

## SOIL - PHYSIOGRAPHY RELATIONSHIP IN KODAYAR RIVER BASIN OF KANYAKUMARI DISTRICT FOR LAND USE PLANNING

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**ABSTRACT** : Basic information on soils is necessary for optimum utilization of the the agricultural potentialities of an area. The relationship between physiography and soil can be successfully utilized for proper understanding of soil and other edaphic conditions of a region. Such relationship is known to be advantageous for faster soil mapping. The approach has acquired greater significance in the context of increased use of aerial photographs and remotely sensed data for soil survey and land use planning. An attempt has been made in the present investigation to study the soil physiography relationship in Kodayar river basin of Kanyakumari district for their proper management and land use planning . Kodayar river basin covers an area of about 331 Sq. Km. Pechiparai dam which is constructed across Kodayar river is one of the major sources of irrigation in the district. Soil mapping in the area was carried out using base map transferring physiographic delineations of landsat satellite imagery on the survey Of India toposheet of 1:50,000 scale. Representative pedons were studied for their morphometric characteristics.

### INTRODUCTION

The study of relationship between physiography and soil can be successfully utilised for proper understanding of soil and other edaphic condition of a region in order to improve agricultural production. But the evaluation of Soil - Physiographic relationship for land use planning is complicated by the fact that within any one area the environmental conditions are not comparable, and further even in the smallest area these conditions vary owing to changes in the type of vegetation, the topographical features of land, hydrological conditions and local climatic features. Consequently if these edaphic influences are superimposed on the results produced by individual local soil factors, negative effect of soil factors may either get

intensified or lessened resulting in reduced or increased agricultural production. Therefore judicious and conjunctive use of soil-physiography relationship and environmental condition is essentially called for.

### STUDY AREA :

The study area, Kodayar river basin lies in the southern most part of India, ie. in the district of Kanyakumari in Tamil Nadu state. It is located in between 8° 21' N to 8° 43' N latitude and 77° 12' 35" E to 77°20' E longitude (Fig. 1) occupying nearly 331 sq. kms area. The elevation varies from 50 m at stream bed to 1800 m at the hill top with general aspect from South West to North East. The major part of the study area is accounted by Archean

