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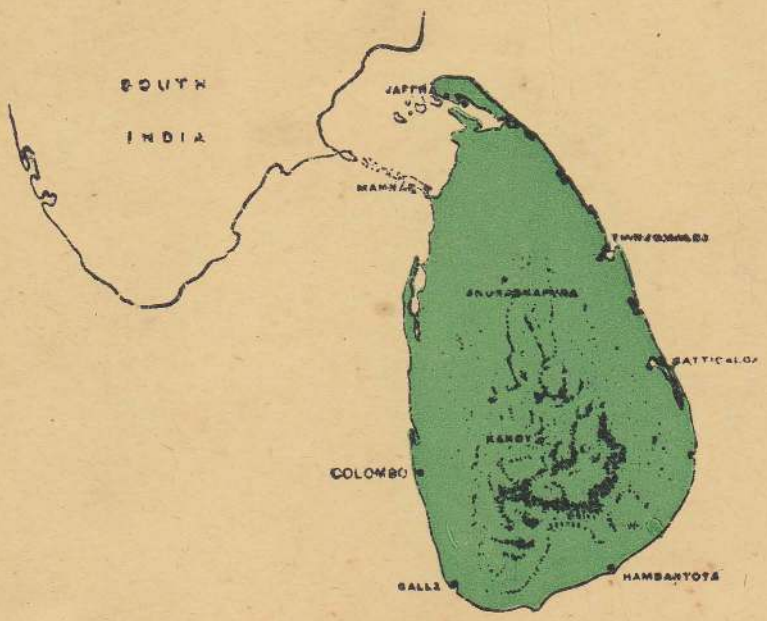
OF THE

# CEYLON

# GEOGRAPHICAL SOCIETY

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C/o Department of Mineralogy
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# NOTES ON THE PATANAS OF CEYLON*

By R. A. De Rosayro

## SITUATION

The montane grasslands (patanas) of Ceylon are mainly confined to altitudes above 2,000 feet and are concentrated mainly in and around the central mountain mass of the Island, occurring specifically in the undulating hilly country lying between the second peneplain (1,600–1,900 feet) and third peneplain, and within the third peneplain proper (6,000–8,000 feet). The greatest development of the patana is, however, to the east of the Central Massif mainly in the Province of Uva, in the region known as the Uva Basin. Fig. 1 shows the approximate location and spread of the patanas. Fig. 3 which shows a section (line of section shown in Fig. 1) across a part of the patana country also illustrates the typical topography of the patanas.

The patanas occupy approximately 250 square miles of country, of which roughly 225 fall in the Province of Uva. There exists easily recognizable differences based on climate between the two main types of patana, for which, the terms " dry patana " and " wet patana " have been applied and are significant. The wet patanas are confined to the Central Massif proper and its western slopes, which is the region where the south-west monsoon exerts a controlling influence on the rainfall. The dry patanas which are far more widespread in distribution lie on the eastern slopes of the Central Massif between the approximate altitudinal limits of 2,000 to 4,500 feet ; here the south-west monsoon has little or no effect on the rainfall, so that during the period the south-west monsoon is in force, the climate of the dry patana is dry with negligible rainfall. This difference in climate is naturally correlated with differences in the soil and floristic composition.

In Fig. 1 the approximate divide between the wet and dry patanas has been indicated ; this actually corresponds to the divide between the climatic zones ; in general, the divide between the zones above and below 20 inches rainfall during the period of the south-west monsoon (May to September) marks the limit of the wet and dry patanas respectively. An intermediate type (or ecotone) between the wet and dry patanas proper occurs roughly between the altitudinal limits of 4,500 to 6,000 feet where the climatic zone of the controlling influence of the south-west monsoon merges into the climatic zone where the south-west monsoon ceases to have a controlling influence.

* Reprinted from Bulletin of the C.G.S., Vol. II, 1947, pp. 36-44.

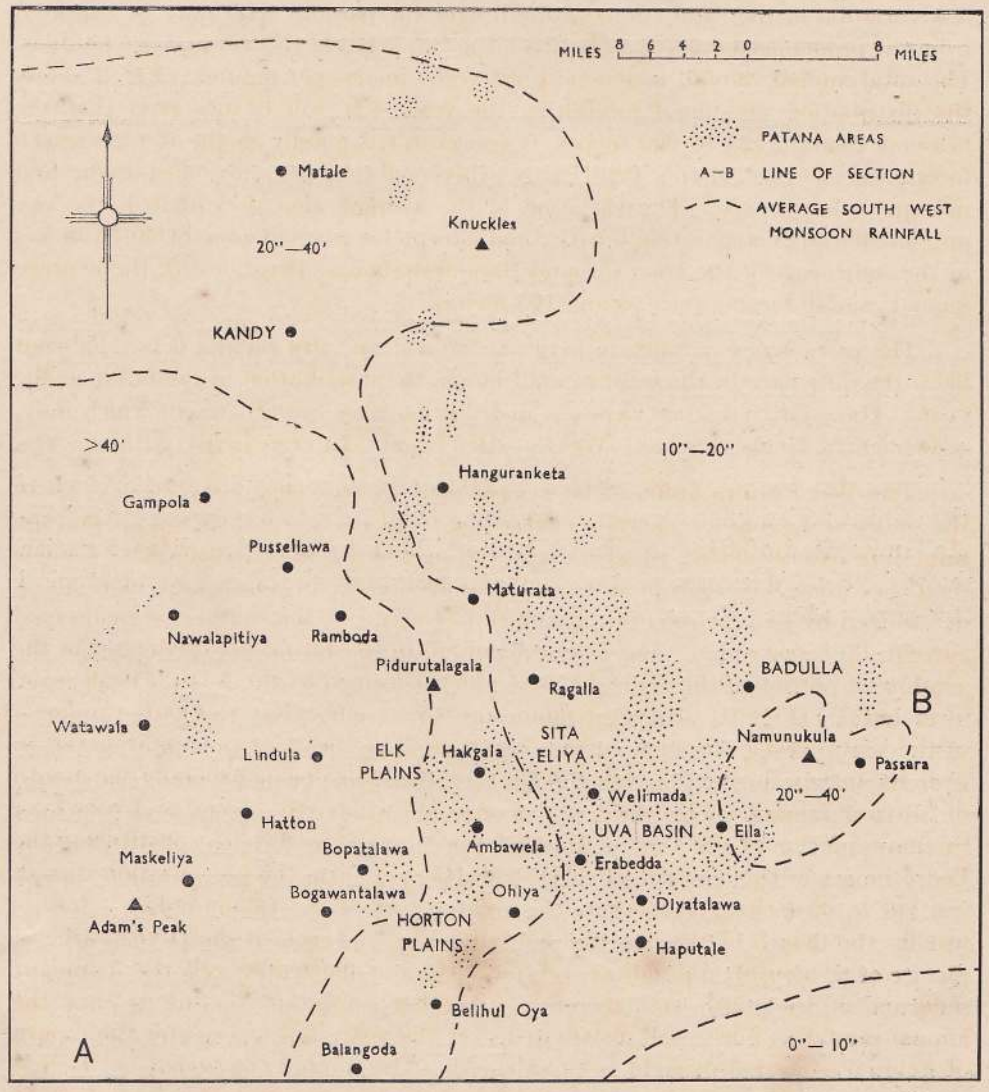


Fig. 1.—Sketch map showing Distribution of Patanas and Average South-west monsoon Rainfall.

## CLIMATE

Corresponding to the distinction between wet and dry types of patana there is a pronounced difference in climate, the main controlling factors of which are altitudinal variation and proximity to the direction of the main monsoonal currents.

**Rainfall.**—The distribution of rainfall is typically monsoonal ; both the south-west and north-east monsoons are of importance, and, generally speaking, there is less variation in the total annual rainfall over the patanas than may be expected from the pronounced differences between the two types of the wet and dry patanas. The total annual rainfall is generally above 60 inches per annum. Fig. 1 shows the distribution of annual rainfall in the tract. It will be observed that the heaviest rainfall, 125 to 200 inches, is concentrated mainly in the wet evergreen forest zone of the Adam's Peak range where patanas are only of sporadic and infrequent occurrence. The variation in the average annual rainfall in the two patana zones is comparatively little, and except for a small zone of 50-75 inches in the south-east of the tract (around Bandarawela and Diyatalawa), the average annual rainfall lies between 75 and 125 inches.

The pronounced distinction between the wet and dry patana types does not lie in the difference in the total rainfall but in the distribution of rainfall over the year. Three fairly distinct types of distribution may be recognised, which may, conveniently, be classified as " Wet ", " Dry " and " Intermediate " patana zones.

**The Wet Patana Zone.**—The wet patana type corresponds to the zone where the south-west monsoon exerts a controlling influence and in general, an average rainfall of over 40 inches is experienced during the period of the south-west monsoon, *i.e.* from May to September. The influence of the south-west monsoon is determined by two factors : (*a*) proximity to the line of the south-west monsoonal current, (*b*) topography. The heaviest rainfall in the Island is experienced in the south-west portion of the Central Massif which is formed by the Adam's Peak range of mountains (Fig. 1). Here the mountain barrier effectively checks the progress of the south-west monsoonal current and causes the heaviest precipitation, 80 to over 100 inches, during the period of the monsoon, June being generally the month of heaviest rainfall. The south-west monsoonal winds still ascend and pass over the main portion of the Central Massif formed by the mountains constituting the Pedro ranges in the Nuwara Eliya District (Fig. 1) ; here the precipitation though less (40 to 60 inches), still forms the greater part of the total rainfall. July is usually the month of the heaviest rainfall. Fig. 2 (1) which shows the curve of the average monthly rainfall at a typical station, illustrates well the dominant influence of the south-west monsoon. Another important feature is that the annual rainfall is fairly well distributed over the year, and, except for the month of February, no real drought is experienced. The rainfall considered by itself is the type which is generally characteristic of the wet evergreen forests, which at altitudes approximately above 2,000 feet merge into the sub-tropical or temperate wet evergreen forests. The wet patanas are therefore subordinate to the main forest type, and, except at altitudes above 5,000 feet are only of sporadic occurrence and are usually in valley sites. Wet patanas proper occur at altitudes approximately above 5,000 feet and are fairly extensive, especially on semi-high plateaux such as the Horton Plains (above 7,000 feet) and Elk Plains (above 6,000 feet).

**The Dry Patana Zone.**—The dry patana type corresponds roughly to a zone where the total rainfall during the south-west monsoonal period (May to September), is less than 20 inches. As the total average rainfall within the zone is comparatively high, *i.e.* from 60 to 90 inches, the rainfall during the period of the

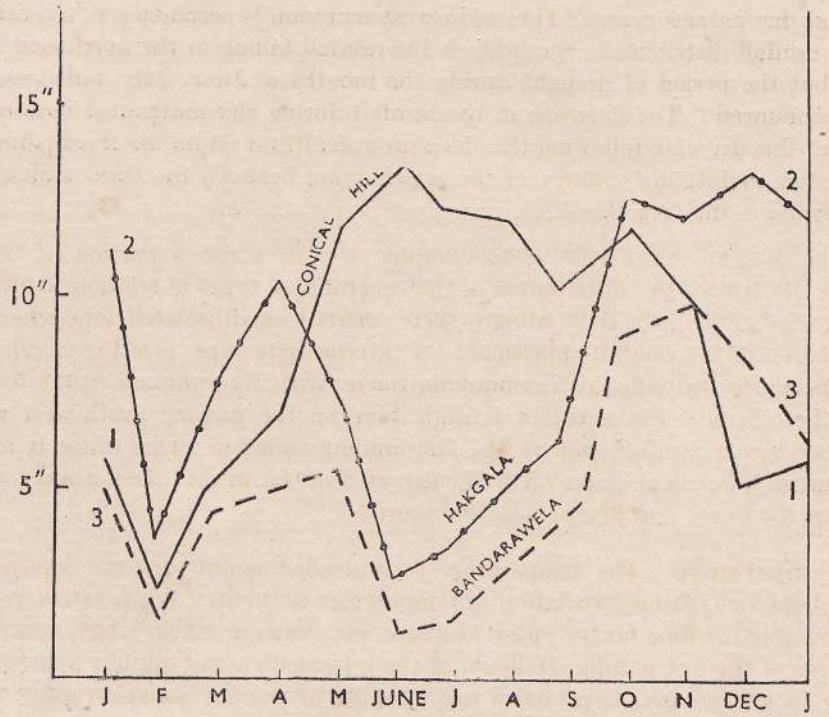


Fig. 2.—Average monthly Rainfall Graphs.

south-west monsoon is thus, comparatively little. Curves of the monthly rainfall for two typical stations are shown in Fig. 2 (3). The highest precipitation for all stations is during the months of November, December and January, *i.e.* during the phase of the north-east monsoon. The influence of the south-west monsoon is weak ; the months of June and July especially, in which the rainfall is highest on the wet patanas, shows a comparative period of drought, with the rainfall generally less than 2 inches monthly. During this period and commencing early in May and terminating in August, the south-west monsoonal winds which have been deprived of their moisture, pass through the undulating hilly country of the Uva Basin as strong, drying winds which deposit negligible rain. There is, therefore, a well marked period of drought in this zone which, in conjunction with the drying winds, is mainly responsible for the corresponding physical and floristic differences in the patana type.

**The Intermediate Patana Zone.**—The eastern escarpment slopes of the third peneplain, generally between elevations of 4,500 to 6,000 feet, form an intermediate zone or ecotone between the wet and dry patana zones, or more properly between the dry patana and upper montane evergreen forest. On account of the

abrupt fall from the third to the second peneplain (1,600–1,900 feet), this intermediate zone forms a narrow belt between the wet and dry patana zones and corresponds roughly to the zone where the rainfall during the south-west monsoonal period is from 20 to 40 inches. The curves of six typical stations in this zone, Fig. 2 (2), illustrates the intermediate character of the rainfall between the wet and dry patana types. The south-west monsoon is secondary in importance in the rainfall distribution, the bulk of the rainfall falling in the north-east monsoon, but the period of drought during the months of June, July and August is less pronounced. The decrease in the rainfall during the south-west monsoon is gradual, this decrease following the steep drop in altitude from the third peneplain to the low undulating country of the region lying between the third and second peneplain, *i.e.* the Uva Basin.

The diagram on Fig. 3, a topographic section across a portion of central Ceylon, illustrates the distribution of the vegetational types in relation to altitude and rainfall. With the dry patanas, there occurs a small isolated zone where the distribution of the rainfall approaches the intermediate type, *vide* Fig. 2 (2). This corresponds to the isolated Namunukula range, with Namunukuli, 6,671 feet, as its highest peak. The effect of altitude here on the passing south-west winds produces higher rainfall than in the surrounding country. This range is forest-clad and its lower slopes have all been cultivated in tea, so that the natural ecotone between the forest and dry patana is obscured.

