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THE PRESENT LAND USE
of
TERENGGANU

by

I. F. T. WONG

SEPTEMBER 1970

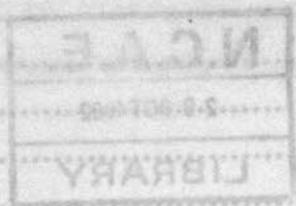
PRESENT LAND USE REPORT NO. 9

PRESENT LAND USE OF WEST MALAYSIA

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INTRODUCTION

Before the resources of a country can be developed on sound lines, a national resource inventory, based on scientific principles, must be carried out. With the resource inventory data at hand, sound long term development plans can be made, which when implemented can result in the development of suitable land presently unutilized and, in settled areas, the land use can be intensified, diversified or completely changed. One form of resource inventory is a Present Land Use Survey.

ACKNOWLEDGEMENTS

A Present Land Use Survey will present, in some form or other, a picture of existing land utilization. The method of execution and the form of presentation depends on the scope of the survey, the degree of accuracy required, and the basic materials available. The general end-products are a cartographical display and/or an area account of existing activities.

The same "present" qualifies this type of survey and places emphasis on the current situation. The author is indebted to the following Units whose efforts have made this report possible. It is to be noted that some are essential to the data-gathering programme.

Up till now in West Malaysia the best cartographical display of land use has been contained in the National Topographical Mapping series and in State maps of smaller scales showing land allocation. The land use information obtainable from these maps, however, is insufficiently detailed, often out-of-date, and in many places misleading (land allocation does not always correspond to actual use). Acreage statistics of major crops and land use are also available, but the accuracy of such statistics are dependent on the methods used and are not always completely accurate. It is not difficult to relate such statistics to specific geographical localities.

The Interpretation Unit under the direction of Mr. J.D. McEachern, Canadian Colombo Plan Land Use Specialist/Geographer.

The purpose of the survey is to provide a scientific, quick and accurate assessment of land use and land cover in the country, so that an account of all significant changes in land utilization is given and measured for every State and District of each State.

The Cartography Unit under the direction of Mr. G.W. Millington-Hogg, Canadian Colombo Plan Cartographer.

In the present situation the formulation of development plans is facilitated. Large and small scale mapping combined with acreage figures listed for all political units ensures the comprehensive supply of "basic facts" data for both the Local and National Planner.

The cartographic end-products of the Survey are:-

The Area Measurement Unit under the direction of Miss Chong Sew Ying.

Present Land Use Mapping (1966) at a scale of 1:25,000.

Present Land Use Mapping (1966), by States, at a scale of 2 miles to an inch.

Government Agriculturists and Planners have realized for some time the need for such information, but it was not until the drawing up of the First Malaysia Plan that the requirement was given definite form. Under the Colombo Plan, the Canadian Government was requested to conduct a present land use survey over West Malaysia, which forms a land use index of the country.

Thanks are also due to Mr. Law Wei Min, Acting Senior Soil Scientist, for his constant encouragement.

The Canadian Government contracted Lectured Survey Corporation of Toronto to conduct the survey and Canadian aircraft and aircraft companies conducted the aerial photographic phase in early 1966. Aerial photographs at the scale of 1:25,000 were taken of the entire area of West Malaysia between 1967 and the Present Land Use Survey could then commence.

INTRODUCTION

Before the resources of a country can be developed on a sound basis, a national resource inventory, based on scientific principles, must be carried out. With the resource inventory data at hand, sound long term development plans can be made, which when implemented can result in the development of suitable land presently unutilized and, in settled areas, the land use can be intensified, diversified or completely changed. One form of resource inventory is a Present Land Use Survey.

A Present Land Use Survey will present, in some form or other, a picture of existing land utilization. The method of execution and the form of presentation depends on the scope of the survey, the degree of accuracy required, and the basic materials available. The usual end-products are a cartographical display and/or an area account of existing utilization.

The word "present" qualifies this type of survey and places emphasis on the current status of the information. It also indicates that the information decreases in value with time so that speed is essential in the data-gathering programme.

Up till now in West Malaysia the best cartographical display of land use has been contained in the National Topographical Mapping series and in State maps at smaller scales depicting land alienation. The land use information obtainable from these maps, however, is insufficiently detailed, often out-of-date, and in many places misleading (land alienation often bearing no relationship to actual use). Acreage statistics of major crops and some land use sub-categories are obtainable from various government departments, but the validity and accuracy of such acreages are dependent on the survey methods employed with the result that values are not always completely accurate. Also, it is often difficult to relate such results to specific geographical locations.

The Present Land Use Survey is producing a complete, quick and accurate assessment of land use both cartographically and statistically, so that an account of all significant forms of land utilization is given and displayed for every Mukim and District of each State in the Country. The Planner can thus be supplied with a complete statistical inventory of the present land use, geographically displayed and with this full understanding of the situation the formulation of development plans is facilitated. Large and small scale mapping combined with acreage figures listed for all political units ensures the comprehensive supply of "bench mark" data for both the Local and National Planner.

The tangible end-products of the Survey are:-

1. Acreage statistics of all land use sub-categories.
2. Present Land Use Mapping (1966) at a scale of 1:25,000.
3. Present Land Use Mapping (1966), by States, at a scale of 2 miles to an inch.

Malaysian Agriculturists and Planners have realised for some time the need for such information, but it was not until the drawing up of the First Malaysia Plan that the requirement was crystallised into action. Under the Colombo Plan, the Canadian Government was requested to conduct a resource type survey over West Malaysia, which from a land use point of view, would entail the supply of medium scale aerial photography and the execution of a Present Land Use Survey.

The Canadian Government contracted Lockwood Survey Corporation of Toronto to conduct this Survey and Canadian aircrew and aircraft commenced the aerial photographic phase in early 1966. Aerial photographs at the scale of 1:25,000 were taken of the entire area of West Malaysia by early 1967 and the Present Land Use Survey could then commence.

Between January and July 1967, Lockwood Survey Corporation, under the Canadian Colombo Plan Programme, supplied the services of two Land Use Specialists and one Cartographic Specialist. It was their duty to set up a Land Use Section within the Soil Science Division of the Department of Agriculture and to commence production as soon as possible.

For convenience and through the helpful auspices of the Directorate of National Mapping, an Interpretation Section was established at the Directorate while an Area Measurement Section and a Cartographic Section were established in the Soil Science Division of the Department of Agriculture. The first State acreage results were produced by October 1967 and a programme has been devised to ensure that the production of all acreage results and 1:25,000 land use mapping will be completed in the latter half of 1969.

It should be remembered that the aerial photographs were taken during the period January 1966 to February 1967 so that the mapping and crop acreages which are being published will not include changes in land use which occurred subsequent to the date of actual photography.

Within a two-year period, reports will be written for all the States of West Malaysia. This particular report is on the Land Use of Terengganu. The principal aims of this report are:-

1. To describe the methodology adopted.
2. To qualify the acreage statistics of State land use.
(Contained in Appendix B).

At the conclusion of the Land Use Survey a comprehensive Land Use Report of West Malaysia covering all eleven States will be compiled. Then, with the availability of complete mapping coverage and acreage statistics it will be possible to discuss the land use of West Malaysia as an entity and, from the geographical point of view, to subdivide it into specific regions of characteristic land use.

METHODOLOGY OF SURVEY

An understanding of the methodology of the Present Land Use Survey can best be obtained from a brief description of the four distinct yet interlinked phases of the Survey.

Interpretation

Scaled 1:25,000 aerial photographs are stereoscopically inspected under power 3 magnification mirror stereoscopes and the photo image showing different types of land use is interpreted according to a land use classification legend (Appendix A). This legend is substantially the same as the one recommended by the Commission on World Land Use Survey (International geographical Union) and only slightly modified to suit Malaysian conditions. Land Use sub-categories of two acres or larger are delineated in ink on the aerial photographs so that this annotated photography becomes a permanent record of the survey. There are approximately 18,000 aerial photographs in this 1:25,000 photographic coverage of which about 1,603 cover the State of Terengganu (Figure. 6).

Interpreted photographs are then closely checked by a second interpreter before being passed on for compilation.

Manuscript Compilation

The interpreted scaled photographs are keyed to the transparent compilation bases of the 1:25,000 national mapping series and the delineated land use boundaries are traced onto a manuscript of dimensionally stable film (Durafilm). At this stage a certain amount of planimetric detail and all local political boundaries are added. This facilitates future field orientation of the final maps and enables acreage counts to be made for the smallest political unit - namely, the Mukim.

Area Measurement and Tabulation

The manuscript is the basis for the next two phases - area measurement and fairdrawing.

On each 1:25,000 land use manuscript an acreage count using a dot grid, is made for each sub-category and these counts are tabulated by Mukims. At this stage a valuable check is made by ensuring that the cumulative physical acreage of all the small sub-category units equals that of the total physical acreage of the gridded sheet. A further check is made by repeating the whole process and comparing the results for the same sub-category from the two counts. This double count ensures that each individual sub-category is correctly measured.

When a district has been interpreted and mapped in manuscript form it is possible to compile a District Abstract of land use acreage where all acreages are listed under Mukims. From this abstract a separate District Summary sheet of acreage is compiled, where the acreages of all nine land use categories and their sub-categories are presented as percentages of the district as a whole. The total agricultural acreage is given and presented as a percentage of the district while agricultural sub-categories are shown as a percentage both of agricultural land and of the district as a whole. A State Summary of land use acreage (the one for Terengganu is Appendix B of this report) follows substantially the same outline as the District Summary with the combined State Land Use acreages and percentages being listed as well as those for the component district.

Thus, a complete picture of land use is presented. The "whole" has been obtained by inspection, delineation and classification of the entirety. Regardless of the limitations imposed by the aerial photographic method, it can confidently be stated that an accurate universal picture is obtained and that, as far as the major crops are concerned, the results can be considered as those of an accurate crop survey.

Fairdrawing

The final 1:25,000 map sheet is compiled by a fairdrawn tracing of the manuscript on dimensionally stable film. This is the final record from which printed maps or dyeline copies can be made; these may then be hand-coloured by the user according to a recognised colour system suggested by the Commission on World Land Use. The anticipated market for this scale of land use mapping is likely to be limited and therefore a coloured series at this scale is not being produced.

A printed coloured land use map series at a scale of 2 miles to an inch is being published for all States. The uncoloured version, enclosed in the back cover pocket, is presented with this report.

