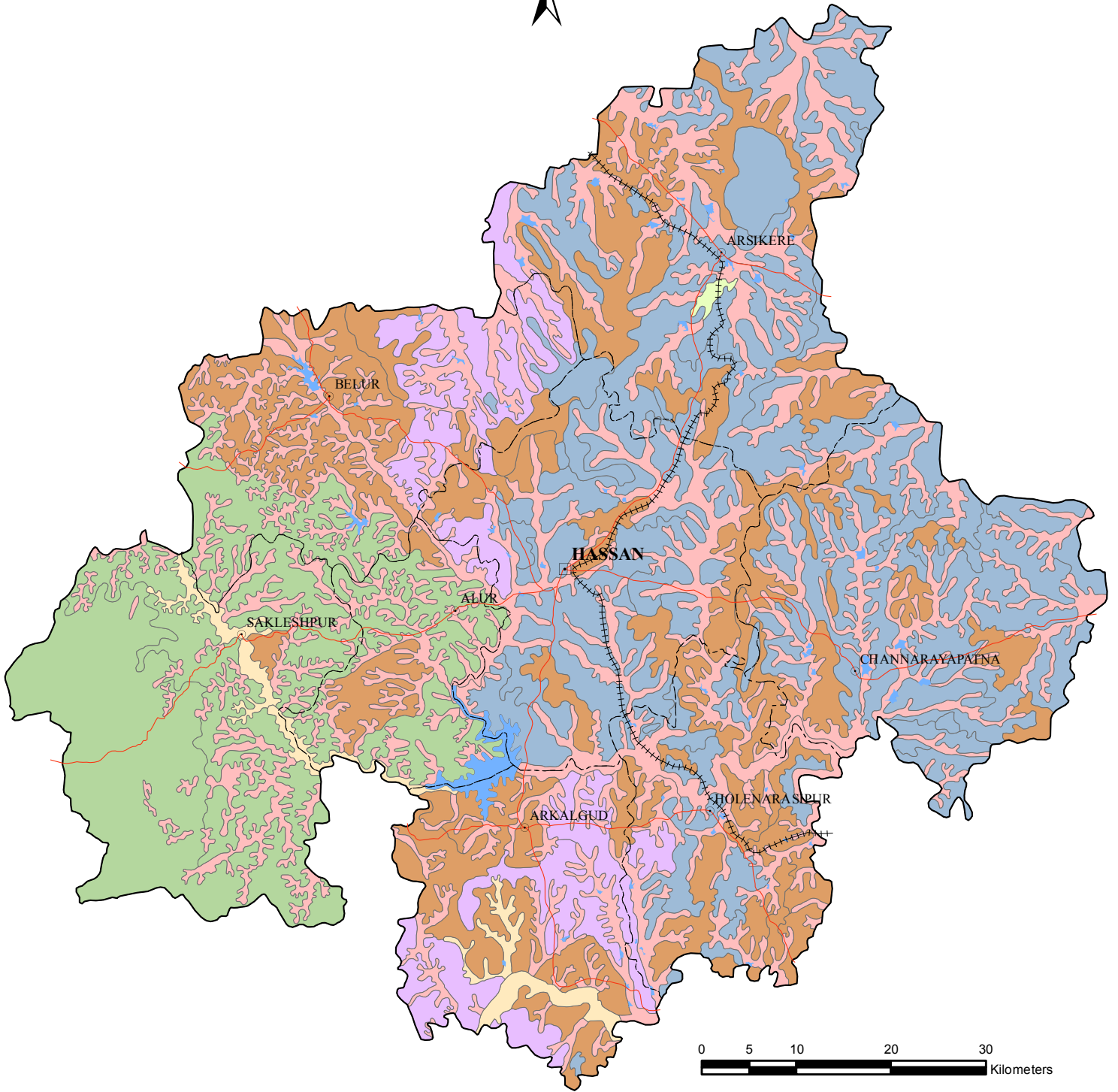
Stoniness gravelliness rockiness: 0 = 0-10%  
1 = 10-15%  
2 = 15-35%  
3 = 35-60%  
4 = 60%

B.S. % & CEC is weighted mean of the series control section for 100 g m soil clay percentage is weighted mean of the control section.



# HASSAN

## Slope



### Legend

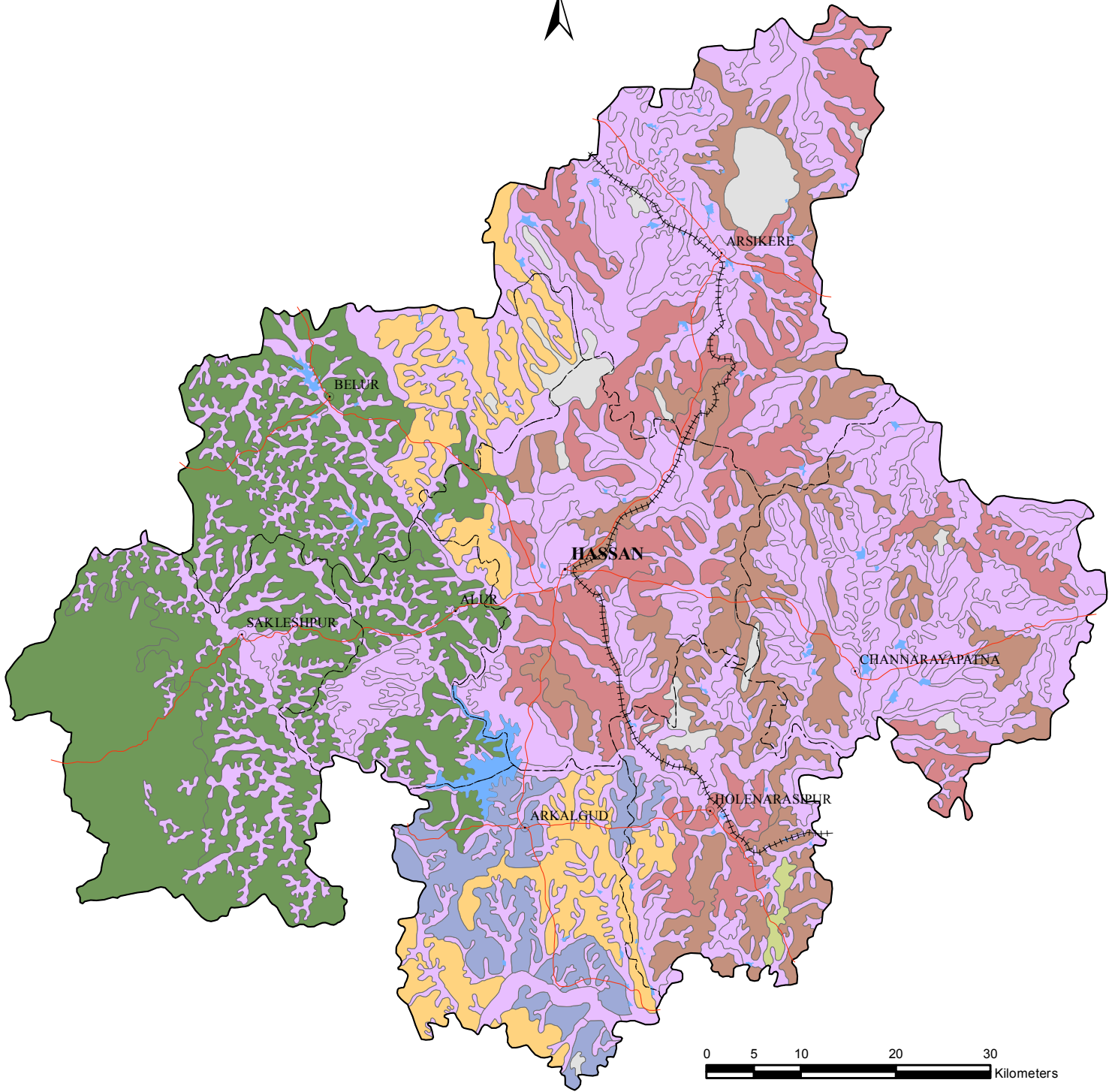
|  |  |
|--|--|
|  | Level to nearly level                    |
|  | Level to nearly level-Moderately sloping |
|  | Very gently sloping                      |
|  | Gently sloping                           |
|  | Gently sloping-Moderately sloping        |
|  | Moderately sloping                       |
|  | Moderately steep-Moderately sloping      |

### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Soil Depth



## Legend

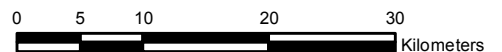
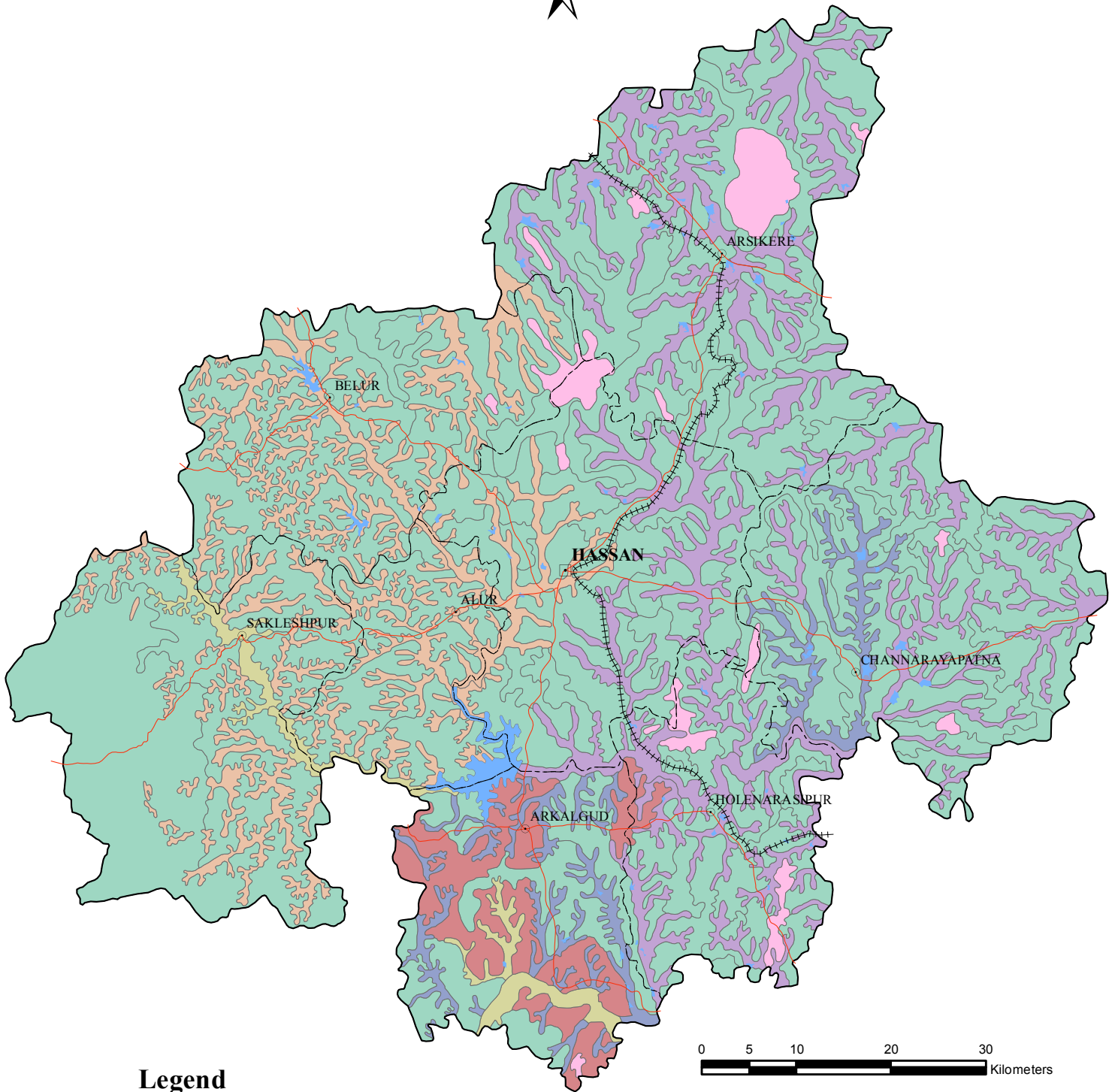
|  |                          |
|--|--------------------------|
|  | Shallow                  |
|  | Mod. deep                |
|  | Mod. deep-Very deep      |
|  | Deep                     |
|  | Deep-Very deep-Mod. deep |
|  | Very deep                |
|  | Very deep-Deep           |
|  | Not Available            |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Soil Drainage



## Legend

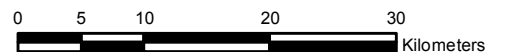
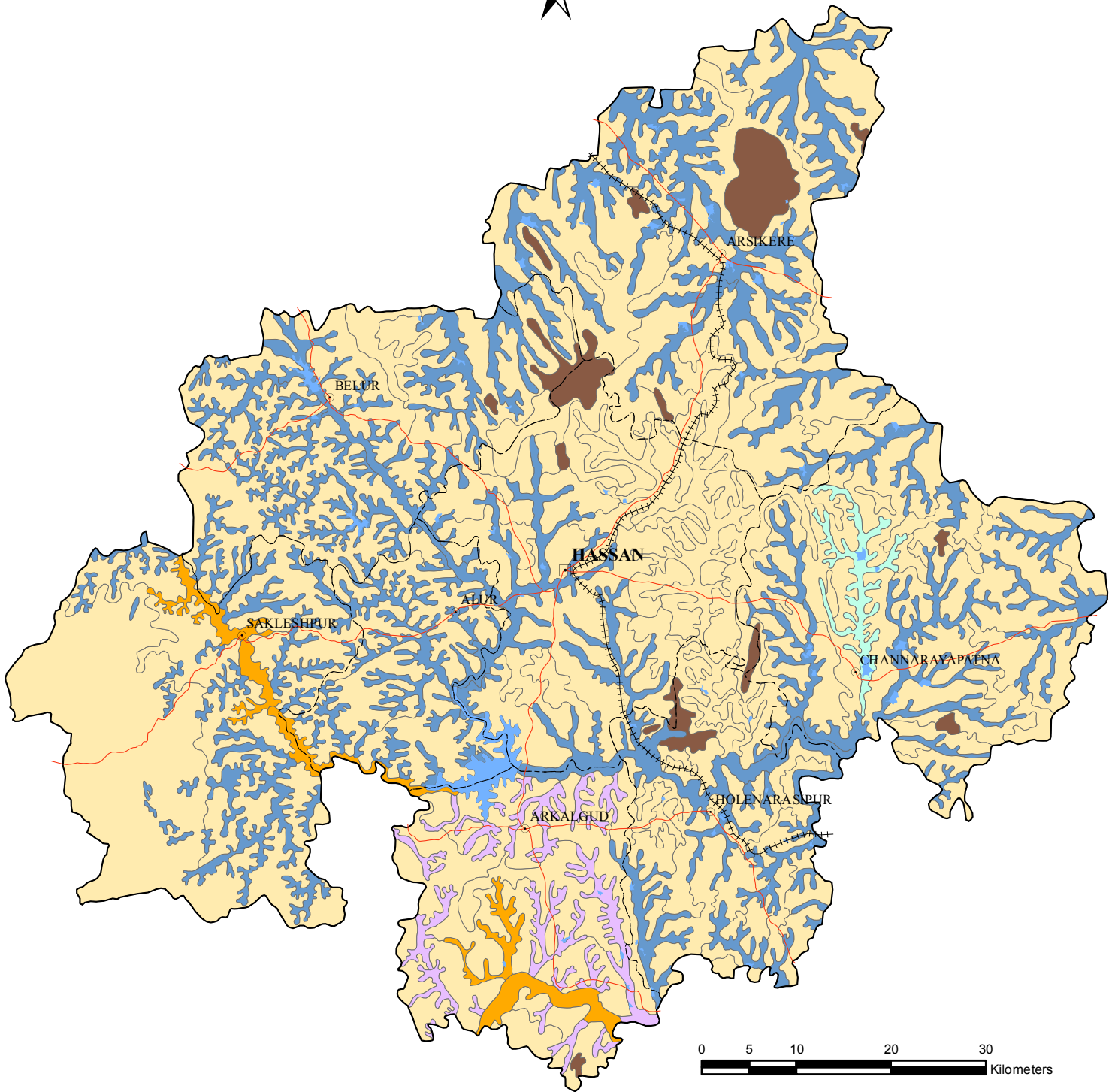
|  |                    |
|--|--------------------|
|  | Imperfect          |
|  | Imperfect-Mod well |
|  | Imperfect-Poor     |
|  | Poor               |
|  | Mod well           |
|  | Mod well-Well      |
|  | Well               |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Groundwater