**Temperature.**—The temperature is controlled mainly by the topography of the land and seasonal variation in temperature is slight. Temperature records are available for four fairly typical stations, viz. Nuwara Eliya, which is a representative of the wet patana, Hakgala of the intermediate patana but approaching closely to wet patana, Diyatalawa and Badulla of the dry patana type. These records are given in Table I.

TABLE I.

MONTHLY MEANS (M.M.) AND DAILY TEMPERATURE RANGE (D.T.R.)

| STATION | | Altitude in Feet | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N'Eliya | M.M. ... | 6170 | 57·3 | 57·2 | 58·5 | 60·3 | 61·5 | 60·8 | 60·2 | 60·4 | 60·0 | 59·6 | 59·6 | 50·6 | 59·5 |
| | D.T.R. ... | | 20·2 | 25·3 | 23·8 | 22·2 | 17·2 | 10·7 | 10·9 | 12·8 | 13·9 | 16·3 | 17·5 | 19·5 | 17·5 |
| Hakgala | M.M. ... | 5581 | 60·1 | 60·4 | 62·2 | 64·4 | 65·4 | 63·7 | 62·8 | 63·8 | 63·4 | 62·8 | 61·4 | 50·6 | 62·4 |
| | D.T.R. ... | | 13·6 | 18·9 | 19·9 | 19·3 | 15·3 | 11·0 | 10·8 | 12·7 | 13·4 | 14·3 | 14·3 | 14·1 | 14·8 |
| D'talawa | M.M. ... | 4125 | 64·6 | 65·7 | 67·4 | 69·0 | 70·2 | 70·3 | 70·4 | 69·9 | 69·3 | 68·4 | 67·5 | 65·2 | 68·6 |
| | D.T.R. ... | | 13·9 | 18·2 | 18·6 | 17·8 | 16·7 | 15·2 | 15·7 | 16·6 | 17·0 | 15·9 | 14·0 | 13·7 | 16·0 |
| Badulla | M.M. ... | 2225 | 70·0 | 71·2 | 73·2 | 70·1 | 75·8 | 75·3 | 75·2 | 75·3 | 74·8 | 74·2 | 72·3 | 70·8 | 73·6 |
| | D.T.R. ... | | 12·3 | 13·8 | 17·5 | 18·0 | 18·7 | 20·2 | 22·3 | 22·0 | 21·4 | 17·6 | 13·6 | 12·3 | 17·6 |

Although the monthly variations in temperature are insignificant, the daily temperature range is considerable. Cloudlessness is the major cause of the great variation in the daily temperature; in the dry patanas, during the long period of drought corresponding to the south-west monsoonal season, from May to September, the daily temperature range is therefore greatest. This is clearly seen in the recorded variation for Badulla which is over 20° during the months of June, July, August and September. In the wet and intermediate patana types, the variation during the south-west monsoonal rains is comparatively much less, as exemplified by the records of Nuwara Eliya and Hakgala. Instead, a pronounced variation

in the daily temperature is experienced during the months of February, March and April when a comparatively dry period is experienced. During the north-east monsoonal period, *i.e.* from November to January, the dry patanas, as exemplified by Badulla and Diyatalawa (the latter approaches the intermediate type), show comparatively little variation in the daily temperature.

**Relative Humidity.**—The relative humidity records of the same stations bring out better the reason for these variations in the daily temperature. These records are given in Table II.

TABLE II.

MONTHLY MEAN OF RELATIVE HUMIDITY (8)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N'Eliya | 6170 | 70 | 58 | 62 | 67 | 76 | 84 | 80 | 82 | 81 | 79 | 79 | 76 | 75 |
| Hakgala ... | 5581 | 85 | 74 | 74 | 76 | 80 | 82 | 79 | 80 | 76 | 81 | 85 | 85 | 80 |
| Diyatalawa ... | 4125 | 77 | 63 | 62 | 67 | 66 | 60 | 60 | 58 | 62 | 70 | 76 | 80 | 67 |
| Badulla ... | 2225 | 80 | 72 | 70 | 70 | 69 | 64 | 61 | 60 | 63 | 70 | 78 | 82 | 70 |

(Summarised from—The Montane Grasslands (Patanas) of Ceylon, Parts I, II, III, Tropical Agriculturist, Volume CI 1945, pp. 206-213; Volume CII, 1946, pp. 4-16, and 81-94, Ed.).

In the dry patana stations, Badulla and Diyatalawa, the relative humidity is lowest in the months of May to September, the months of the south-west monsoonal rains, when the temperature range is greatest; and highest during the north-east monsoon during the months of November, December and January, when the temperature range is lowest. In the wet patana zone the same relationship between the temperature range and relative humidity is observed, the relative humidity is lowest during the relatively dry months of February, March and April when the daily temperature range is greatest. For Nuwara Eliya, during the period of the south-west monsoon, relative humidity is highest. For the intermediate patana station, Hakgala, which receives both the south-west and north-east rains, relative humidity is high during both periods, but higher during the months of November, December and January when heavier rains are experienced.

**Frost.**—The incidence of frost is confined to the wet patana type only, where it occurs most commonly during the months of December, January, February and rarely, March. A high daily temperature variation prevails during these months especially in the month of February when the ground temperature during the night occasionally drops below zero and frost is experienced. The incidence of frost rarely exceeds a few days, normally about five for the whole year.

## DISTRIBUTION

**The Wet Patanas.**—The wet patanas are concentrated mainly within the highest peneplain of the Island (6,000–8,000 feet) and, except for small locally occurring patanas are confined to four large tracts: (*a*) the Horton Plains, 6,900–7,300 feet, which marks the highest altitudinal limit of the patanas and also their most extensive development, (*b*) the Elk Plains including its extension in the Conical Hill-Ambawela-Pattipola patanas, 5,600–6,500 feet, (*c*) the Bopatalawa-Bogawantalawa patanas, 5,000–5,800 feet, (*d*) the Sita-Eliya patanas including the Moon Plains, 5,500–6,200 feet. These areas are clearly shown on Fig. 1. The wet patanas generally consist of tongues of grassland in the valleys and along water-courses, expanding wherever there is any extensive relatively flat land. The characteristic wet patana type may be observed at the Horton Plains and Elk Plains where large expanses of relatively flat and marshy patana land occur.

The estimated approximate total extent of wet patana is 14,000 acres of which approximately 5,000 acres are in the Horton Plains, 3,000 in the Elk Plains, 2,500 in the Bopatalawa-Bogawantalawa patanas and 1,500 acres in Sita-Eliya.

The wet patanas are characterized by being damp all the year round and boggy and sodden during rainy seasons, the moisture content increasing in the immediate vicinity of streams or depressions where marsh conditions prevail. The patanas may extend to the upper slopes of valleys but seldom for any great distance. At lower elevations, however, for example at Bopatalawa (5,000–5,800 feet), they may spread on to the summits of hills and even encircle small isolated patches of forest. The demarcation between patana and forest is sharp and abrupt. The only tree species of the patana is the Rhododendron arboreum Sm. which has a characteristic stunted and gnarled habit. The grasses themselves are tufted, coarse and wiry and in areas which have escaped burning for a considerable period are luxuriant, often up to three feet in height.

**The Montane Temperate Evergreen Forest** which extends generally above 4,000 feet elevation and up to 8,000 feet is the climax vegetation. The existing montane forest zone occupies a continuous sheet or cap extending over the entire third peneplain from the Pedro range to the Totupola range (near Horton Plains) and up to the Adam's Peak range ; only two other isolated forests now remain, Haputale and Namunukula forests, the former separated by intervening belts of patana ; the latter is a curious localized montane formation cut off from the main central semi-high-plateau. The approximate extent of the entire existent montane forests is computed at approximately 110,000 acres. Large extents of the more accessible and cultivable montane forests at altitudes generally below 6,000 feet were felled in the latter part of the 19th century and planted in coffee and occasionally cinchona, to be later ousted by tea.

The montane forest is composed of low stunted tree species rarely exceeding 60 feet in height and attaining a maximum girth of about 10 feet, with characteristic flat tops and stiff, coriaceous and often erect leaves. With increasing altitude, the tree growth becomes more stunted, and dead and dying trees are more often the rule than the exception.

**The Intermediate Patanas.**—The wet patanas proper are localized and surrounded on all sides by forest. They are not extensions of the Uva dry patanas. The " wide tongues of patana " extending " in a westerly direction up to, and in some cases over the summit of the ridge " (Pearson) into the montane forest zone do not merge gradually into the wet patana zone ; in most instances they have no direct connection at all with the main wet patana tracts. These tongues of patana are actually the furthermost limits of the dry patanas reaching up to an elevation of approximately 5,000 feet. They form, as stated earlier, a narrow belt hardly exceeding a mile wide, termed arbitrarily, the " intermediate " patana zone ; the distinguishing topographical features being the steep, rocky and abrupt slopes characteristic of the escarpment of the third peneplain (6,000–8,000 feet). The patana almost always occupies the crests of the folds while the forest is confined to the moisture troughs and depressions often accompanying streams or streamlets. The forest zone becomes sparser as we descend into the dry patana zone, the forest now forming tongues and intrusions and sometimes, small isolated

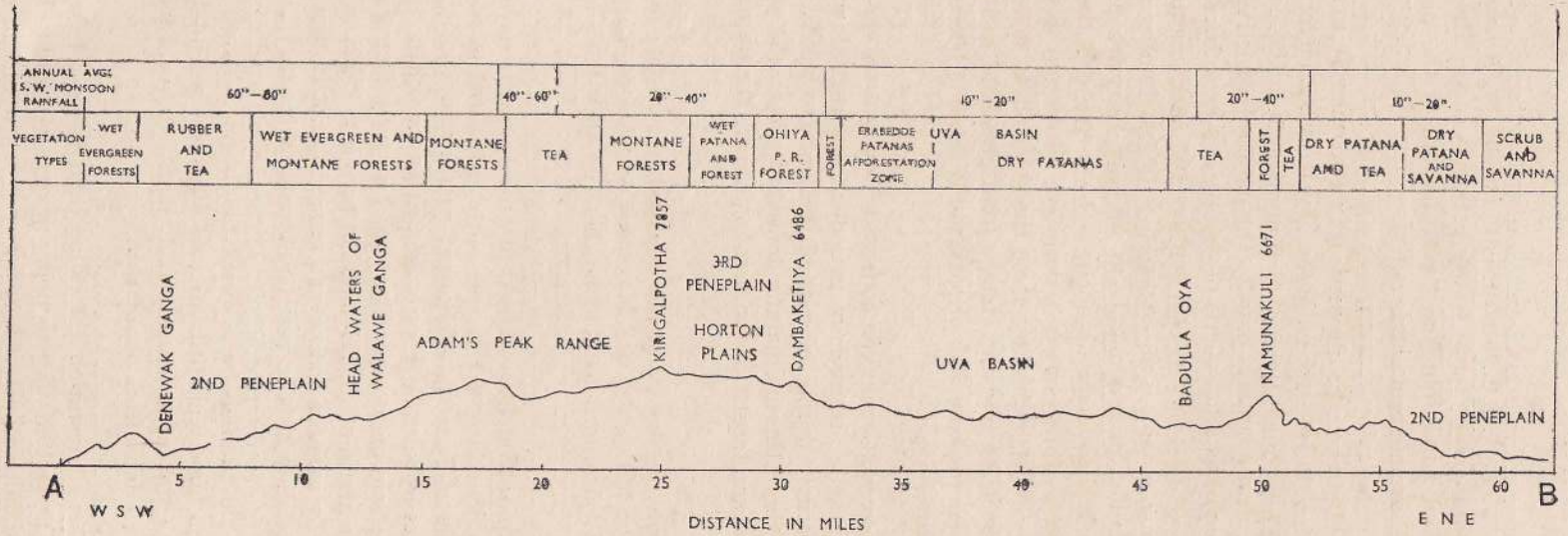


Fig. 3.—Topographic Section across Central Ceylon (Line A-B, Fig. 1.) showing zones of annual average South-west monsoon Rainfall in Relation to Vegetation Types.

woods in the patana. The belt of intermediate patana is, therefore, the zone in which the change from montane forest to dry patana occurs. The patana grasses still retain their tufted habit, but the 'wet' feature of the patana gradually disappears and the Rhododendron peters out.

**The Dry Patanas.**—The dry patanas are comparatively much more widespread and extensive than the wet patanas. Their approximate extent is computed at 150,000 acres, of which the bulk is concentrated in the Uva Basin immediately east of the central mountain mass. The patana land is typically undulating hilly country. Considerable extents of dry patana have been brought under cultivation in the latter part of the 19th century and early in the 20th century, so that the remaining patana is interspersed with tea estate; but, where the patana has been retained intact, mainly as military reservations in Errebedde and Diyatalawa, which alone make up about 50,000 acres, it is the representative vegetation of the tract. Intrusions of patana are also found in the Matale and Kandy Districts (*vide* Fig. 1) especially along the escarpment slopes of the second peneplain (1,600–1,900 feet), and the change from grassland to the dry forest is marked by a zone where the savannah or parkland vegetation becomes a characteristic and typical feature.

The dry patana vegetational type consists of low grasses closely cropped by extensive grazing of cattle and usually periodically burnt. Soil conditions are usually dry and especially during periods of drought the soil is hard and most difficult to work. Where the dry patana zone approaches the savannah forest, isolated tree species characteristic of the savannah make their appearance, chiefly the patana-oak.

True forest within the dry patana is confined to moister sites on the lower slopes and folds of the hills which are associated with water-courses. The forest belts are of purely local occurrence and nowhere do they have any appreciable development.

**Utilisation.**—Apart from large extents of what appear to have been originally patana chiefly in the Province of Uva, presently cultivated in tea, the economic use of the patanas, particularly the dry patanas, have from time immemorial been almost limited to pasturage, though of poor quality, for cattle. Both types are frequently burnt over to provide fresh pasturage for cattle, and in the dry patanas those near to villages are mostly close cropped by cattle. The development and utilisation of patana for other purposes such as cultivation of food crops and large scale farming has been only of recent initiation, stimulated by the recent war.

Afforestation of the patanas on a small scale began between 1890 and 1900, but the possibilities of large scale utilisation of otherwise worthless grassland was realised, and the afforestation of comparatively large extents of patana, especially in the Province of Uva dates from about 1916.

