

Classifying the Capability of Land by Defining Land Capability Classes in Kerala

Sneh*

Geography (UGC NET)

Abstract – The significance of soil assets to accomplish manageability in crop production, eco-advancement and insurance of condition is a set up actuality. Management of soil consistently is fundamental for supported and expanded farming production, on this prime point of view an examination on physiochemical characters of soils has been led in the Talapilli Taluk of Thrissur District, India. Land classification lies at the focal point of land assessment plans. The goal of the examination is to distinguish the land capability of Talapilli Taluk, Thrissur District by receiving National Resources Conservation Service - land capability criteria. The main aim of this paper is to classify the land capability by using the classes. The land capability classification incorporates eight classes of land I to VIII. The parameters considered are texture, slant, depth, erosion, permeability and soil reaction. The parameters are considered in detail and requested in land capability classification. Five land capability class II, III, IV, VI, and VII and three capability sub-class, e - erosion, w - water and s - soil impediments is recognized in the Taluk. Talapilli. Talapilli is the agrarian overwhelming zone in the District and consequently the examination helps in all the more comprehension of the nature of the soil for appropriate management rehearses in horticulture and different segments also. It has high extent of class II - great cultivable and class III - respectably great cultivable land covering the wetlands and its adjacent zones. Upper east and northwest of the Taluk is concentrated with class IV - genuinely great cultivable land appropriate for intermittent or restricted development. Parcels of land appropriate for class VI - grazing and forestry and class VII - genuinely appropriate for brushing and ranger service is seen at focus and north of the Taluk which isn't reasonable for continued use in view of constraints.

Keywords: Land, Capability, Classification, Class, Parameter, Soil, Erosion, Depth, Oil Permeability, Texture, Reaction

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1. INTRODUCTION

The quickly developing total populace puts significant weight on the rare characteristic assets and there is a critical need to grow increasingly proficient and reasonable horticultural production frameworks to encourage the developing populace. This ought to be founded on an underlying evaluation of the physical and biological capability of normal assets, which can shift extraordinarily. A productive land use additionally keeps up horticultural manageability. Land assessment for better land use is along these lines a prime concern. The circumstance is the same in Kerala. In a State where agribusiness is an overwhelming part, Kerala is creating under 15% of the State necessity of paddy according to Economic Review 2011. Production, region and productivity of real crops in Kerala are on the decay. To capture this pattern, a superior comprehension of the soil and land qualities which add to crop production and productivity is essential. Soil review which embraces soil and land asset stock as a major aspect of its point by point and surveillance field overview

exercises and which has a voluminous database on soil and land is all around set to attempt an activity on productivity potential and land reasonableness. The USDA Land Capability Classification is additionally a standout amongst the most broadly known land assessment frameworks which can be adjusted to suit Kerala conditions. This can adequately fill in as the land assessment strategy. The appraisal of the reasonableness of land for explicit utilizations is an imperative piece of land use arranging and farming advancement. Combination of this information in a GIS structure, could enable us to distinguish crop reasonableness sites which when joined with socioeconomic contemplations can prompt food security in this piece of the world.

Horticultural crop production is controlled via land qualities like Physiography, Slope, soil attributes like Soil reaction, Soil texture, CEC, Effective soil depth, Coarse sections, Base Saturation Percentage, Productivity potential, Hydrologic gathering, Soil seepage, Erosion and climatic

elements. Every one of these elements aggregately decide the reasonableness of a given zone for a specific kind of crop development. Subsequently, so as to develop an effective crop production framework, assessment of land appropriateness/crop reasonableness every now and then is fundamental. This appropriateness of a tract to a specific crop is a component of crop prerequisites and soil/land attributes. As it were, coordinating the soil and land attributes with the crop necessities gives the suitability.

The risk of land degradation and the need to oversee land inside its capability has been perceived at the government level and at the State level by the Natural Resources Commission (McKenzie et al. 2002). Land is additionally unevenly disseminated regarding its qualities. It has its constraints for various employments. Land can be improved for specific use by specific measures, it can likewise be improved by a particular sort of land use or possibly sustained production can be guaranteed (Raju, 2015). Land capability is the inalienable physical limit of the land to sustain a scope of land uses and management rehearses in the long haul without degradation to soil, land, air and water resources (Dent and Young, 1981). Land capability depends on an evaluation of the biophysical attributes of the land, the degree to which this will restrict a specific sort of land use, and the present innovation that is accessible for the management of the land (Emery, 1986). The arrangement of classification principally dependent on physical structure of the land, inherent soil attributes and natural factors that limit the utilization of land for various purposes (Natarajan et al, 1997). The land capability is administered by the distinctive land characteristics, for example, the kinds of soil, its depth and texture, underlying geology, topography, hydrology, and so forth. These parameters limit the land accessible for different purposes (Panhalkar, 2011). The coupling of carefully inferred soil and land qualities with a traditional land reasonableness structure encouraged the quick assessment of provincial scale horticultural potential in remote region (Harms et al., 2015).