## Legend

|  |                      |
|--|----------------------|
|  | Deep                 |
|  | Mod deep-Mod shallow |
|  | Mod deep             |
|  | Mod shallow          |
|  | Mod shallow-Mod deep |
|  | Rockoutcrop          |

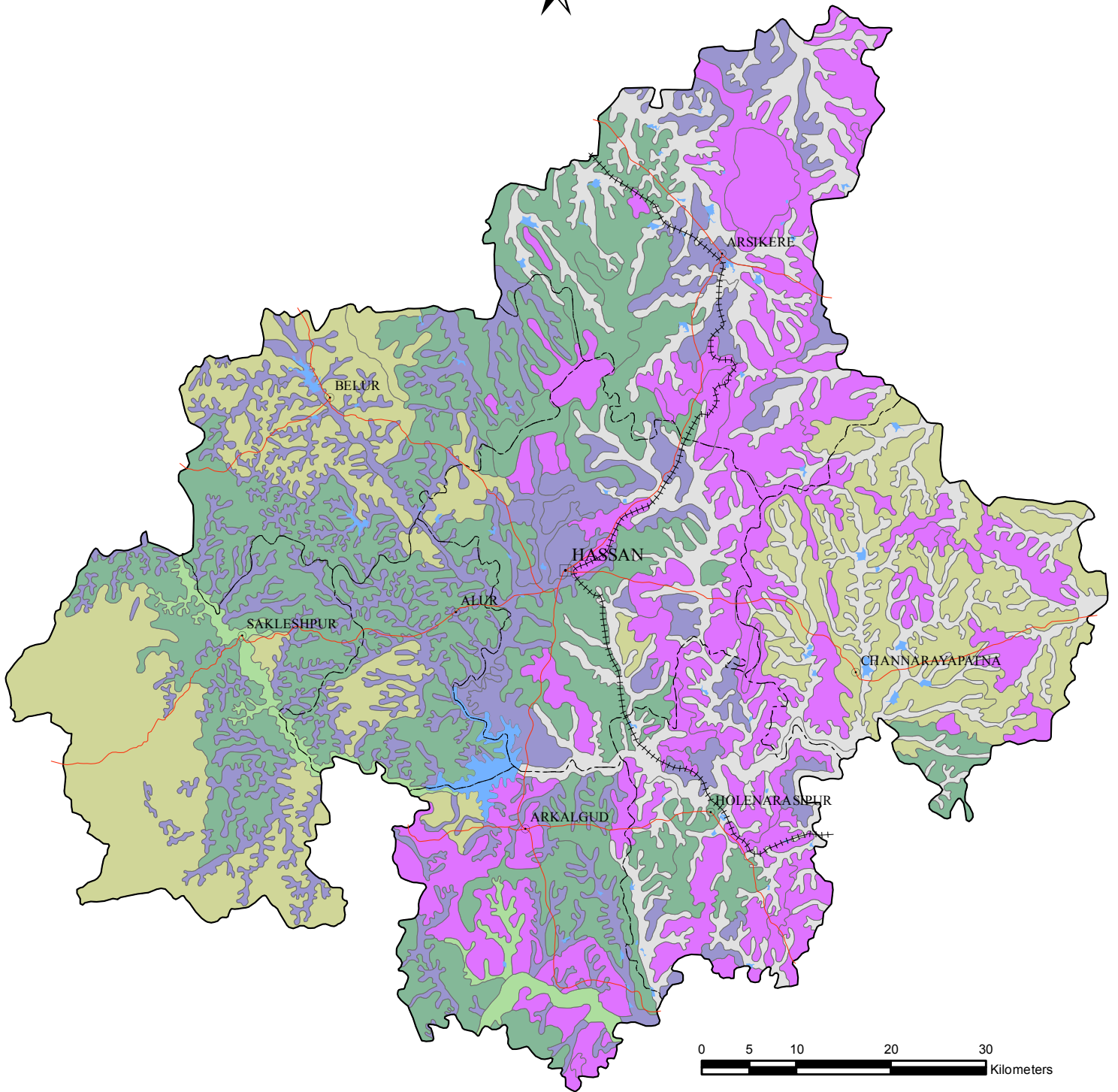
## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |









# HASSAN









## Surface Stoniness



### Legend

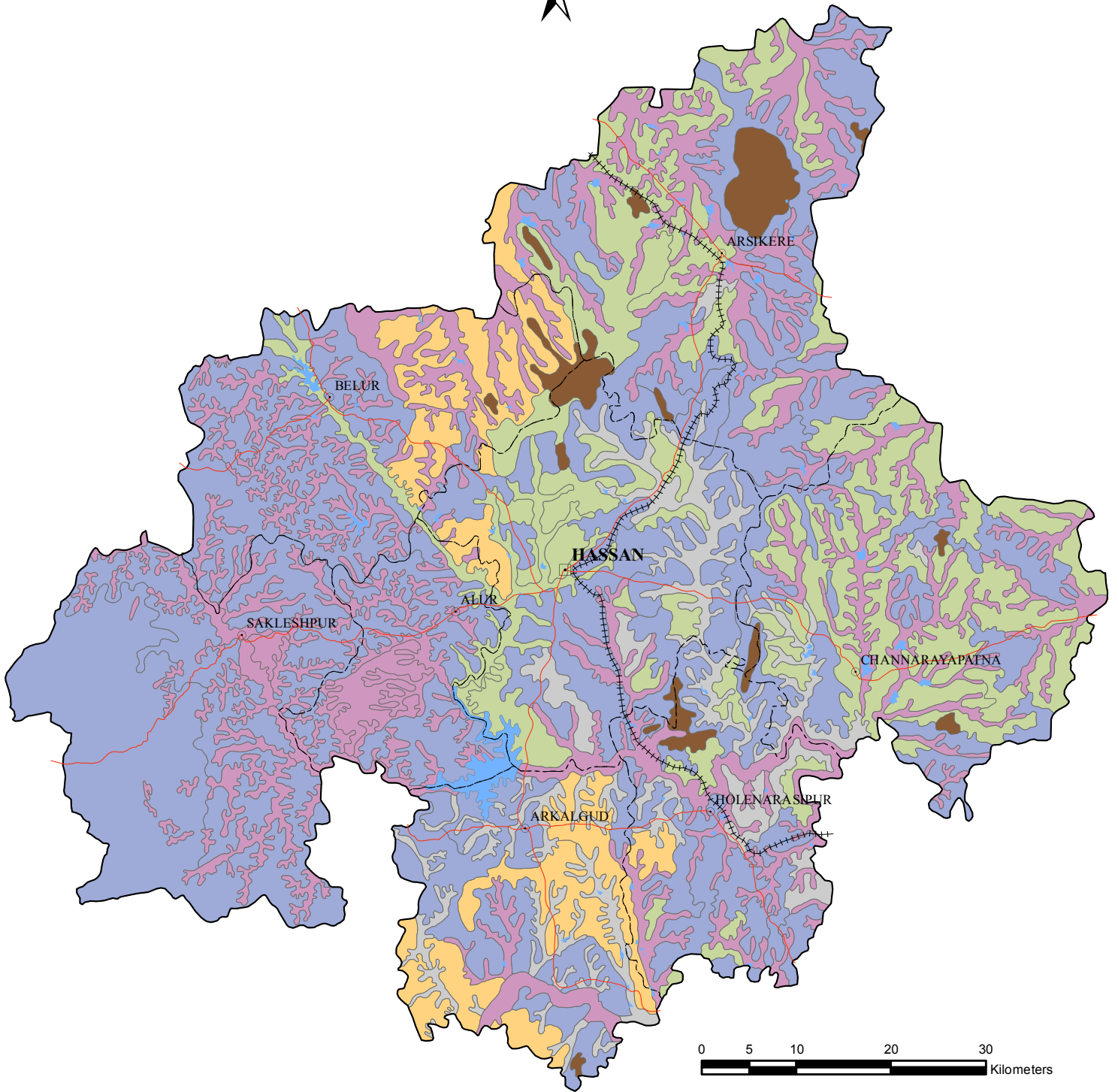
|   |               |
|---|---------------|
|  | Not Available |
|  | upto 10%      |
|  | 0-10%         |
|  | 10-15%        |
|  | 15-35%        |
|  | 35-60%        |

### References

|   |                   |
|---|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Soil Erosion



## Legend

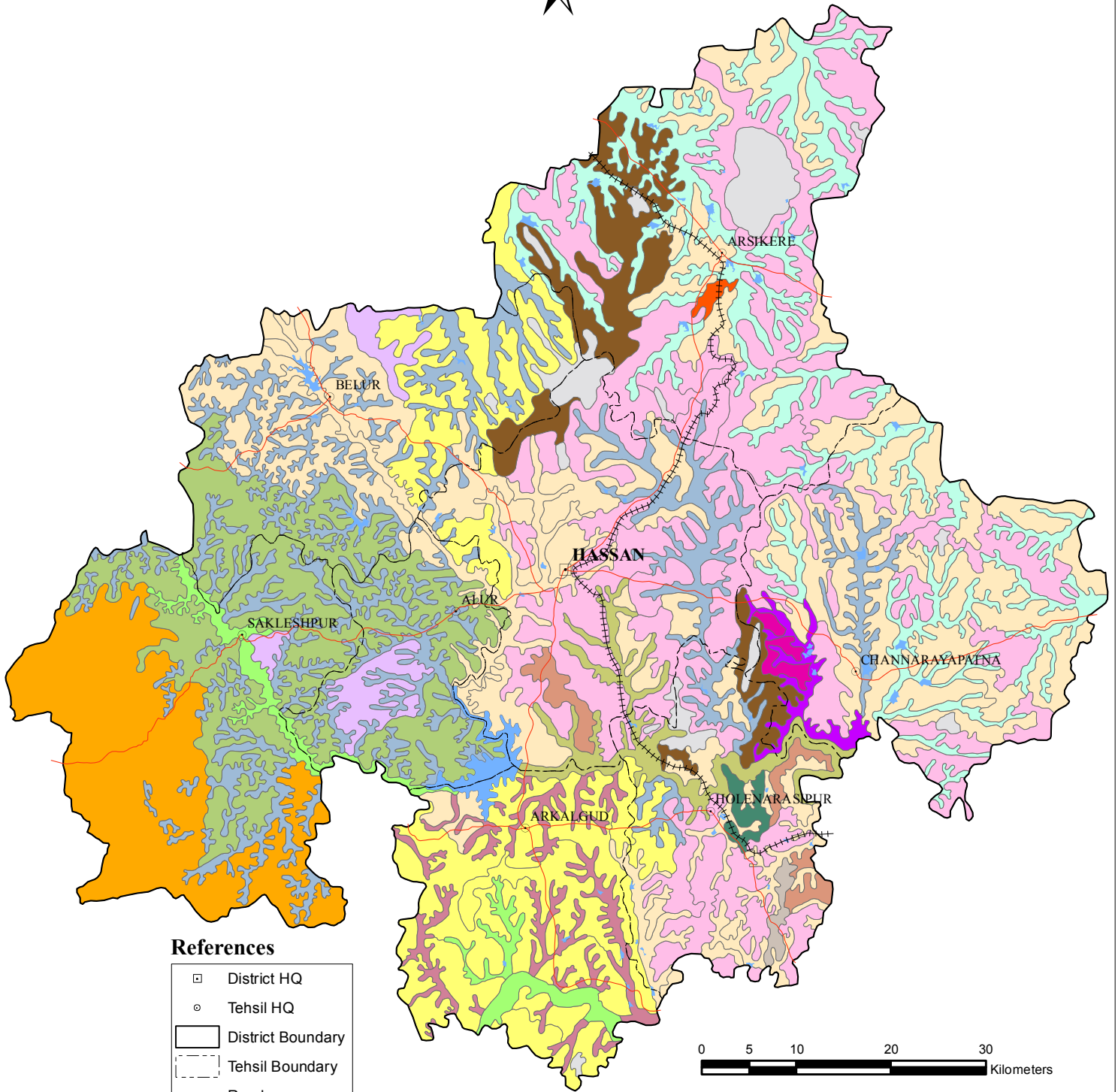
|  |                             |
|--|-----------------------------|
|  | Slight                      |
|  | Slight-Moderate             |
|  | Moderate-Severe             |
|  | Moderate-Severe-Very severe |
|  | Rockoutcrop                 |
|  | Not Available               |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Surface Texture



### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |

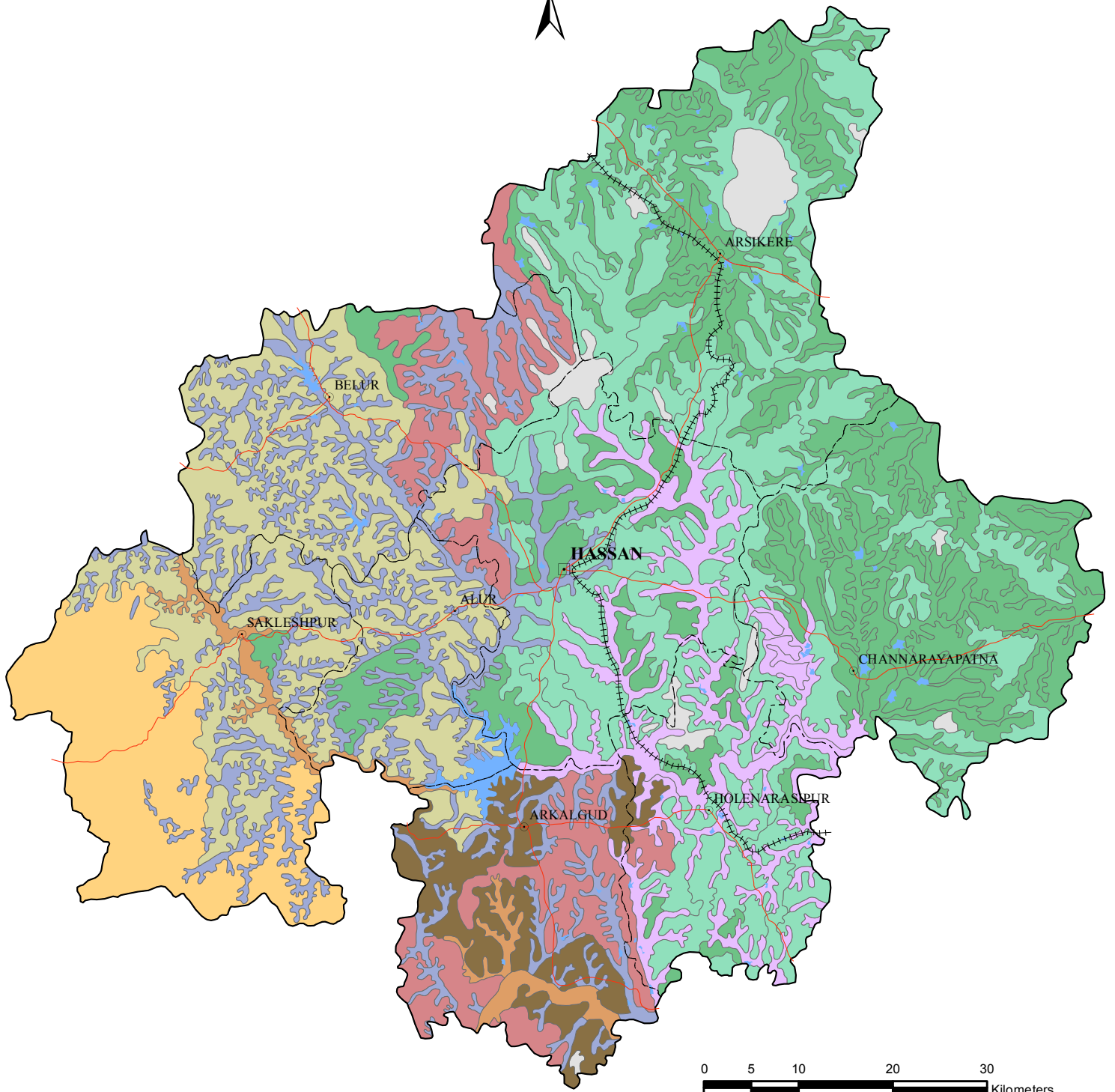
### Legend

|  |   |  |   |  |                             |
|--|---|--|---|--|-----------------------------|
|  | Not Available   |  | Gravelly sandy clay loam-gravelly clay loam       |  | Sandy clay loam-clayey loam |
|  | Fine loamy sand-fine sandy loam                           |  | Gravelly sandy loam-gravelly sandy clay loam      |  | Sandy loam                  |
|  | Fine loamy sand-fine sandy loam-clay loam-sandy clay loam |  | Loamy sand-sandy loam                             |  | Sandy loam-clayey loam      |
|  | Clay loam-sandy loam-silty clay loam-clay                 |  | Loamy sand-sandy loam--sandy clay loam-loamy sand |  | Sandy loam-sandy clay loam  |
|  | Clay loam-clay-sandy clay loam-sandy clay                 |  | Sandy clay loam                                   |  | Sandy loam-silty clay loam  |
|  | Gravelly clay loam  |  | Sandy clay loam-silty clay loam                   |  | Waterbody                   |
|  | Gravelly loamy sand                                       |  | Sandy clay loam-clayey loam-sandy loam            |  |                             |