From 1939, patana afforestation in Uva has been designed to serve the purpose of wind belts for the protection of areas under peasant or middle class colonization or under farming and cultivation. Afforestation is now a recognised form of land planning.

# A GEOGRAPHICAL INTERPRETATION OF CEYLON HISTORY *

By S. F. de Silva

## Part I

The history of a country is the study of the rise and development of the human community living in it. The life of a community is influenced by many factors, the first and perhaps most significant is the means whereby the community gains its daily bread. Man does not live by bread alone and so there are undoubtedly other influences that mould and fashion the thoughts of men and women.

The geographical factor comes into importance because no human society can live independently of its physical environment. This is the stage on which the play is acted, and the nature of the stage has a conditioning influence on the play itself. In fact, a society lives and has its being by making use of what the geographical environment provides. Thus the position of any country is what no human efforts can change, so that the environment of a people living in an island in the tropics can never be the same as that of people living in an island in the cold regions of the world. The two islands provide two different environments and the course of human development must inevitably differ.

Similarly, other facts such as climate, soils, minerals, must needs influence the lives of human societies. The food of men in tropical climates can never be the same as the food of people in temperate latitudes because what can be grown in one climatic environment cannot be grown in another wholly unsuited to it. Soils too play their part in the lives of men. People living in a poor soil habitat will get a poor return for their efforts while rich soils may lead to prosperity. It has been proved how human societies have perished when they could not effectively check soil impoverishment. Perhaps this is *one* reason for the decay of the early Sinhalese Kingdom.

The presence of minerals has also had a profound influence on the lives of human societies. The deposits of iron and coal in areas like the Tyne and the Ruhr, Birmingham and Lancashire, have completely changed the face of those regions. Areas which were once rural with village gardens, fields and farms, are today densely populated industrial regions.

It is worth while examining the geographical factors behind Ceylon history and in this way to understand the reasons for some of the traits of early Ceylon and modern Ceylon history.

The most significant geographical fact in Ceylon's history is her position in the Indian Ocean. She is an island *close* to India and is related to India as Britain is related to Western Europe and Japan to China. Ceylon is not too far to be left outside the range of Indian influences nor is she so close as to be completely absorbed in Indian history. This helped her to absorb much from India and yet maintain her individuality. What did India contribute to Ceylon's history ?

*Reprinted from Bulletin of the C.G.S., Vol. II, 1947, pp. 56-59, 85-94.

In the first place, the people of Ceylon are of Indian stock. The earliest human settlers of Ceylon were hunters and these came to Ceylon from India in prehistoric times. The Veddas are descendants of these early hunters and they bear a close resemblance to the primitive hunters of the Deccan.

More important than these were immigrants from the borders of Bengal. They were *farmers* and settled down in the West and South-East of the Island. In course of time they became the dominant settlers of the island and came to be known as the Sinhalese. These people had a North Indian script and language, and for many centuries maintained close relations with India. In Asoka's days Buddhism came to Ceylon and to it the *beginnings* of Buddhist art and architecture can be traced. When the Andhras flourished in the Deccan, the people of Ceylon were linked to them by bonds of a common faith and Andhra influence in Buddhist art can be seen in the 'Oyikas' or ornamental facades of dagobas, the earliest attempts at statuary in limestone. In later days when the Guptan civilization flourished in India, Ceylon too received the benefits of the Indian cultural Rennaissance. Sanskrit became the classical language and cultural men in Ceylon were steeped in it. This literature opened to men a wider vista of life and knowledge of the world than the Pali language had done. It helped people to study mathematics, politics, grammar, rhetoric, astronomy and medicine besides introducing them to a world of romance in the great Indian epics and the plays of Kalidasa, the love poetry of such writers as Bhartihari. To people whose outlook had been other-worldly, this literature of the world must have come with as much of an awakening to the beauty of this world as Greek literature awakened in Medieval Christendom.

Guptan art with its love of the beauty of the world is reflected in the Sigiriya frescoes. Here is a light reflected from Ajanta. The theme is woman and it is interesting to note that a visitor to Sigiriya many centuries after Kasyapa's death, scribbled a verse on the parapet wall to ask whether these ladies had their hearts turned to stone after their lord's death, for why should they have no eyes for him! This is a voice of the Italian Renaissance. It is not the voice of Medieval Buddhism.

Another link with Guptan India is the group of figures found at Isurumuniya. It shows a soldier with a lady seated on his lap. They were perhaps lovers, and their happiness has been immortalised in stone by some unknown artist.

> "Bold lover, never, never cans t thou kiss,
> Though winning near the goal—yet do not grieve;
> She cannot fade though thou has not thy bliss
> For ever wilt thou love and she be fair."

From the 8th century A.D. South Indian influence began to play a great part in Ceylon's history. It was the era of powerful South Indian kingdoms and Ceylon was subject to frequent invasion until in 1015 North Ceylon became a part of the Chola empire. It remained so till 1072 when Wijayabahu I freed Ceylon from Cholian rule.

These years of South Indian occupation brought Hinduism into Ceylon. Hindu devales of this period can still be seen at Polonnaruwa and the effects of

South Indian architecture can be seen in the decorative designs on the walls of Polonnaruwa viharas. By invasion and perhaps more by peaceful penetration South Indian people soon made their home in the northern and east coastlands of the Islands.

Thus the framework of the history of early and medieval Ceylon is entirely Indian. The religions of her country, her people, her arts and crafts, her systems of administration, her philosophical and scholastic studies can be traced to Indian origin. What the Island's debt to India is and how deeply her history has been coloured by Indian influences can be seen if one compares the history of Ceylon with that of other islands such as Sumatra and the Andamans which remained outside the ambit of Indian civilization.

## Part II

If one considers the relation of Ceylon with regard to lands round the Indian Ocean, the importance of the Island's position will be apparent.

The Indian Ocean is divided into two sections by the peninsula of India, and Ceylon lies to the south of the Peninsula. On the east is the Bay of Bengal with an eastern fringe of land extending from Burma to Australia. The Straits of Malacca is a significant gap in this land fringe giving access to the China Sea. On the west side is another fringe of land extending from Arabia to the Cape of Good Hope. This land fringe has an important gateway westwards in the Persian Gulf and another in the Red Sea.

Ceylon's position is thus mid-way between the eastern and western halves of the Indian Ocean, and traffic lines went past her at all times from the past to the present and will no doubt in the days to come.

In the very early days when ships kept close to the coast, vessels from the west from Arabian and Persian ports sailed along the coast past " Makikurain, " modern Makran—the coast of the fish eaters—to " Erinon " or the Rann of Cutch and so arrived in Indian ports such as Calliana (Kalyan—Bombay) to Nelkyndaor (Nilakanta) and no ship could sail into the Eastern ports without sailing past Ceylon. Similarly, ships from the east sailed through the Straits of Malacca to the " Golden Chersonese "—the coasts of lower Burma and the Malay Peninsula. On their way westwards they touched at ports at the mouth of the Ganges and sailed south along the east coast of India and in this way reached Ceylon. It is significant that in the era of coastal traffic headlands became important as "sign-posts ". Two such are found in Ceylon—*one* on the north-west " Kudremalai " and *one* on the north-east " Trikanemalai. "

In the second century of the Christian era, a great discovery was made by a Greek navigator, Hippalu. He understood that the south-west monsoon blew as a west wind off the south coast of Arabia and if a ship set sail with this wind it could cross the north Arabian sea and reach India. In this way the long and tedious coastwise route could be avoided. But what was equally important was the discovery that a ship could come back with the north-east monsoon to ports at the mouth of the Red Sea or on the coast of Cape Guardafie. These

discoveries were fully exploited by sailors and we learn that over 140 ships would assemble at Eudaemon Arabia or Aden to await the south-west monsoon and set sail on the ' Indian Voyage. ' Similarly ships from the Far East used to assemble at Takolamash (Kedah) at the mouth of the Straits of Malacca and set sail with the north-east monsoon for South Indian and Ceylon ports and return with the south-west monsoon.

Another fact of importance is that great ocean drifts were set in motion with the monsoon. Thus when the south-west blew a great ocean drift started past Guardafie and swept across the Arabian Sea towards the west coast of Peninsular India. This then swung south and *went past the south of Ceylon* towards the head of the Bay of Bengal. It next turned south following the coast of Burma and the Malay Peninsula and entered the Straits of Malacca. Ship-masters used to set their ships in this drift and move with it and in so doing they *inevitably* sailed past the south of Ceylon. When the north-east monsoon blew another ocean drift set in from the coasts of Malaya and swept *past the south of Ceylon* westwards to Cape Guardafie. Ships could use this drift to sail west and in this case too they sailed past the south of Ceylon.

We know for certain that ships from the east and the west reached Ceylon, for sailors spoke of a great emporium in Ceylon. Sopater, a Greek who visited Ceylon in the 6th century A.D. tells us :—

> " . . . . This is the great island of the Indian Ocean, situated in the Indian Sea ; which is called by the Indians Sielediba, by the Greeks Taprobane. Two kings reign in the island hostile to each other. It is frequented by a great press of merchants from far countries. In that island is established a church of Christ, of the sect of the Persians, and there is a presbyter sent from Persia and a deacon and the which service of the church. But the natives and the kings are of other faiths . . . . From all parts of India, Persia and Aethopia come a multitude of ships to this Island which is placed as it were midway between all lands ; and it sends ships likewise hither and thither in all directions."
>
> From the inner regions, that is from Tzinista and from the other market towns, are brought silk cloth, aloe-wood, cloves and sandalwood and it forwards them to these of the outside, that is to Male in which pepper grows, to Calliana, to Sinda, to Persia, to the country of the Homerites and Adulis.
>
> And so this Island placed in the midst of India receives goods from all markets and ships to all being itself a very great market."

It is also interesting to note that in much later times Galle was a port frequented by many merchants. A trilingual slab containing inscriptions in Chinese, Persian and Tamil was discovered in Galle. The Chinese and Persian inscriptions refer to money and material set apart by merchants for festivals connected with Adam's Peak, while the Tamil inscription refers to a great festival at Devinuwara or Dondra.

Ceylon was thus from the 2nd century to much later times a sentinel of the Indian Ocean.

## Part III

The conquests of the Mongals and the creation of a great empire extending from the Pacific to the borders of Europe and the eastern Mediterranean, had a profound influence on the history of Asia. The Mongol rulers were not at all averse to foreigners. They were invited to the Court of the Great Khan and traders were specially welcomed. The great land routes across Asia were policed and kept safe so that people could enter and travel in the great empire without molestation.

Such a state of affairs greatly encouraged trade between the East and Europe. Venetian, Genoese and Byzantine merchants made frequent visits to the Court of the Great Khan and we have the account of Marco Polo, the Venetian, to attest the splendour of the civilization of Cathay. The trade routes from China started from the Hoangho Valley and proceeded to the Sinkiang region. One route lay along the foothills to the south of the Tarui desert while the other went along the northern piedmont. These routes entered what is called Russian Turkestan either *via* Kashgar or the Dzungaria gate. The former continued along the southern piedmont and entered Persia. Tabriz was one of the great market towns of the time and from here, landways led either to Byzantine or to the Ports of the Levant. The former entering Russian Turkestan *via* the Dzungarian gate travelled westwards to the head of the Sea of Azov and from here by sea to Byzantium.

Along these routes traders made their way without any interruption until an event took place which closed these routes to Europeans. By the 14th century the Monguls were converted to Islam and the routes across the Near East were not permitted to any, save Muslim traders. The Europeans, unwilling to lose the valuable Eastern trade, began to direct their thoughts to a way to the East by travelling over the sea.

The Portuguese, inspired by Henry the Navigator, discovered a way to the East *via* the south coast of Africa and so were the first Europeans to enter the Indian Ocean. They discovered that their trade could not flourish if their Moslem rivals were not destroyed. They set to work and very soon the Moslem rulers were reduced to impotence. The Portuguese realised that to control the trade of the Indian Ocean certain key positions were necessary. They were Ormusz on the Persian Gulf, Aden at the gate of the Red Sea and Malacca guarding the Straits opening to the East Indies and the China Sea. Yet with all this the Portuguese could not wipe out smuggling and they then realised that without the conquest of Ceylon the control of the Indian Ocean trade was impossible.

A map of the winds and specially the currents and drifts across the Indian Ocean shows that the trans-Indian Ocean currents whether in the south-west or north-east monsoon months all pass the South of Ceylon. Sailing vessels often travel with ocean drifts so that ships sailing east or west across the Indian Ocean had to go past Ceylon.

Further, as Peninsular India juts south into the Indian Ocean and as Ceylon is a further extension of the Indian Peninsula all sea traffic naturally passed the south coasts of Ceylon.

The Portuguese realising this decided to conquer Ceylon. The following letter sent by King Emmanuel to the Viceroy of Goa is quite clear as regards this decision.

**Letter of King Emmanuel to Francisco Almeida:**

"On the return voyage, if it please God, according to the information we have, it appears to us that you can well take the course to Ceyllam, which is a thing of such importance in India, as you know, and in which is much wealth and fun which can be derived under profit. We think it well that you come to it and endeavour to make here in the said Ceyllam a fortress and leave in it some men and vessels with which it can remain more secure: and it appears to us that you ought to use all endeavour for it on account of the advantages that this island possesses; having in it the fine cinnamon and all the choicest of the seed pearls and all the elephants of India and many other wares and things of great value and profit; and being so near to Malacca and the gulf of Bengal; and being near to Kayal; *and lying in the track of all the ships of Malacca and Bengalla and none being able to pass without being seen and known of in that part*; and being near to the archipelago of the 12 thousand islands; and the fortress that may be made there being so near to India; and therefore it appears to us that your principal residence ought to be there since it seems that you are in the centre of everything and that your being there gives more authority to our service and to your person. If your principal residence being in this island of Ceyllam since it appears that from here you can better provide for and assist in all things than from any other part on account of your being in the centre of all the fortresses and things that we have there . . . . We are pleased to commend for the accomplishment thereof."

The Portuguese therefore were anxious to occupy Ceylon not because of the island's resources but because of its very valuable position. It was from Ceylon that the Portuguese could really police the trans-Indian ocean routes and the island came to be the sentinel of the Indian Ocean.

The Dutch in their turn realised the value of Ceylon for the control of the trade in spices. They occupied the Cape of Good Hope, the Mauritius islands and *Ceylon*. Dutch vessels entering the Indian Ocean were supplied with fresh food at the Cape and the south-west monsoon winds brought them direct to Ceylon *via* Mauritius. Ceylon was thus *central* to the trade routes of the Indian Ocean when sailing ships used the 'Cape route' and the cargoes of value were to be found in the spices of the East.

