ANALYSIS OF LAND SUITABILITY FOR AGRICULTURE IN HAVERI DISTRICT

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Abstract:

The objectives of this paper are to examine the land suitability for agriculture by taking the very important physical variables which are influencing on the agriculture like slope, soil type , rainfall and ground water potentials. Different weights are assigned to the variables depending up on its importance in the agriculture. Finally five suitability classes are identified in the Haveri district like areas very highly suitable for agriculture , highly suitable for agriculture , Moderately suitable for agriculture, Moderate to poor Suitable for Agriculture, Poor suitable for Agriculture and poor to nil suitable for agriculture.

Key words: Haveri District, Agriculture, Suitability , variables etc,.

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Introduction:

Land suitability is the fitness of a given type of land for a defined use. The land may be considered in its present condition or after improvements. The process of land suitability classification is the appraisal and grouping of specific areas of land in terms of their suitability for defined uses. Land Suitability is the degree of appropriateness of land for a certain use. Land suitability could be assessed for present condition (Actual Land Suitability) or after improvement (Potential Land Suitability). Actual Land suitability is a land suitability that is based on current soil and land conditions, i.e. without applying any input. The information is based on physical environment data generated from soil or land resources surveys. The information is based on soil characteristics and climate data related to growth requirements of crops being evaluated. Potential Land Suitability is the suitability that could be reached after the land is improved. The land to be evaluated can be natural (conversion) forest, abandoned or unproductive lands, or land currently used for agriculture, at a sub-optimal level of management in such a way that the productivity can be improved by changing to more suitable crops.

The land suitability classification, using the guidelines of FAO (1976) is divided into Order, Class, Sub Class, and Unit. Order is the global land suitability group. Land suitability Order is divided into S (Suitable) and N (Not Suitable).

Suitability of land is assessed considering rational cropping system, for optimizing the use of a piece of land for a specific use (FAO, 1976; Sys et al., 1991). The suitability is a function of crop requirements and land characteristics and it is a measure of how well the qualities of land unit match the requirements of a particular form of land use (FAO 1976). Suitability analysis can answer the question (what is to grow where?). In order to define the suitability of an area for a specific practice, several criteria need to be evaluated (Belka, 2005). Multi Criteria Decision Making (MCDM) or Multi Criteria Evaluation (MCE) has been developed to improve spatial decision making when a set of alternatives need to be evaluated on the basis of conflicting and incommensurate criteria. MCE is an effective tool for multiple criteria decision-making issues (Malczewski, 2006) and aims to investigate a number of choice possibilities in light of not only multiple criteria but also multiple objectives (Cover, 1991).

Land suitability Classes reflect degrees of suitability. The classes are numbered consecutively, by arabic numbers, in sequence of decreasing degrees of suitability within the Order. Within the Order Suitable the number of classes is not specified. There might, for example, be only two, S1 and S2

Objectives:

- To study the soil suitability for agriculture in the study area.
- To map and classify the land suitability on the basis of different variables.

Methodology

The most important elements for identify the land suitability is Soil, Rainfall, Slope and Ground water potential. Table 1.1 is indicate the ranking of given elements for land suitability.

Soil: The most important soil characteristics in land suitability, in the study region having three different kinds of soil. i.e., Black Soil, Red Sandy soil and Red loam soil.

