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SOILS OF THE SOUTH WESTERN COASTAL PLAIN

Ambalangoda-Galle Regions

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In a recent article published in the Ceylon Coconut Planters' Review (Vol. 5, No. 4 March 1969) the soils of Ceylon were generalized within the framework of the Great Soil Groups, and the soils of the Southwestern coastal plain were classified as the strongly lateritic soils of the Low Country Wet zone. These soils which are also referred to as the Red Yellow Podzolic soils will be discussed here in detail, with special reference to the areas under coconut cultivation. Since the climate and vegetation of the area have already been described in the article mentioned above, the landforms and geology and the detailed classification of soils alone will be discussed here.

Geomorphology (*Geos*—earth; *morphos*—form)

Geomorphology is not only the study of the physical features of the earth, but also the history of their cycles of formation and erosion. The Southwestern coastal plain may have in the past been a moderately high land surface which has now dissected into a system of rounded island like formations in broad U shaped valleys. These island land masses are rolling and undulating, consisting of high, moderately eroded ridges, and highly eroded lower ridges and slopes, which merge into the continuous valley system. (Air photograph I, and Diagram 1)

The valley floor, which may be called the Deniya, consists of slightly higher Deniya slopes, and low Deniya slopes, and the drainage system present here ultimately empties into the deep landlocked lagoons such as the Ratgama and Madampe lagoons which may be drowned estuaries. (Air photograph II).

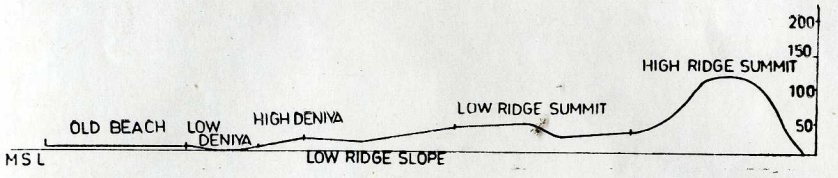


Diagram 1

Diagramatic Cross Section through the Land Forms in the Coastal Plain.
(Hikkaduwa Region).

Towards the interior of the present beach is an inland beach which contains marine deposits like limestones at depth, and these are the fossils of calcareous marine fauna deposited by seas which submerged these areas in the past.

Geology

The predominant rocks in the area are charnokites and these are deeply weathered into laterites in the low ridges and slopes. Whilst a few surface outcrops are exposed as weathered iron stone rocks in the lower areas, fresh charnokites are exposed to a limited extent generally round the margins of the higher ridges.

Drainage in relation to the landform and soil profile

During rains, part of the water runs down the slopes to accumulate in the Deniya areas, whilst the rest percolates into the soil profile, and accumulates on the impervious rocks, above which form the water storage layer or aquifer, and this aquifer is also recharged with water from the Deniya areas, by underground flow. The soil profile is saturated with water above the aquifer, and the upper limit of this zone of saturation is called the water table, which roughly follows the contours of the land. (Diagram 2).