The occupation of the island by the British was in the first place not connected with any desire to control the trade of the Indian Ocean. The wars of the French Revolution also led to war between the French and British East India Companies. In this struggle the British East India Company discovered that ships damaged in a naval engagement in the Bay of Bengal could not be effectively repaired in any port on the Bay of Bengal owned by the British.

The best harbour for this purpose was Trincomalee and the Dutch held it. Negotiations for the use of the harbour were completed with the Dutch King

when in exile in England but the newly formed Dutch Republic would have no friendly relations with the British as they were allied with the French.

When the British, in accordance with the exiled king's order, attempted to enter Trincomalee they were resisted by the Dutch. The British then occupied Trincomalee by force of arms and later occupied all the important harbours of Ceylon lest they should fall into the hands of the French.

The British held the Maritime Provinces hoping when hostilities were over in Europe to hand over the island to the Dutch. But by the Treaty of Amiens Ceylon was ceded by the Dutch to the British. This was how the British came to acquire the Maritime Provinces of Ceylon.

The importance of Ceylon's location did not diminish with the passing of time. The opening of the Suez Canal made Ceylon an important half-way house for ships bound for Australia or the Far East. It will be seen that Galle is the nearest point to a great circle sailing south from Aden to Australia and the Far East. Thus Galle became the most frequented port of call in early British times and it was when coffee, tea and rubber developed in the south-west that a more convenient port had to be constructed at Colombo which was more centrally situated to the planting districts than Galle.

The great strategic value of Ceylon was re-emphasised when the second World War broke out and Japan formed the hostile power. When Singapore fell by a sudden sweep over the land, Trincomalee was the only naval base left to the Allies. The Headquarters of the South-East Asia Command were established in Ceylon and the counter-offensive was planned from Ceylon.

Ceylon is vital to the defence of India. If an enemy power occupied Ceylon an invasion of India by air and land would be a matter of a few days. Air power plays such an important part in modern war that Ceylon would be an air base for hostile attacks on Indian ports and industrial centres.

Ceylon is for the same reason vital to the policing of sea routes from Britain to Australia and East Africa. In fact, if Ceylon falls into the hands of an enemy with powerful air and ocean fleets, that power will control the Indian Ocean.

Ceylon is thus one of the key points in the system of the British Commonwealth defences and this is primarily based on the fact that Ceylon has been for all the time the sentinel of the Indian Ocean.

## Part IV

The Island's pre-history is wrapped in myth and legend which no doubt is based on a substratum of fact. The earliest known inhabitants of the Island were hunters, and we have evidence that even hunters of the stone age lived here. Evidence of this is found in the uplands of the Uva and the Mavalatenne plateau where stone implements and caves containing artefacts have been discovered.

The Yakkas were no doubt a race of hunters, and we believe that the Veddas are the descendants of these hunters, then they no doubt are kith and kin of the hunting tribes of the Deccan such as the Bhils and Gonds.

Recorded history in Ceylon begins with the coming of a community of farmers from the borders of Bengal. These were the forefathers of the Sinhalese. There is good reason to believe that they arrived in more then one stream of migration and that one of these settled down in the north-west and the other on the south-east of Ceylon. It was out of these settlements that the Sinhalese people and their kingdom came to be established over the whole Island.

Our earliest records tell us of Vijaya and his band landing in the north-west and in course of time they built villages and made their home here. Such were Uruvela, Upatissagama, Vijita and Anuradhagama. In the south-east too village settlements were established, the most distinguished being Magama and Kajaragama.

These earliest settlements were made in what we call the *Arid Zone of Ceylon*. The rainfall here is seasonal and the annual rainfall varies from 25″-50″. The air is relatively dry and the sunshine more or less uninterrupted save for the wet days from September to December. The dry season began in May and ended in August. Such conditions did not encourage thick forests. The natural vegetation is sparse and land could be easily cleared by fire in the dry season. Such an environment is favourable for the settlement of the land by paddy farmers. Moreover, the Kala Oya, the Malvali Oya and Walawe-Kirindi Oyas have built extensive flood plains providing suitable soil and land for paddy. The wet season was the growing season and when February arrived the paddy was ready to be harvested. On the uplands where less jungle stood, clearings were made by fire, and garden crops cultivated. In this way the early agrarian people were able to establish themselves. Their houses were on the banks of rivers so that they were sure of supplies of water. Tank building had not yet begun.

There was, however, one disadvantage in this otherwise suitable environment. The rainfall of 25″-50″ was barely adequate as most of it was evaporated by the sun's heat. Above all, the rain was not reliable and the wet season did not bring adequate rain every year. This brought in an element of uncertainty and insecurity to the farmers. Very soon migration to more favoured regions began.

You will perhaps appreciate the significance of the Arid Zone as the cradle of the Sinhalese and how suited it was, if you can imagine the early immigrants landing in the *Wet Zone* on the south-west of Ceylon. The paddy farmers would never have flourished here because the south-west of Ceylon does not suit paddy cultivation. This would have made settlements of paddy farmers here impossible and the history of Ceylon would never have been the story of the development of an agrarian community.

The first phase of Ceylon history is thus closely connected with the Arid Zone. It was the stage on which the first act of Ceylon's history was played.

The next phase in our island's history is often called *Anuradhapura period*. The scene has now shifted to the *Dry Zone* where conditions are superior to the Arid Zone for the growth of an agrarian society based on *grain cultivation*.

Let us recapitulate the geographical conditions of the Dry Zone. The rainfall is once again seasonal but is much heavier than in the Arid Zone, being 50″-75″ for the year. This favourable factor would enable heavier and more certain harvests of grain and enable a large number to live on the land. Further, more *extensive* and *more fertile land* too was available, in what is today the Nuwara Kalawiya district. In the Kalagam Palata alone, soil of extraordinary fertility is found and it is not in the least surprising that the Kalawewa was built to irrigate these lands.

In this second stage of our history, the Sinhalese developed a marvellous system of irrigation by tanks and canals. This enabled the people to gather a second harvest so that the September-January period was utilized for cultivation with the aid of rain and in the Dry Season of May-August fields were cultivated with the aid of tanks. The significance of these two harvests is great. In the *first* place, more people could be fed and the need to grow more was due to an increasing population. Increased paddy meant more revenue to the State so that the Anuradhapura period was a period of prosperity based on successful production of grain. The great reservoirs that supplied the life-giving waters through the land were the Nuwara Wewa, Kala Wewa and the Padawiya. It is not in the least surprising that the western part of the North-Central Province is called the Nuwara-Kalawiya district after these three great tanks. They are a memorial to the greatness and prosperity of the early Sinhalese.

There is one interesting fact to be noted about *paddy cultivation*. Paddy is the most difficult grain to grow. The land has to be levelled, ploughed and ridged. The water has to be let in and the soil worked into a fine paste. After the seed is sown the water has to be controlled until at harvest time the field is allowed to go dry. Then comes harvest which was gathered by hand.

All these labours needed many workers and without the *co-operate* effort of the inhabitants paddy could not be grown where there was no machinery to take the place of men. Paddy cultivation led to the *creation* of *gamas*, where society was established on the basis of groups, one group co-operating with another for the general well-being of the whole of that society.

Paddy is also the *most* prolific of all grains and an acre under paddy yields more bushels of grain than any other food grain known to man. It can therefore *feed* and *maintain at home* large populations. If the population increased, more land was brought under cultivation and more harvests gained by building tanks to enable cultivation in the dry season. There was thus no need for people to go *beyond* the sea or to engage in other pursuits. It is interesting to note that the Sinhalese were never a race of seafarers or traders. They had no need to seek their living beyond the homeland by trade and traffic with other lands. In marked contrast are the people of South India where the barren land drove her sons beyond the sea to seek a living.

Paddy cultivation thus created a *static* society—a *stay-at-home* people. The village became the *unit* of settlement and administration and *co-operation* the way of life for all. Towns were very few because townsmen do not grow their own food. They have to live on the food raised by the village dweller. Now in

those days when there was no extensive internal trade, the peasant produced as much grain as he needed for his food and the payment of taxes. There was no surplus grown for trade so that many towns could not exist for want of food. The result was that towns were few, the most important being Anuradhapura. This was the place of residence of the King and was naturally situated in the *heart* of the great agrarian district of the Nuwara Kalawiya.

The next phase in the early history of the island is often called the *Polonnaruwa period* after the capital city of the kings at this time.

Polonnaruwa was selected as a capital by the Cholians in 1015 when they made north Ceylon a part of their empire. This place was chosen for strategic reasons. The Cholians were aware that any attempts to wrest the north country from them must inevitably come from Ruhuna rata. There were two important fords of the Mahaveli Ganga and it was at these points people crossed the river. One was at Dastota and the other at Mahagantota. Polonnaruwa is at a point equidistant from these two and it was also on the road from these fords to the old city of Anuradhapura. In fact, there was even in much earlier times a fortress where Polonnaruwa now stands. Elara who conquered the north country a hundred years before Christ, had his fortress of Vijitapura built to keep watch on movements of people across the Mahaveli. This fort was near to Polonnaruwa and even in the 13th century the southern suburb of Polonnaruwa was called Vijita.

Thus foreign rulers selected Polonnaruwa as a frontier capital to withstand attacks from the indigenous people in much the same way that *Peiping*, *Peshwar* (Purushapura) and *Delhi* (Indraprastha) were chosen as capital cities.

When the Sinhalese in 1072 drove the Cholians away and Vijaya Bahu became king, Polonnaruwa still remained as the capital city. Vijaya Bahu too had to face hostile attacks from Ruhuna because the feudal nobility here had not quite acquiesced in his rule over Lanka. Even after his death when Parakrama Bahu the Great was king, Polonnaruwa continued to be the royal capital and at this time too Ruhuna was far from being subservient to the rule of the Polonnaruwa kings. Parakrama Bahu the Great had to wage a 10-year war with his relations in the Ruhuna before he was master of all Ceylon.

Another reason explains the continuance of Polonnaruwa as a capital city. Like Anuradhapura it was also the centre of an extensive region of agricultural production. The Minipe ela and the Kalinga ela, together with the great Parakrama Samudra supplied the water used to cultivate what we today call the Tammankaduwa district. Its clay soils are to this day among the best paddy lands in the North-Central Province.

**The Drift to the South-West:**

The period of the island's history from 1215 A.D. is often and rightly called a "*period of decline.*" When the Sinhalese were compelled to abandon the region suited to paddy cultivation for one like the Wet Zone not so well suited for paddy, the result was that *revenue* from grain declined and what was worse,

*food* also became less plentiful. In course of time the man-power of the country also declined so that the Sinhalese as a nation declined in prosperity and national strength.

The south-west of the island belongs to the Wet Zone and this climate though unsuitable for paddy is nevertheless ideal for palms. The high temperature and steady rain throughout the year also encourage rapid vegetative growth so that the leaf, and bark and sap of plants are maintained in vigorous growth throughout the year. If any of these are of *food* or *commercial* value, then there is the possibility of economic development of this region and the existence of a prosperous community.

The Sinhalese came into the Wet Zone for safety and the dense forests and marshes were certainly impenetrable defences. But *food* was hard to get as grains do not grow well, and the Sinhalese were thus compelled to change their time-honoured and familiar mode of life based on subsistence agriculture for the precarious one of trade. *Money* would thus become the *nexus* of society, not *land holding* as it used to be.

The first of the articles of trade was Cinnamon as this plant grew wild in the forests of the south-west. Muslim traders came to Ports such as Puttalam, Salwat (Chilaw), Migamuwa (Negombo) and Kolantota (Colombo) for Cinnamon and we know that the kings of Kotte certainly derived the greater part of their revenue from the cinnamon trade. In fact the capital city of Kotte defended by river and marsh, was in direct communication with the Port of Kolantota. Barges of cinnamon sailed down the Kelani Ganga and entered the harbour *via* a distributory of the river which flowed past the spot where the Khan Clock Tower stands today. Close to this distributory were the Moslem store-houses (Banga sala) along what is today known as Bankshall Street. We also know that the Kings of Kotte shipped cinnamon to South Indian ports such as Adriampet. But this new line of economic development was fatal to the economic structure of the earlier feudal state. The lack of land and the climatic unsuitability for paddy destroyed the *food* and *man-power* resources of the people. When later they had to face constant attacks from such foes as the Portuguese, man-power declined very rapidly and the Kingdoms of Kotte and Sitawaka fell never to rise again. Here is the proof that an ancient State based on paddy cultivation although it flourished in a climate suitable for this grain, declined rapidly when forced to occupy a habitat unsuited for paddy cultivation.

Another part of the island was also occupied by the Sinhalese after they were forced out of the Dry Zone. This was the hill country of the island where a Sinhalese kingdom lasted well into the 19th century.

The Kandyans, as this section of the Sinhalese people came to be called, to distinguish them from the Low-Country Sinhalese, occupied the land over 1,000 feet and geographically called the "Kandyan Plateau." This included the Matale District, the Kandy District and the "Uva Basin." Dense forests enclosed this State on all sides and by Royal decree the forests were never cleared because they were nature's ramparts of defence. On the north there was a pathway through the Nalanda Pass to Matale and Kandy. On the west there were

the Weuda and Balana Passes, while on the east there were the Alutnuwara gap and Passara gaps leading to Kandy and Badulla respectively. On the south there were two high mountain passes, at Idalgashinna and Haputale, but very rarely did danger come this way. These passes were the only way whereby foreign trade from Puttalam, Batticaloa and Kotiyar entered the Kandyan Kingdom.

When the Sinhalese entered this mountain home, they were compelled to adapt themselves to its environment. Being paddy farmers they instinctively selected those regions within the hill country which favoured grain cultivation. If you draw a line joining up Matale, Kandy, Nuwara Eliya and Haputale you get two divisions of the hill country, the one to the east being a dry, while the one to the west is a wet region. The dry region has a rainfall of 50″-75″ for the year for the most part and as this rainfall is seasonal it provides a regime most suited to the cultivation of grain, fruits and fibres. In fact, the climatic conditions here are akin to those of the Dry Zone lowlands save that elevation brings about a lower temperature.

In this Dry Zone of the hills the Kandyans found a home suited to the cultivation of paddy. But, of course, the more rugged relief compelled them to devise a *new technique* of cultivation and irrigation. The slopes had to be terraced with great care and mountain streams had to be utilized to irrigate the fields in the dry season. The terraced paddy fields are undoubtedly one of the greatest achievements of the Kandyans because it showed how well they had adjusted themselves to their mountain home. Paddy does not grow well above the 3,000 feet elevation as low night temperatures are hostile to the plant. In these elevated regions the forests grew thick and supplied the timber and game for the villages. In the Uva Basin, the upland grasslands known as " patanas " were often used for ' chena ' crops or for the grazing of cattle. In these ways the Kandyans made a home in the Dry Zone of the hills, but they never could develop the Wet Zone as it was in no way suited to their economy. The forests here were a wall of refuge from invasions from the south-west and many a time the Kandyans beat the Portuguese and Dutch who attempted to make their way through the forests.