Land use mapping at this scale is useful as it gives an overall picture of the present conditions as well as facilitating regional and state planning. The 2 miles to one inch Land Use Map of Terengganu was compiled by condensing 91 of the 1:25,000 map sheets (Figure 7).

THE PHYSICAL ENVIRONMENT

Location and Extent

The State of Terengganu is situated on the east coast of West Malaysia. It shares a common boundary with the State of Kelantan to the west and the State of Pahang to the west and south. It is bounded on the east by the South China Sea (Fig. 1). Located within latitudes $3^{\circ} 50'N$ and $5^{\circ} 52'N$ and longitudes $102^{\circ} 20'E$ and $103^{\circ} 30'E$, it covers an area of 3,199,062 acres or 4,998.53 square miles.

Politically, it is divided into six districts with five (Besut, Kuala Terengganu, Marang, Dungun and Kemaman) along the coast and one (Ulu Terengganu) in the interior of the State.

Physiography and Geology

The East Coast Range dominates the highlands of Terengganu. It is mainly granitic in composition but may have a mantle of sedimentary strata in places e.g. at Gunung Gagau in the south where arenaceous sediments of Jurassic - Cretaceous age occur (Geological Map, 1963). The landform in this region is very rugged with narrow valleys and steep interfluves being common features.

The foothills which occur midway between the highlands to the west and the coast to the east are usually less than 750 feet in height, are less rugged than the mountains and may be separated from one another by flat valleys and river basins. They are formed by both igneous and sedimentary rocks. The igneous rocks are similar to those of the mountains, being subdued extensions of the mountain masses. The sedimentary formations consist chiefly of argillaceous rocks, shales and sandy shales with minor occurrences of quartzite, sandstone and limestone; these formations are often recognizable by their very pronounced steeply sloping ridges running in a north-north-west and south-south-east direction.

To the east of the foothills lies the coastal plain which is characterized by long, low sandy ridges or permatangs aligned more or less parallel to the coastline. The swales between these permatangs are often waterlogged either by seasonal flooding or high ground water-table.

Drainage

All the rivers of Terengganu have their headwaters in the highlands along the eastern border and all of them drain into the South China Sea to the east. The Sungai Busut and Sungai Kemaman which drain the north and south of the State, respectively, are relatively short when compared to the Sungai Terengganu and Sungai Dungun which drain the central two-thirds of the State. Also draining a portion of the southern third of the State is the Sungai Paka.

These rivers have swift-flowing headwaters with waterfalls and rapids but in their lower courses they become sluggish and meander over the plains.

Climate

The effect of the northeast monsoon has a dominating influence on Terengganu's climate which can be described as tropical monsoon. Although the annual precipitation in the State is nowhere less than 80 inches, (Fig. 3), Terengganu has the highest mean annual rainfall figures along the east coast of West Malaysia. Most of the rain, however, precipitates during the months of November, December and January when the northeast monsoon is at its peak (Fig. 4). According to Ooi (1964) between one-third and one-half of the annual total precipitation falls during the northeast monsoon. Maximum precipitation recorded at the Kuala Terengganu Meteorological Station between 1941 and 1958 has been 21.7 inches for a 72 hour period (D.I.D. Rainfall Records, 1961).

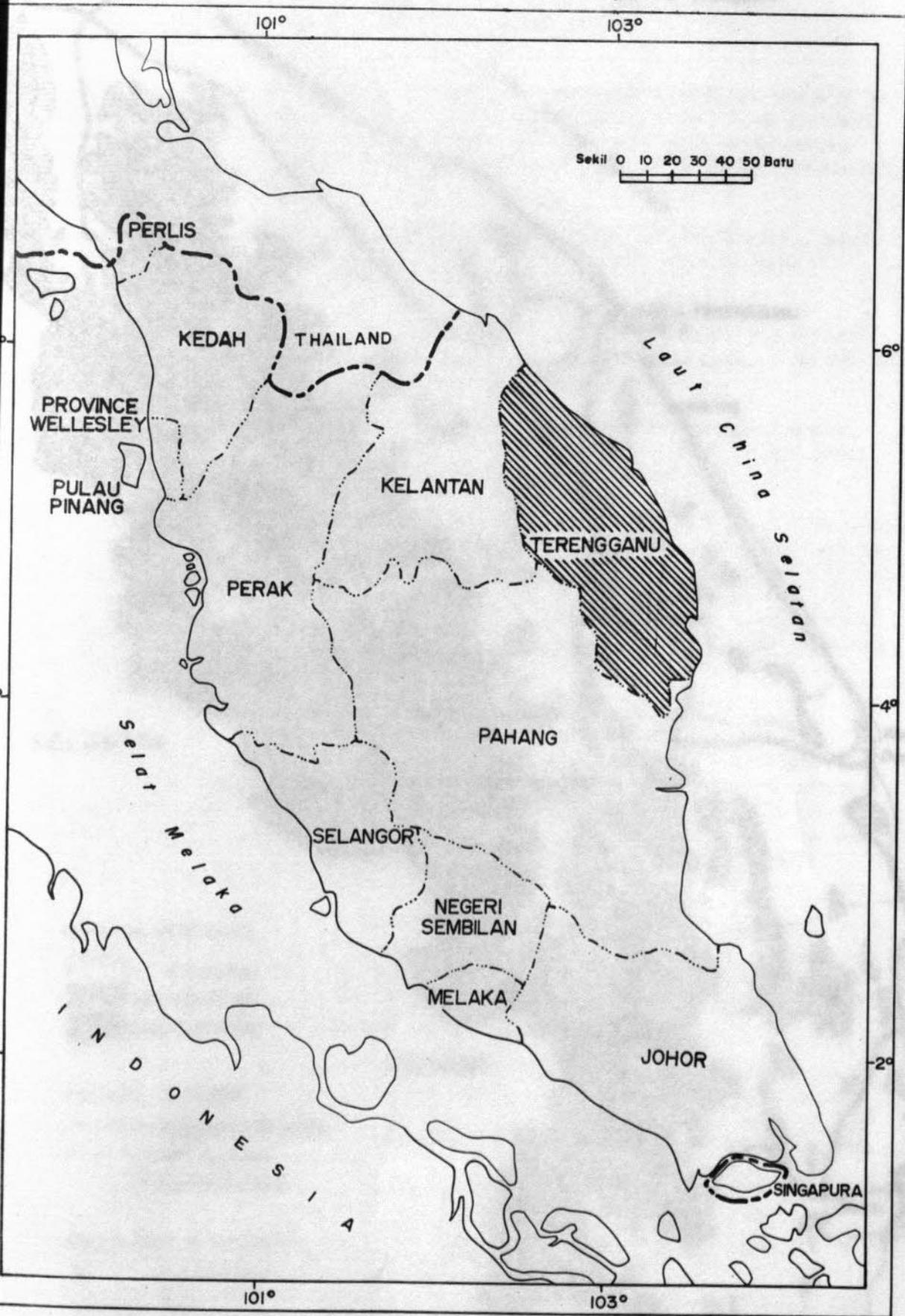
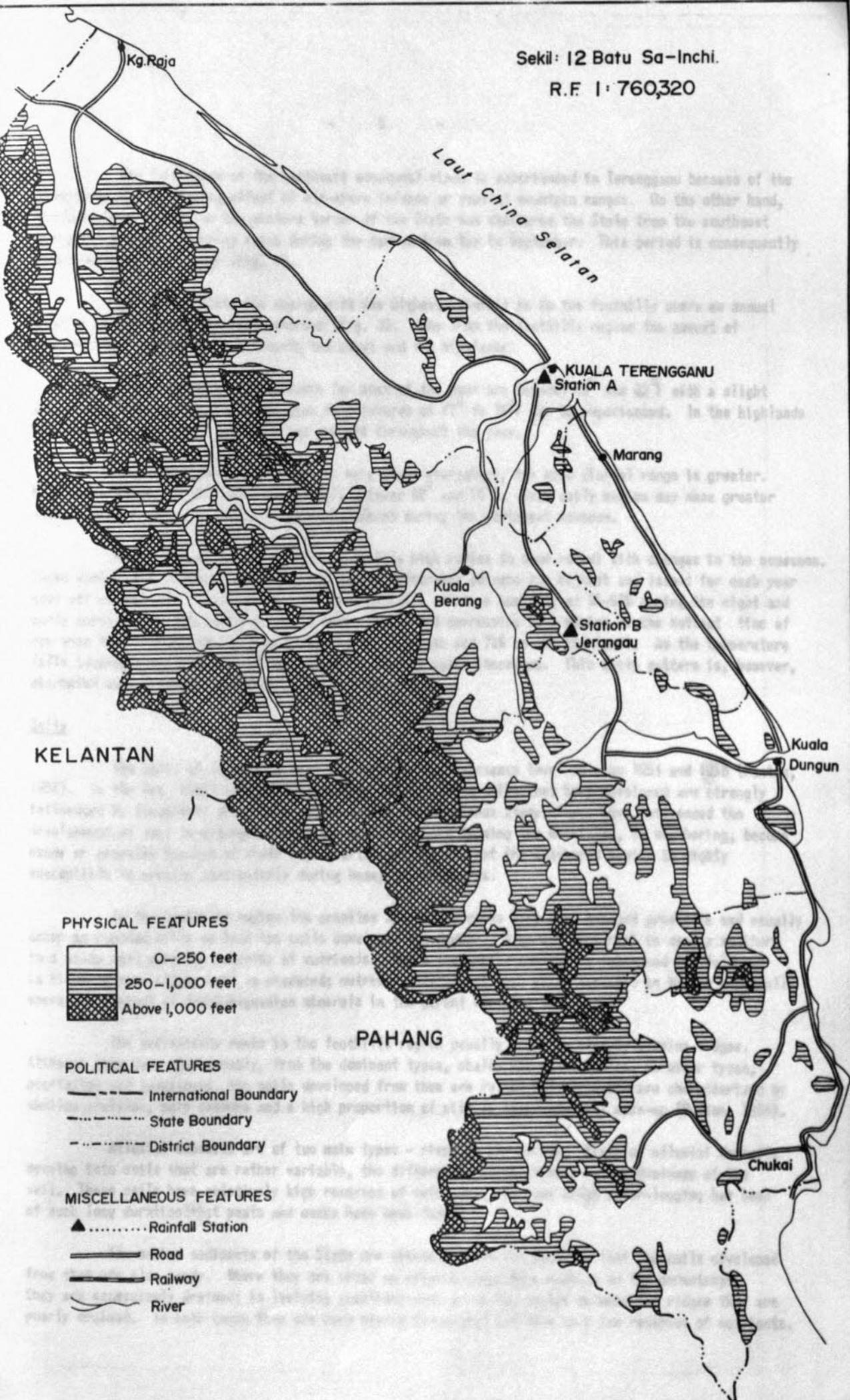


Figure 1. Location of the State of TERENGGANU within West Malaysia.

