

## Setting and Morphometric Characteristics of Soils in Lalgudi Taluk, Tamil Nadu

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Lalgudi offers a good site for exploring the influence of environment on the soil forming features. These soils are derived from different parent materials and based on the different geomorphic and pedogenic factors, the soil series have been identified and described.

The distribution of different soil types in Tamil Nadu has been studied but not much work has been done to explore their genesis. However, a few reports on the soils of Trichirapalli district are available (Blanford, 1862; Anantarama Ayyar, 1933). In this paper the soils of the Lalgudi Taluk in Trichirapalli district have been described with particular reference to their mode of occurrence, the environmental conditions and their morphological features.

### MATERIAL AND METHODS

An extensive traverse was made in Lalgudi Taluk, Tiruchirapalli district, and the reconnaissance soil survey was carried out as per the standard techniques prescribed in the soil survey Manual, 1970. Soil series were established based on a number of profile studies (Guidelines for profile description, FAO) and correlation thereupon.

### DESCRIPTION OF THE STUDY AREA

i.) **Location :** The area, comprising 965.94 Sq. km, lies between 10° 15' and 11° 8' North latitudes and 78° 35' and 79° 1' East longitudes.

ii.) **Geology :** The bed rocks are of different age, of differently formed kinds under diverse conditions (Blanford, 1862). These are stratigraphically classified as (1) granites and gneisses with intrusions of chlorite schist and hornblende of Archean era, (2) sedimentary rocks formed during the cretaceous age, comprising the three formations namely, Uttatur group, Trichinopoly group and Ariyalur group, (3) sedimentary rocks of post cretaceous age, the Cuddalore sandstones and (4) the alluvium of Cauvery.

The alluvium borders the Coleroon river on the northern side. The Archean gneisses are confined to the high grounds of the western half, while the

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cretaceous rocks occupy the eastern half of the taluk. The Cuddalore sandstone occurs in two small patches on the north Eastern side. The cretaceous rocks include, shell limestone, gypseous clays, shales and grey sandstones.

iii) **Relief** : There is a general relationship of the soils to the geomorphic surfaces. That, the topography is a direct reflection of the underlying geology is well exhibited in this study area. Except the land surface occupied by the alluvium and the puvalur series, the rest of the country is of undulating nature. The lowest contour entering the taluk is 50 m. The general slope of the area including the flood plain is towards south-east.

The flood plain and Puvalur series occur in an altitude ranging from 48 m to 83 m. The area north of this region where the other soils occur have an altitude above 83 m. While flat lands are uncommon in the Archaean rock zone covered by Irugur and Omandur series, they do occur in mid-uplands wherever black soils cover the surface.

The unconformable resting of different formations of cretaceous rocks and the scattered soft clays have permitted themselves to be washed away and present a ghastly appearance of little ravines resembling bad land topography as reported by Blanford (1862).

iv) **Drainage** : The drainage pattern has some relationship to the geology of the area as well as to the soils occur-

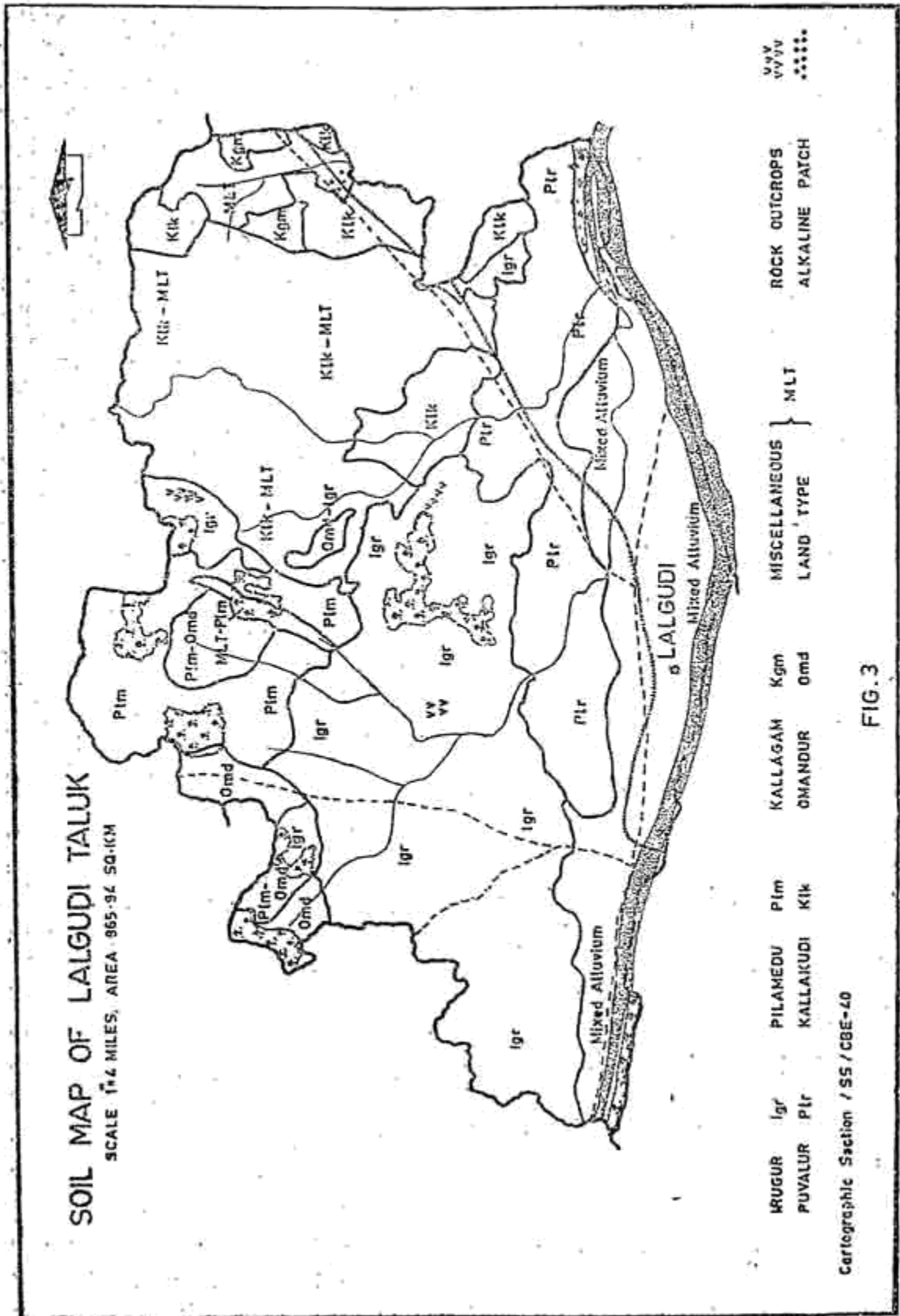
ring over it. The drainage lines in the area under the mixed alluvium run eastward parallel to the river Coleroon presenting an almost parallel drainage pattern due to the pronounced unidirectional regional slope. The drain lines in the Puvalur series area form a network almost resembling a rectangular pattern. The hard and compact Archaean rocks have only permitted, a low density, coarse textured, dendritic pattern in the areas under Irugur and Omandur series. The fine textured soils have had their influence in the fineness of the dendritic pattern of drainage in the area under Pilamedu series.