The Kandyan Kingdom was, however, not a very rich or populous Kingdom. It could not be, because a hill country may be a refuge of *freemen* but not a home of *prosperous men*. If we are to believe Knox, the standard of living among the Kandyans was not high and they were as a people poor. But in their forest encircled mountain home they developed a typically Kandyan culture. They specialised in *wood carving* and it is interesting to note that they made marvellous use of timber for structural purposes just as the kingdom of the plains used clay, limestone and granite. The '*Kandyan roof*' as their characteristic roof style has been called harmonises wonderfully with a mountain environment in much the same way as Nepalese and Chinese pagodas harmonise with the natural environment. The Kandyan Walauwas were in keeping not only with the land but the times as well. The Kandyans throughout their history had to keep watch against invasions and many a time foreigners, especially the Portuguese harried the land. In such a land a home has to be a fortress as well, and these features are noteworthy in the more ancient Walauwas. Kandyan music too is characteristic of

a mountain people and there is something most attractive in the Kandyan flutes as the music echoes from valley to valley.

The Kandyan Kingdom fell for many reasons, one of which was the gradual falling off in *man-power*. An agrarian community based on *paddy* cultivation cannot be very numerous if the environment is not altogether favourable for paddy. Such numbers as can exist will gradually fall *if constant* wars take away the manhood of the community. The invasions by the Portuguese and the final harrying and laying waste of the Kandyan Kingdom in 1818 broke the strength of a proud and independent people and Keppitipola's brave death was typical of the end of his people.

The scene of those activities which characterise modern Ceylon is the south-west and centre of the island falling within the area known as the Wet Zone. This region is humid and the rainfall heavy and well distributed throughout the year. The temperature is also uniformly high—about 80°F. except on the higher hills. In such a climatic region forests will grow thick and fast because there is *no dry season* to check plant growth, and plants will develop leaf, and bark and sap all the year through. Forests such as these which are evergreen, humid and with vast areas of swamp and marsh are *very* difficult to clear. There has to be a constant battle against the jungle in places where man has succeeded in making a clearing, for wild plants grow almost overnight.

Palms also thrive in this climate. The *coconut palm* grows best along the coast " within sound of the sea " and up to an elevation of 2,000 feet at which the average temperature will be about 73°F. The *areca* and the *kitul* palms grow well inland but these too disappear about 3,000 feet above sea level.

The economic exploitation of the natural vegetation of the south-west began with the export of *cinnamon*. The Kotte Kings drew a good share of their revenue from the sale of cinnamon and when the Portuguese took over the Muslim trade, they monopolised its exploitation and commerce. The Dutch realising that supplies of cinnamon were insecure as long as it grew in forests which the Kandyans could destroy began to *cultivate cinnamon plantations* close to *fortified* places on the coast. In this way ' gardens ' were opened out near Negombo, Kadirana, Ja-ela, Colombo, Mount Lavinia, Kalutara, Alutgama, Galle and Matara. Labour supplies were ensured by the monopolisation of the labour of the cinnamon peelers, who were registered under a Captain of the Cinnamon Department and kept on the task by methods which were not far removed from slavery. Each cinnamon peeler had to pay a " body tax " in cinnamon, his tax to begin at the early age of 23 and ending in old age. Any cinnamon peeled over and above the quota fixed as body tax was paid for at a very low rate.

Besides cinnamon, the palms too provided the Dutch with commercial products. Arecanut was sent to South India where there was an excellent market for it and one Dutch Governor reported that if the sale of arecanuts was well organised, the cost of maintaining the army could in this way be realised. *Arrack* was despatched to the East Indian and South Indian markets while *vinegar* was shipped to Holland. There was no great demand for coconut oil, but coir was needed for shipping and naval stores.

The Dutch attempted to introduce new crops to Ceylon but met with no great success. Among these were coffee, cotton and mulberry. Paddy was encouraged to cut out imports necessary to feed the company's employees.

When the British took over the Maritime Provinces cinnamon was the most important product. But after 1818 when the Kandyan Kingdom was annexed and specially after 1832 *coffee* was begun round Kandy, Matale and Gampola step by step. For many years *coffee* was ' king ' in Ceylon. The forests of the wetter half of the hill country were cleared and estates opened up. Roads and railways followed because coffee was grown for export. Even the Kandyans were tempted by this plant as it grew well in village gardens and provided an ample return on small holdings. The rapid expansion of plantation agriculture was not altogether a good thing because very little was done to encourage *subsistence* agriculture. This led to the gradual impoverishment and decay of the *peasantry* who were drawn into the estates as daily paid workers. On the other hand, a new class of people arose, namely, Sinhalese business men, who acquired *capital*, and they later became the ' middle class ' of a *new society* which arose with the development of plantation agriculture. The construction of roads and, later, railways helped to break up the isolation of the countryside ; it increased internal trade and brought people into contact with one another. The attitude of mind that referred to people as of this or that village gradually disappeared and with it much of the parochialism common to a feudal community.

Plantation agriculture brought *cash* into common use. This helped to undermine the system of personal services known as Rajakariya, for now services could be paid for in cash.

When coffee failed, tea took its place on the hills of the Wet Zone. It fitted the mountain environment because hill slopes can be utilized for tree cultivation. The heavy rain encouraged the growth of leaf and bud and these were the commercial products of the plant.

In 1902 Rubber came to be systematically grown in the lower sections of the Wet Zone. Being a native of *Hot* Wet lands it does not thrive at elevations of over 2,000 feet. The steaming moist foothills of Central Ceylon, the Kegalle, Ratnapura and Kalutara Districts were ideal for its cultivation, and as these areas are close to the port of Colombo the problem of transport was not at all difficult.

By 1911 Coconut estates for the large scale production of copra, desiccated nuts and coir were opened out in the Chilaw, Kurunegala and Negombo District.

The land utilisation involved in the development of these forms of agriculture was confined to the *Wet Zone*. In course of time the scene of economic and political activity was shifted here, towns sprang up and the inhabitants of the Wet Zone had all the advantage of education, trade and commerce and almost a monopoly of employment in all manner of ways. The English educated persons became aware of the value of political rights and began to ask for an increasing share in the government of the land. *Political associations* such as the Ceylon National

Congress, the Low-Country Products Association, etc., organised an agitation for political rights and very soon newspapers devoted to Ceylonese interests took their place side by side with those primarily connected with European trade and business.

In these ways the south-west of Ceylon became the most populated and economically the most important region. The people living here came into active contact with the outside world and were thus more progressive than the people in the more remote parts of the island. A complete transformation had taken place in the evolution of a feudal State into a modern democratic State. The habitat of the former was the Dry Zone favourable to paddy cultivation, while the habitat of the latter was the Wet Zone well suited to the development of plantation agriculture.

# NOTES ON THE WILGOMUWA COLONIZATION SCHEME

By P. G. Cooray

## INTRODUCTION

The hamlet of Wilgomuwa (it can hardly be called a village) is situated about two miles from the west bank of the Mahaweli Ganga, and nine miles east of Pallegama in the Matale District. To reach it one has to travel 23 miles from Elahera along a road which is motorable only in dry weather up to Pallegama, and jeepable the rest of the way.

In the course of geological survey work the writer spent a week in February, 1955, in the Wilgomuwa area and saw for himself the progress of the colonization scheme. These notes were made during that visit, and the author is grateful to the Colonization Officer, Mr. Crusz, for much of the information.

## PHYSIOGRAPHY

The Wilgomuwa area is part of the alluvial flood-plain of the Mahaweli Ganga, but is characterised by the presence of numerous small hills with bare rock surfaces. These are *inselberge* or erosion remnants of migmatitic granite gneisses standing up from the lowest peneplain which surrounds the Island on three sides. A few miles west of Wilgomuwa are the foothills of the Knuckles Massif which dominate the area on that side. The erosion remnants are all rounded in form, with bare rock surfaces on the sides and top. Sometimes the surfaces are covered with short grass while a few stunted trees have been able to put down shallow roots in crevices and cracks. In between these rocky hills are flat alluvial stretches in which are situated a large number of small tanks, abandoned until quite recently.

## HISTORY OF COLONIZATION

About 40 years ago there was a much more permanent settled population in the area, living in a number of villages scattered about the area. Nearly all the tanks were in decay, and the only cultivation was of *kurakkan* in chenas. It was a desolate and forgotten area of Ceylon, almost completely isolated from the centres of civilization. The people of the area are nearly all of Veddah descent, a fact evident in their stature, features, speech, in the names of the villages and in the fact that they refer to their ancestors as " veddiparamparana " and to outsiders as " ratawaru ".

In the 1940's efforts to rehabilitate the area were made by the restoration of some of the tanks, *e.g.* Wilgomuwa Wewa, Oggumuwa Wewa and Radunne Wewa ; these were not very successful largely owing to the isolation of the area and the lack of good means of communication with the rest of the district.

It was in 1953 that an Assistant Government Agent of Matale felt that it would be possible to carry out full-scale colonization plans for the landless peasantry in areas to the west by settling them in and around Wilgomuwa, and a scheme was begun of allotting land to peasants from Laggala Udasiya Pattu,

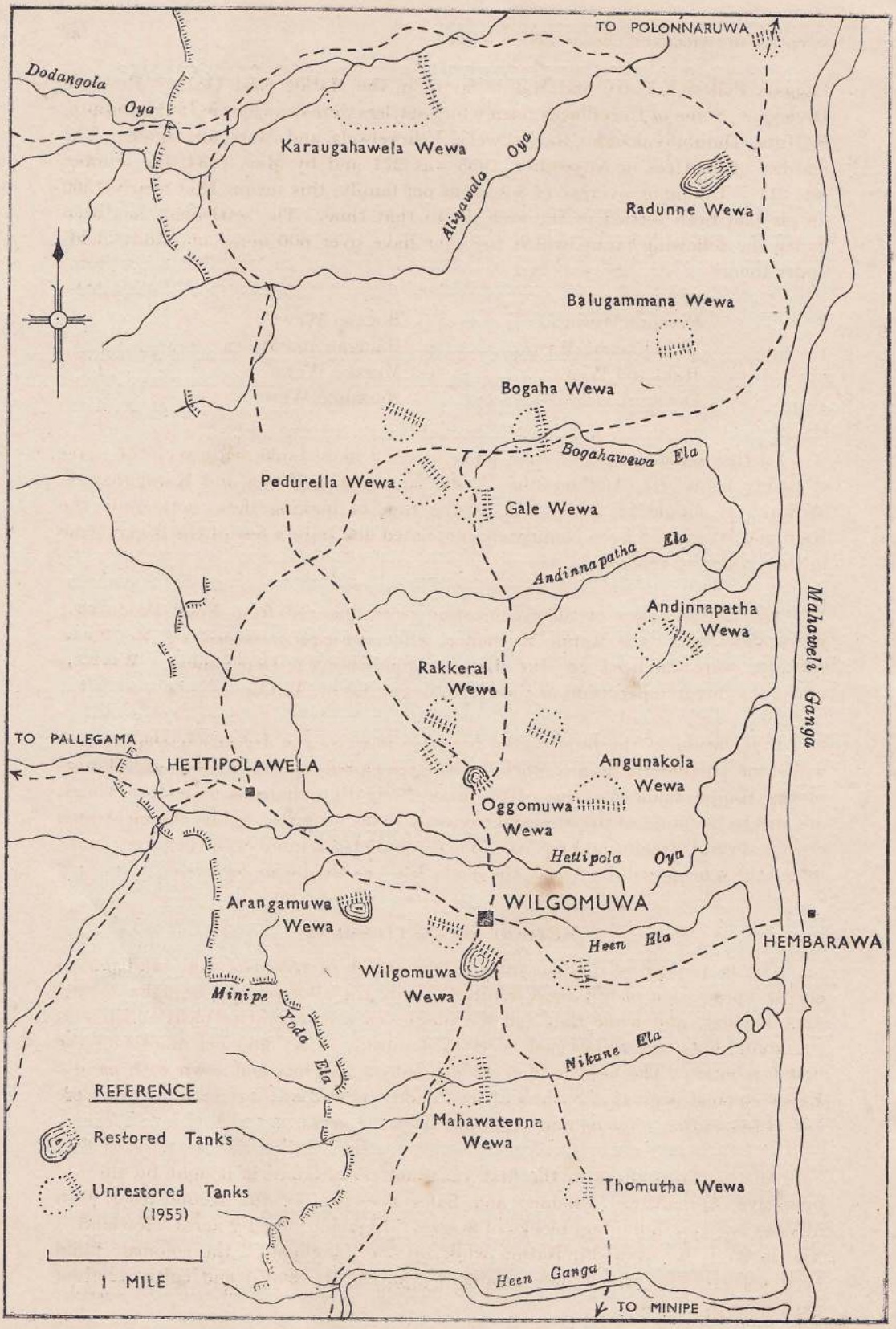


Fig. 1.—Map of Wilgomuwa area.

Laggala Pallesiya Pattu and Matale South in the Matale East District Revenue Division. Some of the villages from which settlers were drawn were Illukkumbura, Rattota, Hambiliyakadde, Galgediwela, Uduwelwela and Moragahaulpota. The number of allottees in November, 1953 was 271 and by May, 1954, the number was 311. Taking an average of 5 persons per family, this means that nearly 1500 people had been settled in the area up to that time. The settlement has been under the following tanks, which together have over 600 acres of paddy fields under them :—

| | |
|---|---|
| Wanora Wewa | Bogaha Wewa |
| Kekilletenne Wewa | Balugamana Wewa |
| Rakkarel Wewa | Marake Wewa |
| Devagiri Wewa | Radunne Wewa |

Further settlement is to take place under 3 more tanks with over 700 acres of paddy fields, viz. Andinapatha Wewa, Angunukole Wewa and Karagahawela Wewa. (It should be noted that at the time of making these notes only the Radunne Wewa had been completely renovated and only a few of the others were in the process of repair).

The initial stages of the colonization were financed from Food Production votes allocated to the Matale Kachcheri while subsequent stages, *e.g.* the house subsidy, were financed by the Land Commissioner's Department. Work is under the direct supervision of the Government Agent, Matale.

