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GEOSPATIAL ANALYSIS OF SOIL CLASSIFICATION STUDY OF RAICHUR DISTRICT IN KARNATAKA STATE, INDIA USING GEOINFORMATICS TECHNOLOGY

Basavaraj Hatti **Laishram Ibomcha Singh**

Department of Applied Geology, VSK University, PG Centre,

Nandihalli-583119, Karnataka, INDIA

ABSTRACT:

An investigation was carried out to understand the Raichur district soils. The district soils are classified into four types. Assorted red and black soils, average black soils, deep black soils and red covered in dust soils. First, assorted red and black soils usually occur on gently undulating plains or complex geological formations comprising of granitic gneisses and schist's, which occupy the central parts of the district. The second allotment consists of the Medium black soils are seen in the western part of the district overlying the peninsular gneisses. The third division consists the Deep black soils occur on gently sloping to nearly even or low grounds on parent rocks like gneisses, schist's of mixed origin and occupy considerable areas in the northern parts of the district. The remaining portion consists of Red sandy soils occur on undulating landscape on acidic rocks like granites and granitic gneisses under three distinct physiographic locations are upland, midland and low land regions. The present study is basically deals with the status of soil needs and vast area comes under the semiarid tract and is also drought prone frequently. It is necessary to the monitor the future development of ground water, so that preventive measures can be taken the quality of water is unsuitable for irrigation in Raichur district.

Keyword: Soils, spatial, geoinformatics, lowland, catchment

INTRODUCTION:

Soil is a most important source of nutrients essential by plants for growth. The most important nutrients are nitrogen, phosphorus and potassium.

Depending on its location, a soil includes some combination of sand, silt, clay and organic matter [1-5]. The district naturally presents large open plains; formed of almost horizontally natural productiveness of soil is controlled by the set of pedogenic factors that vary from soil to soil [6]. Evaporation soil fertility is the main cause for low land productivity [7]. Present day tyrannical agriculture, which not only increased crop yield but also exhausted our soils of their nutrient reserve. Further, it resulted in the appearance of a number of nutrient paucity.

The most important essential natural resource that determines the eventual sustainability of any agricultural system is the soil [8 and 9]. Raichur district can be roughly classified into three major zones. Zone one is the northern rocky upland, zone two is the southern lower plains with inselbergs and inaccessible hillocks and zone third is valley fills. Investigation soils in Raichur district of Karnataka was selected for this study as it has extensive variety of soils. As the catchment area is a puffiness terrain, it is quite predictable that the land is subjected to different degrees of erosion consequential in different depth of soils, making them fit for growing only a few set of crops. Observation these issues in mind the study has been undertaken to study, classify and preparing thematic maps of the soil types of Raichur district and to recommend the land use plan to defend the natural resources for sustainable crop production.

MATERIAL AND METHODS:

Raichur district is situated in north-eastern part of Karnataka state. It falls in the northern upland region, between 15º 32’ to 16º 35’ North latitudes and 76º 13’ to 77º 37’ East longitudes and also between the two major rivers namely the Krishna and the Tungabhadra. The district is bounded on the north by Yadgir on the south by Ballari district, on west by the Bagalkot and Koppal districts and east by the Mahabub Nagar district of Telangana. Administrative location of the district is shown in Fig 1.

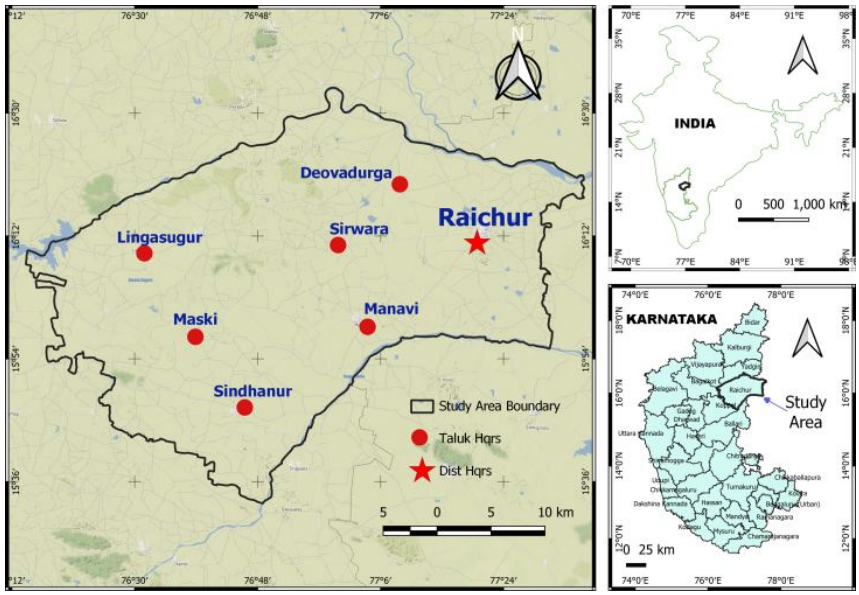

Fig. 1. Location map of the study area Raichur District, Karnataka State, India

The district has a total geographical area of 8,386 km^2. The district has been divided into seven taluks; Raichur, Lingasgur, Manvi, Sindhanur, Deodurga, Sirwar and Maski for administrative convenience. The population density of the district as per the 2011 Census is 228 per km^2. The district has witnessed a growth rate of 15.51% during the last decade. The district forms part of Krishna catchment in northern part, while southern part forms the lower Thungabhardra catchment area and are perennial in nature. Approximately sixty percent of the geographical area in the district is under irrigation. Canals, tanks, wells, bore wells; lift irrigation and others are the important sources for irrigation.