The soft clays of Uttatur formation and other loose sedimentary rocks have been responsible for the severe, random headward erosion by the dendritic drainage lines in the cretaceous rock zone. The unusual drainage density has resulted in the isolated bad lands as reported by Easterbrook (1969). The large gullies are cutting back into the cultivable lands.

v) **Climate** : The area, in general has a dry climate with the hot period during April to June. The average annual rainfall is about 845 mm, 60 per cent of which is received during north-east monsoon, about 35 per cent during south-west monsoon and the rest during summer.

## RESULTS AND DISCUSSION

i) **Soils** : Six soil series] were identified and mapped in this area (Fi. 1). The soils along the northern



border of coleroon in a belt fringing that river could not be fitted in any taxonomic unit owing to the textural discontinuity and presence of pure sandy layers intermittently in the profiles at different depths. This area has been delineated as mixed alluvium. The strip along the northern edge consists of dark brown, resembling very much the black soil. But, the soil is very deep with no trace of bedrock other than sand contemporaneous to the alluvium and hence been delineated as Puvalur series.

Soils developed over the gneissic rocks with different intrusions are red soils of Irugur series over granitoid gneiss, brown soils of Omandur series over biotite gneiss and black soils of Pilamedu series over chlorite schist. Another red soil occurring to a limited extent is the Kallagam series developed over Cuddalore sandstones. It had been apparently difficult to group the soils occurring in the cretaceous zone owing to the widely varying soil characteristics and highly dissected nature. However, dark gray soils of mappable extent have been delineated as Kallakudi series underlain mostly by limestone. The rest of the soils in association with Kallakudi series and the areas with considerable rock outcrops occurring within Irugur series have been delineated as miscellaneous land type 'MLT'.

## ii) Morphology of soil profiles :

Profile descriptions do not indicate much difference in morphological fea-

tures of the Puvalur, Kallakudi and Pilamedu series. These are very deep, very dark gray to dark greyish brown fine textured soils developing cracks during summer and underlain by different strata. There is no marked horizon differentiation as observed by Oakes and Thorp (1967) in these type of soils. The sub-soil has the pressure faces and slickensides typical of vertisols. The vertic characteristics are well exhibited in the Puvalur series and slickensides are well pronounced and well developed angular blocky structure in the sub-soil. In Kallakudi series the vertic characters are less pronounced than the Puvalur series, but are more than that of Pilamedu series. A lime concretionary layer occurs between the soil above and the underlying material in the Kallakudi and Pilamedu and is absent in the Puvalur series owing to its depth.

The solum depth extends beyond 200 cm in Puvalur series, does not exceed 200 cm in Kallakudi series while it ranged between 50 and 105 cm in Pilamedu series.

There are two red soils occurring in the area, *viz.*, Irugur and Kallagam series which are distinctly different from each other. Presence of quartz gravels of angular and irregular shapes strewn over the surface and distributed in the sub-soil is a common feature in the Irugur series. Sometimes they are present as a band just above the weathered parent rock. Argillans are

but a rare feature and structural development is only moderate. The soils are moderately deep to deep, non-calcareous and fine loamy in nature and occupies a major portion.

The other red soil, Kallagam series, is very deep, fine loamy to fine, slightly calcareous at lower depths. The profile exhibits strongly developed structure in the sub soil with yellowish to greyish brown mottles. Quartz gravels are present at the lowest boundary.

The Omandur series, is a very poorly developed dark brown soil, moderately deep to deep, calcareous and coarse loamy to fine loamy in texture. The light texture and poor structure may perhaps be due to the micaceous intrusions in the parent materials.

The stratification in the profiles has its implication on the morphological features in the mixed alluvium soil. The sandy layer sandwiched between medium to heavy textured layers is bound to serve as a water reservoir.

The perceptible and conglomerate influence of environmental factors like geography, geology, geomorphology and climate are seen in the soils under study and offers scope for detailed study.

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