Renovation of the large tanks is being done by the Irrigation Department while the smaller tanks are officially being repaired by the Kachcheri. Traces of the Minipe Yoda Ela, one of the major irrigation channels of historic times, are still to be found in the area and there are plans for restoring the channel which crosses several streams and rivers. When completed a number of the larger tanks under the scheme will be fed by the Yoda Ela—as they were formerly.

## METHOD OF SETTLEMENT

The two essential qualifications in the choice of colonists were landlessness and the possession of fair-sized families. Only the allottees are brought to the area at first, and while they fell the jungle on a co-operative basis and live in communal huts or *wadiyas* each receives a subsidy of Rs. 20/- per month for the first 9 months. The land is then divided into 2-acre lots and sown with paddy. Every colonist is given 4 bushels of seed paddy as well as other seed material like *kurrakkan*, *maize*, *sorghum* and vegetable seeds.

All this takes place in the first year and the produce is bought by the Co-operative Agricultural Produce and Sales Society. In the second year each allottee is given individual blocks of 3 acres " highland " and 2 acres " lowland ". The latter is for asswedumisation while on the " highland " the colonists build their cottages (for which they receive a grant of Rs. 800/-) and cultivate their garden crops.

## CULTIVATION

A proportion of the settlers are indigenous villagers, many of whom have small-sized paddy fields. As is common in the Dry Zone, such peasants who practise both settled and shifting cultivation, are kept busy throughout the year, as can be seen from the summary given below :

*Mid-June :* Start chena felling. Generally the chenas are nearby, but some have to go 10 to 15 miles away.

*July-September :* Lower the jungle and cut and stack the branches.

*Early October :* Forest is set on fire ; stumps which fail to burn are stacked and re-fired. The balance sticks are used to fence the plot.

*Rest of October :* Maize is " dibbled ", *i.e.* a small hole is dug in which the maize is planted ; 3 to 4 seeds per " hill " (a mound erected by covering over the holes with soil). The " hills " are spaced sporadically. *Kurrakkan* is sown (broadcast) on higher spots between the maize.

*November :* Families are brought to the chena plots ; paddy is sown on the lower land, and pumpkin creepers are trailed on partly burnt stumps.

*Early January :* Harvesting of the tender maize and of earheads of *kurrakkan*. (This forms their main subsistence until mid-March when the paddy is harvested).

*Late January :* Mature maize is harvested.

*Mid-March :* Harvesting of paddy.

*Early April :* Threshing of paddy.

*May :* Chena is abandoned, and families with fields return to them with their harvest.

Continuous watching of the chena plots is necessary from mid-November until March-April against the ravages of parrots (who attack the maize) and other birds, elephant, elk, wild boar and stray cattle.

Some of the settlers possess paddy fields which they work from January to May when the harvesting takes place. They sow this with a 3-month variety of paddy which is a " meda " crop, *i.e.* neither Maha nor Yala. The yield of this variety is about 20 bushels per acre, the reason for the poor yield being that tillage is poor, being carried on in a slipshod manner. These peasants thus carry on both chena and paddy field cultivation between January and May—another reason for the poor yields from the fields. (It seems as if chena cultivation in these circumstances is a misguided waste of time and energy, both of which could be more profitably applied to paddy cultivation. Chena work is however a traditional system and it would take many years and generations of carefully directed education to make the peasant see this).

## ROADS AND COMMUNICATIONS

The only line of communication between Wilgomuwa and the rest of Ceylon is through Pallegama, 9 miles to the west, and Elahera, 14 miles beyond that. Eastwards it is hemmed in by the Mahaweli Ganga, across which lies the equally-isolated village of Hembarawa. Communication between Polonnaruwa on the north and Weragantota on the south is difficult, being along the easily flooded and marshy banks of the river.

A motorable road exists between Elahera and Pallegama but it is a gravel road which becomes almost impassable during the heavy rains of the north-east monsoon. When the author visited Pallegama in late January, for example, the lorry in which he travelled took about 9 hours to do the 15-mile trip. Several of the causeways had to be cleared of silt and leaves before proceeding, while we were bogged down in the mud on a number of occasions.

Up to 1953 this road stopped north of the river at Pallegama, but a causeway was built the following year taking the road right up to the hospital and the centre of the village. In the same year a jeepable road was built from Pallegama to Wilgomuwa, but the heavy rains of early 1955 had washed away parts of the road, flooded the streams and damaged several of the culverts and bridges. As a result travel between Pallegama and Wilgomuwa had to be done on foot, and goods were transported either by head-loaded or in " tavalams " or pack bulls, the last two miles of the journey being extremely tiring as the mud through which one had to struggle was almost knee high. Communication between the different points of settlement was also difficult as many areas were flooded and the rivers were in spate.

It is understood that the road has since been repaired and is jeepable up to Hettipola and from there northwards through Bogahạ into the southern part of the Wasgomuwa Reserve (Fig 1.) This is part of much larger scheme to open up the left bank of the Mahaweli Ganga from Minipe almost up to Polonnaruwa.

As recently as 10 years ago Pallegama could only be reached *via* Rattota and Laggala, a much more arduous journey. Even in 1955 the postal route from Pallegama was via Laggala, the mails being carried to a point half-way from Illukkumbura and transferred to a postal runner from the latter village at that point. The runner from Pallegama returned the same day with the mails for that area.

A bus from Matale comes as far as Illukkumbura, this itself being no mean journey, and those who use this route have to walk the rest of the way. On the other side, hiring cars, generally in the last stages of their usefulness, ply between Elahera and Pallegama. Neither cars nor vans however survive long on this road and while the author was there one of them just broke in two and was abandoned on the side of the road. (It seems to the writer that the most sensible thing to do *first* in all such schemes would be to make secure the communications both to the area and within it, as this is surely the most important and indispensable factor in all development).

## CUSTOMS

Girls marry very early, *e.g.* at 13 or 14 years while the men marry at about 18 or 19. Marriage usually takes place within the family and if outsiders are married the local partner usually leaves the area. It is customary for a man to marry his brother's widow.

Kurakkan *rotis* are the staple food of the Wilgomuwa area but rice has been introduced recently. Hoppers or " string hoppers " are unknown.

# BUILDING MATERIALS USED IN CEYLON

By J. S. Hosking

In determining the requirements of any country for bricks and tiles, traditional practices play an important part in arriving at any decision. As a guide therefore to the more urgent siting of a works in one area as compared with another in Ceylon some idea of local traditional practices is necessary.

The General Report of the Census of Ceylon 1946 indicates that over 60 per cent. or nearly two-thirds of all the houses in Ceylon are of the most primitive one or two-roomed, wattle and daub or cadjan, thatched roof type. Thirty-nine per cent. of all rural houses have only one room; 36 per cent. have two; the situation in Municipalities and Urban Councils where the respective figures are 30 per cent. and 32 per cent. are much the same. Of the remaining houses, 26 per cent. or about one quarter of the total are built of brick or stone with tiled roofs in about equal numbers—the tiles mostly being those of the poor quality local type. Wood, concrete and galvanised iron together account for only about 2·5 per cent. of the materials used for walling houses, although galvanised iron is used on 7.5 per cent. of the roofs of dwellings which are mainly of the sunbaked block or stone tenement type used to house workers on tea and other plantations.

When houses in urban areas alone are considered the picture is somewhat different to that for the Island as a whole. Here nearly 50 per cent. or half of the houses are built in brick with no less than 67 per cent. or two-thirds tiled. Thatched wattle and daub or mud houses, however, still account for a quarter of the town dwellings and some 5 per cent. of the houses—the same figure as for the Island as a whole—is still built entirely of cadjan.

This distribution of the various materials throughout the Island is interesting and throws some light on building practices in the past and possible trends of the future.

## WALLING MATERIALS

*Brick.*—Although about half the urban houses in Ceylon are of brick, there is marked variation in the actual proportions in the various Municipalities and Urban Council areas, the overall variations being from 87 per cent. in Wattegama in a large brickmaking area to only 7 per cent. in Jaffna where all bricks have to be imported. In Colombo and the immediate surroundings, 80 per cent. of the houses are of brick, but in adjacent towns the figure drops to 33 per cent. In the brickmaking areas of Kadugannawa and Gampola, each of these towns has 85 per cent. of its houses of brick, but in adjacent towns the figure drops to 33 per cent.

Nuwara Eliya, strangely enough, although with apparently no brick works in the vicinity, has about the same proportion of brick houses as Kandy and this no doubt reflects the early English development of the town as a summer resort and the import of bricks despite the costs and difficulties of transport. About one half of the houses in the three towns of Badulla, Bandarawela and Balangoda

in the south-eastern highlands and Batticaloa on the east coast, and about one-third of those in Galle are of brick, but the proportional numbers are lower in Weligama, Matara and Hambantota to the east of Galle and on the south coast. In Anuradhapura and Trincomalee the proportion is much the same as in Galle. Apart from Jaffna the lowest relative numbers of brick houses are found in the four Urban Council areas of Kalutara, Panadura, Horana and Beruwela where the percentage ranges down from 18 per cent. to less than 1 per cent.

In rural areas the proportion of brick houses according to Districts only exceeds 20 per cent. in Badulla, 15 per cent. in Chilaw and 10 per cent. in Kandy, Matale, Nuwara Eliya, Trincomalee and Batticaloa. The proportion is lowest in Jaffna where it is less than 1 per cent.

*Mud.*—The most used building material in all Ceylon is mud, either in the form of daub in a timber framework in wattle and daub or as sunbaked mud bricks or blocks. It is the chief building material still in no less than 15 Urban Council areas and accounts for 71 per cent. of the houses in Hambantota, 65 per cent in Ambalangoda, 55 per cent. in Anuradhapura, 45 per cent. in Jaffna and over 40 per cent. in 10 other towns. Twelve per cent. of the houses in Colombo are built of mud, but this figure rises to 40 per cent. in Negombo and even higher in other towns in the Colombo District.

In rural areas, mud accounts for 71 per cent. of all houses which outnumber brick ones 9:1 and stone 6:1. Only in Nuwara Eliya where 50 per cent. of the houses are of stone and in Mannar and Puttalam where over 40 per cent. are entirely built of cadjan is the number of mud houses exceeded in number in all rural districts in Ceylon. The highest proportions of mud houses are in Kurunegala District (86 per cent.) and Hambantota (85 per cent.) and the lowest in Nuwara Eliya (28 per cent.) and Mannar (38 per cent.).

*Stone.*—Stone ranks next in importance to mud and brick as a building material in Ceylon, although in all it accounts for only about 13 per cent. of the houses in rural areas and 11 per cent. in the towns. Included under stone are the crystalline rocks used mainly on the highlands, limestones in the Jaffna Peninsula and laterite or cabook in the south-western districts. The widespread development of laterite deposits along the west and south coasts is reflected in the high proportion of buildings erected out of this material in these areas. In Kalutara District, 50 per cent. of the houses in Panadura and about 40 per cent. of those in Beruwela, Horana and Kalutara are built in stone, presumably mostly laterite. In the south, 43 per cent. of the houses in Weligama, 24 per cent in Matara and 20 per cent in Galle are built of this material. Laterite is also found in and around Colombo and Negombo and although only 11 per cent. of the houses in the former are recorded as built of stone, laterite is definitely much commoner than the figure indicates. It is used widely in Colombo for garden and other walls and it is fairly certain that many houses recorded in the Census as of brick are in fact of laterite. Crystalline rock accounts for 14 per cent. of the houses in Nuwara Eliya and limestone for 17 per cent. of those in Jaffna.

In rural up-country areas crystalline rock has been fairly widely used throughout the Nuwara Eliya District (50 per cent. of all houses), Kandy and Badulla

(each about 33 per cent.) and Matale, Kegalle and Ratnapura (each about 20 per cent.). Laterite accounts for some 20 per cent. of the houses in Kalutara and limestone for 14 per cent. of those in the Jaffna District. The use of stone is quite negligible, except in Colombo (8 per cent.), throughout the rest of the country.

*Cadjan.*—Of the remaining materials cadjan in urban and rural areas alike, accounts for about 5 per cent. of all the houses in Ceylon. Highest concentrations are in the palm-growing districts of Puttalam 46 per cent. (town 22 per cent.), Mannar 43 per cent., Trincomalee 40 per cent. (town 36 per cent.), Jaffna 26 per cent. (town 26 per cent.), Chilaw 22 per cent. (town 33 per cent.) ; in Negombo it is used to the extent of 22 per cent.

*Other Materials.*—Concrete and wood each account for only 1 per cent. of the houses in Ceylon, and except for Hatton-Dickoya with the high proportion of 39 per cent. and Jaffna with 10 per cent. concrete houses, and Wattala and Ratnapura each with 11 per cent. wooden houses, little building in these materials has been practised. Houses of galvanised iron which reach only 0.2 per cent. of the total are even more sparsely scattered, although in Hatton-Dickoya again, there are some 10 per cent. and Trincomalee 6 per cent. of the houses built entirely of iron.

## ROOFING MATERIALS

*Clay Tile.*—Clay tiles of either the cottage or Mangalore type which constitute less than a third of the roofs of Ceylon taken as a whole, are used on over 60 per cent. of urban houses. Colombo with 92 per cent. has the highest proportion of tile roofs, then follow, Kadugannawa with 91 per cent., Ambalangoda, Matara, Gampola, Wattegama with over 80 per cent., Kalutara, Balangoda, Beruwela, Kandy, Gampaha, Matara, Tangalla with over 70 per cent., Panadura, Horana, Nawalapitiya, Hambantota, and Kegalla with over 60 per cent. and Kurunegala and Badulla with over 50 per cent. Tile roofs are less than 10 per cent. in Nuwara Eliya, only 17 per cent. in Hatton and 20 to 30 per cent. in Chilaw, Puttalam, Jaffna, Batticaloa and Trincomalee. Negombo a centre for tile making has only 33 per cent. of its roofs tiled.

In rural areas where thatch is so dominant as the roofing material, Galle District is outstanding in that no less than 50 per cent. of the roofs there are tiled. Tile roofs are also pronounced in Matara (44 per cent.) and in Kalutara (37 per cent.) Districts. Next in order are Hambantota 30 per cent., Colombo 24 per cent., Badulla 24 per cent. and Matale 20 per cent.

The greater number of houses roofed with clay tiles than built of clay bricks is interesting, and of particular significance are the outstanding differences both in the urban and rural areas in the District of Kalutara and to a lesser extent in those of Galle and Matara in the south-west of the Island. In the Kalutara District the ratio of tiled to brick houses is 14:1 and in the Urban Council area of Beruwela, Horana, Panadura and Kalutara it is 77:1, 6:1, 5:1 and 4.5:1 respectively. In the rural areas of Galle and Matara the ratios are 12:1 and 6:1 respectively and in the towns 2:1 and 3:1. These striking differences are probably accounted for

in the first instance by the much greater use of laterite in these districts in preference to brick and in the second by the fact that the clays throughout the region are generally more plastic than the brickmakers will use for bricks so that tiles are frequently the only clay product or at least by far the major one produced in these areas.