The authors are acknowledged using geoinformatics technology a analysis of thematic maps are the most fundamental prerequisite in any soil studies [10-15]. The study area is about 8386 km^2. A systematic analysis of soil mapping has been carried out using geoinformatics tools such as open source QGIS, MapInfo Pro version, AutoCAD-MAP, Garmin GPS and SRTM satellite images. In additional to this, SRTM satellite image data is also used to delineate the regional lithology of the study area. During soil mapping, a large number of fresh outcrop samples, soils were identified and collected from the in situ outcrops and

to conclude prepared the thematic maps for soil classification study as shown in Fig 2.

RESULTS AND DISCUSSION:

The soils of the district can be classified broadly into the following four types namely: average black soils, assorted red and black soils, red covered in dust soils and deep black soils. Average black soils are considering in the western part of the district excessively in the peninsular gneisses. The soils are fairly deep about one and half meter thick, and are dark to dull, brown or black, brown to dark reddish in colour, usually calcareous furious clayey soils. Sufficient soil and water management practices are required to get sustainable yields. Assorted red and black soils regularly occur on tenderly undulating plains or versatile geological pattern comprising of granitic gneisses and schists, which attract the central parts of the district. Red soils are coarse grained and have enhanced drainage than the black soils. These soils respond improved to water management practices.

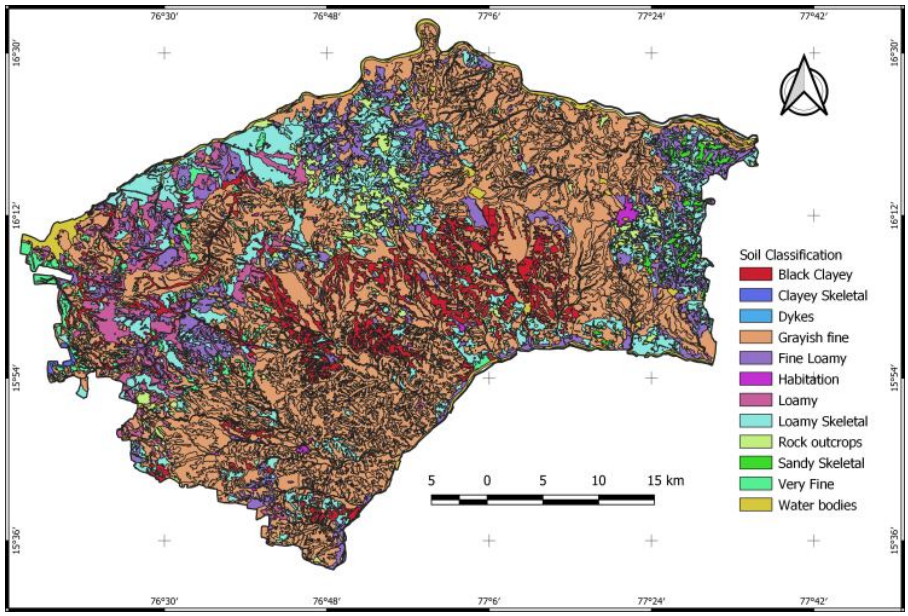

Fig. 2. Soil classification map of Raichur District, India

Red covered in dust soils occur on swelling land on acidic rocks like granites and granitic gneisses under three distinct physiographic arrangements are moorland, midland and plain land regions. Red covered in dust soils occurring in the moorland region are shallow to moderately deep, reddish brown

to dark reddish in colour, with high permeability and low yield. These soils need improvement for irrigation. The soils of the midland region are deep to extremely deep, reddish brown, loamy sand to sandy loam and healthy developed with moderate permeability and react healthy to irrigation. The soils of the lowland region are partially deposited soils occurring on very tenderly sloping to nearly plane valley bottom region. The soils are deep to extremely deep dark brown, sandy loam to sandy clay, loam to clayey soil in the subsurface horizon. The soils are defectively drained and with near to the ground permeability. Brackish areas are seen at places. Yields are normally good.

Deep black soils take place on soothingly sloping to practically even or low grounds on parent rocks like gneisses, schists of various origins and engage large areas in the northern parts of the district. Almost a one meter thick, these soils are dark brown, dark grayish brown, or black in colour. The texture is usually clayey throughout the section, and at places on the surface clayey-loam to silty-clay texture. Lime concretions on the surface and sub-surface are also present. These soils are normally fertile and bring into being good yields. Good drainage facilities are necessary to obtain sustainable yields, or else salinity and water logging environment may increase.

CONCLUSIONS:

The soils of the study area are different in nutrient condition and the fertilizer utilize should be designed on the basis of site specific fertility condition and nutrient necessity of the crops. The texture of black soils was finer than red soils. Within all the soils, clay and silt substance was increased with depth; fine and coarse sand substance was decreased with the strength. Soils were low to high in organic carbon substance which increased with strength. The maximum water holding facility of red and black soils diverse. In black and red soil sequence water holding facility increased with strength, because of increase in clay substance. The bulk density of the subsurface layers was more than the surface layer. The calcium carbonate content improved with strength. Soils were low to medium in obtainable nitrogen, phosphorus and sulphur and high in

presented potassium. But, the content is presented manganese, iron, copper was adequate level but soils were poor in zinc.

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