Fig: 16 Soil Texture

# HASSAN

## Particle Size Class



0 5 10 20 30 Kilometers

### Legend

|  |                 |  |                                     |
|--|-----------------|--|-------------------------------------|
|  | Not Available   |  | Fine loamy-Loamy skeletal           |
|  | Fine            |  | Fine-Clayey skeletal-Loamy skeletal |
|  | Fine-Fine loamy |  | Loamy skeletal                      |
|  | Fine loamy-Fine |  | Loamy skeletal-Fine loamy           |
|  | Fine loamy      |  | Loamy skeletal-Fine                 |

### References

|  |                   |
|--|-------------------|
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|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbody         |





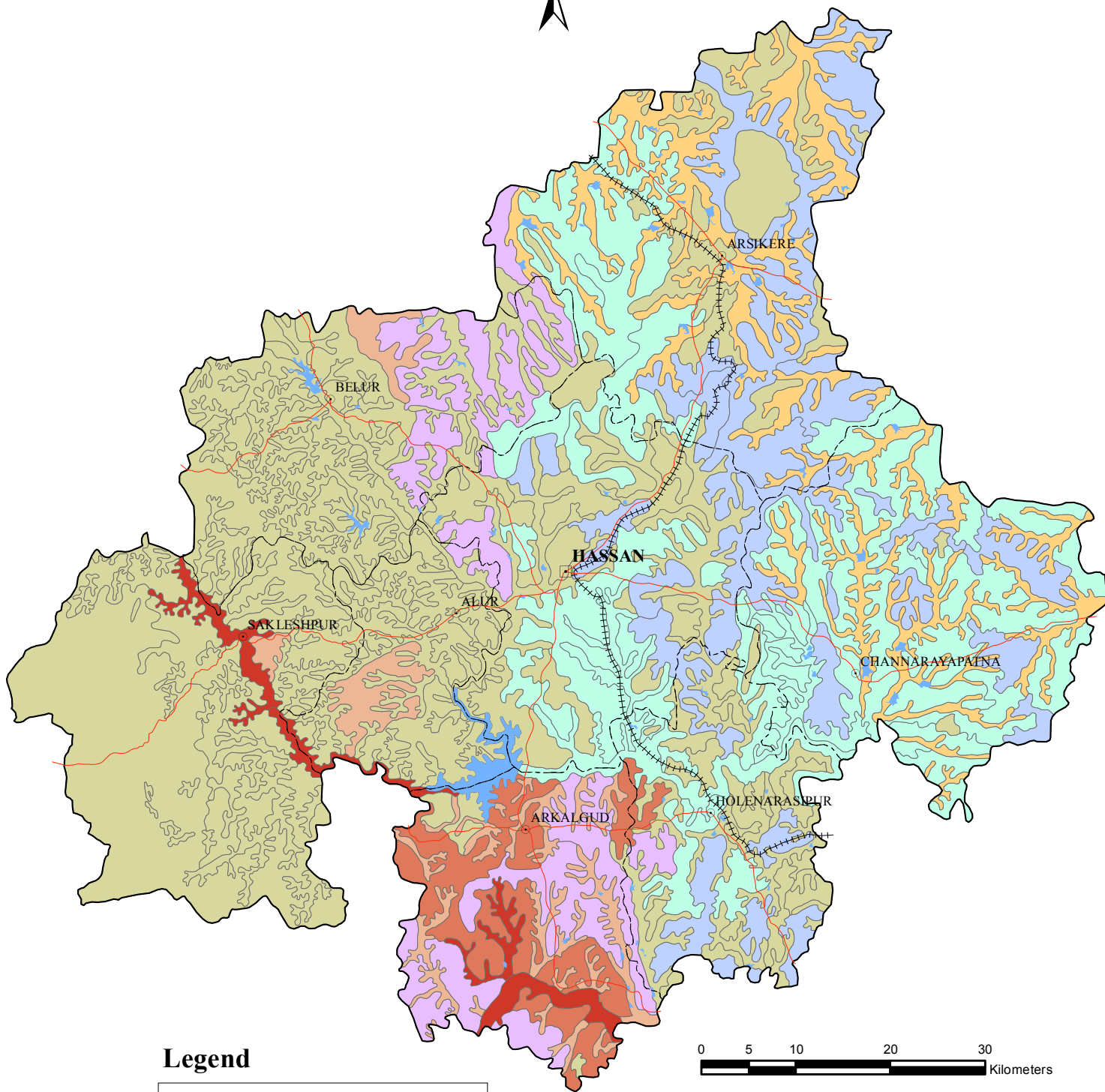
Table 6. Physical and chemical properties of typical soils of Hassan district (KARNATAKA)

| Horizon                | Sand | Silt | Clay | Textural class | Coarse fragments | Soil : Water 1:2.5 Ratio |      | O.C. % | Caco <sub>3</sub> | C.E.C.          |            | B.S. % | Extractable cations |      |
|------------------------|------|------|------|----------------|------------------|--------------------------|------|--------|-------------------|-----------------|------------|--------|---------------------|------|
|                        |      |      |      |                |                  | pH                       | EC   |        |                   | meq 100 gm soil | 100 g clay |        | Ca                  | Mg   |
| 1                      | 2    | 3    | 4    | 5              | 6                | 7                        | 8    | 9      | 10                | 11              | 12         | 13     | 14                  | 15   |
| 25 Idenahalli Series   |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 84.3 | 2.1  | 22.5 | Scl            | 0.8              | 7.2                      | 0.1  | 0.6    | -                 | 7.7             | 27.5       | 76     | 4.9                 | 0.9  |
| Bt                     | 45.6 | 6.0  | 46.2 | c              | 5.2              | 7.0                      | 0.1  | 0.2    | -                 | 6.2             | 12.3       | 60     | 3.2                 | 0.4  |
| 18 Tejigere Series     |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 79.3 | 8.6  | 19.1 | gsl            | 43.2             | 7.3                      | 0.3  | 0.3    | -                 | 10.7            | 52.3       | 72     | 6.4                 | 0.8  |
| Ac                     | 75.2 | 2.0  | 21.7 | gscl           | 72.5             | 6.9                      | 0.1  | 0.06   | -                 | 12.3            | 56.6       | 80     | 5.8                 | 5.1  |
| 13 Machenahalli Series |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 76.3 | 7.3  | 15.4 | glc            | 9.7              | 6.3                      | 0.1  | 0.4    | -                 | 6.2             | 40.2       | 76     | 2.1                 | 2.6  |
| Ac                     | 70.0 | 13.0 | 16.3 | gls            | 62.8             | 6.3                      | 0.1  | 0.2    | -                 | 7.4             | 45.4       | 78     | -                   | -    |
| 8 Honnavalli Series    |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 72.2 | 11.8 | 11.5 | ls             | 1.9              | 6.1                      | 0.1  | 0.2    | -                 | 9.8             | 80.8       | 85     | 3.4                 | 4.1  |
| B                      | 65.7 | 8.5  | 25.3 | gscl           | 40.8             | 6.1                      | 0.1  | 0.1    | -                 | 13.9            | 54.5       | 85     | 6.6                 | 4.9  |
| 4 Banavara Series      |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 56.3 | 3.0  | 32.8 | gscl           | 60.6             | 6.8                      | 0.1  | 0.5    | -                 | 16.9            | 47.8       | 91     | 8.7                 | 6.2  |
| Bt                     | 51.1 | 4.1  | 43.6 | gc             | 69.1             | 6.8                      | 0.1  | 0.3    | -                 | 29.3            | 66.5       | 93     | 14.5                | 13.0 |
| 5 Chalya Series        |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 74.1 | 4.1  | 19.2 | gcl            | 22.5             | 7.4                      | 0.01 | 0.7    | -                 | 12.5            | 48.0       | 84     | 8.2                 | 1.8  |
| Bt                     | 55.4 | 10.1 | 34.2 | gsc            | 62.5             | 7.2                      | 0.01 | 0.3    | -                 | 18.7            | 54.1       | 87     | 12.9                | 2.7  |
| 10 Kallenahalli Series |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 62.7 | 9.0  | 25.6 | Scl            | Nil              | 7.4                      | 0.1  | 0.5    | -                 | 19.5            | 69.5       | 83     | 12.7                | 3.0  |
| Bt                     | 47.0 | 11.8 | 43.5 | c              | Nil              | 8.0                      | 0.1  | 0.2    | -                 | 20.2            | 46.7       | 92     | 13.9                | 3.7  |
| 9 Kadabagere Series    |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 66.2 | 6.8  | 25.5 | scl            | 5.9              | 6.7                      | 0.1  | 0.5    | -                 | 8.4             | 28.2       | 89     | 5.5                 | 1.2  |
| Bt                     | 45.5 | 7.9  | 50.2 | c              | 6.8              | 6.3                      | 0.1  | 0.3    | -                 | 10.2            | 20.3       | 76     | 5.5                 | 1.5  |
| 11 Kanatur Series      |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 68.5 | 4.8  | 17.3 | sl             | 12.5             | 9.2                      | 0.4  | 0.7    | 1.08              | 10.9            | 53.1       | 93     | 8.6                 | 0.9  |
| C                      | 22.4 | 25.6 | 52.2 | c              | 15.2             | 9.8                      | 0.5  | 0.4    | 1.92              | 30.2            | 56.3       | 100    | 16.5                | 10.5 |
| 15 Nuggihalli Series   |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 64.8 | 7.1  | 27.7 | scl            | 3.0              | 8.6                      | 0.3  | 0.7    | 0.51              | 23.8            | 79.7       | 89     | 9.8                 | 10.1 |
| B                      | 48.3 | 6.9  | 44.3 | c              | 3.5              | 8.2                      | 0.1  | 0.4    | 1.03              | 24.4            | 52.8       | 97     | 12.7                | 8.6  |
| 7 Hemavathi Series     |      |      |      |                |                  |                          |      |        |                   |                 |            |        |                     |      |
| Ap                     | 86.2 | 2.1  | 12.2 | ls             | 6.1              | 7.4                      | 0.1  | 0.5    | -                 | 7.6             | 52.4       | 78     | 4.4                 | 1.5  |
| C                      | 84.2 | 2.0  | 18.2 | sl             | 1.2              | 7.6                      | 0.1  | 0.5    | -                 | 7.6             | 52.4       | 78     | 4.4                 | 1.5  |
| Iic                    | 68.2 | 2.5  | 26.2 | scl            | -                | 7.2                      | 0.1  | 0.5    | -                 | 15.2            | 58.0       | 86     | 12.3                | 2.0  |









Note: Soil separates in the subsurface is the weighted average of all the horizon upto parent material/CEC for 100 g clay is estimated on the basis of clay and organic carbon.

# HASSAN

## Soil Reaction (pH)



### Legend

|   |                            |
|---|----------------------------|
|  | Slightly acidic            |
|  | Slightly acidic-NA         |
|  | Neutral                    |
|  | Neutral-NA                 |
|  | Neutral-NA-Slightly acidic |
|  | Mod alkaline               |
|  | NA-Neutral                 |
|  | Not Available (NA)         |

### References









|   |                   |
|---|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



Table 7. Soil taxonomy of Hassan district (KARNATAKA)

| Series                         | Family          | Sub group            | Great group | Sub order | Order      |
|--------------------------------|-----------------|----------------------|-------------|-----------|------------|
| Bagolu                         | Fine            | Udic Rhodustalf      | Rhodustalf  | Ustalf    | Alfisol    |
| Banavar                        | Loamy skeletal  |                      |             |           |            |
| Kadabagere                     | Fine            | Oxic Rhodustalf      | Haplustalf  |           |            |
| Kogaravalli                    | Clayey skeletal |                      |             |           |            |
| Chalya, Arehalli               | Loamy skeletal  | Udic Haplustalf      | Haplustalf  |           |            |
| Biccodu, Idenahalli            | Fine            | Oxic Haplustalf      |             |           |            |
| Kallenahalli                   | Fine loamy      | Typic Haplustalf     |             |           |            |
| Adagur, Banankere              | Fine            | Typic Ustropept      | Ustropept   | Tropept   | Inceptisol |
| Honnavalli, Sunnakalluhosuru   | Loamy skeletal  |                      |             |           |            |
| Ramanathapura, Basavanahalli   | Fine loamy      |                      |             |           |            |
| Bellur                         | Fine            | Oxic Ustropept       |             |           |            |
| Koratakere                     | Loamy skeletal  |                      |             |           |            |
| Hettur                         | Fine loamy      | Vertic Ustropept     |             |           |            |
| Kodigehalli, Maradanahalli     | Fine            |                      |             |           |            |
| Nuggihalli, Konanur            | Fine            | Aquic Ustropept      | Ustorthent  | Orthent   | Entisol    |
| Valambige, Mandanahalli        | Loamy skeletal  | Lithic Ustropept     |             |           |            |
| Doddakadanur                   | Fine loamy      | Fluventic Ustorthent |             |           |            |
| Machenahalli, Yedegondanahalli | Loamy skeletal  | Lithic Ustorthent    |             |           |            |
| Kanatur                        | Fine            | Typic Ustorthent     | Ustorthent  | Orthent   |            |
| Mavinakere                     | Fine loamy      |                      |             |           |            |
| Tejigere                       | Loamy skeletal  |                      |             |           |            |
| Yagachi                        | Fine            | Typic Ustifluent     | Ustifluent  | Fluvent   |            |
| Srinivasapura, Hemavathi       | Fine loamy      |                      |             |           |            |

The mineralogy is mixed and temperature regime is Isohyperthermic for all the soils.