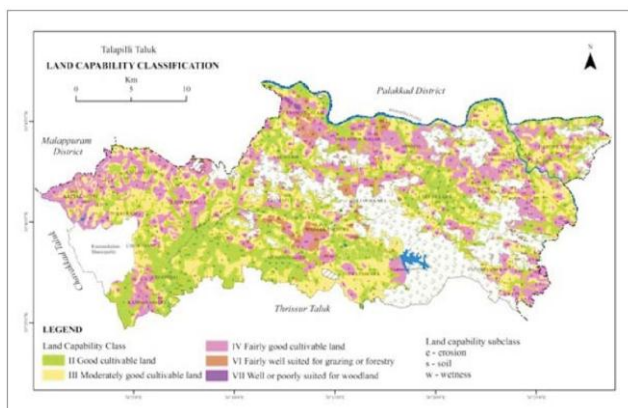


Figure 1 Land Capability Classification

2. STUDY AREA

Talapilli is a Taluk in Thrissur District of Kerala, situated between 10° 35' N and 10° 46' N scopes and 78° 0' E and 78° 28' E longitudes. The Taluk shares the administrative limit of Thrissur District with Malappuram and Palakkad Districts in the north and north east. The geographical zone of Talapilli is 677 sq.km. The lengthened Taluk is a low-lying land with elevation running from 20 to 400 meters (MSL) contiguous coastal margins of Arabian Sea. The west and the south limits of the Taluk are shared by Chavakkad and Thrissur Taluk separately. Organization of Talapilli is isolated into three squares Chowannur, Wadakkanchery and Pazhayannur and a Municipality called Kunnankulam. Bharathapuzha and Gayathripuzha are the two rivers streaming in the Taluk and reservoir in the southern forested territories called Vazhani reservoir.

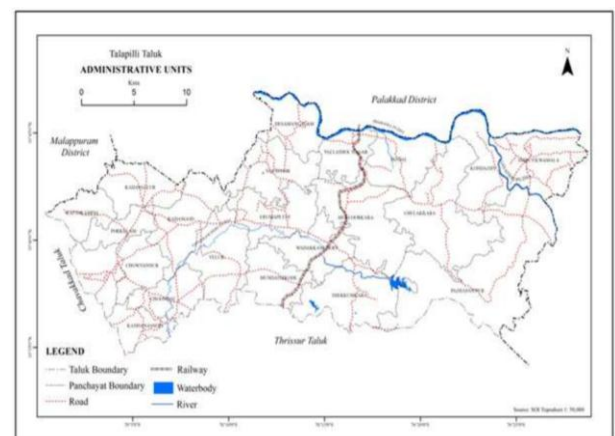


Figure 2 Study area

3. METHODOLOGY

The land capability of the investigation territory is done by breaking down the physical and chemical parameters of the soil by embracing National Resources Conservation Service, land capability criteria. Soil data is collected from the branch of soil overview govt. of Kerala. The capability classification gives three noteworthy classifications of soil groupings (1) capability unit (2) capability subclass and (3) capability class. The gathering of soils into capability units, subclasses, and classes is done principally based on their capability to create basic cultivated crops and field plants without weakening over an extensive stretch of time (Klingebiel, 1961). The broadest classification in the capability classification has eight classes, class I to VIII. It tends to be gathered into two noteworthy types land suited for cultivation and different uses goes under class I to IV and land restricted being used commonly not suited for cultivation incorporates class V to VIII. First the parameters picked for study is changed over into topical layers and furthermore each topical layer is classified into capability class dependent on NRCS

criteria at long last the topical layers are overlaid to recognize the land capability. The investigation and spatial portrayal of the outcomes is done in GIS condition.

4. DATA ANALYSIS AND DISCUSSION

4.1 Surface Texture

Soil texture is a term regularly used to assign the proportionate circulation of the distinctive sizes of mineral particles in a soil. It does exclude any natural issue.