Sekil: 12 Batu Sa-Inchi.

R.F. 1:760,320



PHYSICAL FEATURES

- 0-250 feet
- 250-1,000 feet
- Above 1,000 feet

POLITICAL FEATURES

- International Boundary
- State Boundary
- District Boundary

MISCELLANEOUS FEATURES

- Rainfall Station
- Road
- Railway
- River

Figure 2. The main physical and political features of Terengganu and the two rainfall stations

The full force of the northeast monsoonal winds is experienced in Terengganu because of the absence of the sheltering effect of off-shore islands or coastal mountain ranges. On the other hand, the East Coast Range, on the western border of the State has sheltered the State from the southwest monsoonal winds which bring rains during the period from May to September. This period is consequently relatively dry every year (Fig. 4).

Within the State the region with the highest rainfall is in the foothills where an annual average of 170 inches has been recorded (Fig. 3). Away from the foothills region the amount of precipitation decreases both towards the coast and the highlands.

Temperatures in the lowlands for most of the year are between 78° and 82°F with a slight drop during the northeast monsoon when temperatures of 77° to 78°F can be experienced. In the highlands temperatures between 63° and 65°F may prevail throughout the year.

While the mean annual range is very small everywhere, the mean diurnal range is greater. Mean daily minima in the lowlands may fall between 69° and 76°F. Mean daily maxima may show greater variation (Ooi, 1964) and this is more pronounced during the northeast monsoon.

Relative humidity which is persistently high varies to some extent with changes in the monsoons. These variations, however, are not great as the difference between the highest and lowest for each year does not exceed 13%. The diurnal cycle consists of a relative humidity of 93-98% during the night and early morning when temperatures are at their lowest and decreasing to a minima at the hottest time of day when the relative humidity is 62-74% in the lowlands and 75% in the highlands. As the temperature falls towards evening and night the relative humidity again increases. This daily pattern is, however, disrupted when a shower or thunderstorm suddenly occurs.

Soils

The soils of Terengganu were surveyed at reconnaissance level between 1954 and 1956 (Panton, 1958). In the hot, humid climate prevalent in the State the soils that have developed are strongly influenced by topography and parent material. In the highlands steep slopes have influenced the development of soil to a large extent; the granitic rocks forming the mountains, on weathering, become sandy or gravelly because of their high quartz content, so that the weathered mantle is highly susceptible to erosion particularly during heavy thunderstorms.

In the foothills region the granites and allied rocks have more subdued gradients and usually occur as rounded hills so that the soils developed are deeper. A parent rock rich in quartz weathers to a sandy soil with low reserves of nutrients. Where the quartz content is lower and the feldspar is higher a more clayey soil is produced; nutrient reserves of such soils may also be higher especially where the content of ferro-magnesian minerals in the parent rock has been high.

The sedimentary rocks in the foothills region usually occur as steeply sloping ridges. Although they vary considerably, from the dominant types, shales and sandy shales, to minor types, quartzites and sandstones, the soils developed from them are rather infertile and are characterized by shallow profiles, pale colours and a high proportion of silt in their textural make-up (Panton, 1958).

Alluvial deposits are of two main types - riverine and marine. Riverine alluvial deposits develop into soils that are rather variable, the differences being chiefly in the drainage of the soil. These soils have relatively high reserves of nutrients. In some areas water-logging has been of such long duration that peats and mucks have been formed.

The marine sediments of the State are characteristically sandy so that the soils developed from them are also sandy. Where they are sited on elevated positions such as on the permatangs they are excessively drained; in lowlying positions such as in the swales between the ridges they are poorly drained. In both cases they are very poorly structured and have very low reserves of nutrients.

Sekil 18 Batu Sa-Inchi
 R. F. 1:1,140,480

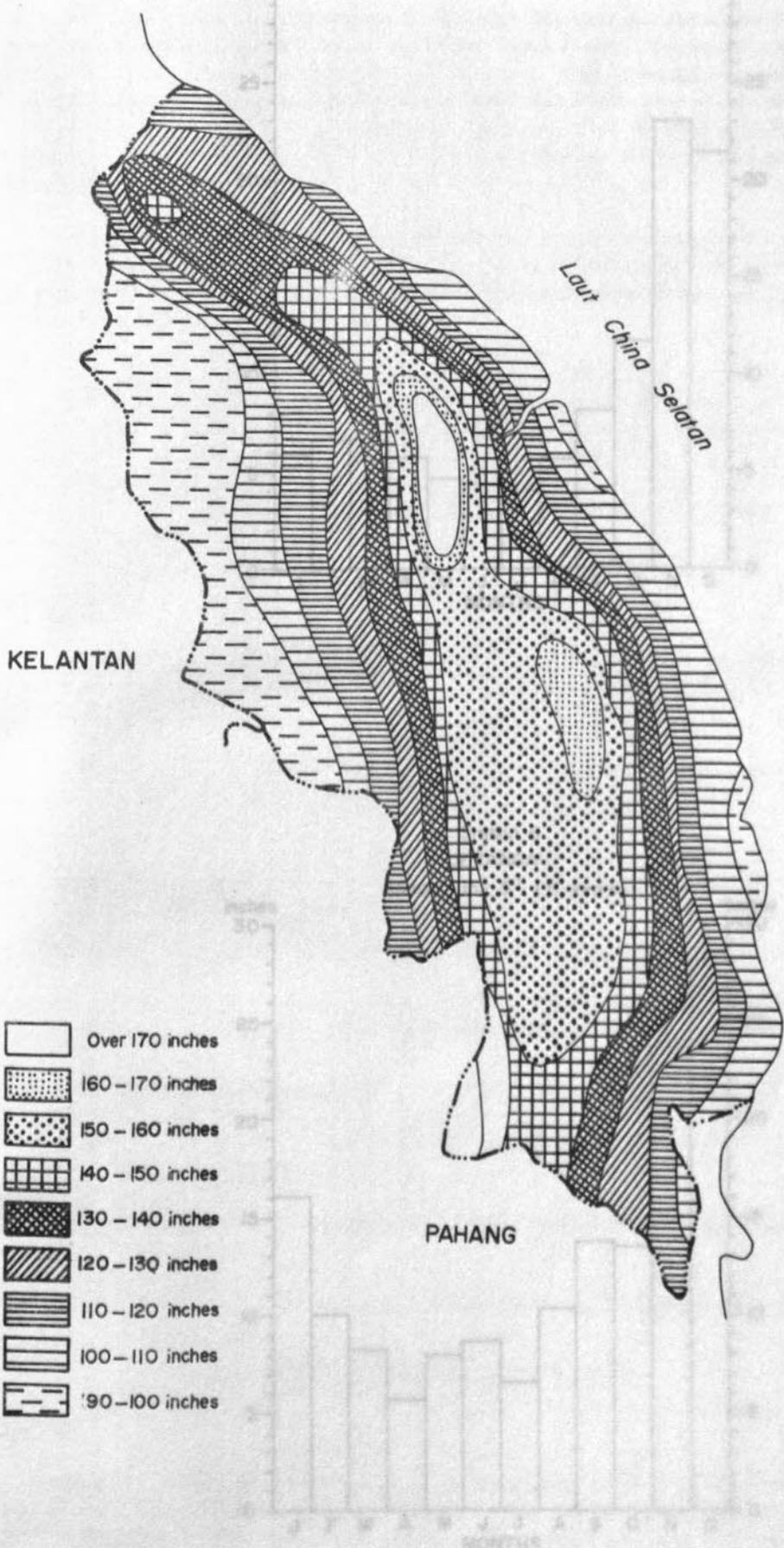
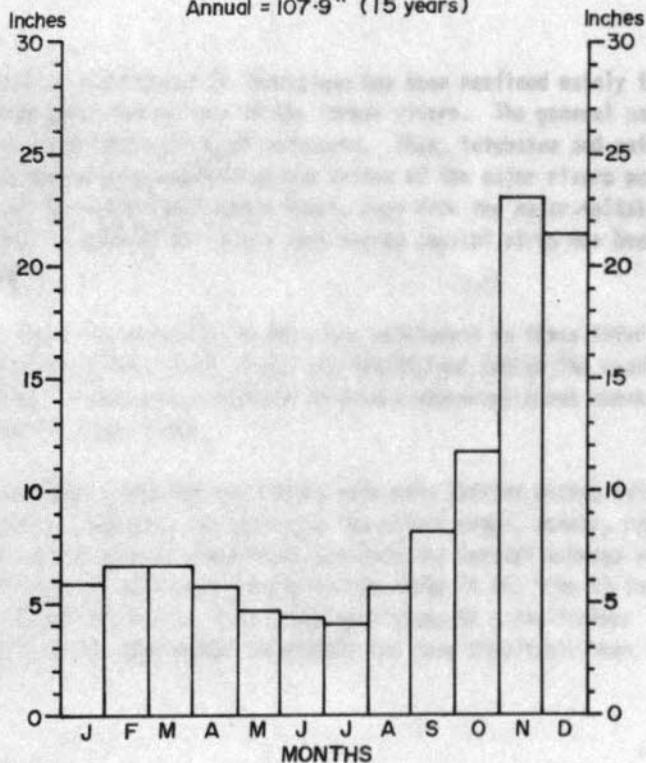


Figure 3. Mean annual rainfall distribution of Terengganu (1950-1965 compiled by D.I.D)

Scale 1:1,140,480 Average monthly precipitation for the month shown

Station A
 KUALA TERENGGANU
 Annual = 107.9" (15 years)



Station B
 JERANGAU
 Annual = 152.5" (8 years)

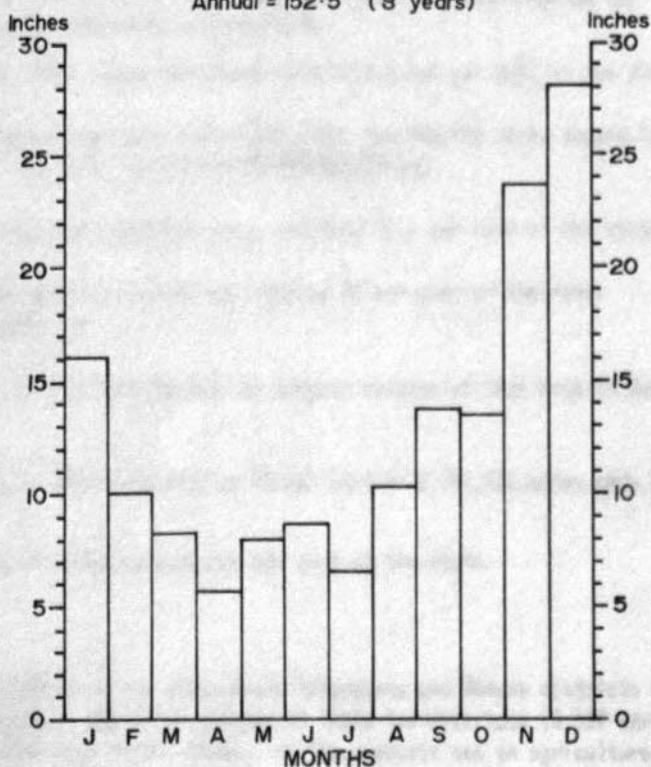


Figure 4. Average monthly precipitation for two rainfall stations.