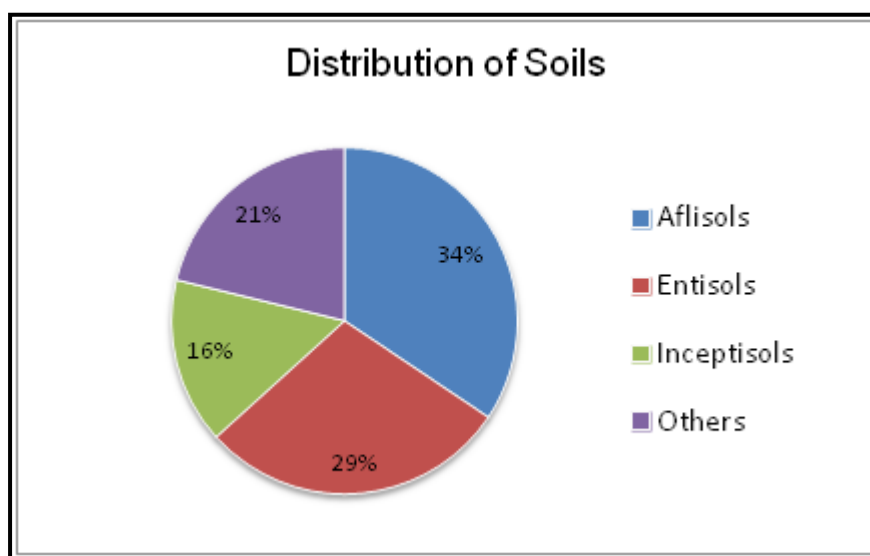
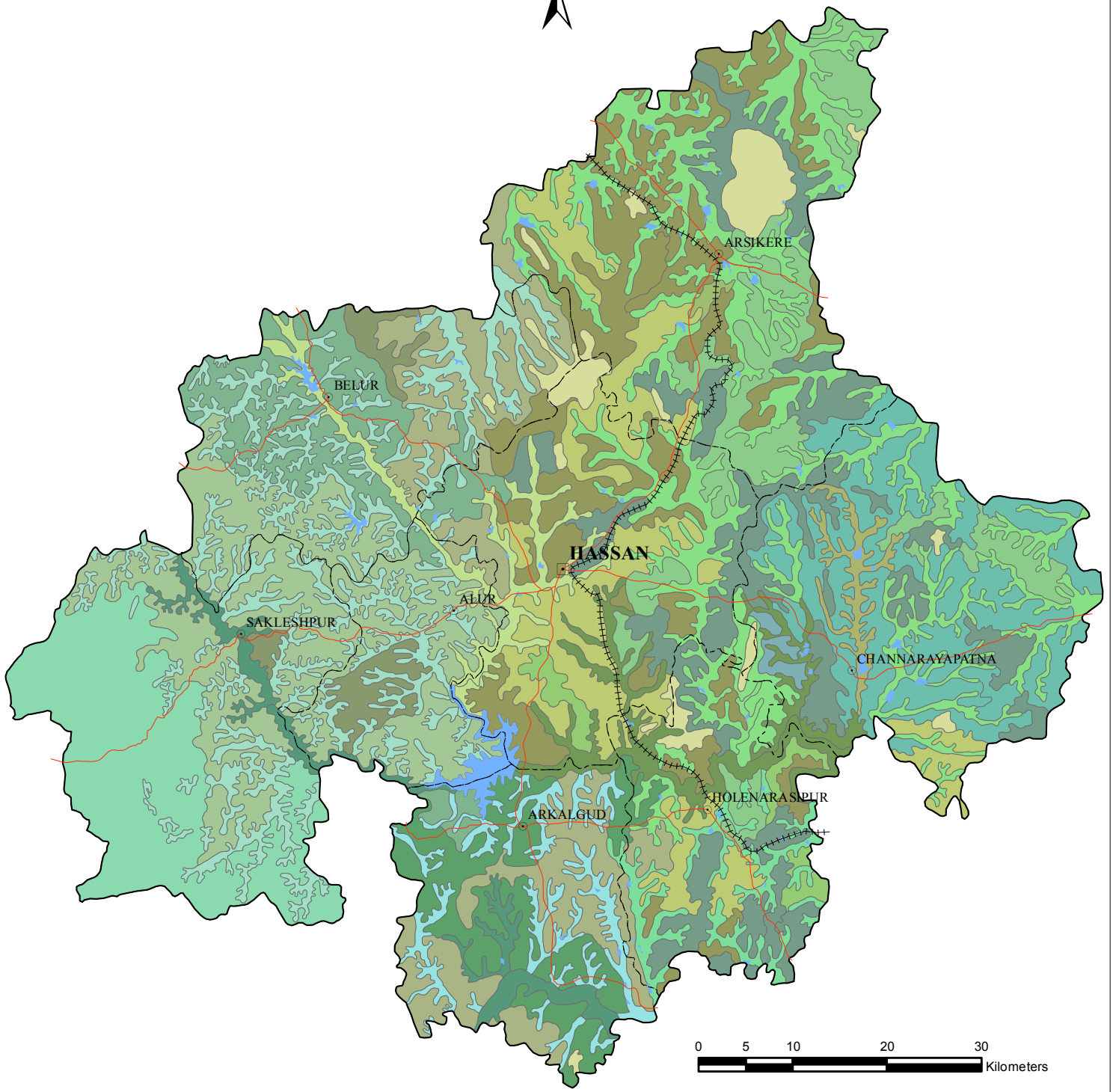


Fig.19 Distribution of soils

# HASSAN

## Soil Taxonomy



### Legend

|  |                                |  |                                  |  |  |
|--|--------------------------------|--|----------------------------------|--|--|
|  | Aquic Ustropept                |  | Typic Ustifluent                 |  | Aquic Ustropept-Typic Ustifluent-Vertic Ustropept  |
|  | Fluventic Ustorthent           |  | Typic Ustorthent                 |  | Lithic Ustorthent-Typic Ustropept-Lithic Ustropept |
|  | Lithic Ustorthent              |  | Typic Ustropept                  |  | Oxic Haplustalf-Oxic Ustropept-Udic Haplustalf     |
|  | Lithic Ustropept               |  | Typic Ustropept-Typic Ustorthent |  | Oxic Ustropept-Oxic Rhodustalf-Udic Haplustalf     |
|  | Oxic Rhodustalf                |  | Udic Haplustalf                  |  | Typic Ustifluent-Aquic Ustropept-Typic Ustropept   |
|  | Oxic Ustropept-Oxic Haplustalf |  | Udic Rhodustalf                  |  | Typic Ustifluent-Typic Ustropept-Typic Ustorthent  |
|  | RO                             |  | Vertic Ustropept                 |  | Typic Ustropept-Udic Haplustalf-Oxic Ustropept     |
|  | Typic Haplustalf               |  |                                  |  | Udic Haplustalf-Udic Rhodustalf-Lithic Ustorthent  |

### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
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|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |

## 5.

**SOIL SURVEY INTERPRETATIONS FOR LAND USE PLANNING**

Evaluation of land for land use planning is a consequent step following the mapping process. In the recent past, it has gained high popularity in almost every land development program. Generally the agronomist would generate this kind of information after conducting field experiments on individual soil mapping units. Since this would take considerable time, planning will have to proceed with the information given in the soil survey reports. In view of the practical need for exploiting soils of the Hassan district for optimum land use planning, land capability, irrigability, productive and problem soils, suggested land use and soil suitability for crops has been worked out for the mapped soil units.

**5.1 Land Capability:**

Land capability classification is an interpretative grouping made primarily for broad agricultural, forestry and non-agricultural use. The arable soils are grouped, according to their limitations, in Class I-IV; the forestry soils are grouped in Class VI & VII; the Class VIII soils have maximum limitation are used for recreation or quarrying.

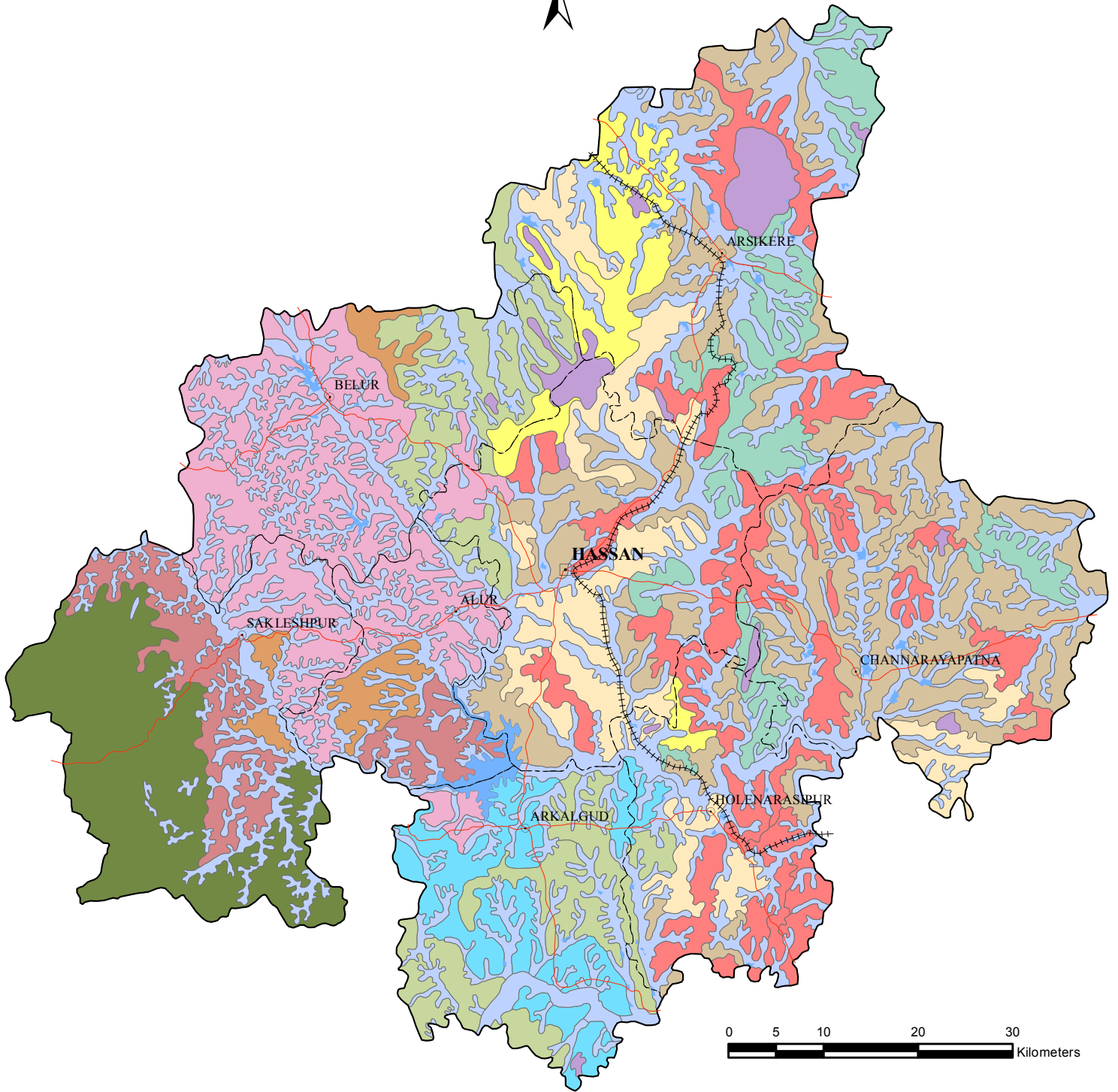
Further sub-division of the classes have been based on the dominant limiting factor, such as 'e' for erosion, 's' for soil, 'd' for drainage and 'w' for wetness. The soil mapping unit have been grouped into different subclasses and indicated in Table 8.

Table 8. Land capability classification

| Map symbol | Land capability Sub-class | Description  | Area ha. | Percent |
|------------|---------------------------|--|----------|---------|
| 1          | IIs                       | Good lands under irrigation with minor problems - clayey subsoil salinity, drainage                                  | 174975   | 25.8    |
| 2          | Ie                        | Good lands with minor problems erosion hazard, low fertility   | 80889    | 11.9    |
| 3          | IIIe                      | Moderately good lands with problems of erosion   | 19077    | 2.8     |
| 4          | IIIes                     | Moderately good lands with problems of erosion gravelliness  | 41970    | 6.2     |
| 5          | IVes                      | Fairly good lands with problems of slope, gravelliness and erosion   | 40177    | 6.0     |
| 6          | VIes                      | Lands not suitable for cultivation with shallow soils gravelliness, steep slopes, severe erosion                     | 85808    | 9.7     |
| 7          | IIIes-IIes(VIes)          | Moderately good and good lands with lands not suitable for agriculture with minor to severe problems of soil-erosion | 46217    | 6.8     |
| 8          | IVe-VIes (IVes)           | Fairly good lands and some lands not suitable for agriculture with gravelly soils, steep slopes, erosion             | 36661    | 5.4     |
| 9          | VIes (IIIes)              | Lands not suitable for agriculture and some moderately good lands with erosion hazard and gravelly soils             | 27239    | 4.0     |
| 10         | VIe-VIes                  | Lands not suitable for agriculture with steep slopes to be permanently under vegetation                              | 54245    | 8.0     |
| 11         | IVe-IIIe                  | Fairly good and some moderately good lands with erosion hazard   | 10119    | 1.5     |
| 12         | IVe-VIe-VIes              | Fairly good lands and some lands not suitable for agriculture with steep slopes and erosion hazard                   | 60466    | 8.9     |
| 13         | VIII                      | Hillocks and base rock outcrops  | 12940    | 1.9     |

# HASSAN

## Land Capability



### Legend

|  |                |  |               |
|--|----------------|--|---------------|
|  | IIs            |  | IVe-VIe-VIes  |
|  | IIe            |  | IVe-VIes-IVes |
|  | IIIe           |  | VIes          |
|  | IIIes          |  | VIes-IIIes    |
|  | IIIes-IIe-VIes |  | VIe-VIes      |
|  | IVes           |  | VIII          |
|  | IVe-IIIe       |  |               |

### References

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## 5.2 Irrigability:

It has already been indicated earlier 16 per cent of the total cropped area is under irrigation. The irrigated areas are generally in Plains and valleys. The soils of the area were evaluated to suitability for irrigation so that where possible more area could be brought under irrigation, particularly after the completion of the Hemavathi project.

Soil irrigability classification is made on the basis of important soil characteristics namely surface, soil texture, depth, available water retention capacity and permeability, alkali and saline conditions. Land irrigability classification is made taking into consideration, in addition to soil irrigability class, the quantity and quality of water, drainage requirements, topography, and economic considerations.

Irrigability class includes both soil and land irrigability classes. Sub-classes have been divided to cover similar limitations such as 's' - problems due to soils 'd'- problems due to drainage, and 't'- problems due to topography.

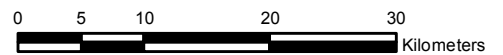
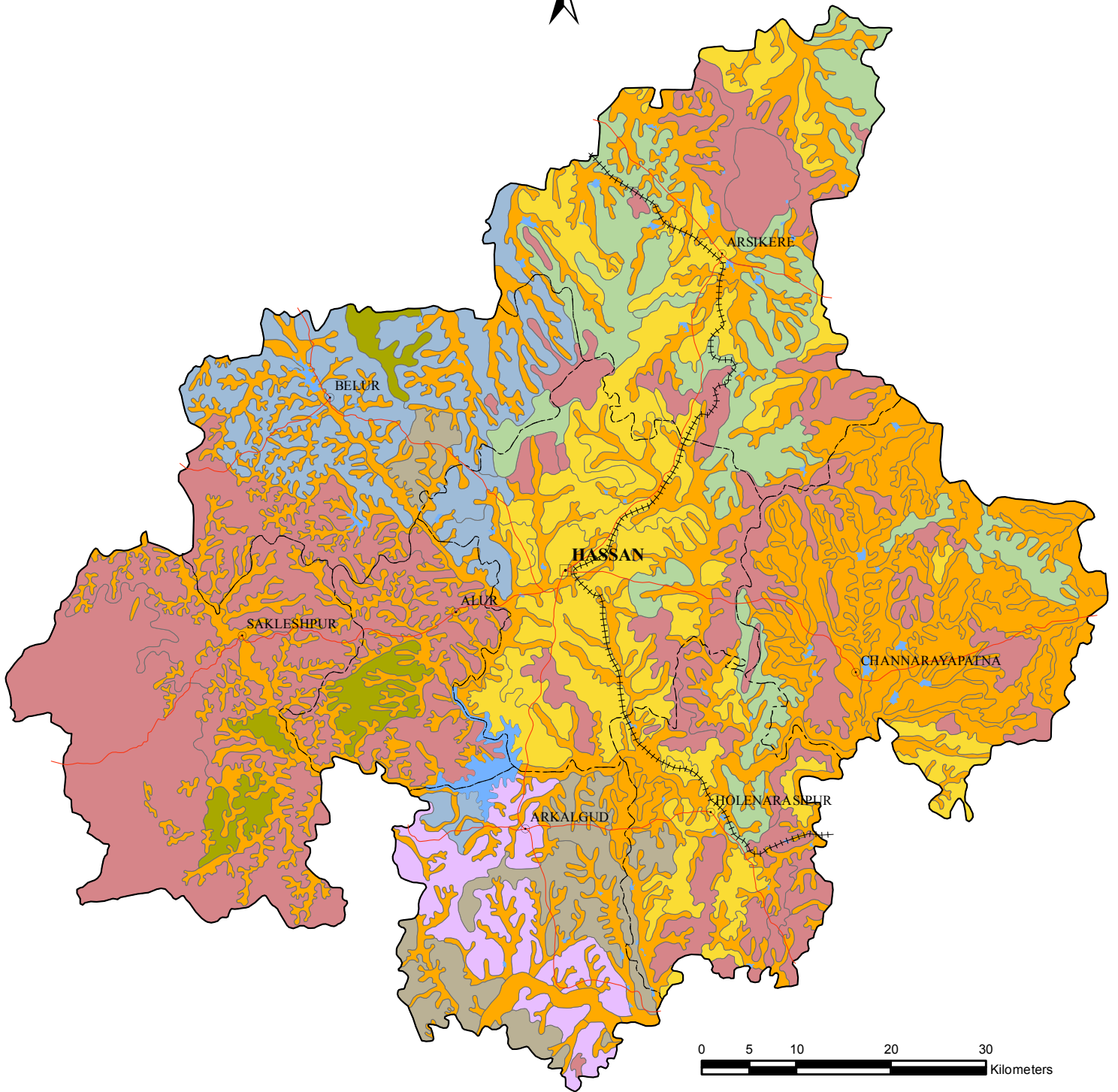
Mapping units in the soil map have been grouped into various irrigability class and subclass (Table 9).