These mineral particles change in size from those effectively observed with the unaided eye to that underneath the scope of a powerful magnifying lens. As per their size, these mineral particles are assembled into "separates." A soil separate is a gathering of mineral particles that fit inside distinct size points of confinement communicated as width in millimeters. Sizes of the isolates utilized in the USDA arrangement of classification for soil texture. The surface texture of the soils is a critical factor which assumes a crucial job in deciding the landuse of a zone, horticulture in explicit. The spatial circulation of surface texture of Talapilli is changed in nature they are loamy sand, sandy soil, topsoil, gravelly topsoil, clay topsoil, gravelly clay topsoil, sandy clay soil, gravelly sandy clay soil, silty clay, sandy clay, gravelly sandy clay and clay. The gravelly clay topsoil and gravelly sandy clay soil soils are the significant types distributed in the Taluk. The flood fields of rivers like Bharathapuzha and Gayathripuzha in the north and north east are stacked by clay topsoil soils. Sandy clay topsoil soils are found in the wetlands finds the slope inclines. Clay soil is discovered distributed in northwest of the Taluk. The remaining is found at minor extent distributed as pockets in a few pieces of the Taluk. Considering the general significance of soils, the land capability criteria for surface texture is assembled into four capability classes II, III, IV and VI.

4.2 Soil Depth

Sloping towards north east. Since the moderately deep, deep and exceptionally deep soils are useful for farming the greater part of the regions can be treated as land proficient for horticulture having minor impediments. Land capability class under soil depth is three classes II, III and V.

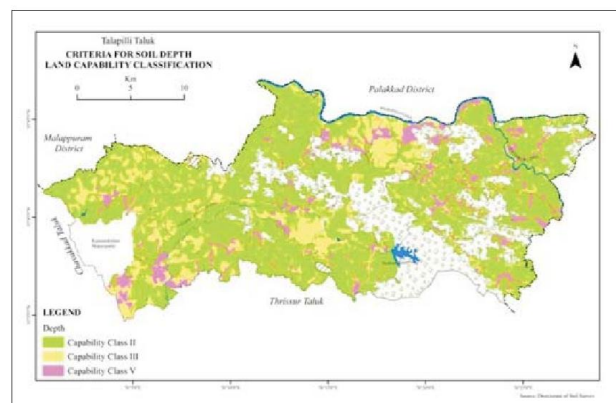


Figure 3 Land Capability Class: Soil Depth

4.3 Soil Slope

Slope is the angle of an elevation change. An ascent of 10 feet in a level separation of 100 feet is a slope of 10 percent. Ranges of slope allocated to outline speak to pragmatic breaks on the landscape that are vital for the utilization and management of the review zone. Slope is the critical factor while concentrating the suitability of land any reasons, soak slopes does not support the majority of the landuse explicitly agribusiness as a result of its constraints. To the extent Talapilli is concerned the sloping idea of the landscape is moderate seen in significant parts. Moderate slope is found in the focal point of Taluk in higher extent on account of the steady diminishing of the lofty slope from the raised zones towards the west. Low lying land wetland tracks are having gentle slope and are seen along the margin zones of streams and rivers. Strong slope is seen along the foot hills in the east, upper east and south of the Taluk. Moderate slope covers a zone of 18 percent of the Taluk.

Table 1 Criteria for Land Capability Classification, National Resources Conservation Service

Characteristics	Class I	Class II	Class III	Class IV	Class V	Class VI	Class VII	Class VIII
Slope (%)	0 - 1	1 - 3	3 - 8	8 - 15	<3	15 - 30	30 - 50	30 - 50
Erosion	Nil	e0	e1	e2	e3	e0	e2	e3
Depth	>150	150 - 100	100 - 50	50 - 25	50 - 150+	25 - 10	<10	NA
Texture	loam	cl	sl, c	scl	s, c	ls, cl	ls, c, s	ls, c, s
Soil Reaction	5.1 - 8	8 - 8.4, 4.5 - 5.1	> 8.4	NA	NA	< 3.6	NA	NA
Permeability	Moderate	Mod, Rapid	Rapid; Slow	Very Rapid; Slow	NA	NA	NA	NA

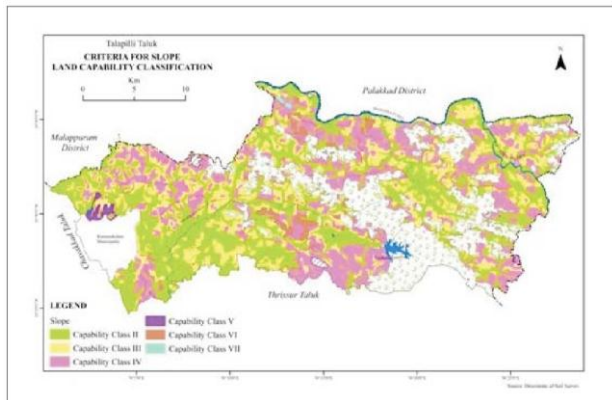


Figure 4 Land Capability Class: Slope

The change of slope from soak to about dimension starts from the east and it bit by bit decreases towards the west and south west alongside the stream of streams and rivers and nearly levels at west which additionally frames gentle to gentle slope possessing 16 percent in the south focal point of the Taluk. Slope is the significant segment in land capability classification. There are six land capability class dependents on slope of Talapilli they are class II, III, IV, V, VI and VII.