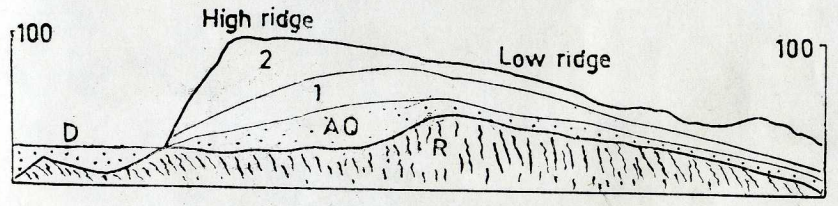


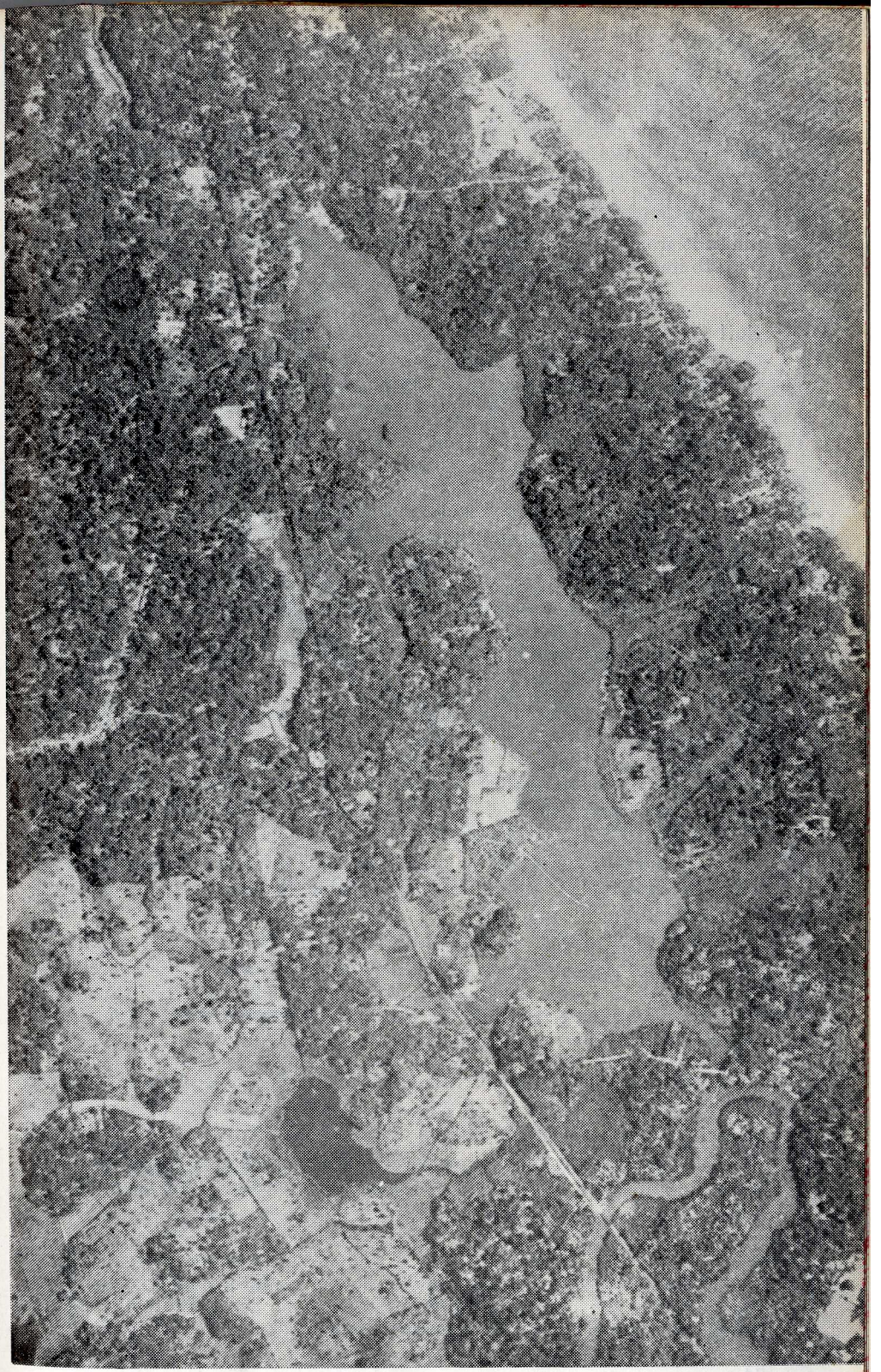
Diagram 2

Rise and fall of the Water Table in a Lateritic Profile.
1. Dry weather Water Table.
2. Wet weather Water Table.
AQ. Aquifer R. Rock D. Deniya.

A characteristic feature of the lateritic profile is the rapid rise and fall of the water table, as seen from wells in lateritic regions which almost overflow during the rains, and rapidly drops down, and these rapid fluctuations of the water table is very characteristic of the lowlying lateritic redges and slopes.

Aerial Photograph I

Air photo Mosaic showing Island Land Forms (IL) in the Valleys (D). The Valleys Drain into the Flood Plan (FP).



Aerial Photograph II

Thelwatta Lagoon. An inland lagoon typical of the South Western coastal plain.

The rise and fall of the water table in the soil profile is indicated by mottles, and the height of mottling is indicative of the level to which the water table has risen during the wet season, and on this criterion the soils are classified into Poorly Drained, Imperfectly Drained and Perfectly Drained soils. It is also important to observe that deep red, and yellowish red soils are perfectly drained, whilst greyish and yellowish greytones reflect poor to imperfect drainage.