Table 9. Irrigability classification









| Map symbol | Irrigability Sub-class | Description  | Area ha. | Percent |
|------------|------------------------|--|----------|---------|
| 1          | 2s                     | Irrigable lands with moderate limitation; texture, alkalinity, drainage  | 213757   | 31.5    |
| 2          | 3s                     | Irrigable lands with severe limitations of gentle slopes, gravelly subsoil   | 84075    | 12.4    |
| 3          | 4st                    | Marginally irrigable lands undulating slopes, graveliness, stoniness, excess run off   | 61659    | 9.1     |
| 4          | 6st                    | Lands not suitable for irrigation, shallow gravelly soils, steep slopes and hills  | 190854   | 28.2    |
| 5          | 3s-6st                 | Irrigable lands with severe limitations gentle slopes gravelly subsoil; some lands not suitable for irrigation                         | 46217    | 6.8     |
| 6          | 6st-3s                 | Lands not suitable for irrigation shallow gravelly soils; some irrigable lands with severe limitation, gentle slopes, gravelly subsoil | 27239    | 4.0     |
| 7          | 4st-6st                | Marginally irrigable lands, undulating slopes gravelly soils, stony soil; some lands not suitable for irrigation                       | 36661    | 5.4     |
| 8          | 4st-3s                 | Marginally irrigable lands, undulating slopes; some irrigable lands severe limitation of gentle slopes                                 | 10119    | 1.5     |

# HASSAN









## Land Irrigability



### Legend

|   |        |   |         |
|---|--------|---|---------|
|  | 2s     |  | 4st-3s  |
|  | 3s     |  | 4st-6st |
|  | 3s-6st |  | 6st     |
|  | 4st    |  | 6st-3s  |

### References

|   |                   |
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|  | Waterbodies       |





### 5.3 Productive Soils:

Soils identified and mapped in the district which have least limitations and are expected to respond well to management for major crops are classified under productive soils. Based on soil characteristics and availability of water, the soil mapping units have been grouped under two classes: Good and average (Table 10).

Table 10. Productive soils

| Map symbol | Productivity class | Soil map unit                            | Description  | Recommendations   | Area   |      |
|------------|--------------------|--|--|---|--------|------|
|            |                    |  |  |   | ha     | %    |
| 1          | Good               | 6, 7, 11, 12, 14, 15, 16, 27, 28, 29, 30 | Very deep, moderately well drained, clayey and loamy soils in valley regions.  | Response to Management is good. Suitable for paddy, sugarcane, coconut, finger millet, vegetables and flowers. Two crops can be taken.                | 174985 | 25.8 |
| 2          | Average            | 2, 3, 5, 9, 10, 21                       | Very deep, well drained clayey and gravelly clay loam soils with high moisture retentivity on very gently sloping lands. | Require minimum soil and water conservation measures. Response to management is average under dry land agriculture. Suitable for long duration crops. | 169076 | 24.9 |

### 5.4 Problem Soils:

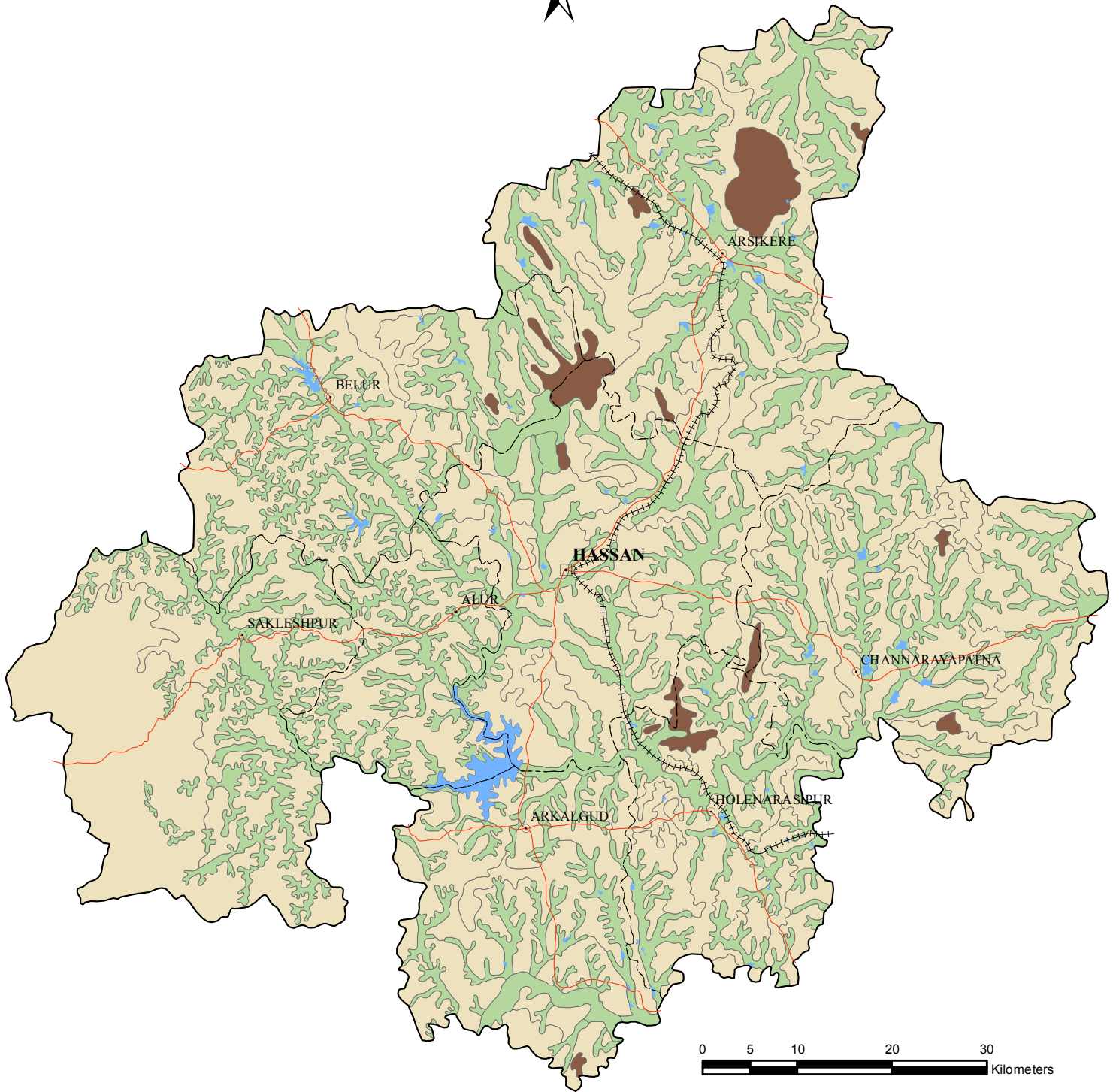
Soils with considerable limitations which hinder crop growth and yield are termed problem soils. problems associated with soils of Hassan district are shallow to moderate rooting depth, gravelliness, stoniness, rockiness, low to moderate water retentivity, poor fertility status, tendency towards development of saline and alkali conditions, high water table, flooding, sheet, rill and gully erosion and steep slopes. Based on the intensity of the above limitations, soil mapping units have been grouped into three classes: slight, moderate and severe (Table 11).

Table 11. Problem soils

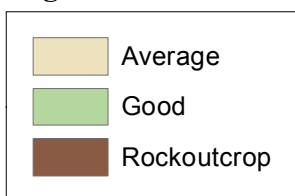
| Map symbol | Intensity of problem | Soil map unit | Associated problems  | Recommendations  | Area   |      |
|------------|----------------------|---------------|--|--|--------|------|
|            |                      |               |  |  | ha     | %    |
| 1          | Slight               | 8, 13, 22     | Shallow to moderate rooting depth, gravelly, stony, few rock outcrops gentle to moderate slopes, sheet erosion, scanty vegetation. | Require intensive soil and water conservation measures and dry farming practices. Suitable for pastures and limited agriculture.                                       | 119174 | 17.6 |
| 2          | Moderate             | 17, 18, 19    | Shallow rooting depth, gravelly, stony and rocky soils, moderate to steep slopes, severe erosion scanty vegetation.                | Require high input in soil and water conservation measures and dry farming practices. Suitable for forestry, pastures and limited agriculture of short duration crops. | 12440  | 1.8  |
| 3          | Severe               | 1, 20         | Rocky, bouldery, stony with very shallow rooting depth, steep slopes. Excessive relief very thin scrub vegetation.                 | Require permanent vegetative cover. Suitable for quarrying recreation and forms good catchment for watersheds, possibility of construction of storage tanks.           | 14350  | 2.1  |

# HASSAN

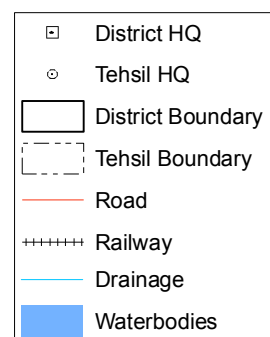
## Productive Soil



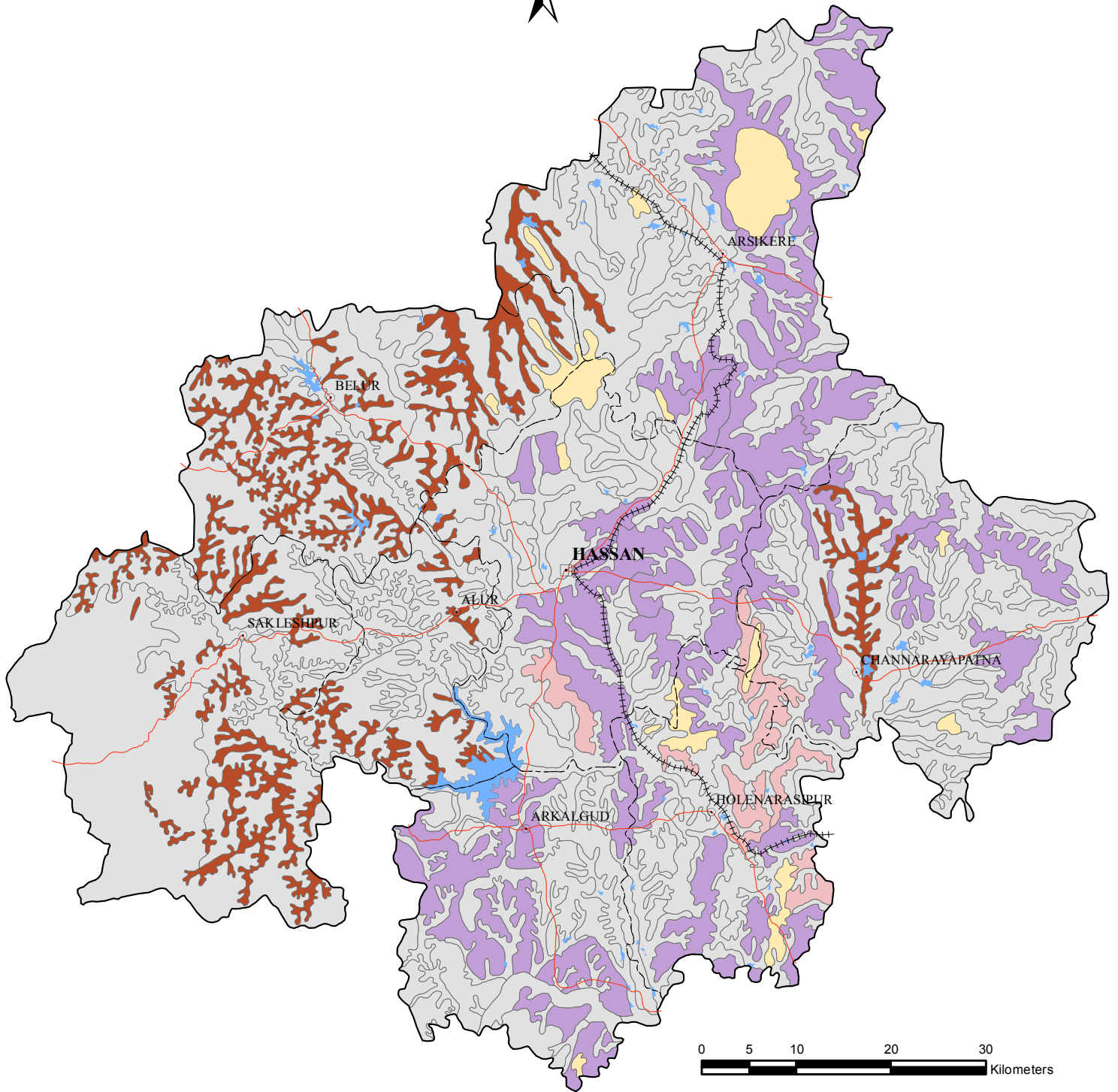
### Legend



### References



# HASSAN Problem Soils



## Legend

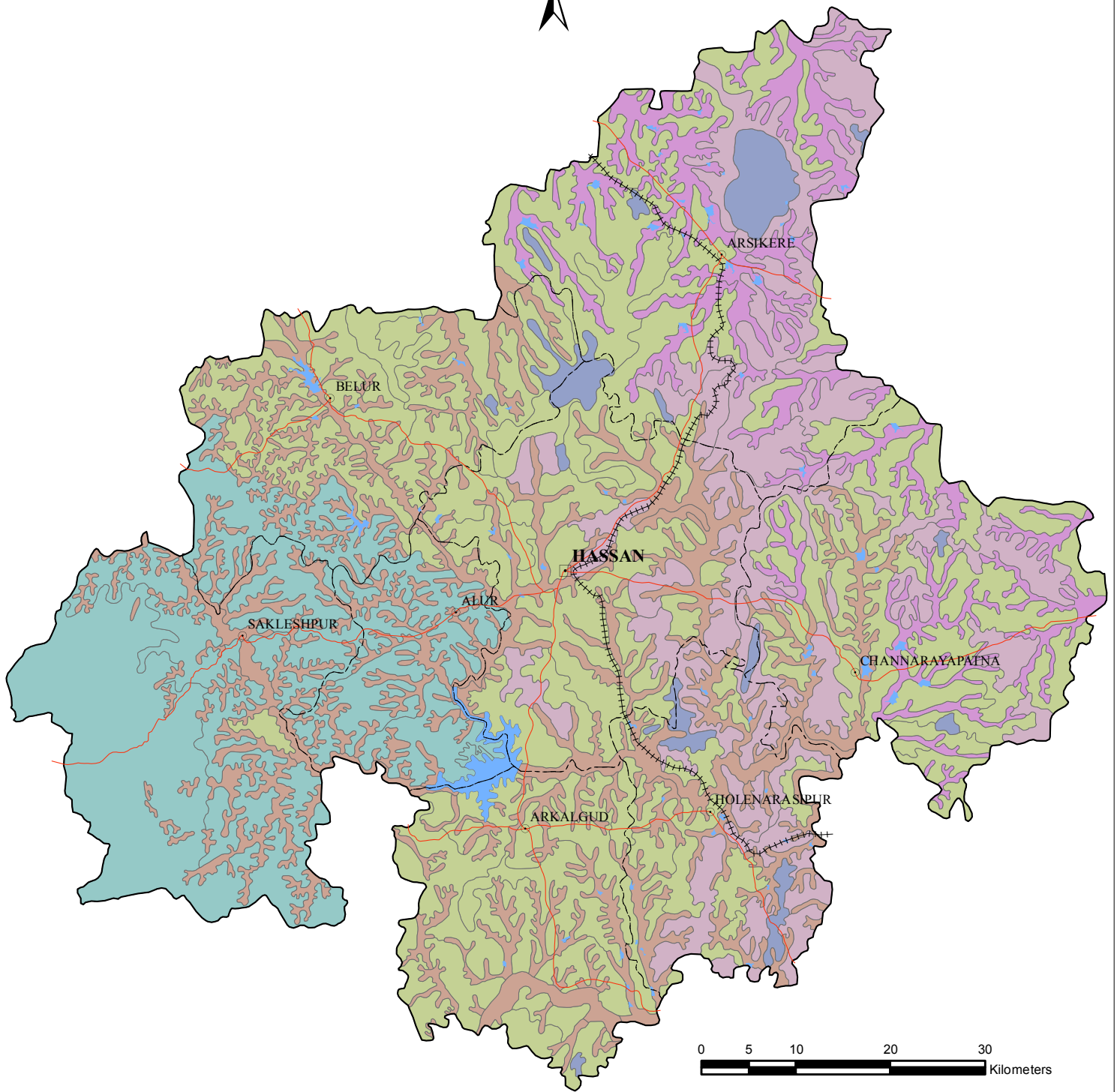
|  |   |
|--|---|
|  | Slight  |
|  | Slight tendency towards salinity and alkalinity |
|  | Moderate  |
|  | Severe  |
|  | Not Available                                   |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



# HASSAN Land Use (1978-79)



## Legend

|  |  |
|--|--|
|  | Coconut plantation                                       |
|  | Finger millet, other mixed crop                          |
|  | Forest land with plantation crops like coffee cardamom   |
|  | Mining and quarrying                                     |
|  | Paddy under irrigation                                   |
|  | Scrub forest with occasional cultivation of minor millet |

## References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



### 5.5 Suggested Land Use:

The survey has provided information on the distribution of soils, their morphology, physio-chemical characteristics and qualities of different soils in the district. Major crops grown in the district are given in Table 3. Management of soils under different land capability and irrigability classes has been discussed. The problem and productive soils have been grouped and described. Based on the above interpretation, the suggested land use patterns are recommended for the identified and mapped soil units. The recommendations given furnish general guidelines for cropping and management.