Table.No 1 Haveri District

Ranking for Agricultural land suitability

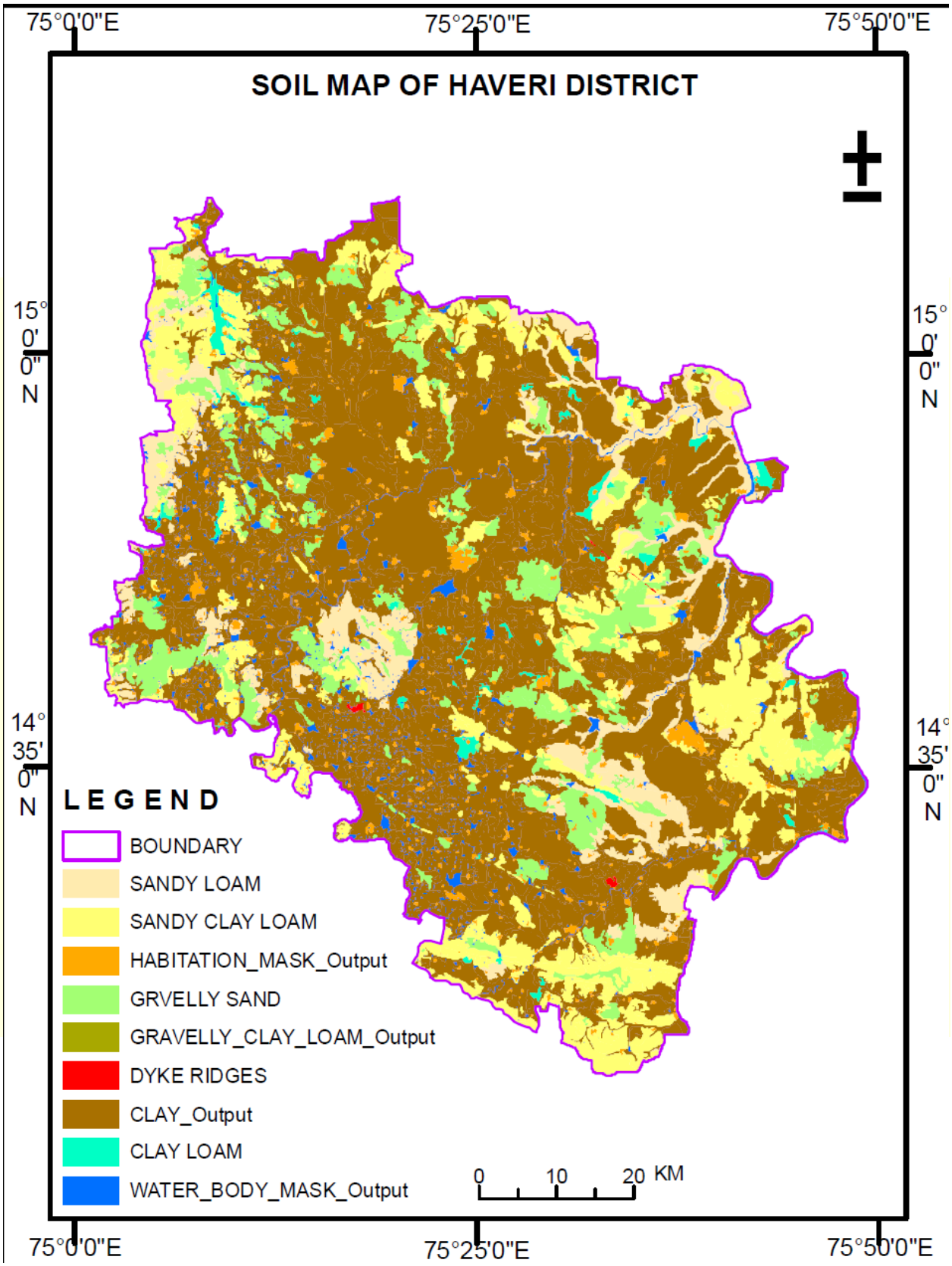
Sl.no	Theme	weight	Classes	Ranking
1	Slope	8	0-5% 5-15% 15-30% 30-60% >60%	5 4 3 2 1
2	Soil	6	Black soil Red sandy Soil Red Loamy soil	1 2 3
3	Rainfall	4	High Medium Low	3 2 1
4	Ground water Potential	2	Good Medium Poor	3 2 1

Source: prepared by author.

Rainfall: Rainfall data should be obtained from weather stations located at representative sites. The measurement can either be conducted manually (usually daily rainfall that may be summed up to monthly and annual rainfall) or automatically that could be set to minutely, five minutely, etc. records, according to need. For land evaluation, the required data are annual rainfall and the number of dry and wet months. Oldeman (1975) climatic classes are based on the number of consecutive wet months and dry months. The wet months are the months with >200 mm rainfall and the dry months are the months with <100 mm rainfall. This criterion is more applicable for annual crops, especially rain fed rice. Schmidt and Ferguson (1951) used a different criteria, in which the wet months are those with >100 mm rainfall and the dry months are those with <60 mm rainfall. This latter criterion is usually used for, but not limited to, perennial crops.

Slope: Slope is one of the major criteria for identifying the land suitability for agricultural crops. In the study region slope is classified in to four classes i.e., 0-5%, 5-15%, 15-30%, 30-60% and more than 60%.

Ground water potential: In the study region ground water potential is classified in to three classes i.e., High, Medium and Low, if the land is having high level of ground water potential that land is having first ranking, medium and low ground water levels is having second and third ranking class respectively.