*Thatch.*—Thatch, principally of cadjan but also from rice straw, certain reeds and other materials where coconuts or palmyrah palms are not grown, accounts for all but a few roofs over the greater part of rural Ceylon. No less than 90 per cent. of the houses in Puttalam, Chilaw and Kurunegala Districts and from 85 to 90 per cent. of the houses in Anuradhapura, Vavuniya, Jaffna, Batticaloa and Trincomalee are roofed in this way. The percentages drop to 75 in Colombo and Mannar Districts. With the relatively high proportion of tiles in the Kalutara and the south, and galvanised iron in Nuwara Eliya, Badulla and Kandy the figures for thatch fall away in these districts.

While tiles are the predominant roofing material in most towns, thatch accounts for 74 per cent. of the roofs in Batticaloa, 72 per cent. in Puttalam, 71 per cent. in Chilaw, 67 per cent. in Jaffna and Negombo and 62 per cent. in Trincomalee. In Wattala, a northern suburb of Colombo, tiled and thatched roofs are the same with 48 per cent. of each.

*Galvanized Iron.*—Galvanized iron is the only other roofing material of any consequence, but accounts for only 7.5 per cent. of Ceylon's roofs; it is used mostly in the up-country tea growing regions of the Island. Eighty-eight per cent. of the houses in the town of Nuwara Eliya are roofed with iron and 60 per cent. of those in the rural surroundings. Towns next in order of importance with iron roofs are Hatton 63 per cent., Bandarawela 49 per cent., Nawalapitiya 24 per cent., Badulla 21 per cent., Wattegama 19 per cent. and Kandy 11 per cent. The rural areas of Badulla with 45 per cent., Kandy 43 per cent., Matale and Ratnapura each 28 per cent., Kegalle 20 per cent. and Kalutara 12 per cent. galvanized iron roofs follow Nuwara Eliya District in that order. Its use elsewhere is negligible.

*Asbestos.*—Asbestos sheeting, used to a small extent throughout the Island though probably increasing, accounts for less than 0.5 per cent. of roofs in practically every urban or rural area in Ceylon except at Hatton which has the surprisingly large proportion of 17 per cent. asbestos roofs.

*Other materials.*—All other materials such as shingles, concrete and concrete tiles account for only one per cent. of the roofs in Ceylon.

(Summary of Chapter VII of "Report on the Establishment of a Modern Brick and Tile Industry in Ceylon", Ceylon, 1952).

# A NOTE ON LIME-BURNING IN THE KEGALLE DISTRICT*

By P. G. Cooray and P. W. Vitanage

The burning of crystalline and coral limestone for the manufacture of lime is an important and ancient industry in many parts of Ceylon, chiefly along the south-west coast, in certain areas of the Central Highlands, and in the Jaffna Peninsula, but the various methods of burning employed are generally inefficient and maximum recovery is seldom, if ever, achieved. To study the defects in these methods and indicate the way in which they could be remedied, a small area in the Kegalle District was selected and the results of that investigation are submitted in this note.

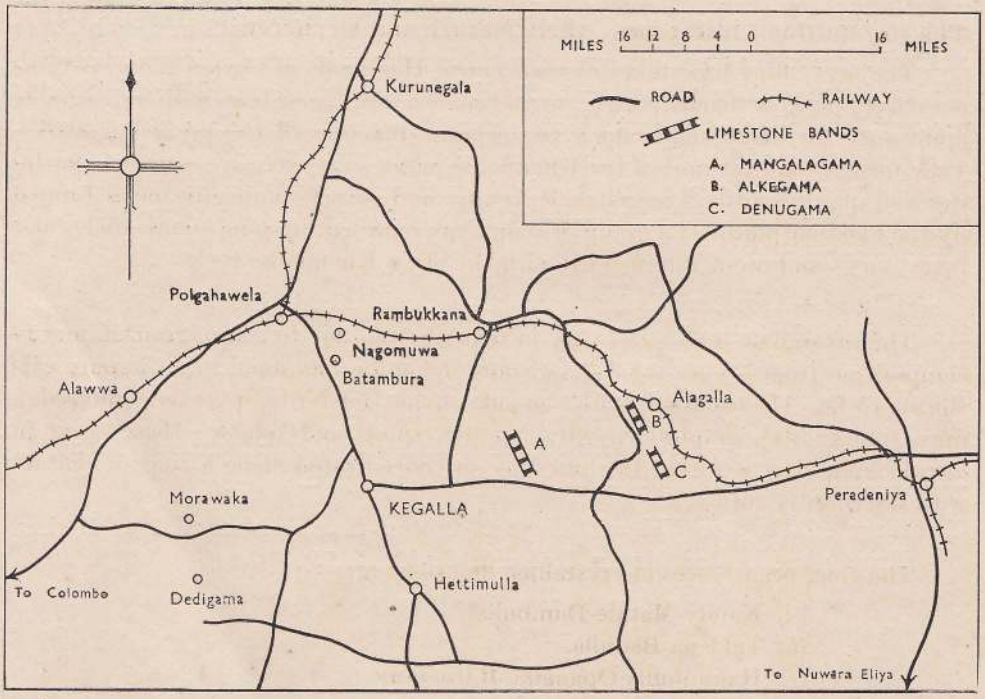


Fig. 1.—Sketch map of Kegalle Area, showing localities mentioned in text.

*Reprinted from Bulletin of the C.G.S., Vol. II, 1947, pp. 69-76.

The area under study lies within an 8-mile radius of Kegalle Town, and typical kilns were visited in the following localities shown on the map (Fig. 1) :—

(1) Mangalagama,
(2) Nagomuwa West,
(3) Nagomuwa East,
(4) Kottanawatta,
(5) Batambura,
(6) Morawaka, and
(7) Dedigama.

The lime-burning industry has existed in Ceylon for many centuries and the practice has been handed down from father to son. It is in fact so traditional that the methods have been taken for granted by most observers, and apart from a few references to the industry, there has been but one brief attempt to describe them. Speaking about the Getambe limestone, Adams (1) says . . . .

> " The rock is burnt for lime in a kiln by the side of the quarry, being broken into pieces about the size of a walnut and thrown into a kiln with small sticks and fragments of waste wood, which give rise to a smouldering fire. The lime is raked out between the grate bars at the bottom of the kiln from time to time. This quick-lime is slaked in a large bin and is all sold to the Sinhalese . . . ."

This note is therefore probably the first attempt to describe as completely as possible the method of lime-burning and the part the industry plays in the rural economy of a particular area of Ceylon.

## The Crystalline Limestones—their Nature and Occurrence

The crystalline limestones of the Central Highlands of Ceylon occur as comparatively narrow bands, often discontinuous, but persisting with remarkable uniformity for many miles along the general direction of the prevailing strike. They form a compact unit of the Khondalite Series—an extensive series of quartzites and quartz schists, granulites, leptynites and garnet-sillimanite rocks, formed by the metamorphism of a group of sediments representing sandstones, shales and limestones—and occur interbedded with the other Khondalite rocks.

The crystalline limestones vary in texture from fine to coarse-grained, and in composition from a pure calcitic and pure dolomitic limestone to an impure calc silicate rock. The usual impurities include olivine (forsterite), pyroxene (diopside), mica (phlogopite), graphite, pyrites, apatite, spinel and sphene ; these occur in streaks and patches within the limestone or concentrated along a zone of contact with the country rock (2).

The chief occurrences of crystalline limestone are—

(*a*) Kandy-Matale-Dambulla.
(*b*) Taldena-Badulla.
(*c*) Haldumulla-Opanaike-Ratnapura.
(*d*) Godakawella-Pallebedde.
(*e*) Kurunegala-Galgamuwa.

Several smaller occurrences have also been noted which are prolongations and branches of these chief bands.

Analyses of some typical crystalline limestones are given in Table I.

TABLE I.

*Analyses of Crystalline Limestones from Ceylon*

| CONSTITUENT. | COMPOSITION PER CENT. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H |
| CaO ... | 30·41 | 50·0 | 27·44 | 30·06 | 45·61 | 36·0 | 39·0 | 59·6 |
| MgO ... | 20·98 | 2·0 | 23·90 | 20·01 | 8·50 | 26·3 | 0·3 | 2·35 |
| $SiO_2$ ... | 3·2 | 2·0 | 10·24 | 2·49 | 0·17 | 4·1 | 26·1 | 6·2 |
| $FeO_2$—$Al_2O_3$ ... | 0·7 | — | 1·68 | | 1·56 | 2·0 | 4·0 | 2·5 |
| $CO_2$ ... | 43·54 | 42·0 | 31·87 | 39·89 | 44·70 | *31·6 | *40·6 | *38·4 |
| $H_2O$ ... | — | 2·0 | 3·23 | 4·48 | | | | |
| TOTAL | 98·73 | 98·0 | 98·36 | 96·93 | 100·54 | 100·0 | 100·0 | 100·05 |

*by difference

| SPECIMEN | LOCATION | ANALYST |
|---|---|---|
| A ... | Diyaluma Falls, Koslanda | ... Imperial Institute |
| B ... | Kandy (?) | ... George Middleton |
| C ... | Hakkgala | ... Imperial Institute |
| D ... | Ampitiya, Kandy | ... Chemistry Dept., University of Ceylon, 1946 |
| E ... | Kadikawa, Anuradhapura District | ... Imperial Institute |
| F ... | Kandapola, Central Province | ... Agricultural Chemist, Colombo |
| G ... | Matale District | ... ,, ,, ,, |
| H ... | Mangalagama, Kegalle District | ... Chemistry Dept., University of Ceylon and Chemist, Dept. of Industries and Commerce, 1946 |

## Sources of Raw Material

The only exposure of crystalline limestone so far located within the area under review is at Mangalagama, 6 miles east of Kegalle. This is a narrow band, about a mile long, running parallel to the prevailing strike, viz.: NNW—SSE. It is a relatively impure limestone (Table I—4) in which the impurities are uniformly distributed throughout the rock, and for this reason is disliked by some of the burners in the area. These latter obtain part of their supplies from Matale, which though more costly, and requiring longer burning and more attention, yields a larger proportion of lime.

A band at Dunugama-Alkegama (10 miles east of Kegalle) has recently been located. It is a narrow discontinuous band to the east of the Rambukkana-Mawanella road in the valley of the Talagalla Oya, a tributary of the Maha Oya, and has a NW—SE strike, Alkegama being 1½ miles NW of Dunugama. In appearance the limestone is intermediate between the Mangalagama and Matale types but no chemical analysis of it has yet been made.

This band lies buried under a mantle of alluvium and has to be exposed by digging. The quarries are difficult of access from the main road, there being no cart road. No supplies are therefore obtained from here as it is cheaper to obtain limestone from Matale. Lime-burning in the Dunugama-Alkegama region is similar to that in the rest of the area in nearly all respects, except that a large proportion of the lime is used for building purposes.

The only other sources of limestone near the area are at Wellawa (near Kurunegala) 25 miles north of Kegalle, and at Ampitiya, 27 miles east of Kegalle. A burner at Hettimulla was reported as obtaining supplies from Wellawa but none were reported from Ampitiya.

## Quarrying and Dressing

Owing to the nature of crystalline limestone, blasting is usually a necessary operation in quarrying. It is however often facilitated by cracks and joints in the rock, along which solution has resulted from the percolation of surface and sub-surface water, this jointing being of particular advantage when the rock is needed for architectural purposes.

Since impurities are disadvantageous to efficient calcination, a preliminary selection takes place by the purer bands being blasted first. The shattered rock is broken up at the quarry into irregular pieces measuring 5-6 inches across, and at the kiln these are dressed and broken into as small pieces as possible (about $\frac{1}{2}$ inch cubes). The impurities, where irregularly scattered in the rock are chipped of and discarded, this constituting the dressing.

The Mangalagama limestone, the chief source of raw material in the area is a uniformly impure rock. It is therefore not dressed at the kilns but merely broken into small pieces, no impurities being discarded. While breaking the rock some grit is accumulated containing fragments of calcite, dolomite and silicates, which is not discarded but subsequently burnt. There is no doubt that this uniformly impure nature of the rock and the impossibility of dressing it successfully partly accounts for the impure nature of slaked lime from kilns using it. The difficulty of working very impure crystalline limestones is well illustrated by the case of a trader in Balangoda who preferred to burn coral limestone from Ambalangoda (brought nearly 140 miles by train and cart), rather than use the limestone found in Balangoda itself.

*Fuel.* Two types of fuel are used in the lime kilns—coconut shell and firewood, the chief kinds of firewood being *siyambala* (bot. Tamarindus Indica), *seru mora* (bot. Nephelium Longana), *milla* (bot. Vitex Altissima), *waya* (bot. Cassia Stamen) and *kumbbuk* (bot. Terminalia Arjuna).

It was reported that the better types of firewood, where obtainable, were preferred to coconut shell since they burned for a longer time. Coconut shell burns out in about 12 hours and calcination is often not complete, some unburnt pieces usually remaining.

In neither case is charcoal formed however. The fuel burns down to ash which drops through the grate or is blown off by the wind when the lime is slaked.

In England when faggots are used it is customary to burn the fuel separately, as some types, *e.g.* those containing sulphur, have a deleterious effect on the lime, but this practice has so far not been noticed in Ceylon (3).

## Types of Kiln

The lime kilns in the Kegalla District are all relatively small, a feature probably explained by geographical factors such as markets, distance from raw material and uses of manufactured product.

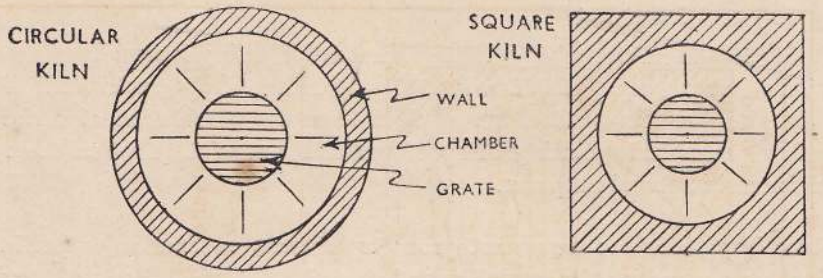


Fig. 2.—Diagrammatic plan of typical lime kilns.