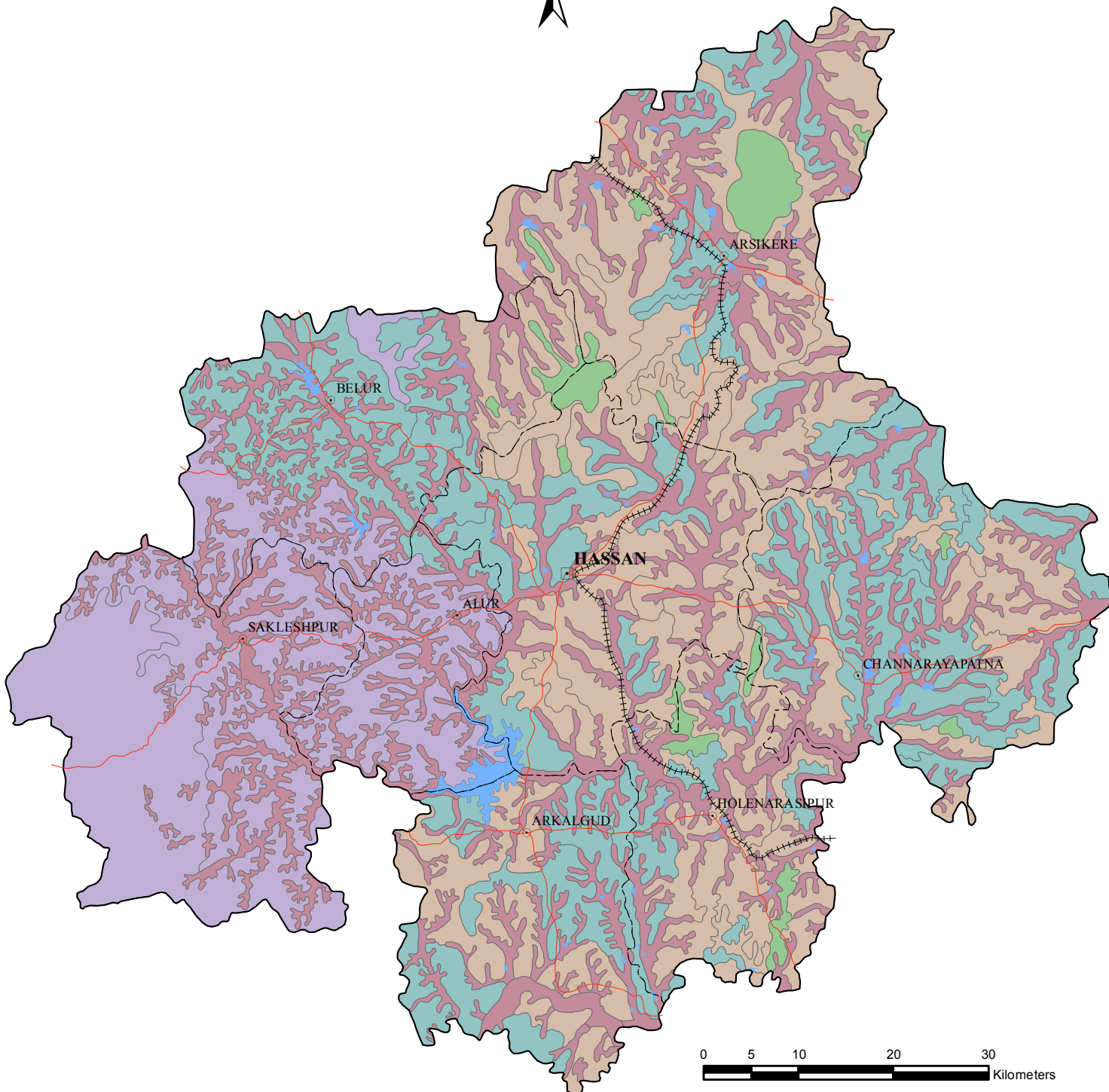
The suggested land use is given in Table 12.

Table 12. Suggested land use

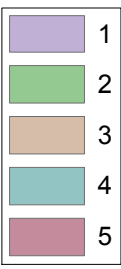
| Map symbol | Description and soil map units   | Suggested Land use   |
|------------|--|--|
| 1          | Hill ranges with steep to moderate slopes having very deep soils and high rainfall areas includes the soil mapping units of<br><br>Hettur-Kogaravalli-Arehalli (24), Bellur-Idehalli (25) and Biccodu-Hettur-Arehalli (26)   | Suitable for plantation crops and maintenance of forest. Crops recommended are - Coffee, tea, citrus, pepper, cardamom, tapioca, cashew  |
| 2          | Hillocks with rock outcrops and shallow gravelly soils with stoniness includes the soil mapping units :<br><br>Rock outcrops (1) and Yedegondanahalli (20)   | Suitable for forestry and pasture. Quarrying and mining of economic minerals   |
| 3          | Undulating to rolling lands with few rock outcrops and gravelly soils includes soil mapping units :<br><br>Chalya (5), Honwavalli (8), Machenahalli (13), Sunnakalluhosuru (17), Tejigere (18), Valambige (19) and association of series, MachenahaHi-Ramanathapura-Mandanahalli (22)  | Suitable for grazing land and farm forestry with small areas for dry land agriculture of short duration crops<br><br>Crops recommended are : Horsegram, groundnut, sesamum, cowpea, pearl millet and fodder crops  |
| 4          | Gently sloping lands with very deep clayey and loamy soils includes soil mapping units :<br><br>Bagolu (2), Banankere (3), Kadabagere (9), Kallenahalli (10) and association of series Basavanahalli-Arehalli-Koratakere (23), Chalya-Bagolu-Machenahalli (21)   | Suitable for agriculture with minor amendments of soil and water conservation. Rain fed crops recommended are : Finger millet, sorghum, pulses, castor, pearl-millet, hybrid maize<br><br>Irrigated crops are : Finger millet, sorghum, groundnut, rice, mulberry, potato, vegetables, flowers and coconut |
| 5          | Valley lands (Tank Command areas and river valleys) with very deep, clayey and loamy soils under tank and canal irrigation includes soil mapping units :<br><br>Doddakadanui (6), Hemavathi (7), Kanatur(II) Kodigehalli (12), Mavinkaere (14), Nuggihalli (15), Srinivasapura (16) and association of series Konanur-Srinivasapura-Maradanahalli (27), Adagur-Mavinakere (28), Yagachi-Adagur-Mavinakere (29), Hemavathi-Konanur, Adagur (30) | Suitable for agriculture with very minor amendments for drainage<br><br>Crops recommended are:<br><br>Kharif : Rice, sugarcane, finger millet, vegetables and flowers.<br>Rabi : Bengal gram, peas, onion, potato'<br>Plantation Crops : Coconut, banana and inter crop                                    |

# HASSAN

## Suggested Land Use



### Legend



### References

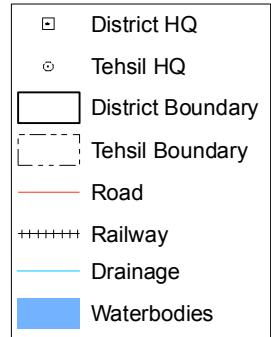


Fig: 26 Suggested Land Use

### 5.6 Soil Suitability of Ragi:

It has been generally realized that the user agencies look forward for the interpretations of the soil map in terms of its suitability for growing crops, so as to make the optimum use of the limited land resource.

It is well known that most of the crops need well-drained moderately-fine to medium-textured soils, free of salinity and having optimum physical environments. Soil maps based on several parameters, can aid in predicting the behavior and suitability of soils for growing crops. In many areas, soil surveys have been completed showing the extent and distribution of various kinds of soils, but practically no attempts have been made to evaluate the suitability of such soils for growing crops so that such findings could find application in other areas with comparable soil characteristics.

Based on the soil site characteristics of the studied soils, (Table 5), the mapped soils of the Hassan district was grouped into different suitability classes based on the parametric approach of FAO (1975) as modified by Sehgal and Associates for Ragi crop which covered more than 1/3 of the total cultivated area (20% of the total geographical area). The evaluation has been based on the several parameters. Every soil unit was rated as per limitation technique using site characteristics (Table 13). The limitation of two indicate that the crop still be grown economically but with a marginal profit. The degree of limitations allocated for each property in respect of each map soil unit as shown in Table 14 and overall suitability of the soils determined based on the degree and the number of limitations for that particular unit. The final soil suitability is based on the number and degree of limitation(s) as per definitions of the following criteria:

#### Order 'S' Suitable:

Land on which sustained use of the kind under consideration is expected to yield benefits without unacceptable risk to land resources.

Table 13. Criteria used in assessing suitability for Ragi

| Soil site characteristics                  |            | Degree of limitation      |                              |                           |                 |             |
|--|------------|---------------------------|------------------------------|---------------------------|-----------------|-------------|
|  |            | None                      | Slight                       | Moderate                  | Severe          | Very severe |
| Climate (annual rainfall in mm)            |            | 750                       | 500-750                      | 400-500                   | 400             | -           |
| Topography (slope %)                       |            | 1-3                       | 3-5                          | 5-10                      | 10-15           | 15          |
| Drainage                                   |            | Moderately well           | Imperfect to weak            | Poor excessive            | Very poor       | -           |
| Texture                                    |            | Loam silt sandy clay loam | Clay loam<br>Silty clay loam | Loamy and silty clay loam | Sand, fine clay | -           |
| Gravelliness/ Stoniness                    |            |                           |                              |                           |                 |             |
| Volume                                     | Surface    | 3                         | 3-5                          | 15-40                     | 40-75           | 75          |
| Percent                                    | Subsurface | 15                        | 15-40                        | 40-75                     | 75              | -           |
| Soil depth (cm)                            |            | 80                        | 50-80                        | 20-50                     | 20              | -           |
| Lime %                                     |            | 15                        | 15-25                        | 25-50                     | 50              | -           |
| Cation exchange capacity (soil) (meq/100g) |            | 16                        | 10-16                        | 5-10                      | 5               | -           |
| Base saturation %                          |            | 80                        | 50-80                        | 35-50                     | 35              | -           |

Soil Resource Based Land Use of Hassan District (Karnataka)

Table 14. Suitability classification of soils for Ragi crop, Hassan district (Karnataka)

| Soil Mapping Unit | Series Association                     | Degree of limitation due to |            |          |         |                        |                   |             |            |     |                 |                    |                   |
|-------------------|--|-----------------------------|------------|----------|---------|------------------------|-------------------|-------------|------------|-----|-----------------|--------------------|-------------------|
|                   |  | Climate                     | Topography | Drainage | Texture |                        | Gravels Stoniness |             | Soil Depth | CEC | Base Saturation | Overall limitation | Suitability class |
|                   |  |                             |            |          | Surface | Series central section | Surface           | Sub surface |            |     |                 |                    |                   |
| 2                 | Bagolu                                 | 0                           | 1          | 1        | 0-1     | 1-2                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 3                 | Banankere                              | 0                           | 1          | 1        | 0-1     | 1-2                    | 1                 | 0           | 0          | 0   | 0               | 1-2                | S1-2              |
| 4                 | Banavar                                | 1                           | 2          | 1        | 2       | 2                      | 1                 | 2           | 0          | 0   | 0               | 2                  | S2                |
| 5                 | Chalya                                 | 0                           | 2          | 1        | 1-2     | 1                      | 1                 | 2           | 0-1        | 0   | 0               | 2                  | S2                |
| 6                 | Doddakadanur                           | 0                           | 0          | 0        | 1       | 1-2                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 7                 | Hemavathi                              | 0                           | 0          | 0        | 1-2     | 1-2                    | 0                 | 0           | 0          | 1   | 0-1             | 1-2                | S1-2              |
| 8                 | Honnavalli                             | 1                           | 2          | 1        | 2-1     | 1                      | 3                 | 2           | 1          | 1   | 0               | 2-3                | S3                |
| 9                 | Kadabagere                             | 0                           | 1          | 1        | 0-1     | 2-1                    | 1                 | 0           | 0          | 1   | 0               | 1-2                | S1-2              |
| 10                | Kallenahalli                           | 0                           | 1          | 1        | 1       | 1                      | 1                 | 0           | 0          | 0   | 0               | 1                  | S1                |
| 11                | Kanatur                                | 0                           | 0          | 0        | 1       | 1-2                    | 0                 | 0           | 0          | 0   | 0               | 1-2                | S1-2              |
| 12                | Kodigehalli                            | 0                           | 0          | 0        | 1       | 1-2                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 13                | Machenahalli                           | 1                           | 3          | 1-2      | 1-2     | 1                      | 2                 | 2           | 2          | 2   | 1               | 2-3                | S3                |
| 14                | Navinakere                             | 0                           | 0          | 0        | 0       | 0-1                    | 0                 | 0           | 0          | -   | -               | 1                  | S1                |
| 15                | Nuggihalli                             | 0                           | 0          | 1        | 0       | 2                      | 0                 | 0           | 0          | 0   | 0               | 1-2                | S1-2              |
| 16                | Srinivasapura                          | 0                           | 0          | 0        | 1       | 1                      | 0                 | 1           | 0          | 0   | 0               | 1                  | S1                |
| 17                | Sunnakalluhosuru                       | 0                           | 3          | 1-2      | 1-2     | 1                      | 3                 | 2           | 1          | -   | -               | 4                  | N2                |
| 18                | Tejjere                                | 0                           | 3-4        | 1-2      | 1-2     | 1                      | 3                 | 2           | 2-3        | -   | -               | 4                  | N2                |
| 19                | Valambige                              | 0                           | 2-3        | 1-2      | 2       | 1                      | 3                 | 2           | 2-3        | -   | -               | 4                  | N1                |
| 20                | Yedegondanahalli                       | 0                           | 3-4        | 2        | 2       | 1                      | 3                 | 2           | 2-3        | -   | -               | 4                  | N2                |
| 21                | Chalya-Bagolu-Machenahalli             | 0                           | 1-2        | 1        | 1       | 1-2                    | 1                 | 1           | 0          | -   | -               | 1-2                | S1-2              |
| 22                | Machenahalli-Ramanathpura-Mandanahalli | 0                           | 3          | 1-2      | 2-3     | 2                      | 3                 | 2           | 1          | -   | -               | 2-3                | S3                |
| 23                | Basavanahalli-Arehalli-Koratakere      | 0                           | 3          | 1        | 1       | 1                      | 2                 | 2           | 0-1        | -   | -               | 2-3                | S3                |
| 24                | Hettur-kogaravalli-Arahalli            | 0                           | 3-4        | 1        | 1       | 1-2                    | 1                 | 1           | 0          | -   | -               | 3-4                | N2                |
| 25                | Bellur-Idenahalli                      | 0                           | 3          | 1        | 1       | 2                      | 1                 | 1           | 0          | 1   | 1               | 2-3                | S3                |
| 26                | Bloodu-Hettur-Arahalli                 | 0                           | 4          | 1        | 1-2     | 2                      | 0                 | 0           | 0          | -   | -               | 4                  | N2                |
| 27                | Kananur-Srinivasapura-Maradanahalli    | 0                           | 0          | 1        | 1       | 2                      | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 28                | Adagur-Mavinakere                      | 0                           | 0          | 0        | 0       | 1-2                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 29                | Hagachi-Adagur-Mavinakere              | 0                           | 0          | 0        | 0-1     | 1-2                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |
| 30                | Hemavathi-Konanur-Adagur               | 0                           | 0          | 0        | 1-2     | 2-1                    | 0                 | 0           | 0          | -   | -               | 1-2                | S1-2              |



### **S-1. Highly Suitable**

Land unit (s) represents optimum conditions for plant growth, without limitations or *with only slight limitations*.