4.4 Soil Erosion

Soil erosion is the eroding of the land surface by separation and transport of soil and shake materials through the activity of moving water, or other geographical operators. Three classes are recognized viz., slight, moderate and serious. Talapilli has raised zones in the south east for the most part the forested uplands running towards north and west consummation at plain wetlands. These raised zones are not very high and it finishes in the fields at a most brief separation so the slope of these raised zones is moderate in nature with the exception of some pinnacle focuses having steep slopes, this nature of the Taluk results in low spillover consequently the erosion is likewise less. Accordingly, the intensity of erosion in the Taluk is moderate. The most pieces of the Taluk having moderate to gentle slope experience moderate to less erosion, it accounts a zone of 311 sq.km. Almost 46 percent of the Taluk is encountering moderate erosion. The western pieces of the Taluk have less or slight erosion. This is on the grounds that the landscape gets smoothed in these regions and gets the stores of disintegrated materials from the elevations. About 130 sq.km, that is 19 percent of territory is free from erosion, a positive indication of the land proficient for farming. Serious erosion is at minor extent seen at base of the mountains. In light of the previously mentioned status of intensity of erosion soils is classified into three land capability classes they are class II, III and IV having restricting variables like topography and spillover.

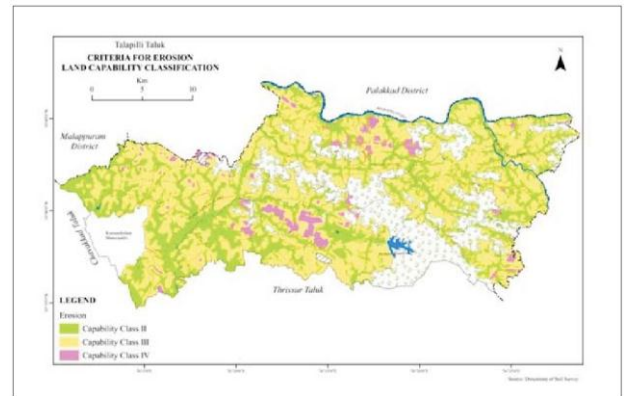


Figure 5 Soil Erosion Status

Soils of Talapilli are moderately deep to deep covering most extreme zone of the Taluk together records 60.24 percent of the all-out region. Moderately shallow soils are likewise found in the pieces of Taluk. The deep soils are distributed all through the Taluk and the deep soils are seen in the wetland tracks in the north east where the testimony is impressively high by the eroded materials from the adjoining raised zones.

4.5 Oil Permeability

Soil permeability is the property of the soil to transmit water and air. The diverse soil arrangement with differed surface texture in Talapilli decide the soil permeability. The permeability status differs from moderate to fast in the Taluk. The low raised wetland zones are having exceptionally moderate to moderate permeability as the separation expands the permeability status changes from moderately moderate to moderately fast and it winds up with quick permeability. It is distinguished that vast regions of Talapilli is under land type having moderate to moderately fast permeability. The soils are sorted into I, II, III and IV classes of land capability dependent on permeability of soil. The regions having high water maintenance limit are put high in land capability classification.