Except at Mangalagama which will be described separately, all the kilns are 3-4 ft. high and are externally square or cylindrical with 6-8 inch thick walls (Fig. 2). The internal chambers have open mouths of 2-3 ft. diameter and are $2\frac{1}{2}$–$3\frac{1}{2}$ ft. deep. Their shapes in cross section are of two types : (1) bell-shaped and (2) jar-shaped (Fig. 3). All have a circular grate of iron bars at the bottom of the chamber, below which is a 6-10 inch high draught passage through which firing is done and part of the *wella* and calcined material removed.

Kilns are usually built of mud with a few stones to strengthen the walls but these show frequent signs of cracking. A layer of sand and mud has therefore to be applied periodically on the internal and external surfaces. None of the kilns has any special internal and external surfaces.

The kilns are all of the Intermittent Alternate Feed Type. There are generally four layers or " sets " of limestone and five of fuel the former being approximately 2 inches thick and the latter 4 inches. The number of sets may increase locally.

## Calcining or Burning

The principle involved in calcination is that of the expulsion of carbon dioxide from calcium carbonate (and magnesium carbonate) leaving calcium oxide (and magnesium oxide) behind. The expulsion of $CO_2$ takes place within a temperature range of 750°C–1000°C, though it is lower for magnesium limestones. It is essential that all the $CO_2$ be completely driven off to prevent a reverse reaction and this is effected in Ceylon by means of the natural draught of the kiln, though in some countries the limestone is wetted or an artificial draught or jet is introduced (4).

After arranging the sets the bottom layer of fuel is fired through the grate and the whole left to burn for 12 or 24 hours depending on the raw material and fuel. Coconut shell, though with a higher calorific value viz. 7,500 B.T.U. per lb. (5) burns out quickly ; the Matale stone on the other hand takes a longer time to calcine. Only one firing is done in a single operation.

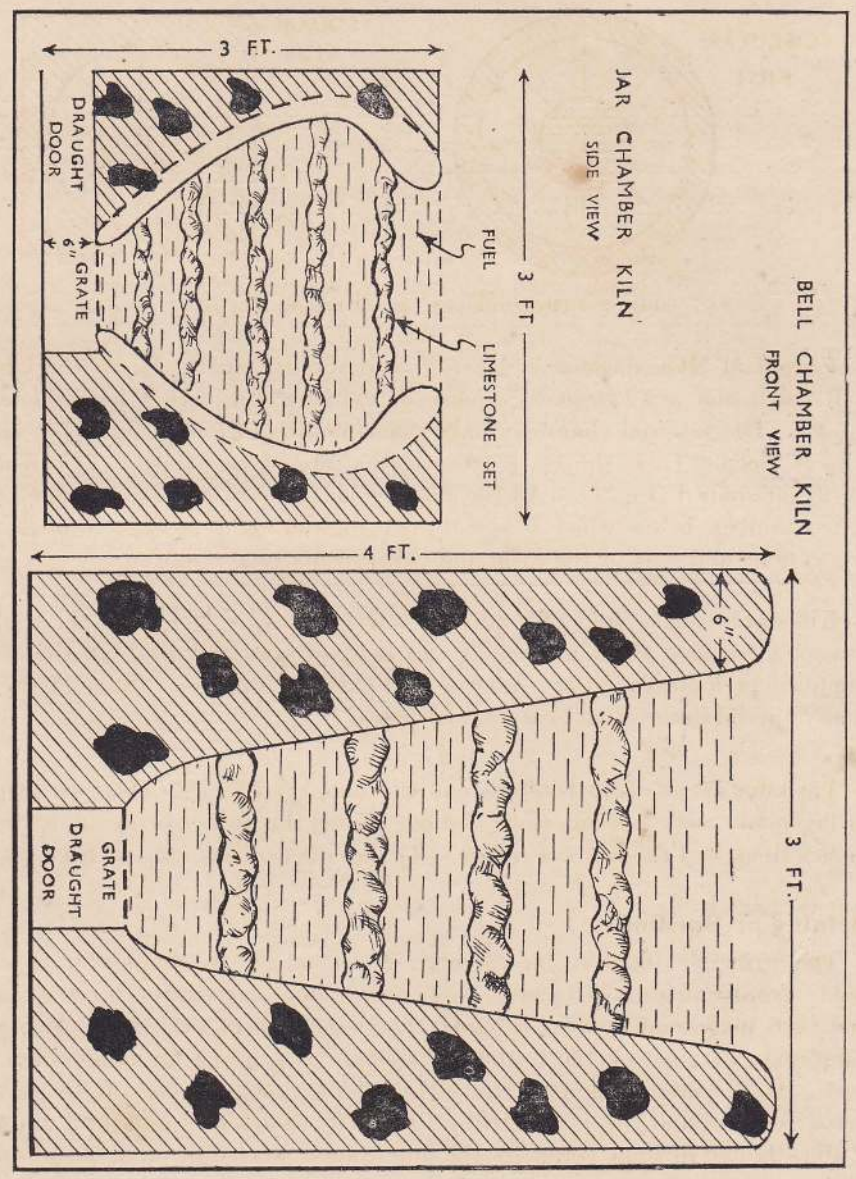


Fig. 3.—Diagrammatic vertical sections of typical lime kilns.

Calcination is reckoned complete when the top layer of limestone turns white and smoking ceases. This is not however very reliable as some pieces always retain an unburnt core ; there is also the danger that the lowest layer might be overburnt. During the period of burning some of the finer material drops through the grate but the bulk of the material is removed through the mouth of the kiln.

### Hydrating or Slaking

Calcined lime is marketed as either quicklime or slaked lime but in the Kegalle District only slaked lime is prepared. The calcined lime from the kiln is dumped at once into one or more pits (buried clay pots) half-filled with water and is thus hydrated or slaked, much heat being evolved in the process.

So far no separation has taken place. In the slaking pits however, the larger pieces of unburnt and partly burnt limestone and the impurities sink to the bottom. The material that floats is then strained through a cloth, the fine particles of calcium hydroxide going through and the larger pieces of silicates and partly burnt lime, together constituting the " wella ", remain on the cloth. This is mixed with the grit mentioned earlier, made into small cakes which are sunburned for 24 hours, and together with the unburnt lime, burnt on a subsequent day.

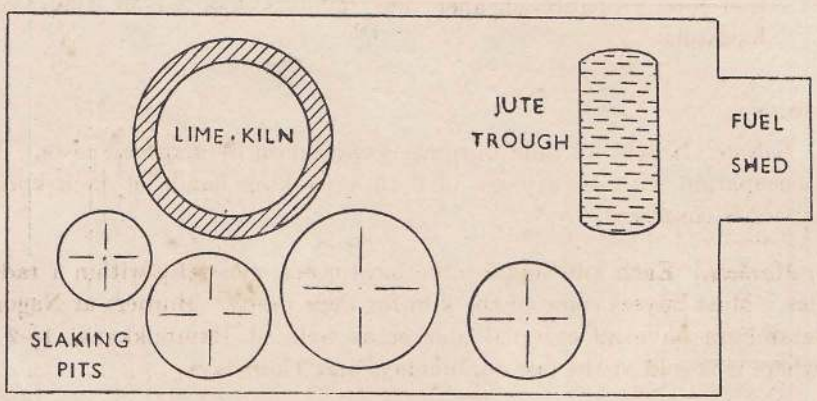


Fig. 4.—Plan of Kiln Shed at Nagomuwa West.

The slaked lime is kept in a trough made of jute (Fig. 4) with its sides held up by coconut husks, pieces of clay pot, etc. and the water allowed to seep through and evaporate until a thick paste is left, in which form it is marketed. Although slaked lime should contain theoretically 18 parts water to 56 of quicklime, there is no such fixed proportion here. In fact water is always in excess. The slaked lime is then stored in tins or areca leaf sheaths and sold thus or in small packets.

Quicklime is never made in the area because coral lime from the SW coast is preferred for building purposes and is also much cheaper.

There are two main exceptions to the conditions described above :

(*a*) *Mangalagama.* This kiln is based on the only outcrop of limestone in the area, the same man owning the kiln and the quarry. The kiln measures 8 ft. square and 10 ft. high with walls 2 ft. thick ; the internal chamber is 8 ft. deep and the mouth 4 ft. in diameter and is lined with bricks : the draught passage is 2 ft. high. This large size is typical of kilns based on large resources of raw material (*e.g.* Ampitiya).

The kiln is a Continuous Feed type, each firing going on for 15 days, alternate sets of fuel and limestone being fed through the top as calcining is done ; the slaked lime is rather impure. The only costs are -/50 cents for transport of each bushel from the quarry ½ mile away, and Rs. 2/50 each per day for 2 labourers ; large profits were thus made at this kiln.

(*b*) *Nagomuwa East.* Burning of limestone has ceased for the last two years. Instead, calcined lime from the kiln is obtained in bags from Matale, and this is slaked and strained in the usual way. The *wella* is pounded and treated 2 or 3 times, and a fairly large amount of comparatively pure lime is obtained.

Lime is purchased at Rs. 60/- per ton (22 bushels) and transport by train and cart costs Rs. 17/- per ton. The slaked lime is sold at Rs. 4/- per tin, one rupee less than the flat rate for the area. This practice is therefore probably cheaper and involves less labour than burning limestone.

## Economics

(*a*) *Labour.* Nearly all lime burning is carried on by a special caste. It is a family occupation with an average of 3 to 4 working hands at each kiln. No hired labour is employed.

(*b*) *Markets.* Each kiln supplies the local needs, generally within a radius of 2-3 miles. Most buyers come to the kiln for their needs. Burners at Nagomuwa and Batambura have an external market as well, at Rambukkana, 1½-2 miles away where it is sold at the fair on Mondays and Thursdays.

(*c*) *Uses.* The chief use for the slaked lime made in the Kegalle District is as *chunam* for betel-chewing, a possible reason for the small total output and the small size of the kilns. The only other use is as wash for walls, mixed with white, yellow, and blue ochres obtained a few miles away from Batambura, but the number of houses with whitewashed walls is relatively small, a fairly good index of the poverty of the area.

Plaster is never made from this lime as it is said to crack easily, a phenomenon explained by the fact that since magnesia absorbs water slowly a magnesian limestone does not slake evenly and is liable to disruption after setting (6). For plaster and for whitewash, lime from coral limestone is imported. In fact the competition of this cheap and purer coral lime is one of the main causes contributing to the slow decay of the industry here.

(*d*) *Output.* Burning generally takes place once a week, and the output from each kiln per week varies considerably viz., 1½ to 6 tins or more. Apart from varying amounts of limestone burnt, the returns given show that such wide discrepancies as 1½ tins from 2 bushels at Dedigama and 4 tins from 2 bushels at Batambura can only be explained by the varying amounts of water added at each kiln, depending ultimately on the cost of production at each.

(*e*) *Cost of Production* The two chief items in cost of production are raw material and transport. Mangalagama limestone is sold at Rs. 2/50 per bushel and Matale limestone at about Rs. 5/- per bushel. Transport from Mangalagama costs from cts. -/66 to Rs. 2/50 per bushel, but from Matale it varies according to whether it is brought by cart, lorry or train.

Firewood is obtained free but coconut shells cost from -/66 cents to -/75 cents per 100. A recurring item is the cloth strainer which costs Rs. 1/50 and lasts for two weeks or more.

TABLE II.

*Cost Per Firing*

| Kiln | Raw M. | Trans. | Fuel | Other Costs | Total Costs | Income From Firing (Est.) | Profit |
|---|---|---|---|---|---|---|---|
| Nagomuwa E. ... | 10·00 | 2·64 | 3·00 | ·75 | 16·39 | — | — |
| Kottanawatte ... | 3·75 | 4·00 | 1·00 | ·75 | 9·50 | 20·00 | 10·50 |
| Batambura ... | 7·50 | 6·00 | — | ·75 | 14·25 | 30·00 | 15·75 |
| Morawaka ... | 10·90 | — | — | ·75 | 11·65 | 15·00 | 3·35 |
| Dedigama ... | 5·00 | 2·40 | — | ·75 | 8·15 | 7·50 | — |

An attempt has been made to show in Table 2 the costs, income and profits of a single firing, but the results, as can be seen, are somewhat anomalous. This can however be partly explained when it is remembered that more than the flat rate of Rs. 5/- per tin would probably be earned when the lime is used for repair work or is sold in 10 cent packets.

(*f*) *Subsidiary Occupation, Ownership of Land, etc.,* Most of the burners are semi-professional masons and are frequently hired to carry out repairs to houses, etc. Some are hired labourers and burn limestone merely as a side occupation. Very few do any cultivation.

Some of them, especially before the war, were in the habit of giving a large packet of lime to certain houses in the area, for which they received a quantity of paddy at the end of the harvest. No other barter is carried on.

Few lime burners own any land, those that did having given it as security for loans. Most of them live on land that has been leased or rented to them.

The kilns have usually been built by the burners themselves though there are one or two men who specialise in the building of kilns. The ages of the kilns vary from 8 to 20 years, though some must be much older.

If any conclusion can be drawn from the economics of the industry, it is that although lime-burners perform a useful and necessary service to the community they live in, they are not sufficiently remunerated for this service ; the industry is thus carried on merely by the force of tradition and the fact that the burners are not equipped to do anything else. It would be fairly safe to predict that in about 20 or 30 years, unless something is done to improve it, lime-burning will cease in many parts of the Kegalle District.

## REFERENCES

(1) Adam, F. D., 1929 : The Geology of Geology ; Canadian J. of S. 1 : 425-511.
(2) Wadia, D. N.
(3) (4), (6), Doncaster : Limes and Cements.
(5) Child, R. : Coconut shell as an Industrial Raw Material: Current Science, 1943.

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1. **Manuscripts** should be typewritten on one side of paper only, with double spacing and wide margins, and should as far as possible be original copies.

2. Each major article should contain an **abstract** which gives a concise summary of the content, including both major and minor points. It should not exceed 100 words.

3. **References** should be given at the end of the article under the heading REFERENCES CITED, and not in footnotes. They should be arranged in alphabetic order of authors' names and chronologically under each author as shown below :—

| | | |
|---|---|---|
| FARMER, B. H., 1951 | ... | Some thoughts on the Dry Zone. Bull, C.G.S., Vol. VI, pp. 165-178. |
| LETTER, N., 1947 | ... | Denudation chronology and the drainage pattern of the Central Massif of Ceylon. Bull, C.G.S., Vol. II, pp. 64-69, |
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In the text, references to the literature cited should follow this form : (Leiter, 1947, p. 67).

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Forms of Land-Use

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Vol. 9, Nos. 3 & 4 July-December, 1955

## CONTENTS



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