SOIL MAP OF HAVERI DISTRICT
75°0'0"E
75°25'0"E
75°50'0"E
15° 0' 0" N
14° 35' 0" N
LEGEND
BOUNDARY
SANDY LOAM
SANDY CLAY LOAM
HABITATION_MASK_Output
GRVELLY SAND
GRAVELLY_CLAY_LOAM_Output
DYKE RIDGES
CLAY_Output
CLAY LOAM
WATER_BODY_MASK_Output
0 10 20 KM

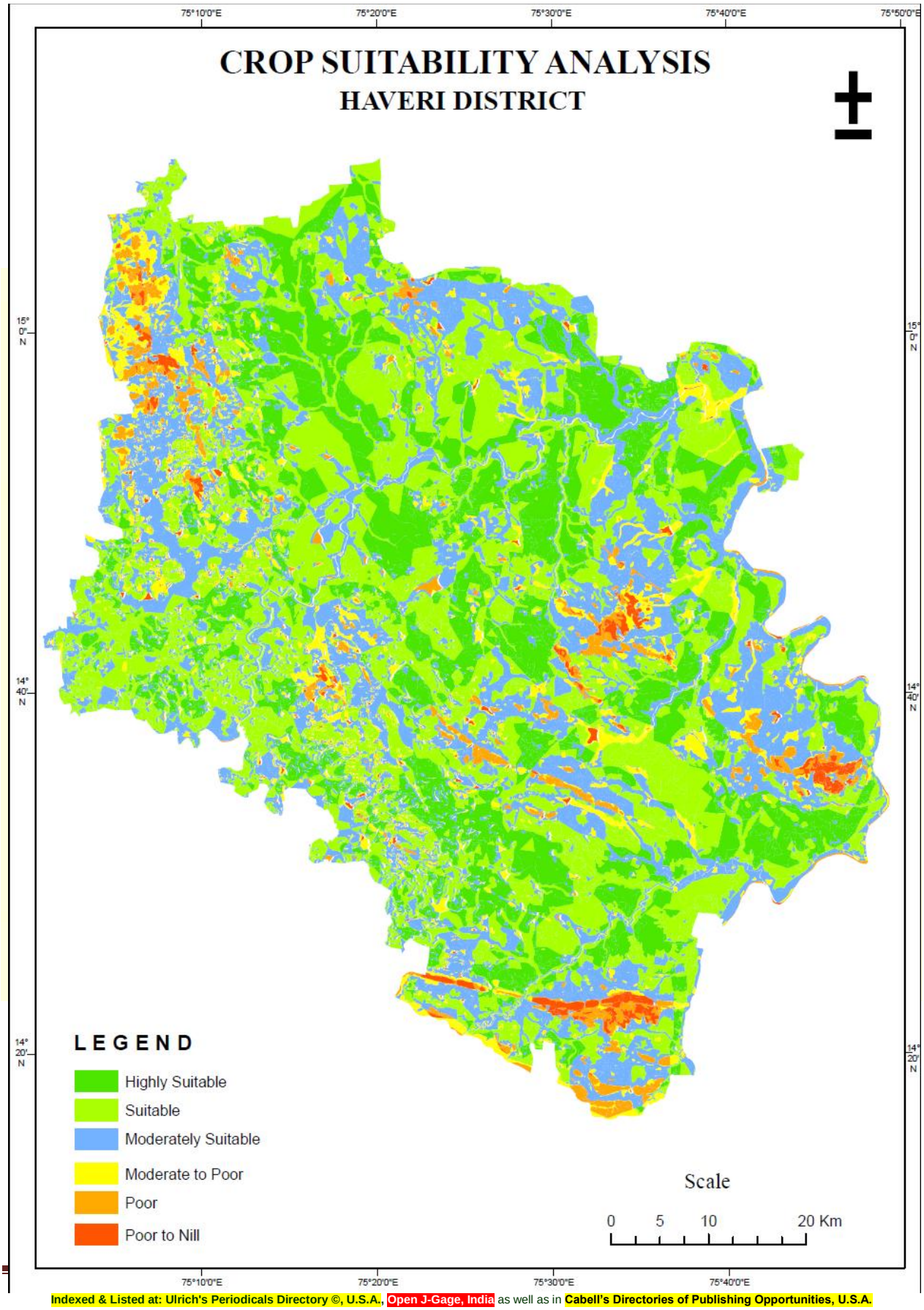

CROP SUITABILITY ANALYSIS
HAVERI DISTRICT
75°10'0"E
75°20'0"E
75°30'0"E
75°40'0"E
75°50'0"E
15° 0' N
14° 40' N
14° 20' N
LEGEND
Highly Suitable
Suitable
Moderately Suitable
Moderate to Poor
Poor
Poor to Nill
Scale
0 5 10 20 Km