Soil Classification

In 1964 a reconnaissance soil survey was carried out in the region, and the lateritic soils were mapped as the Baddegama Series, surrounded by the alluvial complex of the Hikkaduwa ganga and Ginganga basins.

Detailed soil surveys carried out recently have shown that the Baddegama series can be divided into two as follows:—

1. Imperfectly drained soils on low ridges and slopes.
2. Well drained soils on higher ridges.

A characteristic feature of these soils is the presence of rounded gravels in the surface or A horizon, which is called the "Boralu Layer".

The Lateritic Soils of Series 1—(Low Ridge Summit Phase, Low Ridge Sloping Phase)

Beneath the "Boralu Layer" of the soils of series 1, is a gravelly clay-loam hardpan, yellowish grey in colour, which hardens on drying. Root penetration is negligible below this hardpan. These hardpan soils can be divided into the Low Ridge Summit Phase, with superficial hardpans on the tops of ridges, and Low Ridge Sloping Phase, with hardpans below 10" on the slopes of the low ridges.

Also the soils of Series 1 have mottling in a layer called the B_2 horizon, which is indicative of a fluctuating water table. (Diagram 3(I))

The Soils of Series 2—(High Ridge Summit Phase)

Here the typical hardpan is absent, and the middle layer of the soil (B horizon) has a good texture, a quartzitic gravelly clayloam. Root penetration is good, and the soils, as stated earlier, are developed on higher ridges, and may be red, or yellowish red.

These soils have perfect drainage. (Diagram 3(II))

Lateritic Soil on Slump Slopes

Due to slumping of soils on a ridge slope, a deep well drained soil is formed. This is very rare, and was observed beneath a low ridge at Sirikandura.

The Valley or Deniya Soils

It has been stated earlier that the low lying lateritic slopes pass into the valleys or the Deniya areas, and these can be divided into the Higher Deniya slopes and the Lower Deniya slopes.

Ambalangoda-Galle Soil Map

Lateritic Soils of the Baddegama Association. Well to imperfectly drained	Island Land Forms	Developed on charnokite series
Deniya Complex Perfectly to poorly drained	Hikkaduwa Gange-Gin-Ganga System	Colluvial-Alluvial Deposits
Kahawa Series Well to poorly drained	Old Beach	Old beach sands on calcarious deposits