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THE PRESENT LAND USE

General

Urban and agricultural development in Terengganu has been confined mainly to the coastal plain with narrow inroads made along the valleys of the larger rivers. The general pattern of development has been closely associated with major waterways. Thus, intensive and extensive agricultural development and settlement have occurred on the deltas of the major rivers particularly those of the two rivers Sungai Terengganu and Sungai Besut. Away from the major deltaic centres of development, a distinct change is apparent as only a very narrow coastal strip has been utilized for agriculture and settlement.

A major limiting factor to agricultural and urban settlement in these inter-deltaic areas could be the presence of extensive swamps which occupy the depressions behind the coastline. Uneven distribution of rainfall, annual flooding and exposure to strong monsoonal winds annually could be other deterrents to development in these areas.

Terengganu was basically an agricultural state with very limited mining activity. Agricultural development, however, has been confined to a few select crops, namely, rubber, padi and coconuts. Cocoa, though inextensive by comparison, occupied the largest acreage in the whole peninsula. Crops which were known to have been growing in the state at the time of the present survey included pineapples and coffee; but as these crops were grown on a smallholder basis in exceedingly small plots they have not been mapped separately but have invariably been included under mixed horticulture.

Salient Statistics

The State Land Use Summary, presented as appendix B, lists in full the summarised statistics of all the present land use categories. This summary has been compiled from District Abstracts containing land use acreage counts for all mukims.

The following is a synopsis of the salient statistics of land use in Terengganu in 1966.

1. The physical area of the state was 3,199,062 acres or 4,998.5 square miles. This acreage figure is also the total land use figure as intercropping was not practiced except under mixed horticulture.
2. The 273,904 acres under agricultural use constituted 8.6 per cent of the state.
3. Rubber was the most extensively cultivated crop, the 148,416 acres mapped being 54.2 per cent of the total agriculturally utilized land.
4. Padi was the second most extensive crop, covering 22.2 per cent of the state.
5. Mixed horticulture was also extensive, forming 15 per cent of the total agricultural acreage.
6. The 1,065 acres of cocoa constituted the largest acreage of this crop in West Malaysia.
7. The state was mostly forest covered as 72 per cent or 2,304,972 acres were mapped as forest.
8. The 269,577 acres of swamp covered 8.4 per cent of the state.

Urbanization

Among the six districts in the state Kuala Terengganu and Dungun districts had the largest acreages of urban land. Together, the urban acreage of these two districts (3,537 acres) constituted 68% of the 5,226 acres of urban land in the state. As the emphasis was on agriculture in this state a substantial acreage of land utilized for the siting of dwellings could be found dispersed in the developed regions particularly in mixed horticulture areas. If 5 per cent of mixed horticulture areas were taken to be occupied by dwellings, as much as 2,057 acres more could be regarded as built up land.

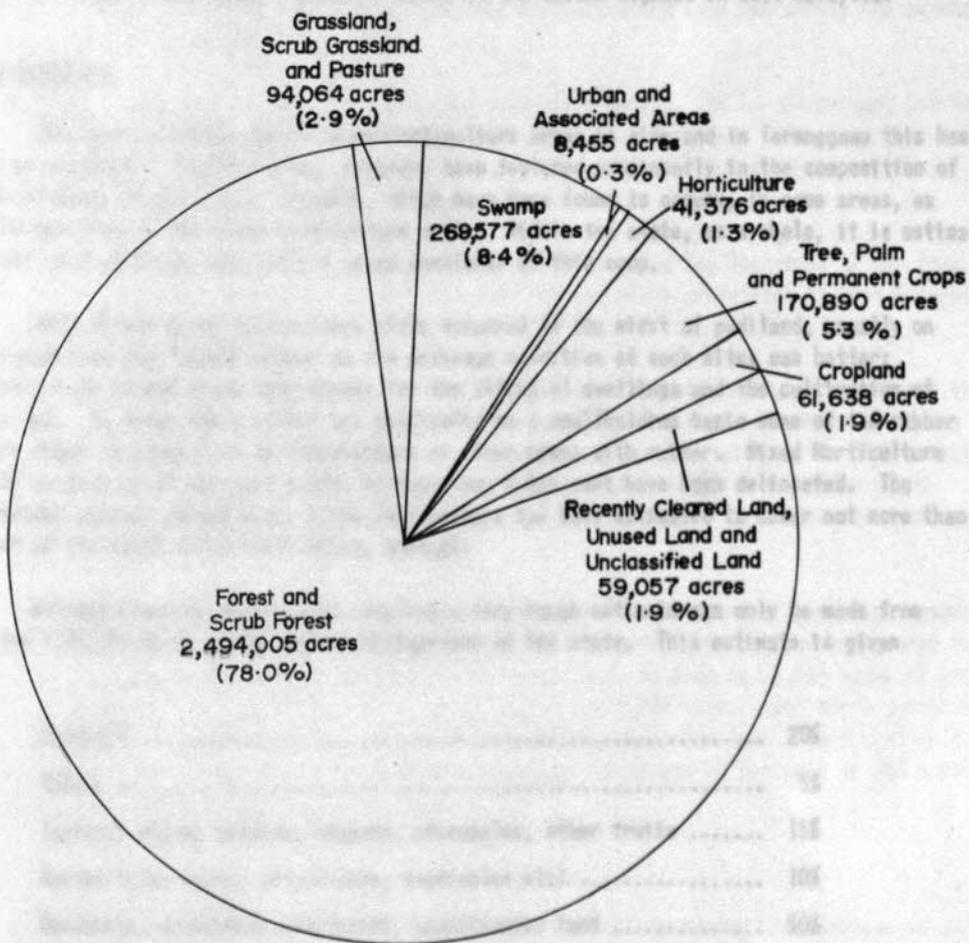


Figure 5. The proportions of land use categories within Terengganu.

Mining

There were 17 tin mines and 1 iron mine in the state in 1966 (Bulletin, Ministry of Lands and Mines, 1968). The acreage of actively worked tin mining land mapped in this survey was only 77 acres. Two of the mines were underground. The single iron mine in Dungun district produced 1,581,035 long tons of iron-ore in 1966 (Bulletin, Ministry of Lands and Mines, 1968); compared with other states this production figure is the second highest in West Malaysia.

Mixed Horticulture

The range of crops within mixed horticulture areas is wide and in Terengganu this has not been an exception. Certain crops, however, have featured prominently in the composition of this sub-category, in particular coconuts, which have been found to occupy, in some areas, as much as 50 per cent of the mixed horticulture units. Within the state, as a whole, it is estimated that 20 per cent of mixed horticulture areas consisted of this crop.

Most of the mixed horticulture plots occurred in the midst of padiland, usually on higher ground than the "sawah" proper as the drainage condition at such sites was better; consequently such raised areas were chosen for the siting of dwellings and the cultivation of dryland crops. In areas where rubber was cultivated on a smallholding basis some of the rubber plots were found to consist of an intermixture of other crops with rubber. Mixed Horticulture plots with as much as 50 per cent rubber to less than 5 per cent have been delineated. The overall rubber acreage mapped under mixed horticulture has been estimated to cover not more than 5 per cent of the total mixed horticulture acreage.

Without rigorous statistical sampling a very rough estimate can only be made from viewing the 1:25,000 scale (1966) aerial photographs of the state. This estimate is given below:-

Coconuts	20%
Rubber	5%
Tapioca, maize, bananas, papayas, pineapples, other fruits	15%
Garden Crops (yams, ground nuts, vegetables etc)	10%
Buildings, footpaths, courtyards, uncultivated land	50%

The total acreage of 41,152 mapped by this survey would thus include approximately 8,230 acres coconuts and 2,000 acres rubber.

Market Gardening

This has been a very minor activity considering that only 100 acres have been mapped in this survey. This total, however, does not constitute the overall acreage in the state as plots of less than two acres have not been delineated under this sub-category but have been mapped under other sub-categories principally mixed horticulture. But even if the above acreage were doubled by the addition of other small plots the overall acreage would still be very small. This is an indication of the lack of outlets for the produce from commercial market gardens since most of the rural population have their own supply of market garden crops from their own backgardens.

Rubber

Occupying 148,416 acres or 54.2 per cent of the total land under agricultural use, rubber was the most extensively cultivated crop in the state.

The Rubber Statistics Handbook (1966) gives the total estate acreage for the state as 17,170 acres. By subtraction from the acreage obtained by the Present Land Use Survey the acreage under smallholdings would be 131,246 or 88.4 per cent.

Out of 39 estates, 38 were Asian-owned and 1 European-owned. The European-owned estate and one of the Asian-owned ones were between 3,000 and 4,999 acres in extent. There was also one Asian-owned estate within the 1,000 to 1,999 acres size group and two of 500 to 999 acres the remaining 34 being each less than 500 acres in size.

Total production from the estate was 2,790 tons and from the smallholdings 12,953 tons, giving a grand total of 15,743 tons which was the lowest overall state production in West Malaysia taking Kedah and Perlis as one unit.

Average yield from the estate sector was 563 lbs. per acre which was also the lowest in the peninsula. The large acreage of smallholding rubber occurred as small units showing varying stages of management and grading gradually at the low management end into scrub land. Approximately 2,000 acres composed of units of less than two acres have been estimated to occur under mixed horticulture; in some of the units mapped as mixed horticulture as much as half the cultivated areas consisted of rubber.