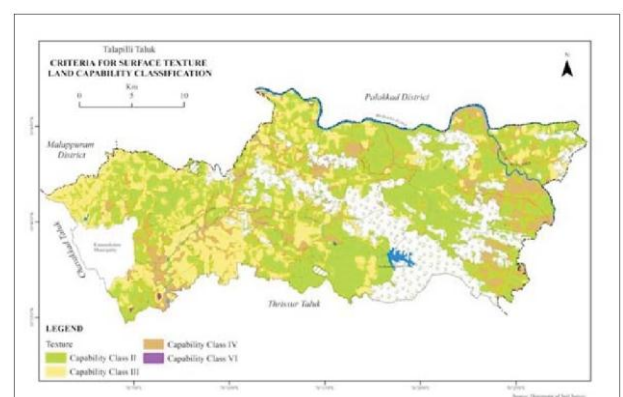


Figure 6 Surface Texture

4.6 Soil Reaction

Soil pH is a statement of the level of acidity or alkalinity of a soil. It impacts the accessibility of plant nutrients. Contrasted with a nonpartisan soil (pH 7.0), an extremely acid soil (pH under 5.0) commonly has lower dimensions of nitrogen, phosphorus, calcium, and magnesium accessible for plants and more elevated amounts of accessible aluminum, iron, and boron. At the other extraordinary, if the pH is excessively high, the dimensions of accessible iron, manganese, copper, zinc, and particularly phosphorus and boron might be low. A pH above 8.3 may show a critical dimension of interchangeable sodium. The soil reaction status of Talapilli demonstrates that acidic nature of soils in plenitude. Soils are acid in reaction all through the root zone, having pH esteems under 6.6. The soils are classified into amazingly acid, strongly acid, medium acid and marginally acid dependent on the pH esteems under 6.6. Very acid soils possess an area of 27 sq.km what's more, strong to strongly acid soils spread an area of 265 sq.km that is nearly 40 percent of the Taluk and is distributed every which way. Soils having medium acidity are spread in 122 sq.km of the Taluk covering 18 percent of the complete area. Marginally acid soil covers an area of 57.30 sq.km, unbiased soils with pH 7.3 and less are likewise seen minor extent along the foot hills of dense forested high lands. Soluble soils pH above 7.3 is additionally found in bundles in the middle and north. Based on reaction status, the soils ordered under four land capability class I, II, III and IV.

Table 2 Land Capability Class Talapilli Taluk

Land Capability	Class	Land Capability Subclass	Area (ha)
Good cultivable land	II	es	358.34
	II	e	4913.73
	II	w	12215.81
	II	ws	25.88
Moderately good cultivable land	III	e	14150.27
	III	es	1396.09
	III	s	434.57
	III	w	193.52
	III	ws	603.70
Fairly good cultivable land suited for occasional or limited cultivation	IV	e	9281.50
	IV	es	3890.86
	IV	w	1062.71
Well suited for grazing or forestry	VI	e	652.46
Fairly well suited for grazing or forestry.	VII	e	52.61

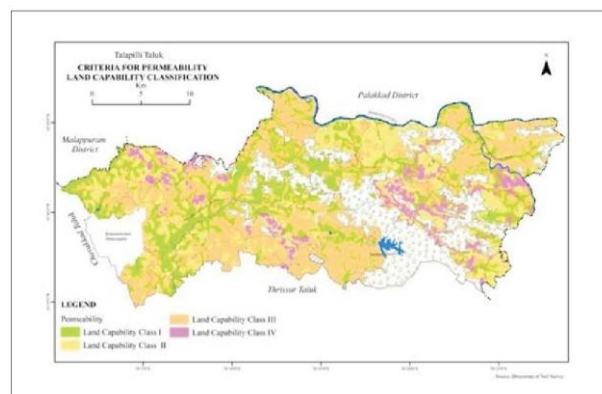


Figure 7 Land Capability Class: Soil Reaction Status

5. CONCLUSION

Capability Classification is the reason for starting classification of the land. The Western Ghat tract was at first delineated according to the point by point operational rules of Western Ghat Development Program, 2002. Talapilli Taluk is wealthy in shifted physical and chemical properties in the soil. The physical properties investigated in the examination are surface texture, soil slope, depth and erosion status and the chemical properties broke down are pH and mineral nutrients for plants. Land capability classification utilizing physical attributes of soil is effectively completed in this investigation. It is recognized that the Talapilli has five land capability class II, III, IV, VI, and VII and three types of impediments in view of e - erosion, w - overabundance water and s - soil constraints restricting horticulture. The outcome expresses that about 26 percent of land falls under class II great cultivable land saw at the low lying areas in southwest of the Taluk along the banks of Vadakkanchey puzha and furthermore along Gayathri puzha in the east, 24 percent of land is class III moderately great cultivable land distributed all through the Taluk contiguous the class II lands, 21 percent of land is genuinely great cultivable class IV land suited for intermittent or restricted cultivation is in the north and northwest of the Taluk and a minor segment of land under class VI and VII found in bundles at focus and north of the Taluk and is having higher impediments which not suitable for sustained use. The assurance of soil land capability of the area will reinforce the information base, capacity to detail useful answers for crop production and the probability of appropriation of best management rehearses.

6. REFERENCES

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Corresponding Author

Sneh*

Geography (UGC NET)

sneh123asiwal@gmail.com