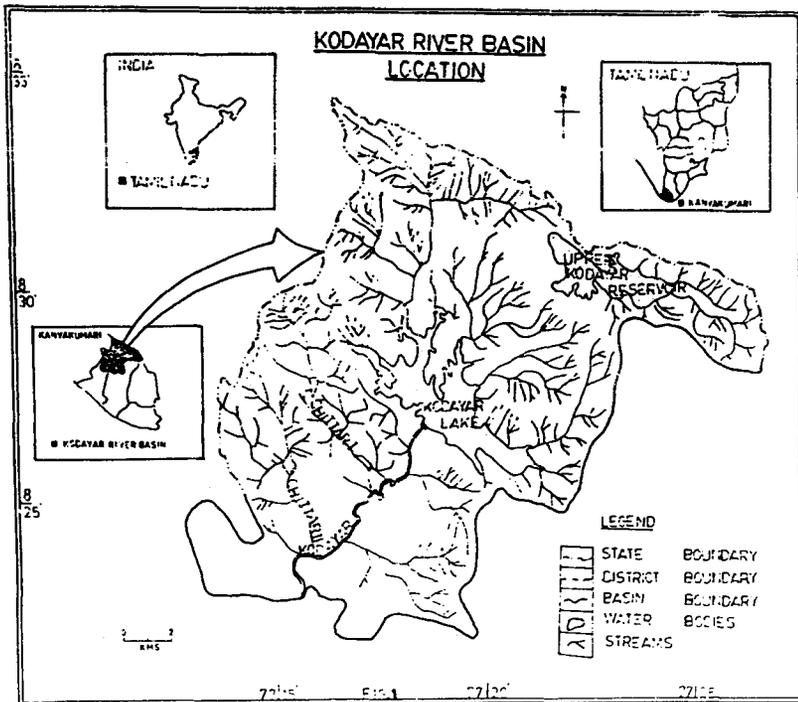


Fig. 1 : Kodayar River Basin Location

Genesis with large tracts of reddish soil of considerable thickness. The Archean rock area represented by a variety of rock types having different mineralogical composition. The area enjoys humid type of climate because of proximity to the sea. The mean annual temperature is about  $28^{\circ}\text{C}$  and the maximum and minimum temperature are  $22^{\circ}$  and  $34^{\circ}\text{C}$  respectively. The mean annual rainfall is 2100 mm of which over 70 per cent is received during October to December. Cooler winds during summer and well distributed showers throughout the year make the climate mild.

Vegetations from Tropical wet evergreen forest to Southern Thorn Scrub forest type occur in the study area because of the diverse locality factors. Wide variations exist in the altitude and climate especially in rainfall.

#### METHODOLOGY :

Soil resource mapping in the study area was carried out using base map prepared

transferring Physiographic delineations of land-sat satellite imagery (FCC 1:50000 scale) on to the survey of India toposheets of 1:50000 scale. The landforms are also delineated from the study of satellite imagery and survey of Indian toposheets.

Representative pedons were studied for their morphometric characteristic and classified according to layers of soil Taxonomy.

#### RESULTS AND DISCUSSION

Physiographic analysis of land-sat satellite imagery of the area revealed four distinct Physiographic divisions 1. The Northern Hilly Terrain covered by Reserve forest land 2. Foot hill regions with sparse vegetation 3. Gently sloping to undulating land 4. Plain land along the river beds. (Fig.2)

The Northern hilly terrain region is not taken for the present study of soil-Physiographic analysis because that is fully covered by reserve

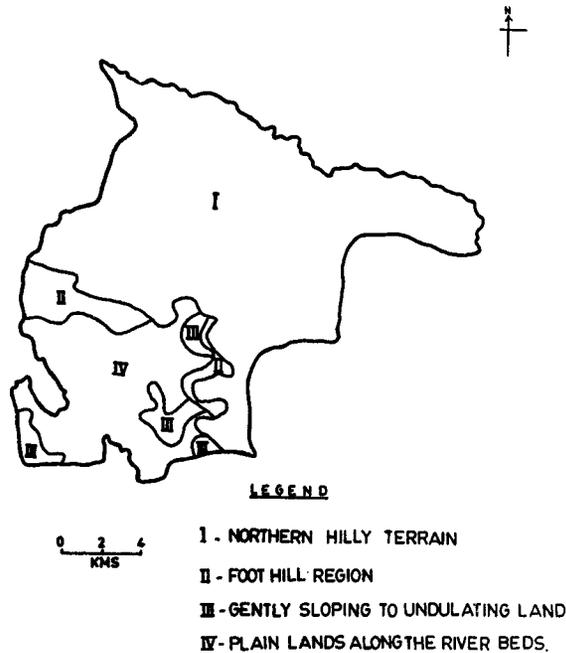


Fig. 2: Kodayar River Basin Physiographic Division

forest. The soil characteristics for the rest of the regions is analysed with their relation to physiography. The soil characteristics are briefly discussed in the Table.1 (Fig.3), and three representative pedons selected in the three different Physiographic regions were also analysed (Fig.4)

### 1. SOIL OF THE FOOTHILLS AND THEIR USE :

The main soil group occurring in this Physiographic unit is Type Entropets (Tetp). Its character is yellowish red, deep gravelly clay loam and Non calcareous and it suffers severe sheet erosion. Its productivity is average. The major land use under this soil type is Rubber and coconut. This soil is well drained and rapid permeability in character. The land capability conditions shows it is in the category of moderately good cultivable land. The special need for this soil is to, control erosion and conservation of irrigation. The

land irrigability condition is moderate.

Some of the suggestions for the improvement of these lands are : Introducing of fast growing forest tree species, Controlled and regulated grazing, adoption of suitable soil and water conservation measures.