### **S1-2. Suitable**

As above with slight to moderate limitations or slight to and/or no more than 1 moderate limitations.

### **S-2. Moderately Suitable**

Land unit(s) representing nearly optimal conditions, affects productivity by 20% or less; *have slight limitations and/or no more than 3 moderate limitations*.

### **S-3. Marginally Suitable**

Land Unit(s) representing moderate conditions, affects productivity significantly, but still economical (marginally) *have more than 3 moderate limitations and/or no more than 1 severe limiting that*, however, does not exclude the use of land.

### **Order 'N' Not Suitable:**

Land which has qualities that appear to preclude sustained use of the kind under consideration.

### **N-1. Currently Not Suitable**

Land unit(s) representing marginal conditions and uneconomical to use; *have one severe limitation* that excludes the use of the land or *more than one severe limitation that can be corrected*.

### **N-2. Permanently Not Suitable**

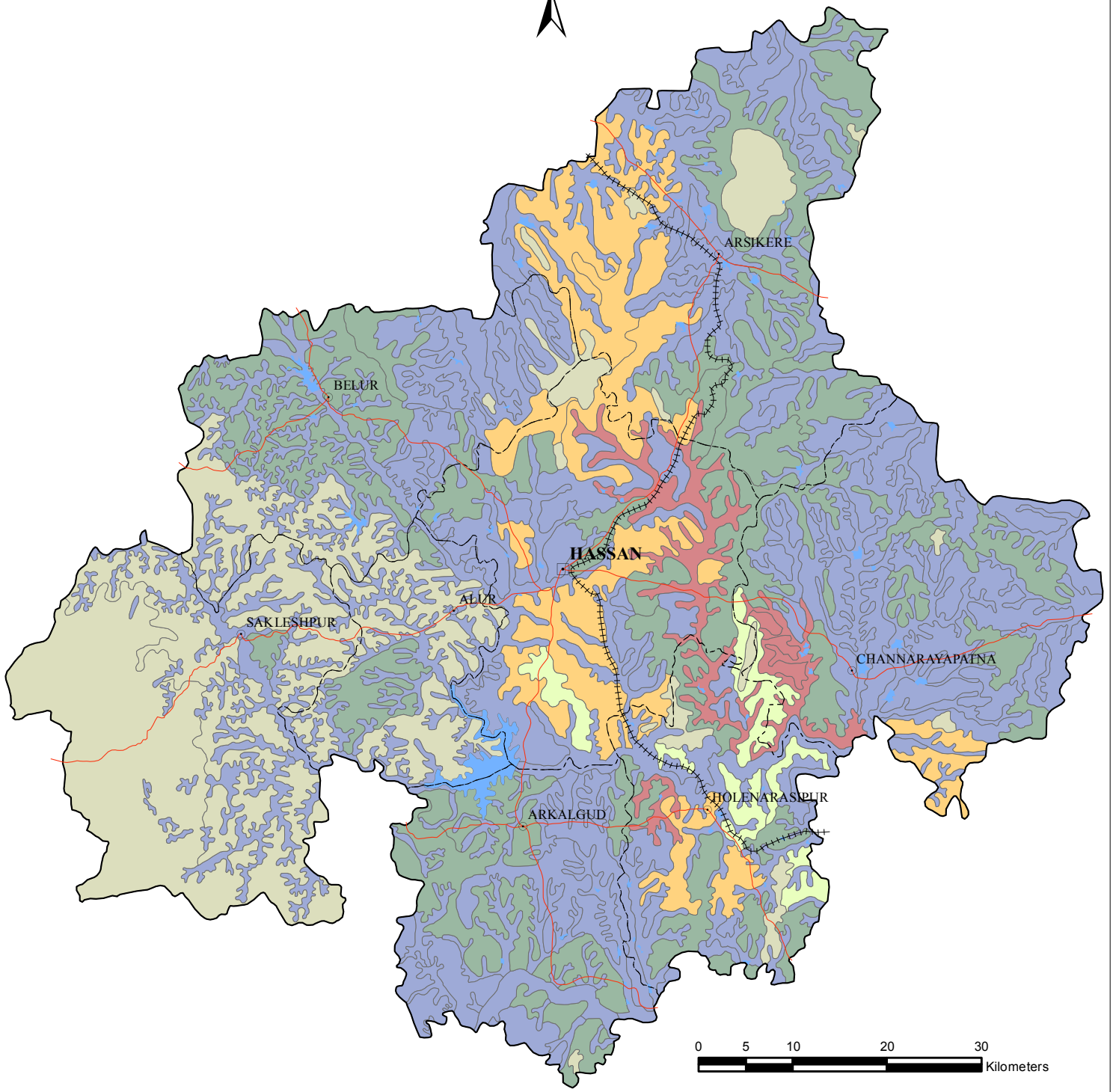
Land unit(s) which yield below the profitable level; inhibits the use of land for considered land use; *have severe or very severe limitations* which excludes the use of the land and which cannot be corrected.

The summarized version of the soils falling in different suitability classes is given in Table 15. The data show that most (41.1%) of the soils are suitable for cultivation of Ragi crop; 3.4% of the area is highly suitable, 9.1% of the area is moderately suitable and 24.5% of the area is marginally suitable for Ragi crop. 1.8% of the area is unsuitable for the above purpose but potentially suitable. 19% of the area is both unsuitable under the present and potential situation.

It may be observed that unsuitable soils presently and potentially are localized in the western part of the district and have two major limitations viz. topography and stoniness. The soils which are presently unsuitable but potentially suitable are located in the southern part of the district and have major limitation of surface stoniness which can be taken care of with high inputs. The suitable soils are generally on gently sloping pediments and valleys. The soils are very deep, well drain to moderately well drained.

# HASSAN

## Suitability for Ragi



### Legend

|  |                                      |
|--|--------------------------------------|
|  | Highly suitable                      |
|  | Suitable                             |
|  | Moderately suitable                  |
|  | Marginally suitable                  |
|  | Unsuitable, potentially suitable     |
|  | Unsuitable presently and potentially |

### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



Fig: 27 Suitability for Ragi

TABLE 15. Suitability of mapping units for Ragi

| Suitability class                            | Soil mapping units   | Area in ha. | Percent |
|--|--|-------------|---------|
| S1<br>(Highly suitable)                      | Kallenahalli (10), Mavinakere (14), Srinivasapura (16)   | 23058       | 3.4     |
| S1-2<br>(Suitable)                           | Bagolu (2), Banenkere (3), Doddakadanur (6), Hemavathi (7), Kadabagere (9), Kanatur (11), Kodigehalli (12), Nuggihalli (15), Chalya-Bagolu-Machenahalli, (21)Konanur-Srinivasapura-Maradenahalli (27), Adagur-Mavinakere (28), Yagachi-Adagur-Mavinakere (29), Hemavathi-Konanur-Adagur (30) | 279023      | 41.1    |
| S2<br>(Moderately suitable)                  | Banavar (4), Chalya (5)  | 61047       | 9.1     |
| S3<br>(Marginally suitable)                  | Honnnavalli (8), Machenahalli (13), Machenahalli-Raraanathapura-Mandanahalli (22), Basavanahalli-Arehalli-Koratakere (23), Bellur-Idenahalli (25)  | 165954      | 24.5    |
| N1<br>(Unsuitable, potentially suitable)     | Sunnakalluhosuru (17), Tejigere (18), Valambige (19)   | 12440       | 1.8     |
| N2<br>(Unsuitable presently and potentially) | Yedegondanahalli (20), Rock out crops (1), Hettur-Kogaravalli-Arehalli (24), Biccodu-Hettur-Arehalli (26)  | 129061      | 19.0    |

Figures in parenthesis indicate soil map symbol.

### 5.7 Soil Suitability for Eucalyptus Plantation:

Eucalyptus plantations are important raw materials for many industries and also they are evergreen trees. The suitability of soils for eucalyptus plantation of Hassan district were evaluated in similar lines as that done for Ragi. The criteria used for assessing the suitability are given in Table 16. The degree of limitations allocated for each property in respect of each mapped soil unit is shown in Table 17. The summarized version of the soils falling in different suitability classes is given in Table 18. A map showing the distribution of the suitability of soils for eucalyptus plantation is also prepared.

It may be observed- that the suitable soils occupy about 8.3% of the area and are distributed in the central and southern part of the district. They are very deep soils in valley regions. Moderately suitable soils are distributed in the eastern and central portion of the district covering 36.5%. They are very deep clayey and loamy soils on gently sloping and undulating pediments. Marginally suitable soils have least area of distribution (26.2%) and they are on undulating to rolling pediments. The unsuitable soils (27.9%) are in the western portion of the district which get heavy rainfall and have steep slopes where eucalyptus will have fungus attack due to high humidity (personal communication) which is the reason of classifying the soils as permanently unsuitable.

Table 16. Criteria used for assessing suitability of soils for Eucalyptus plantation

| Soil site characteristics   | Degree of limitation         |                           |                            |                         |             |
|-----------------------------|------------------------------|---------------------------|----------------------------|-------------------------|-------------|
|                             | None                         | Slight                    | Moderate                   | Severe                  | Very severe |
| <b>CLIMATE</b>              |                              |                           |                            |                         |             |
| -Rainfall (mm)              | 500-1000                     | 250-600                   | 150-250                    | 150<br>1000-1500        | 1500        |
| -MAT (°C)                   | 18-22                        | 22-25                     | 25-28<br>12-15             | 28<br>8-12              | 8           |
| <b>TOPOGRAPHY</b>           |                              |                           |                            |                         |             |
| -Plains                     | 0-1                          | 1-3                       | 3-6                        | 8                       |             |
| -Hills                      | 0-8                          | 8-15                      | 15-30                      | 30                      |             |
| <b>WETNESS</b>              |                              |                           |                            |                         |             |
| -Flooding                   | Nil- Slight                  | Moderate                  | Severe                     | Very severe             |             |
| -Drainage                   | Well                         | Moderately well           | Excessive imperfect        | Poop – Very excessive   | Very poor   |
| Soil texture (USDA)         | sil, l, si, fri, sicl, cl(s) | sic, sc, cl, sicl, cl (m) | sic, sc(m), ls, c (s)      | c (m) s                 |             |
| <b>STONINESS (% volume)</b> |                              |                           |                            |                         |             |
| -Surface                    | 3 (all)<br>3-15 (fgr)        | 3-15 (all)<br>15-40 (fgr) | 15-40 (all)<br>40-75 (fgr) | 40-75 (all)<br>75 (fgr) | 75 (all)    |
| -Subsoil                    | 3                            | 3-15                      | 15-40                      | 40-75                   | 75          |
| <b>SOIL DEPTH (cm)</b>      | 120                          | 80-120                    | 50-80                      | 20-50                   | 20          |
| <b>LIME %</b>               | 3-15                         | 0-3<br>15-30              | 30-50                      | 50-75                   | 75          |
| <b>BASE SATURATION</b>      | 50                           | 50-80                     | 35-50                      | 35                      |             |
| <b>SALINITY</b>             |                              |                           |                            |                         |             |
| -Fine to mod. Fine tex.     | 2                            | 2-4                       | 4-8                        | 8-15                    | 15          |
| -Coarse to moderate         | 4                            | 4-8                       | 8-15                       | 15-25                   | 25          |
| <b>SODICITY (ESP)</b>       | 15                           | 15-25                     | 25-40                      | 40                      |             |

Key: (s) Structured (m) massive (all) all sizes of gravels G stones (fgr) fine gravel 2.5 cm diameter

Source: Introductory pedology, J.L. Sehgal

TABLE 17. Suitability of mapping units for Eucalyptus plantation

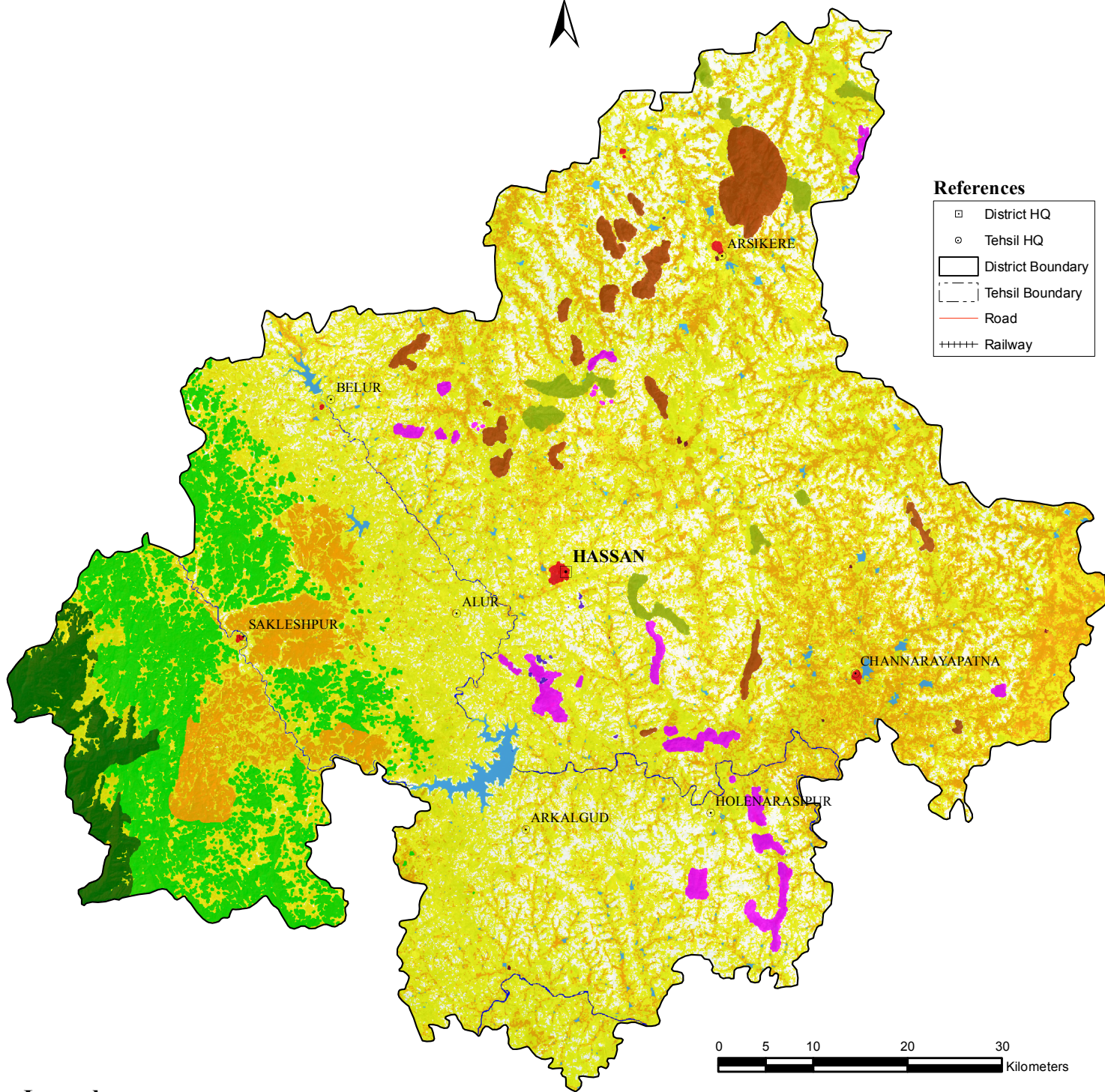
| Suitability class                            | Mapping units                     | Area in ha. | Percent |
|--|-----------------------------------|-------------|---------|
| S1<br>(Highly suitable)                      | 6, 7, 14, 16, 27, 10              | 56219       | 8.3     |
| S2<br>(Moderately suitable)                  | 2, 3, 4, 5, 9, 11, 12, 15, 21     | 247556      | 36.5    |
| S3<br>(Marginally suitable)                  | 8, 13, 17, 18, 19, 20, 22, 23, 29 | 177398      | 26.2    |
| N2<br>(Unsuitable presently and potentially) | 24, 25, 26, 28, 30                | 189410      | 27.9    |