The condition of rubber holdings in the state depended largely on the type of management; while good management has resulted in healthy trees with uniform crown growth, poor management has produced irregular crown growth and uneven spacing of trees; thus, as much as 26,699 acres of poorly managed rubber land have had to be mapped under scrub forest and 5,685 acres under scrub grassland. Without more intensive measurement it can only be conservatively estimated that 20 per cent or 5,340 acres of the above rubber-scrub forest areas were occupied by rubber and 10 per cent or 568 acres of scrub grassland-rubber areas were similarly occupied.

Oil Palm

The survey identified 3,410 acres of oil palm in 1966 in the state. This acreage is only 0.1 per cent of the state and 1.25 per cent of the total area under agricultural use. All the areas mapped were in large blocks, which is indicative of management on an estate or land development scheme basis. The above acreage could be further increased if newly cleared areas in the neighbourhood of the established oil palm fields are included. But as there was no indication on the aerial photographs as to the crop that would eventually be planted in cleared areas, such units have not been mapped as oil palm fields. It was known, however, that the State Government had cleared 4,000 acres of land in the Sungai Tong area in Kuala Terengganu District, out of which 300 acres were planted with oil palm by the end of 1966 (Mohamad bin Jamil, 1969).

Coconut

This was the third most extensively cultivated crop after rubber and padi. The 16,472 acres indicated in the State Summary (Table B. 1, Appendix B) constituted areas of two acres or more of pure coconut palms. But the coconut palm, being an ubiquitous plant, occurred in varying densities within mixed horticulture, scrub forest, scrub grassland and urban areas. While the acreage of this crop may not be significantly large in the latter three sub-categories, it has been roughly estimated to approximate 8,230 acres within mixed horticulture areas.

With only 1,000 acres (Laporan Tahunan, 1966) under estate management, most of the coconut palms were in smallholdings. As such, there were no yield figures for the state. Nevertheless, the production of nuts from the 16,472 acres of pure coconut areas must be substantial when 12,677 acres under estate management in Selangor produced 28,435,000 nuts in the same year (Department of Statistics, 1967).

Cocoa

All the 1,065 acres of cocoa grown in the state occurred in the district of Ulu Terengganu. This crop was under estate management and occupied large contiguous blocks. This is also the largest acreage of cocoa in West Malaysia.

Sago

The sago palm has not received very much attention and has been found growing in long narrow strips along river banks or in old stream channels. Units of two or more acres in size totalled 248 acres and even if smaller units were added to this total the overall acreage for the state would not be very significantly larger.

Bananas

Although this is an ubiquitous crop it has not been cultivated in extensive units. Thus, while it has not been mapped in this survey as a sole crop it was known to be present in very small units in the following sub-categories:-

1. as a mixed horticulture crop
2. within diversified crops areas
3. within urban areas.

Tobacco

Although it was known that tobacco was cultivated on fallow padiland in the state, this crop has not been grown in large contiguous blocks, but in plots of approximately 1/7 acre. As it has not been possible to delineate such small plots of land use at the 1:25,000 scale, tobacco has not been mapped in this survey. The State Agriculture Officer's annual report of 1966 (Laporan Tahunan, 1966), however, states that 1,050 acres of this crop were grown in the state in that year.

Orchards

Pure orchard fields amounted to 1,279 acres out of which 681 acres occurred in Kuala Terengganu District and 423 acres in Besut District. The main orchard fruits were Durian (*Durio zibethinus*), Rambutan (*Nephelium lappaceum*), Duku (*Lansium domesticum* var. *duku*), Langsat (*Lansium domesticum*) and Citrus, though 152 acres in Kuala Terengganu District consisted of cashew nuts. The above acreage of orchards was not the only source of fruits in the state as a substantial acreage could be found grown in mixed horticulture areas.

Padi

Although padi occupied 1.9 per cent of the state's land area, it was the second most extensively cultivated crop, after rubber, accounting for 22.2 per cent of the total agricultural land of the state.

The coastal flats and inland river valleys have been utilized extensively for the cultivation of this crop. The main areas of concentration were the coastal plain covering the two northern coastal districts of Besut and Kuala Terengganu where 81.9 per cent (49,910 acres) of the total 60,939 acres in the state have been utilized.

13,471 acres of padiland in the state were under irrigation schemes in 1966; a further 7,170 acres were under controlled drainage schemes while 6,819 acres were under sub-standard schemes or schemes under construction thus making the total area irrigated or drained 27,460 acres (Statistical Digest, 1968). The proportion of wetland to dryland padi in the state was approximately 5 to 1. Thus out of the 60,939 acres mapped in this survey approximately 50,800 acres were wetland padi. As 27,460 acres were maintained under irrigation and/or drainage schemes, about 23,340 acres were cultivated by simple diversion of river water or by seasonal flooding.

Not all alluvial flats in the state have been successfully cultivated with padi. The survey indicated approximately 20,000 acres of swampland as having been cultivated with padi at one time or another and the evidence of such activity was indicated by the distinct outlines of abandoned fields which were, at the time of the survey, in various stages of reversion to swamp forest. Kuala Terengganu District had the largest (12,285 acres) acreage of abandoned padiland and, within the districts, the mukims with extensive areas of such land were the two adjoining mukims of Kuala Nerus (5,105 acres) and Batu Rakit (2,707 acres). Other mukims with more than 1,000 acres of abandoned padiland were Jabi (1,364 acres) and Kerandang (1,209 acres), both mukims being within the district of Besut.

Production from each of the three main types of padi cultivation, the main season, the off-season and the "dry" or non-irrigated types has been variable as indicated in table 1 below.

TABLE 1. PADI PRODUCTION

Type Production	Main Season	Off-season	"Dry" or Tugalan
Total yield	6,692,000 gtgs*	918,000 gtgs	1,763,000 gtgs
% of West Malaysian Total	2%	1.9%	23%
Average yield	150 gtgs/acre	396 gtgs/acre	206 gtgs/acre

(extracted from Statistical Digest, 1968).

Padi production from the main season crop, although the highest for the state, was the second lowest among the eleven states of West Malaysia. The average yield was also low being 39 per cent of the overall average of 389 gantangs per acre.

The off-season production was the 7th highest among the eleven states while the average yield was 86.7 per cent of the overall average of 457 gantangs per acre.

The yield of padi tugalan was the second highest among the eleven states and the average yield was 99 per cent of the overall average of 209 gantangs per acre.

Diversified Crops

Within this sub-category there was a mixture of semi-permanent crops among which maize and tapioca were dominant. Out of the 686 acres mapped in this survey, 298 acres occurred in Kuala Terengganu District and 214 acres in Besut District. None of the other districts had more than 85 acres of diversified crops grown in units of two acres or more.

Note: *gtgs = gantang.

1 gantang = 1 gallon.

1 gantang rice = 8lbs. rice. (approx).

1 gantang padi = 5.6 lbs. padi.

615 gantangs padi = 1 ton rice.

Forest, Scrub Forest, Scrub Grassland and Swamp

Constituting 72 per cent of the total state area, the 2,304,972 acres of forest made up the largest single land use unit in the state. Except for Kuala Terengganu and Marang Districts, all the other four districts in the state had more than 50 per cent of their land area covered by forest (Table B. 1 of Appendix B). The district with the largest forest cover was Ulu Terengganu District where the 829,108 acres of forest land constituted 87.2 per cent of the district. Similarly, the 541,510 acres of forest in Dungun District made up 81.2 per cent of that district while the 460,497 acres and 293,597 acres were respectively 73.8 and 59.7 per cent of Kemaman and Besut District.

Scrub forest was relatively extensive occupying 5.9 per cent of the total state area. Within the scrub forest areas there were units of land which were not regenerating forest but more likely poorly managed rubber. As a whole these units are significant as they covered approximately 26,700 acres; a conservative estimate is that 20 per cent of such areas consisted of rubber so that approximately 5,340 acres could be considered to be occupied by poorly managed rubber.

Grassland and scrub grassland areas amounted to 94,064 acres or 2.9 per cent of the state. Nevertheless, these areas did not consist purely of grassland. As indicated in the classification legend in Appendix A, scrub grassland can consist of a certain amount of trees. Some of these, it has been observed, were rubber trees. An examination of the aerial photographs showed that about 5,680 acres contained rubber in varying proportions. Taking 10 per cent as a conservative estimate, then 568 acres of poorly managed rubber would have been included under scrub grassland.

Swampland was extensive, the 269,577 acres constituting 8.4 per cent of the total state area. As indicated in table B. 1 of Appendix B, all the coastal districts each had more than 40,000 acres of swampland, with as much as 68,599 acres in Kemaman District. Not all the swamp areas had remained under natural swamp vegetation for long as there were indications that more than 20,000 acres of such land had, in recent times, been cleared for padi cultivation but have since been abandoned.

Recently Cleared Land

Most of the newly cleared areas, particularly large units adjoining existing rubber land, were cleared for planting of rubber and, to a lesser extent, oil palm. Some of these areas could have been cleared from old rubber while others have most probably been cleared from forest.

Unused Land

The 9,157 acres mapped composed mainly of unused beaches and sand bars with a minor occurrence of limestone hills and ridges in the interior.

INDEX OF AERIAL PHOTOGRAPHY AND 1:25,000 LAND USE MAPPING

Photography

Aerial photographs at the scale of 1:25,000 taken in 1966 form the basic tool of this Survey. Hence it is thought desirable that the reader be made aware of the photographic coverage of Terengganu. The original films of this coverage are lodged with the Directorate of National Mapping and prints can be made available to authorised bodies who may require them for carrying out a closer inspection of a particular area.

There are about 1,603 overlapping aerial photographs covering the State of Terengganu. This coverage is represented by an index (Figure 6) which depicts the position of every 5th photograph, the flight line position and the negative film roll number containing a particular line. For example, the photographs stereoscopically covering Kuala Terengganu Town in figure 6 would be referred to as, Roll C-85, Line 85, Photos 105 and 106. The State is covered by 32 north-south lines approximately 2.5 miles apart. The lateral overlap of these lines is approximately 30 per cent with the strip width of a single line being about 3.5 miles. The photographs along the flight lines overlap by about 55 to 65 per cent which means that the principal points (centres) of the photographs are approximately 1.4 miles apart.

Each aerial photograph measures 9" x 9" and covers an area of approximately 12.6 square miles. Since the lateral and forward overlap are necessary to achieve stereoscopic effect, it means that each photograph only "gains" approximately 2.8 square miles of the stereoscopic coverage.