### 2. SOIL OF THE GENTLY SLOPING REGIONS AND THEIR USE:

This physiographic unit covers the soil groups of Aquic tropudalf (Atdf), Udic Rhodutalf (Urdf) and Lthic Troportents (Ltpt). The soil character of Aquic tropudalf is yellowish brown, deep to very deep, coarse loamy and non calcareous and it suffers moderate sheet erosion. Even though its productivity is good it is poorly drained and slowly permeable in character. The important crops in this soil are paddy, Banana and Tapioca. Land capability shows this land unit is in the category of moderately good cultivable land. But this land

Table No. 1

Taxonomic Classifications	Symbol	Physiographic division	Area in Sq. Km	Soil Characteristics	Erosion	Productivity	Drainage & permeability	Land Use	Land capability	Land irrigability	Special need
Typic Dystripepts	Tdtp	Plain landas	48.10	Reddish brown very deep fine loamy Non calcarious soil	Moderate sheet erosion	Average moderately slow permeability	Well drained	Cocanut	Moderately good cultivable land	Lands with moderate limitation for sustained use under irrigation	Conservation irrigation
Typic Eutropets	Tetp	Foot hill region	32.40	Yellowish Red, deep gravally clay loam Non calcarious soil	Severe sheet erosion	Average	Well drained rapid permeability	Rubber Cocanut	Moderately good cultivable land	Lands with moderate limitation for sustained use under irrigation	Conservation irrigation
Aquic Tropudalf	Atdf	Gently sloping to undulating land	16.20	Yellowish brown, deep to very deep coarse loamy Non calcarious Soil	Moderate sheet erosion	Good	Poorly drained slow permeability	Paddy banana Tapioca	Moderately good cultivable land	Land with severe limitation for sustained use under irrigation	Drainage improvement
Udic Rhodutalf	Urdf	Gently sloping to undulating land	14.20	Red, very deep fine loamy calcariious soil	Moderate sheet and gully erosion	Average	Well drained rapid permeability	Paddy banana pepper rubber	Moderately good cultivable land	Lands with severe limitation for sustained use under irrigation	Drainage improvement
Lithic Tropor-	Llpt	Gently sloping to undulating land	20.70	Yellowish red, moderately deep, fine loamy calcariious soils	Severa sheet erosion	Extremely poor	Well drained moderate rapid Permiability	banana	Fairly good lands suited for limited	Lands with severe limitations	Intensive erosion control and careful selection

is with severe limitation for sustatined use under irrigation. The second soil group Udic Rhodutalfs soil has the character of red, very deep, fine loamy calcareous soil. The productivity in this soil is average and it suffers moderate sheet and gully erosion. It is well drained in character. The main land use in

this soil group are paddy, Banana, pulses, pepper and Rubber. The land capability of this soil is similar as Aquic Tropudalf soil. The land irrigability of the soil shows severe limitations for sustained use. Irrigation and drainage improvement is necessary for this soil.