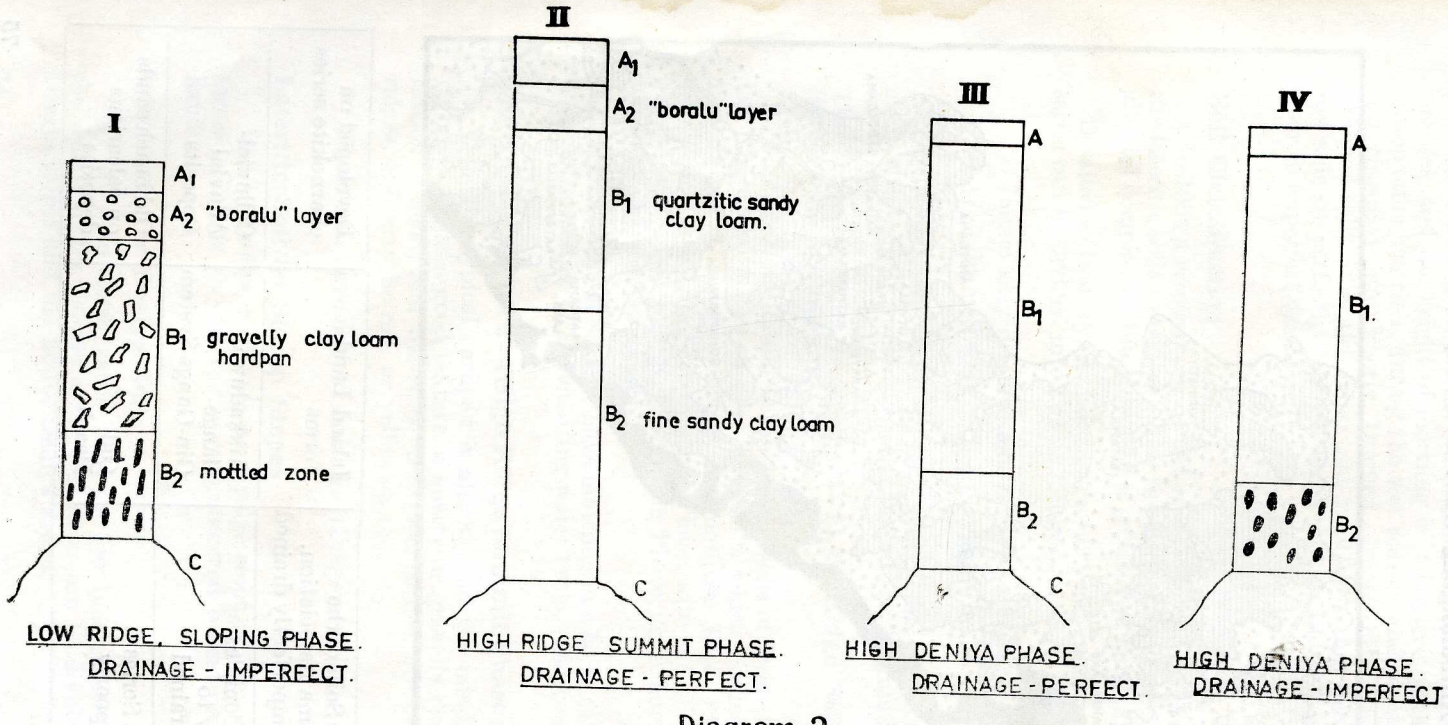


Diagram 3

I. Low Ridge Sloping Phase.
Drainage Imperfect.
A_2 "Boralu" Layer
B_1 Gravelly clay loam hard pan
B_2 Mottled zone

II. High Ridge Summit Phase.
Drainage Perfect.
A_2 "Boarlu" layer.
B_1 Quartzitic sandy clay loam.
B_2 Fine sandy clay loam.

III. High Deniya Phase.
Drainage—Perfect.
B_1 Coarse Sandy loam
B_2 Fine Sandy loam

IV. High Deniya Phase.
Drainage—Imperfect.
B_1 Sandy clay loam
B_2 Sandy clay loam

C Decomposing lateritic rock

Soils on the High Deniya Slopes

These soils are bleached, white sandy clay loams, and rarely well drained. The well drained Deniya soils are termed—"High Deniya Well Drained Phase". (Diagram 3(III))

When there is mottling in the B_2 horizon, these soils are termed—"High Deniya—Imperfectly Drained Phase", and these are the common Deniya soils of the upper slopes. (Diagram 3(IV))

Low Deniya Soils

Low Deniya soils are poorly drained, with very high water tables.

Soils of the Old Beach

These are sandy soils with calcareous deposits, as described earlier. Close to the present beach these deposits are superficial, forming water-logged areas, while towards the inland as at Kahawa the deposits are deep seated at about 6′—10′. A salient feature of these sandy profiles is the rapid fluctuation of the water table.

Land Use

The predominant land use pattern in the areas already described is coconut cultivation, though cinnamon and rubber are also planted to a limited extent.

While carrying out a detailed soil survey at Sirikandura estate, Dodanduwa in August 1968, it was observed by the writer that the disorder of coconut palms in the area, called "Leaf Scorch Decline", was related to certain soil categories described here. It was found to be predominant in the lateritic soils of the Low Ridge Summit Phase, Low Ridge Sloping Phase, the Deniya Soils of the High Deniya Imperfectly Drained Phase, the Low Deniya Poorly Drained Phase, and also in soils of the "Old Beach". It is remarkable that the observation indicated an absence of the disorder on the well drained, hardpan free areas such as the High Ridge Summit Phase, High Deniya Well Drained Phase, which are free from fluctuating water tables. Since laterisation involves a fluctuating water table it would appear that the lateritic hardpan results from such a process.

Acknowledgements

(1) Diagrams drawn by—D. W. Hapuarachchi, E. N. J. B. Fernando, D. S. R. Wijetunge.

(2) Air Photo Mosaic—Hunting Survey Co-operation Ltd., Canada.

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