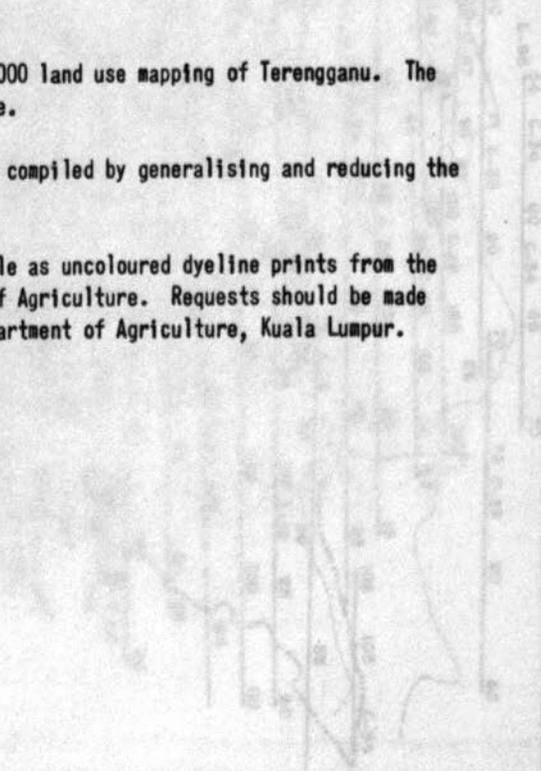
It should be noted that the aerial photographs covering Terengganu were taken at different times during the year 1966. A record of the actual dates and times of exposure for all the photographs is kept in the Land Use Section, Department of Agriculture, Kuala Lumpur.

Mapping

Figure 7 also shows the index of the 1:25,000 land use mapping of Terengganu. The State is covered by a total of 91 sheets at this scale.

A State Land Use Map at 2 miles to an inch compiled by generalising and reducing the 1:25,000 land use mapping is included in this report.

Land use mapping at both scales is available as uncoloured dyeline prints from the Land Use Section, Soil Science Division, Department of Agriculture. Requests should be made in writing to the Assistant Director of Research, Department of Agriculture, Kuala Lumpur.

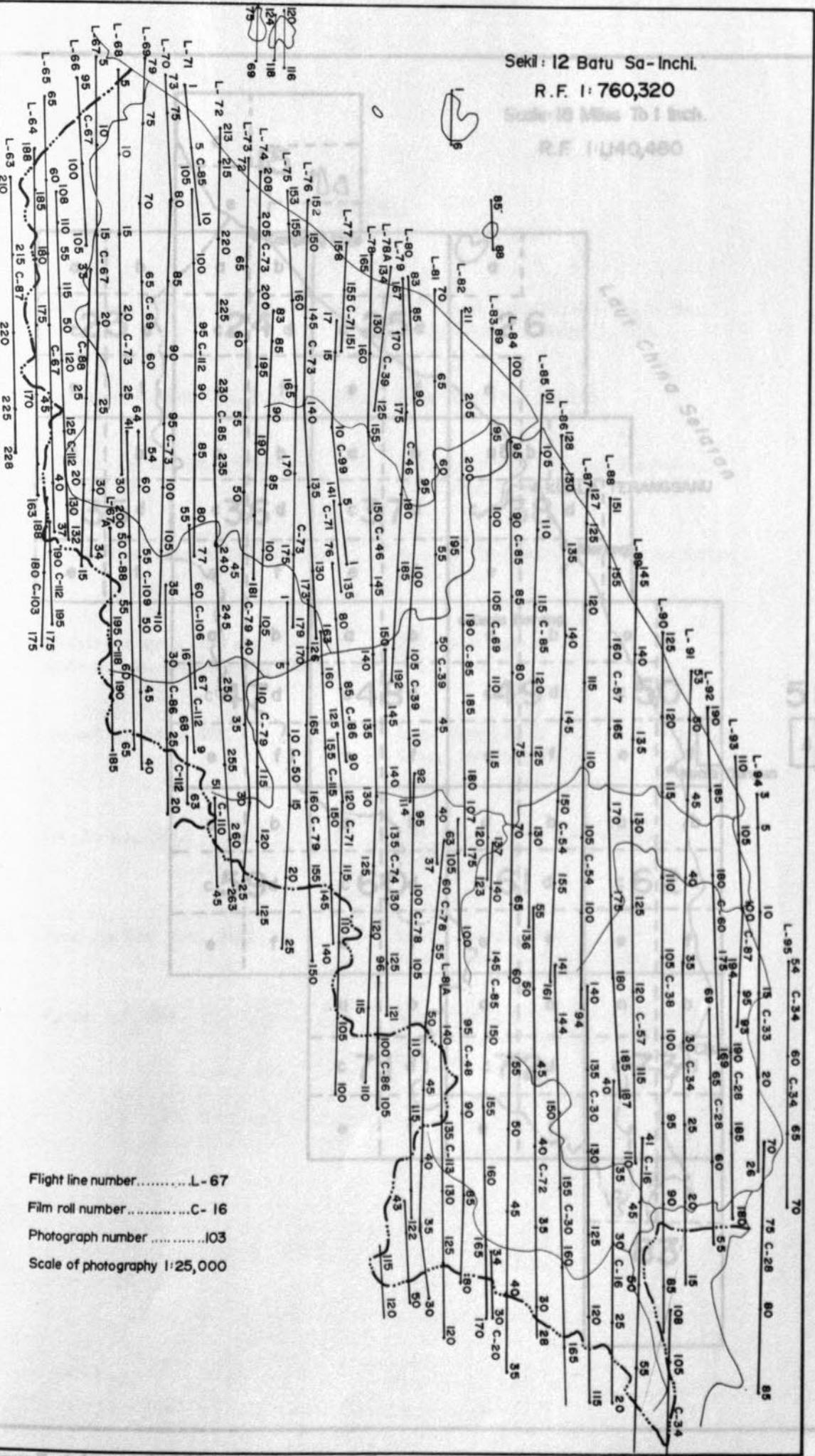


Sekil: 12 Batu Sa-Inchi.

R.F. 1:760,320

Scale 1:760,320

R.F. 1:140,480



Flight line number.....L-67

Film roll number.....C-16

Photograph number.....103

Scale of photography 1:25,000

Figure 6. Index of 1966 aerial photography of Terengganu

Scale: 18 Miles To 1 Inch.

R.F. 1:1,40,480

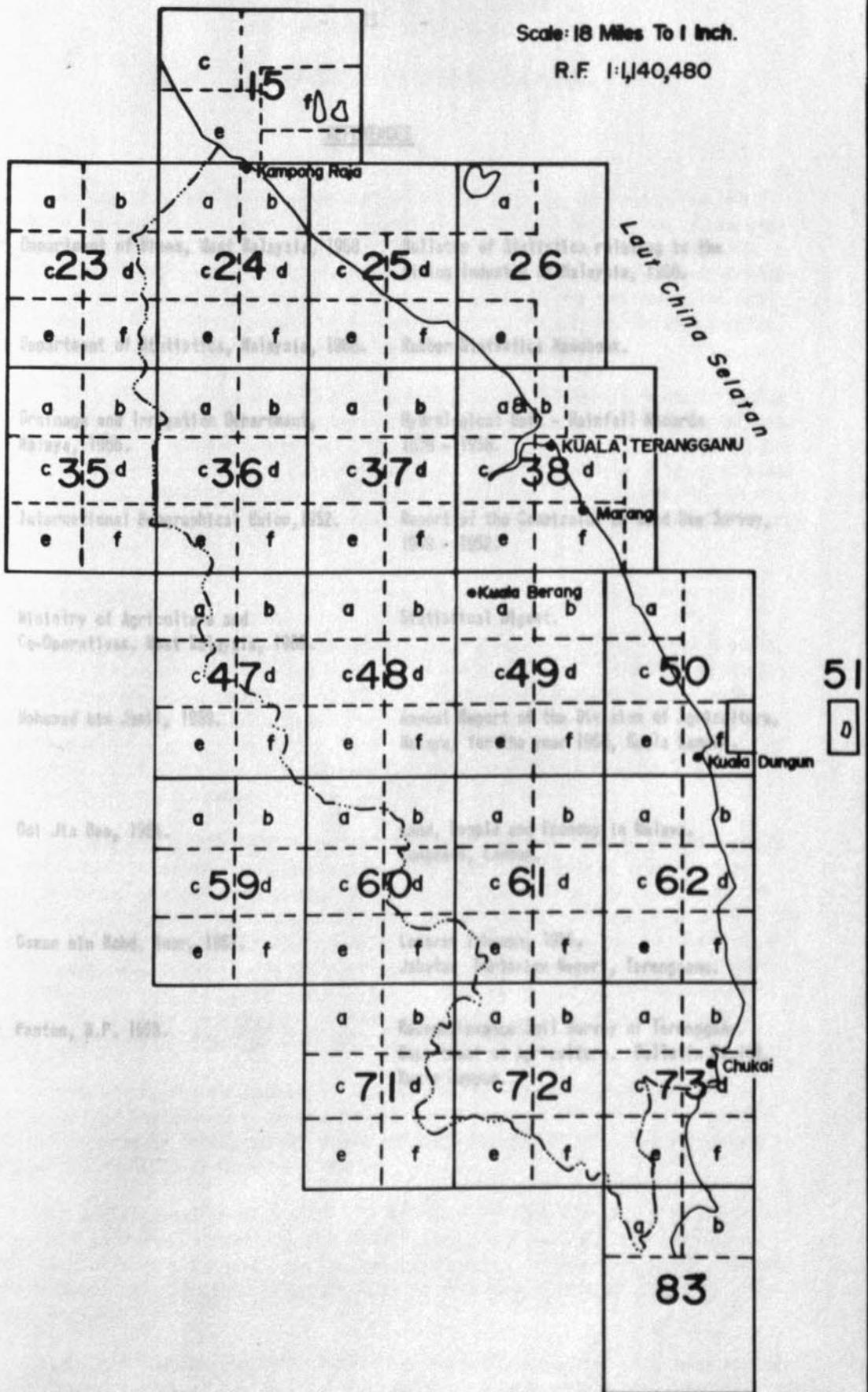


Figure 7. Index of 1:25,000 land use mapping of Terengganu.