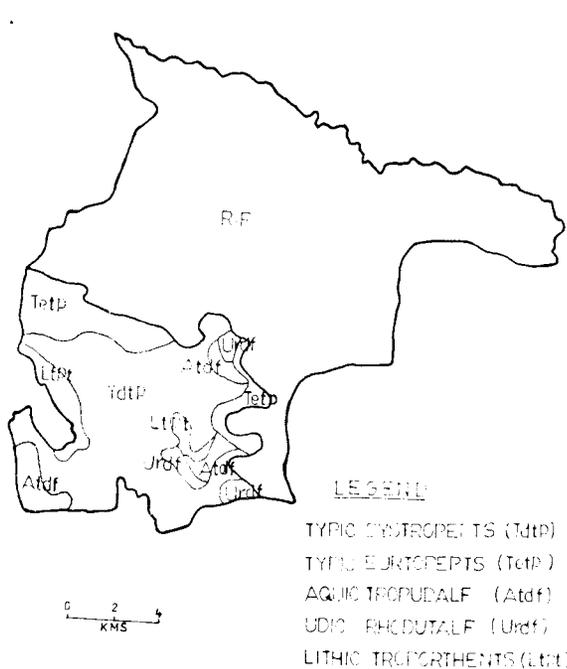


Fig. 3 : Kodayar River Basin Soils

The third soil group Lithic Troporthents (Ltp) has the character of yellowish red, moderately deep, fine loamy calcareous soil with severe sheet erosion. The productivity is extremely poor. The drainage and permeability characters of this soil is same as Udic Rhodutalfs. The main crop under this soil groups is banana. This type of land is fairly suited for limited cultivation. Intensive erosion control and careful selection of crops are necessary for this region. Some of the suggestions for the improvement of this area are adoption of modern techniques for agricultural practices, introduction of high yielding varieties suitable for the areas.

### 3. SOILS OF THE PLAIN LANDS AND THEIR USES.

The main soil group found in the region is Typic Dystrispepts (Tdtp). It has the character

of reddish brown, very deep fine loamy and non calcareous. Its productivity is good and is well drained but has a moderately slow permeability in nature. The important land use in this soil is coconut. The land capability character shows it is in the category of moderately good cultivable land. These lands are having moderate limitation for sustained use under irrigation. The suggestions for improvement of the area are similar to those described earlier for soil of gently sloping land, However, the soil along the stream channel need special attention to check soil erosion problem. Some of the suggestions for improvement in these lands are the introduction of fast growing grass species to keep the soil mostly under vegetative cover, control and stabilization of gullies with suitable soil conservation measures like check dams.

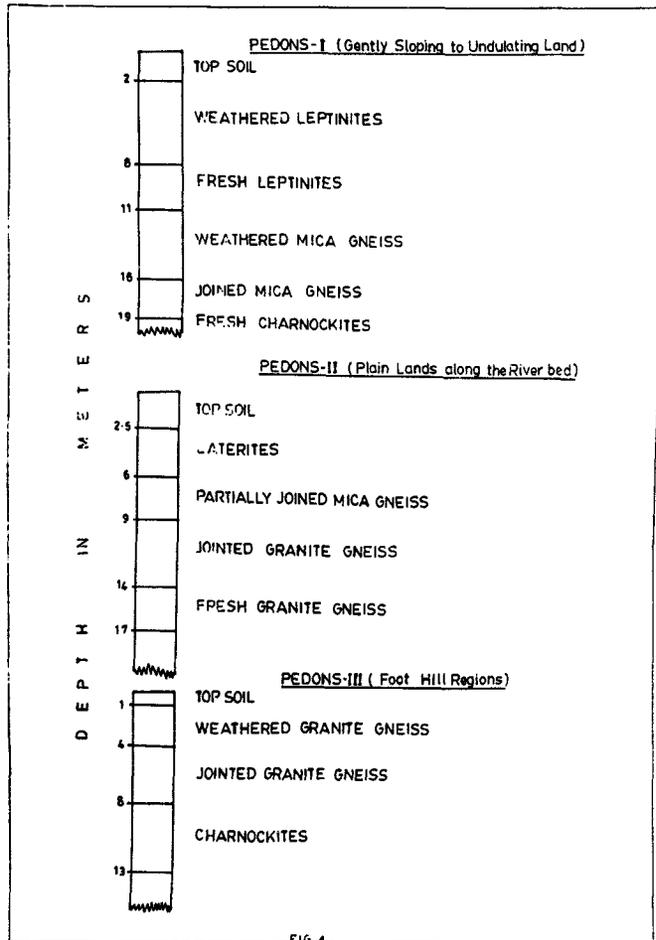


Fig. 4 : Depth in Meters

### CONCLUSION :

From the study it can be concluded that :

- I. Soil developed on the foot hills should be given special attention to check sheet erosion.
- II. The land along the streams should be protected with fast growing grass species to check the gully erosion.
- III. Adopting of modern techniques for agricultural practices and introduction of high yield crop varieties are necessary to increase the crop productivity in the region.
- IV. Soil physiography relationship plays an important role in proper understanding of soil and its potentialities for various kind of uses.

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