Table:2: Haveri District

Distribution of taluka Wise area under different land suitability classes-2014

Agricultural Land Suitability Class	Area in Hectares							
Name	**Byadgi**	**Hanagal**	**Haveri**	**Hirekerur**	**Ranebennur**	**Savanur**	**Shiggaon**	**Total**
Class I : Highly suitable for Agriculture	20083 (9.19)	29459 (13.49)	38393 (17.53)	38733 (17.74)	41618 (19.06)	24256 (11.11)	25778 (11.80)	218320 (100)
Class II: Suitable for Agriculture	10914 (8.99)	19381 (15.98)	18396 (15.16)	17753 (14.63)	22619 (18.65)	15092 (12.44)	17124 (14.11)	121279 (100)
Class III : Moderately suitable for agriculture	7421 (9.56)	13954 (17.99)	12798 (17.97)	12911 (16.63)	12667 (16.31)	8085 (10.41)	9789 (12.61)	77625 (100)
Class IV : Moderate to poor Suitable for Agriculture	2619 (8.99)	5427 18.64)	4799 (16.48)	4842 (16.63)	5428 (18.64)	2695 (9.25)	3299 (11.33)	29109 (100)
Class V : Poor suitable for Agriculture	1310 (6.74)	3876 (19.96)	3200 (16.48)	3228 (16.62)	4524 (23.30)	2156 (11.10)	1122 (5.77)	19416 (100)
Class VI Poor to Nil	1309 (6.76)	5428 (27.96)	2399 (12.36)	3227 (16.62)	3619 (18.64)	1617 (8.33)	1808 (9.31)	19407 (100)
Total	43656 (8.99)	77525 (15.97)	79985 (16.18)	80694 (16.63)	90475 (18.64)	53901 (11.11)	58920 (12.14)	485156 (100)

Table No. 3 **Haveri District**

Distribution of class wise Agriculture soil Suitability

Agricultural Land Suitability Class	Area in Hectares							
Name	**Byadgi**	**Hanagal**	**Haveri**	**Hirekerur**	**Ranebennur**	**Savanur**	**Shiggaon**	**Total**
Class I : Highly suitable for Agriculture	20083 (46.00)	29459 (37.94)	38393 (48.00)	38733 (47.99)	41618 (45.99)	24256 (45.01)	25778 (43.75)	218320 (44.99)
Class II: Suitable for Agriculture	10914 (25.00)	19381 (24.99)	18396 (22.99)	17753 (22.00)	22619 (25.00)	15092 (27.99)	17124 (29.06)	121279 (24.99)
Class III : Moderately suitable for agriculture	7421 (16.99)	13954 (17.99)	12798 (16.00)	12911 (15.99)	12667 (14.00)	8085 (14.99)	9789 (16.61)	77625 (16.00)
Class IV : Moderate to poor Suitable for Agriculture	2619 (5.99)	5427 (7.00)	4799 (5.99)	4842 (6.00)	5428 (5.99)	2695 (4.99)	3299 (5.59)	29109 (5.99)
Class V : Poor suitable for Agriculture	1310 (3.00)	3876 (4.94)	3200 (4.00)	3228 (4.01)	4524 (5.00)	2156 (3.99)	1122 (1.90)	19416 (4.00)
Class VI Poor to Nil	1309 (2.99)	5428 (7.00)	2399 (2.99)	3227 (3.99)	3619 (4.09)	1617 (2.99)	1808 (3.06)	19407 (4.01)
Total	43656 (100)	77525 (100)	79985 (100)	80694 (100)	90475 ((100))	53901 (100)	58920 (100)	485156 (100)

Source : Extracted from the Satellite Image and Computed by author.

Class I (Highly suitable for Agriculture) :

Highly suitable for Agriculture: Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.

In the Haveri district 218320 hectareof land is comes under Highly suitable class, out of this 41618 hectare(19.06%) of land is observed in the taluk of Ranebennur. In the taluks of Hirekerur(and Haveri 3873317.74%) and 38393(17.53%) hectare of land is suitable for agriculture crops. Remaining taluks are Hangal is having 29459 hectare(13.49%), Shiggaon is having 25778 hectare(11.80%) of land is comes under S1 class. Remaining taluks like Savannur and Byadgi taluks is having 24256(11.11%) and 20083(9.19%) hectare highly suitable land for agricultural crop respectively. It is also observed that in all the taluk among the all classes the high suitability of land for agricultural crops ranges between 37.94% to 46%. It shows that , in Haveri district all the taluks having sizable proportion of highly suitable land for Agricultural crops.