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APPENDIX A

THE PRESENT LAND USE SURVEY OF WEST MALAYSIA
THE LAND USE CLASSIFICATION LEGEND

For the Interpretation of 1:25,000 Aerial Photography

Introduction

The Land Use classification, developed for West Malaysia, is one based on the format presented by the Commission on World Land Use Survey for international application. It has been modified to more precisely meet the requirements of Land Use as found in West Malaysia, while still conforming to the internationally recognized and established system. The obvious advantage is that actual photographic interpretation and subsequent mapping will be immediately readable and understandable to a wide and growing group of specialists continually dealing with Land Use Classification, Land Capability and Agricultural Development Programmes.

The development of the classification legend now presented took five months to develop during which time preliminary legends were applied on a production basis to three different areas in West Malaysia, while reconnaissance trips were made to other areas possessing distinctive land use patterns. The writer believes that this legend allows photointerpretation to be accomplished with the minimum of deliberation, keeps field checking to a minimum, and yet enables the identification of all categories necessary for the subsequent compilation of meaningful Land Use Mapping and area measurement.

Classification Modifications

In developing the system of classification used for mapping land use in West Malaysia, two important requirements have been kept in mind. The first is that any classification system should conform as closely as possible to an internationally used and accepted classification. The second requirement is that any classification system must include all significant land use types found within the area for which it is to be used. It is believed that this classification embodies these qualities and only in a minor way do the local modifications differ from the internationally accepted framework.

Two slight changes in nomenclature were considered necessary. First, the Commission's category 6 "Unimproved Grazing Land", has been re-named "Grasslands" because, although it is possible to interpret and map areas of low vegetative cover that might or might not be used for grazing, it is not always possible to accurately determine whether or not these areas are actually used for this purpose. In fact most small herds of cattle graze within and on the boundaries of some of the other categories; e.g. on road right of ways, within settlement areas, inside small-holding rubber areas and on some padi areas during the "offseason". Second, the Commission's category 9, "Unproductive Land" has been re-named "Unused Land" as it is considered unwise to negate the possibility of future use under hitherto unknown practices.

Category 8 "Swamps and Marshes" has been enlarged in concept to include all poorly drained land exhibiting seasonal or permanent waterlogging. It seems illogical to include this type of vegetation in the forest category as its very existence depends on a swamp environment and without this condition it would cease to exist.

The sub-categorisation of category 7 "Forest Land" has been kept to a minimum with the knowledge that the National Forestry Department are in fact presently executing a comprehensive forestry classification interpretation on the same photography. "Shifting Cultivation", however, has been included under Category 4 (Cropland) since this is a form of land use under which food crops are produced.

Category 5 "Improved Permanent Pasture" has been maintained although the total national acreage is exceedingly small. The few areas that do exist are being grown on an experimental basis, and there is a possibility that this land use type will expand in the future.

A detailed explanation of the Classification Legend follows.

THE LEGEND

1. Settlement and Associated Non-Agricultural Lands (Shades of Red)

1U: Urban and Associated Areas

The truly built-up areas of cities, towns, kampongs, including associated and surrounding parks and open spaces, detached industrial sites, settlement areas, reservoirs, etc. Areas obviously in the process of urban development showing evidence of a road pattern and house lots but presently without buildings are also included. Fringes of urban centres, strip development and most kampongs may be included in sub-category 2H "Mixed Horticulture" if more than 50% of the land is under horticultural use.

1E: Estate Buildings and Associated Areas

All areas of estate housing, schools, hospitals, administrative buildings and recreational land. When groups of these exceed two acres they are interpreted but individual and isolate buildings occupying less than this acreage are ignored.

1T: Tin Mining Areas

All areas previously laid waste and devoid of vegetation, areas being worked at present, and cleared land obviously designated for tin mining. Within these areas all water bodies greater than two acres are identified and given the code (W).

1X: Other Mining Areas

All other areas showing mining activity other than for tin.

1P: Power Lines

Power lines or transmission lines of a width greater than one hundred feet are interpreted where they interrupt the land use of the areas they traverse. If there is no disruption of the land use activity the presence of a power line is ignored; e.g. a wide power line crossing a block of padi may not prevent the homogeneous development of the padi area. When a transmission line traverses and interrupts the continuous activity of a sub-category then the actual land use of the line is indicated in parenthesis; e.g. 1P(6) would indicate a power line swath with a ground cover of grassland.

2. Horticultural Lands (Shades of Deep Purple)

2H: Mixed Horticulture

This is a very wide and extensive sub-category including all the typical diversified "garden cultivation" found in a haphazard fashion around a family unit. It may be better visualised if it is realised that the terms, "Dusun" "Minor Cultivation", "Domestic Cultivation" and "Domestic Horticulture" were all considered as possible descriptions.

The essential basis is the family settlement unit with emphasis on the production of diversified crops for family needs with the possibility of small surpluses being sold locally. Included are mixed vegetables, yams, tapioca, chillies, pineapples, fruit trees, bananas, papayas, coconuts etc.

The complexion of this sub-category changes according to geographical location, soil condition and local traditions but the essential feature is always diversification and the activity is intense and focused around the family unit.

Often this sub-category, although existing, is completely overshadowed by the importance of the activity within which it exists. For example, if it is present in small patches within an area of intense smallholding coconuts, then the area will merely be designated as coconuts. Also, where units of more than two acres of other sub-categories appear with a background of "Mixed Horticulture", they are then, of course, separately identified. It is not uncommon to find twenty-acre lots of smallholding coconuts, rubber and orchards within and on the periphery of "Mixed Horticulture".

The most common location is along roads, waterways and on the better drained sites of padi areas. Frequently this type forms buffer strips between estate and smallholding crops.

The interpreter's decision to designate an area as 2H is taken when homogeneous units of other sub-categories are not discernible and the intense land use activity is focused around rural settlement. Mixed tree crops (often very dense) intermingled with small garden plots, footpaths and housing are the cumulative criteria necessary for designation as 2H.

2M: Market Gardening

Areas where the obvious emphasis is on the commercial production of fresh vegetables. The pattern is that of intense neatness and use with individual units being small. These areas should not be confused with the larger areas of "Diversified Cropland" (4C) where the individual units are bigger and "high" crops such as tapioca, sugar and maize are obvious.

Most market garden areas occur in or near large urban centres or in mountain areas favourable to temperate zone crops. In these latter areas, category 2M includes commercial flower gardens.

2E: Government Agricultural Stations

3. Tree, Palm and Other Permanent Crops

(The following sub-categories cover crops at all stages of growth and under various forms of management).

3G: Rubber

3O: Oil Palm

3C: Coconut

3N: Pineapple (Only commercially grown pineapple, sometimes by smallholders in conjunction with coconuts and principally for the canning industry).

3K: Coffee

3T: Tea

3A: Cocoa

3P: Pepper

3S: Sago Palm

3R: Arecanut Palm

3X: Orchards (Rambutan, Durian, Citrus, Clove, Nutmeg, etc.)

3H: Fish Ponds - (Excluded are some old tin excavation ponds often stocked with fish).

When two of the crops mentioned above are found growing in a mixed fashion the area is designated by the number 3 followed by the letter of the tree or palm crop and then by the ground crop; e.g. 3CK describes an area of coconuts with intensive coffee cultivation beneath the coconuts.

4. Cropland (Shades of Brown)

4P: Padi

Double and single cropping padi areas.

4C: Diversified Crops

This sub-category covers a wide range of crops growing in reasonably large areas although the individual units (fields) may be quite small (3 to 20 acres). The size of the fields make it difficult to interpret the actual crop, especially when the same crop may be present at different stages of maturity within a mixed crop area which may also contain areas of fallow. Crops found in this sub-category are almost entirely annual with tapioca occupying the largest acreage. Other crops include maize, sugar, bananas, yams, sweet potatoes, tobacco etc.

NOTE:

Bananas appear in small units within this sub-category. It should however be realised that the bulk of the country's bananas grow within 2H "Mixed Horticulture" and in conjunction with young smallholding rubber. Within these areas they cannot be separately delineated at the present interpretation scale.

Within Malaysia bananas are not grown on a large scale commercial basis. If bananas did appear in large "plantation" areas, they would naturally be included under category 3.

4X: Shifting Cultivation

Shifting cultivation also referred to as "ladang" cultivation, describes an activity carried on by the Aborigines where primary forest areas are selected for cultivation, then cleared and planted with crops, and finally abandoned after a year or two as the soil loses its initial fertility. The most common crops planted are, upland rice (hill padi), tapioca, sweet potatoes, yams and maize. General areas of shifting cultivation are recognized by the cell-like appearance of small clearings in various stages of regenerating vegetation as well as newly cleared ladangs. Only the areas presently in use are identified and areas previously in use, but now abandoned, are identified according to the present vegetative cover. The sizes of these clearings vary between three and twenty acres.

NOTE:

It must be realised that many of the crops found in categories 3 and 4 are also found in small uninterpretable areas (less than 2 acres) within the collective sub-category 2H "Mixed Horticulture". Often the cumulative acreage of these crops within 2H "Mixed Horticulture" can be considerable.

5. Improved Permanent Pasture (Hatched Yellow)

The category at present covers an extremely small proportion of the country. But it is a category with possibilities of expansion. It includes land where selective grasses are being grown for grazing and for the production of marketable fodder.

6. Grasslands (Yellow)

Because of the difficulties created by detailed interpretation combined with the relative unimportance of this Category, it has been decided not to sub-categorize and so this Category includes areas of Lalang, Unimproved Coarse Pasture and Scrub-Grassland. The general appearance of the Category is grassland and areas are only included when shrubs and trees (generally below 15 feet) cover less than 50% of the area. When the scrub component covers more than 50% of an area it is designated as 7S "Scrub Forest".

Lalang, often occurring in "sheets" over extensive areas comprises an important part of this Category as do the grasses inhabiting the beach ridges ("permatang") of the east coast.

It is not always possible to accurately determine which areas within this Category are actually used for grazing and therefore it should be remembered that the title "grassland" does not imply an area of grazing. Only in a few local areas of the country are cattle intentionally grazed within this Category, which for the most part, is devoid of cattle.

Areas of grassland appearing in Urban (IU) and having no apparent recreational use are mapped in this Category.

Areas of grassland or scrub grassland appearing on erosion scars or on landslides are designated 6E.

7. Forest Land (Shades of Green)

7F: Forest

All dryland forests are present in this sub-category. It includes all primary forests and secondary forests or high "belukar", above about 15 feet in height. In a few areas the symbol 7F (R) denotes reforestation, afforestation and "treated" forests.