Table 18. Suitability classification of soils of Hassan district (Karnataka) for eucalyptus plantation

| Soil Mapping Unit | Series Association                     | Degree of limitation due to |      |            |       |          |          |              |           |          |            |        |                 |          |          |                    |                   |                  |
|-------------------|--|-----------------------------|------|------------|-------|----------|----------|--------------|-----------|----------|------------|--------|-----------------|----------|----------|--------------------|-------------------|------------------|
|                   |  | Climate                     |      | Topography |       | Wetness  |          | Soil texture | Stoniness |          | Soil Depth | Lime % | Base Saturation | Salinity | Sodicity | Overall limitation | Suitability class | Major Limitation |
|                   |  | Rain fall                   | MA T | Plains     | Hills | Flooding | Drainage |              | Sur face  | Sub soil |            |        |                 |          |          |                    |                   |                  |
| 1                 | Rock out crops                         | 0                           | 1    | -          | 4     | 0        | 0        | -            | -         | -        | 4          | -      | -               | -        | 4        | N2                 | r                 |                  |
| 2                 | Bagolu                                 | 0                           | 1    | 1-2        | -     | 0        | 0        | 2            | 0         | 0        | 0          | 0      | -               | -        | 2        | S2                 | s                 |                  |
| 3                 | Banankere                              | 0                           | 1    | 1-2        | -     | 0        | 0        | 2            | 0         | 0        | 0          | 0      | 0               | 0        | 2        | S2                 | s                 |                  |
| 4                 | Banavar                                | 0                           | 1    | 2          | -     | 0        | 0        | 1            | 2         | 2        | 0          | 0      | 0               | 0        | 2        | S2                 | s, g              |                  |
| 5                 | Chalya                                 | 0                           | 1    | 2          | -     | 0        | 0        | 1            | 2         | 2        | 0-1        | 1      | 0               | 0        | 2        | S2                 | s,g               |                  |
| 6                 | Doddakadanur                           | 0                           | 1    | 0-1        | -     | 0        | 1        | 1            | 0         | 0        | 0          | 0      | -               | -        | 1        | S1                 | d                 |                  |
| 7                 | Hemavathi                              | 0                           | 1    | 0-1        | -     | 1        | 1        | 1            | 0         | 0        | 0          | 0      | 0               | 0        | 1        | S1                 | d,w               |                  |
| 8                 | Honnnavalli                            | 0                           | 1    | 2          | -     | 0        | 0        | 1            | 3         | 3        | 1          | 0      | 0               | 0        | 2-3      | S3                 | t,g               |                  |
| 9                 | Kadabagere                             | 0                           | 1    | 1-2        | -     | 0        | 0        | 2            | 0         | 0        | 0          | 0      | 0               | 0        | 1-2      | S2                 | s                 |                  |
| 10                | Kallenahalli                           | 0                           | 1    | 1-2        | -     | 0        | 0        | 1-2          | 0         | 0        | 0          | 0      | 0               | 0        | 1-2      | S1                 | s                 |                  |
| 11                | Kanatur                                | 0                           | 1    | 1-2        | -     | 0        | 0        | 2            | 0         | 0        | 0          | 0      | 0               | 0        | 2        | S2                 | s                 |                  |
| 12                | Kodigehalli                            | 0                           | 1    | 0-1        | -     | 0        | 1        | 2            | 0         | 0        | 0          | -      | -               | 2        | 2        | S2                 | s                 |                  |
| 13                | Machenahalli                           | 0                           | 1    | 3          | -     | 0        | 3        | 2            | 3         | 3        | 3          | 0      | 0               | 0        | 3        | S3                 | d,g,t,1           |                  |
| 14                | Navinakere                             | 0                           | 1    | 0-1        | -     | 0        | 1        | 1            | 0         | 0        | 0          | -      | -               | -        | 1        | S1                 | d,s               |                  |
| 15                | Nuggihalli                             | 0                           | 1    | 0          | -     | 0        | 1        | 2            | 0         | 0        | 0          | 0      | 0               | 0        | 1-2      | S2                 | s                 |                  |
| 16                | Srinivasapura                          | 0                           | 1    | 0-1        | -     | 0        | 1        | 0            | 0         | 1        | 0          | 0      | 0               | 0        | 1-2      | S1                 | d                 |                  |
| 17                | Sunnakalluhosuru                       | 0                           | 1    | 3          | -     | 0        | 3        | 0-1          | 1         | 2        | 2          | -      | -               | -        | 2-3      | S3                 | t,d,1             |                  |
| 18                | Tejigere                               | 0                           | 1    | -          | 1-2   | 0        | 3        | 0            | 3         | 3        | 3          | 0      | 0               | 0        | 3        | S3                 | t,d,1             |                  |
| 19                | Valambige                              | 0                           | 1    | 3          | -     | 0        | 3        | 0            | 3         | 3        | 3          | -      | -               | -        | 3        | S3                 | t,d,1             |                  |
| 20                | Yedegondanahalli                       | 0                           | 1    | -          | 1-2   | 0        | 3        | 0            | 3         | 3        | 3          | -      | -               | -        | 3        | S3                 | t,d,1             |                  |
| 21                | Chalya-Bagolu-Machenahalli             | 0                           | 1    | 2          | -     | 0        | 0        | 1-2          | 1-2       | 1-2      | 0-1        | 0      | 0               | 0        | 1-2      | S2                 | s,g               |                  |
| 22                | Machenahalli-Ramanathpura-Mandanahalli | 0                           | 1    | 2-3        | -     | 0        | 2-3      | 1-2          | 3         | 3        | 2-3        | -      | -               | -        | 3        | S3                 | d,g,t,1           |                  |
| 23                | Basavanahalli-Arehalli-Koratakere      | 0                           | 1    | 3          | -     | 0        | 0        | 1-2          | 1         | 1-2      | 0-1        | -      | -               | -        | 3        | S3                 | t,g               |                  |
| 24                | Hettur-kogaravalli-Arahalli            | 4                           | 1    | -          | 1-2   | 0        | 0        | 0            | 0         | 1-2      | 0          | -      | -               | -        | 4        | N2                 | c                 |                  |
| 25                | Bellur-Idenahalli                      | 4                           | 1    | -          | 0-1   | 0        | 0        | 0            | 1         | 0-1      | 0          | 0      | 0               | 0        | 4        | N2                 | c                 |                  |
| 26                | Biodu-Hettur-Arahalli                  | 4                           | 1    | -          | 1-2   | 0        | 0        | 1-2          | 1         | 1-2      | 0          | -      | -               | -        | 4        | N2                 | c                 |                  |
| 27                | Kananur-Srinivasapura-Maradanahalli    | 0                           | 1    | 0-1        | -     | 0        | 0        | 1            | 1         | 0        | 0          | 0      | -               | -        | -        | S1                 | s                 |                  |
| 28                | Adagur-Mavinakere                      | 4                           | 1    | 0-1        | -     | 0        | 1        | 2            | 0         | 0        | 0          | 0      | 0               | 0        | -        | N2                 | c                 |                  |
| 29                | Hagachi-Adagur-Mavinakere              | 3                           | 1    | 0-1        | -     | 1        | 1        | 2            | 0         | 0        | -          | -      | -               | -        | -        | S3                 | c,s               |                  |
| 30                | Hemavathi-Konanur-Adagur               | 4                           | 1    | 0-1        | -     | 1        | 1        | 1            | 0         | 0        | 0          | 0      | 0               | 0        | 4        | N2                 | c                 |                  |

r = rockiness; s = soil; t = topography; g = stoniness; w = wetness; d = drainage; c = climate; 1 = soil depth

# HASSAN Land Use/Land Cover 2003

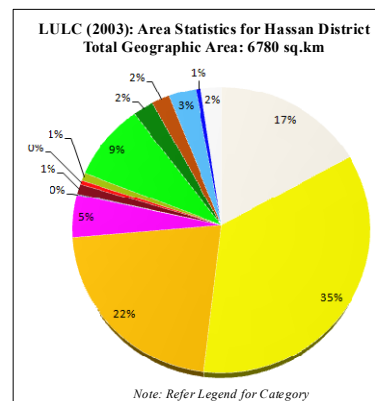


### References

- District HQ
- Tehsil HQ
- ▭ District Boundary
- - - Tehsil Boundary
- Road
- ++++ Railway

### Legend

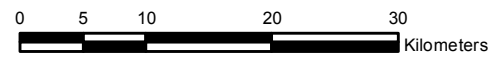
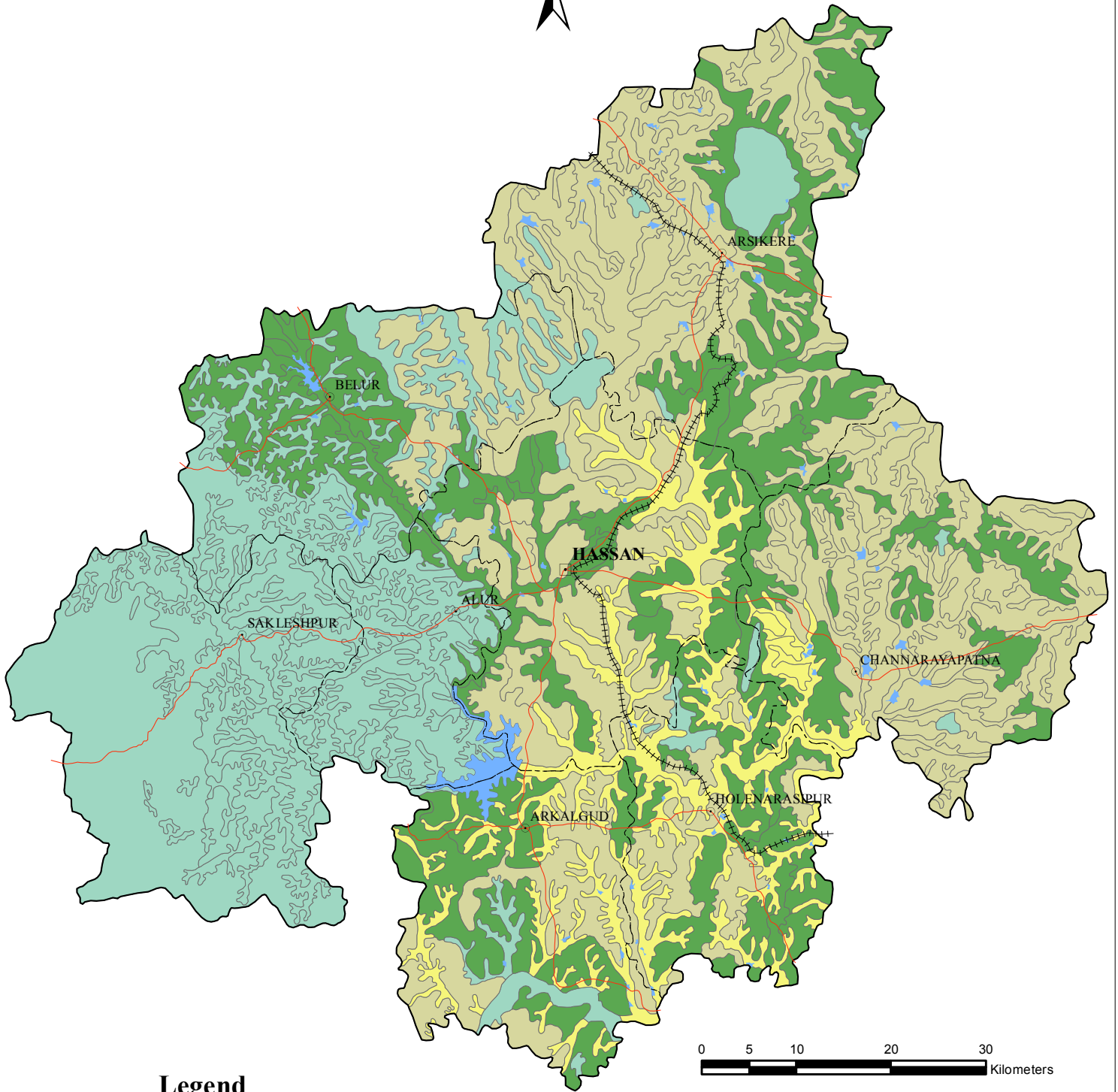
| Classes                            | Area [sq.km] | Classes  | Area [sq.km] |
|------------------------------------|--------------|--|--------------|
| ● Agriculture                      |              | ● Rock outcrops                                | 135          |
| ● Agriculture, Cropland            | 2362         | ● Uncultivable                                 |              |
| ● Agriculture, Plantation          | 1481         | ● Barren/Uncultivable/Wastelands, Scrub Land   | 324          |
| ● Agriculture, Single Crop, Fallow | 1150         | ● Water  |              |
| ● Builtup                          |              | ● Wetlands/Water Bodies, Reservoir/Lakes/Ponds | 205          |
| ● Built-up, Mining                 | 7            | ● Wetlands/Water Bodies, River/Stream/Canals   | 40           |
| ● Built-up, Rural                  | 78           | ● Others                                       | 155          |
| ● Built-up, Urban                  | 31           |  |              |
| ● Forest                           |              |  |              |
| ● Degraded Forest                  | 63           |  |              |
| ● Forest, Deciduous                | 592          |  |              |
| ● Forest, Evergreen/Semi Evergreen | 160          |  |              |



Data Source: Landsat ETM+ Satellite data of Kharif (2002) and Rabi (2003), SRTM DEM, Existing Soil Maps & Reports (NBSS & LUP), and other Statistical Data

# HASSAN

## Soil Suitability for Eucalyptus Plantation



### Legend

|  |                     |
|--|---------------------|
|  | Highly suitable     |
|  | Moderately suitable |
|  | Marginally suitable |
|  | Unsuitable          |
|  | Waterbody           |

### References

|  |                   |
|--|-------------------|
|  | District HQ       |
|  | Tehsil HQ         |
|  | District Boundary |
|  | Tehsil Boundary   |
|  | Road              |
|  | Railway           |
|  | Drainage          |
|  | Waterbodies       |



6.

## CONCLUSION

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Soils of Hassan district, Karnataka have been mapped, characterized, classified and interpreted.

Productive soils occurring along valleys and gently sloping pediments cover about 50.7 per cent. They are very deep, clayey and loamy, with high water retentivity and are suitable for raising climatically adapted crops. These soils are expected to respond well to management. They require minor amendments in drainage and soil and water conservation measures.

Problem soils cover about 21.5 per cent and occur along undulating to rolling lands. They have shallow rooting depth, gravelliness and rockiness and erosion hazard. They are suitable for pasture lands, farm forestry and occasional cultivation of minor crops. They require intensive soil and water conservation measures.

The hill ranges (malnad) need to be permanently covered with vegetation where there is ample scope for growing plantation crops like coffee, pepper, orange, cardamom. The forest species are to be maintained for ecological balance.