Class II: Suitable for Agriculture:

In this class 121279 hectare of land i.e. 24.99% of land is falls under Suitable for agricultural crops in the study area. The highest land under this class is noticed in Ranebennur taluk i.e., 22619 hectare(18.65%). Byadgi taluk is having very less suitable area i.e., 10914 hectares. Remaining taluks like Hangal is having 19381 hectare, Haveri 18396 hectare, Shiggaon taluk 17124 hectare, Herekerur taluk 17753 hectare and in the taluk of Savannur 15092 hectare of land is having suitable criteria for agricultural crops.

Class III (Moderately suitable for agriculture) :

Moderately suitable for agriculture: and having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on Class S1 land.

In this class Haveri district is having 77625 hectare(16%), out of this Hangal taluk is having largest moderately suitable land i.e., 13954 hectare, second largest area can observed in the taluk of Hirekerur i.e., 12911 hectare. Byadgi taluk is having very less moderately suitable land i.e., 7421 hectare. Remaining taluks is having more than 8000 hectare of moderately suitable land.

Class IV (Moderate to poor Suitable for Agriculture):

Moderate to poor Suitable for Agriculture: Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

In the study region 29109 hectare(5.99%) of land is falls under moderate to poor suitable class. Hanagal taluk is having largest area i.e., 5427 hectare and Byadgi taluk is having very less area i.e., 2619 hectare. Remaining taluks are Ranebennur is having 5428 hectare, Hirekerur and Haveri taluks is having 4842 and 4799 hectare of land is moderate to poor suitable for agricultural crops. In the taluks of Shiggaon and Savanur taluks is having 3299 and 2695 hectare of land is comes under this category.

Class V (Poor suitable for Agriculture):

Poor suitable for Agriculture: Land having limitations which may be surmountable in time but which cannot be corrected with existing knowledge at currently acceptable cost; the limitations are so severe as to preclude successful sustained use of the land in the given manner.

In the study region 19416 hectare(4%) of land is comes under poor suitable class. Out of this Ranebennur taluk is having largest area i.e., 4524 hectare and Shiggaon taluk is having least area i.e., 1122 hectare. Byadgi taluk is having second least area i.e., 1310 hectare. Remaining taluks is having more than 2000 hectare of land is comes under this class.

Class VI (Poor to Nil) :

Land having limitations which appear so severe as to preclude any possibilities Of successful sustained use of the land in the given manner.

In the study region 19407 hectare (4.01%) of land is not suitable for agricultural crops, Hangal taluk is having largest not suitable land i.e., 5428 hectare, Byadgi taluk is having very less area i.e., 1309 hectare.

CONCLUSION

The present study explains the soil suitability for agriculture corps in Haveri District. In the soil suitability Ranibennur taluk is has larges highly suitable land for crop cultivation and Byadgi taluk is having very less suitable land i.e., 9.19 percent. Hangal taluk is having largest not suitable land for crop cultivation i.e.,27.96.

References

1. **FAO (1993):** "Guidelines for land use planning", FAO development series. 1. Food and agriculture organization of the United Nations. Rome.
2. **Mukhtar Elaalem.**, Alexis comber & pete Fisher (2010). "Land Evaluation techniques comparing Fuzzy AHP with TOPSIS methods", 13th AGILE International conference on Geographic information science, Guimaraes, Portugal, PP1-8.
3. **Naidu, L.**G.K.(1999). "Land Suitability evaluation of major sugarcane growing soils of Karnatyaka", Ph.D. Thesis, Department of Agronomy, UAS, Bangalore.
4. **Rossiter, D.**G. (1994). "Land Evaluation Basic concepts & procedures of land evaluation", Department of soil, crop, & Atmospheric Sciences, College of Agriculture & Life Sciences, Cornell University, Vol 14-15 pp.8.
5. Subash.S.Sannashiddannanavar(2014) " Micro-Level Spatial Planning for Haveri district, Karnataka Using Geo-Spatial technology". UGC major research Project report. New-Delhi
6. **Shafi, M (1960):** "Measurement of Agricultural efficiency in Uttar Pradesh". Economic Geography Vol 36, no 1
7. **Sys.**E.Ir., Van Ranst, E.,& Debaveyl, J. (1991): "Land evaluation part-I principles in land evaluation and crop production calculations", PP 1-274.