7S: Scrub Forest

This sub-category is used when more than 50% of an area is covered by shrubs, bushes, and young or dwarf trees, having a height of less than approximately 15 feet. It includes a) low "belukar", or secondary growth, which is in the first stage of regeneration of mature forest, and b) scrub vegetation whose occurrence is due to edaphic factors, such as the xerophytic scrub of the dry permatang.

Normally 7S would also include the dwarf Montane and Sub-Montane Forest growing on the thin soils of mountain summits and ridges of the interior. In these areas of primary forest this edaphically controlled dwarf scrub forest is not mapped. This is the only sub-category of land use that is mapped discontinuously, the reason being the unjustifiably high cost of mapping this relatively inconsequential type and also because a comprehensive forestry interpretation is being carried out by the Forestry Department.

NOTE:

If no agricultural land use activity is present on a complete map sheet, the entire sheet is not interpreted and therefore not mapped. These areas are mostly in the interior of the country where natural montane dwarf vegetation is found. Hence considerable areas of this vegetation type are excluded by this survey.

7C: Recently Cleared Land

These are recently cleared areas where there are no indications as to the future land use. For convenience these areas have been placed within the forest Category but it should be realised that they are not necessarily always areas cleared from forest; e.g. areas cleared from old rubber awaiting replanting into oil palm would come under this sub-category. These areas are recognized not only by a very "clean" appearance, but also by the presence of felled trees and traces of burning.

8. Swamp, Marshland and Wetland Forests (Blue-Green)

This category includes all poorly drained land exhibiting seasonal or permanent waterlogging. Wetland Grass and Forest Associations (including Mangrove, Nipah and Gelam) occur in this category, as well as Wetland Forest areas which have been recently cut-over.

9. Unused Land (Grey)

All areas, which by present practices, are unproductive, e.g. riverine and coastal beaches, mudflats, exposed rocks, cliffs, etc.

THE PRESENT LAND USE SURVEY OF WEST MALAYSIA
CONCISE FORM OF THE PRESENT LAND USE CLASSIFICATION LEGEND

For the Interpretation of 1:25,000 Aerial Photography

1. Settlements and Associated Non-Agricultural Lands (Shades of Red)
 - 1U : Urban and Associated Areas
 - 1E : Estate Buildings and Associated Areas
 - 1T : Tin Mining Areas
 - 1X : Other Mining Areas
 - 1P : Power Line Right of Ways

2. Horticultural Lands (Shades of Deep Purple)
 - 2H : Mixed Horticulture
 - 2M : Market Gardening
 - 2E : Agricultural Stations

3. Tree, Palm and Other Permanent Crops (Shades of Light Purple)
 - 3G : Rubber
 - 3O : Oil Palm
 - 3C : Coconut
 - 3N : Pineapple
 - 3K : Coffee
 - 3T : Tea
 - 3A : Cocoa
 - 3P : Pepper
 - 3S : Sago Palm
 - 3R : Arecanut Palm
 - 3X : Orchards - (Rambutan, Durian, Citrus, Cloves, Nutmeg, etc.)
 - 3H : Fish Ponds

4. Cropland (Shades of Brown)
 - 4P : Padi
 - 4C : Diversified Crops
 - 4X : Shifting Cultivation

5. Improved Permanent Pasture (Hatched Yellow)

6. Grassland (Yellow)
 - 6 : Lalang, Unimproved Coarse Pasture and Scrub-Grassland.

7. Forest Land (Shades of Green)
 - 7F : Forest
 - 7S : Scrub Forest
 - 7C : Recently Cleared Land (Black Hatching - No Colour)

8. Swamp, Marshlands and Wetland Forests (Blue-Green)
 - 8 : Wetland Grass and Forest Associations, including Mangrove, Nipah and Gelam.

9. Unused Land (Grey)

APPENDIX B

LAND USE SUMMARY OF TERENGGANU

Land use acreage figures have been summarised and tabulated in table B. 1 for each of the six districts of Terengganu. The extent of land use sub-categories and major categories in terms of acreages and percentages are also indicated. The percentage of land under agricultural use has also been incorporated in the table.

The national area has been given by the Directorate of National Mapping while the population statistics, covering the period up to June 1966, has been supplied by the Statistics Department.

The total land use acreage and the physical area of the state is based on the measurement of all land areas indicated on the 1:25,000 scale aerial photographs taken in 1966.

PRESENT LAND USE SURVEY - 1966
TABLE B.1. State Land Use Summary - Terengganu

AREAS TAKEN FROM 1:25,000 LAND USE MAPPING COMPILED FROM THE INTERPRETATION OF 1966 AERIAL PHOTOGRAPHY

STATE AREA:-

LAND USE ACREAGE 3,199,062 (4,998.5 SQ. MILES)
 PHYSICAL ACREAGE 3,199,062 (4,998.5 SQ. MILES)⁺

NATIONAL AREA	SQUARE MILES 50,806@	ACRES 32,515,840
PERCENTAGE OF NATIONAL AREA	9.84%	
POPULATION* 361,749	% OF NATIONAL POPULATION: 5.76%	
POPULATION DENSITY	PER SQUARE MILE 723.7	PER ACRE 4.36
AGRICULTURALLY USED LAND	SQUARE MILES 427.97	ACRES 273,904
POPULATION DENSITY ON AGRICULTURALLY USED LAND	PER SQUARE MILE 845	PER ACRE 1.32

LAND USE CATEGORY	D I S T R I C T												TOTAL	%	MAJOR LAND USE CATEGORIES IN ACRES	%	LAND UNDER AGRICULTURAL USE IN %				
	BESUT	%	DUNGUN	%	KEMAMAN	%	KUALA TERENGGANU	%	MARANG	%	ULU TERENGGANU	%					MAJOR CATEGORIES	SUB-CATEGORIES			
1U: Urban	451	0.1	1,337	0.2	655	0.1	2,200	0.7	158	0.1	425	-	5,226	0.2	URBAN AND ASSOCIATED AREAS	0.3			1U		
1E: Estate Building	13	-	3	-	130	-	-	-	-	-	20	-	166	-					1E		
1T: Tin Mining	-	-	61	-	16	-	-	-	-	-	-	-	77	-					1T		
1X: Other Mining, Quarrying	33	-	2,462	0.4	418	0.1	70	-	-	-	3	-	2,986	0.1					1X		
1P: Transmission Line	-	-	-	-	-	-	-	-	-	-	-	-	-	-					1P		
2H: Mixed Horticulture	13,041	2.6	3,624	0.5	2,655	0.4	15,264	4.6	2,413	1.7	4,155	0.4	41,152	1.3	HORTICULTURE	1.3	15.0	2H			
2M: Market Gardening	29	-	-	-	12	-	8	-	51	-	-	-	100	-			-	2M			
2E: Agricultural Station	-	-	-	-	-	-	-	-	-	-	124	-	124	-	41,376		-	2E			
3G: Rubber	31,467	6.4	13,537	2.0	38,925	6.2	34,101	10.4	6,577	4.8	23,809	2.5	148,416	4.6	TREE, PALM AND PERMANENT CROPS	5.3	62.4	54.2	3G		
3O: Oil Palm	3	-	1,747	0.3	-	-	-	-	191	0.1	1,469	0.1	3,410	0.1						1.2	3O
3C: Coconuts	4,347	0.9	1,667	0.2	3,258	0.5	4,864	1.5	1,886	1.4	450	-	16,472	0.5						6.0	3C
3N: Pineapple	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	3N
3K: Coffee	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	3K
3T: Tea	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	3T
3A: Cocoa	-	-	-	-	-	-	-	-	-	-	1,065	0.1	1,065	-						0.4	3A
3P: Pepper	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	3P
3S: Sago	33	-	11	-	-	-	183	-	-	-	21	-	248	-						0.1	3S
3R: Arecanut Palm	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	3R
3H: Fish & Hyacinth Ponds	-	-	-	-	-	-	-	-	-	-	-	-	-	-				170,890		-	3H
3X: Orchards	423	0.1	40	-	66	-	681	0.2	5	-	64	-	1,279	-						0.5	3X
4P: Padi	25,754	5.2	833	0.1	965	0.1	24,156	7.4	2,184	1.6	7,047	0.7	60,939	1.9				CROPLAND	1.9	22.5	22.2
4C: Diversified Crops	214	-	10	-	27	-	298	0.1	52	-	85	-	686	-			0.2				4C
4X: Shifting Cultivation	-	-	-	-	6	-	7	-	-	-	-	-	13	-	61,638		-				4X
5 : Improved Permanent Pasture	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5		
6 : Grassland	26,889	5.5	13,289	2.0	12,283	2.0	15,182	4.6	10,797	7.8	15,624	1.6	94,064	2.9	94,064	2.9	100%	99.8%	6		
7F: Forest	293,597	59.7	541,510	81.2	460,497	73.8	136,277	41.5	43,983	31.9	829,108	87.2	2,304,972	72.0	FOREST AND SCRUBLAND	78.0	Total Acreage under Agricultural Use		7F		
7S: Scrub Forest	33,262	6.8	26,701	4.0	27,169	4.3	39,036	11.9	18,061	13.1	44,804	4.7	189,033	5.9			2,494,005			7S	
7C: Recently Cleared Land	4,857	1.0	3,232	0.5	2,414	0.4	5,737	1.7	2,769	2.0	5,524	0.6	24,533	0.8	24,533	0.8	273,904		7C		
8 : Swamp	50,421	10.3	50,635	7.6	68,599	11.0	44,336	13.5	46,271	33.5	9,315	1.0	269,577	8.4	269,577	8.4	Percentage of State area under Agricultural Use		8		
9 : Unused Land	1,835	0.4	1,609	0.2	1,095	0.2	1,760	0.5	1,275	0.9	1,583	0.2	9,157	0.3	9,157	0.3	8.6%		9		
UNCLASSIFIED	4,690	0.9	4,886	0.7	4,711	0.8	3,923	1.2	1,277	0.9	5,880	0.6	25,367	0.8	25,367	0.8					
TOTAL	491,359	99.9	667,194	99.9	623,901	99.9	328,083	100	137,950	99.8	950,575	99.7	3,199,062	99.8	3,199,062	100					

@ As indicated by the Directorate of National Mapping.

* This is a State Population Estimate for June 1966 supplied by the Statistics Department and indicates an increase of 30% over the 1957 Census Total.

+ This acreage total is based on measurement of all land areas indicated on the 1:25,000 aerial photographs taken in 1966.



