

THE GOVERNMENT OF MALAYSIA
LEMBAGA KEMAJUAN TRENGGANU TENGAH



TRENGGANU TENGAH

REGIONAL PLANNING
AND
DEVELOPMENT STUDY

VOLUME II
THE RESOURCE BASE

HUNTING TECHNICAL SERVICES LIMITED

with

Shankland Cox Partnership

NOVEMBER 1974

CONTENTS

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CHAPTER 2

The Economic Background

2. THE ECONOMIC BACKGROUND

2.1 Introduction

Development of an area such as Trengganu Tengah is undertaken with the aim of benefitting people. This basic objective is brought out clearly in the Terms of Reference for this study which incorporates at regional level the New Economic Policy of the Government. It is the intention of this section to relate the existing development of Trengganu Tengah to that of the State and the Nation. The proposed development plan can then be seen in perspective and its success in achieving the basic aims measured in relation to a known base.

Successful regional development requires not only the increase in quantifiable money income and its more equitable distribution but also the wider availability of the non-pecuniary benefits associated with modern life. In this process it is equally important that external effects are not overlooked in searching for policies maximising total regional or sub-regional benefits.

Evaluation of the existing situation is based largely on statistics relating to 1970 as this is the year of the most recent National Census and therefore a convenient datum point for information on human resources.

2.2 The National Economy

The strength of the Malaysian Economy in recent years and the reasons for it have been well documented in numerous planning studies and government publications.^(1,5,9) It is not proposed to repeat such information in this Report other than that required to describe the relationships between Nation, State and Region.

Recently, Malaysia has been climbing fast up the world league table of prosperity as measured by income per head of population. During the 1960's, the growth in domestic product kept slightly ahead of the growth in population at about 3.0 percent per year.⁽ⁱⁱ⁾ Recently however the rapid rise in world commodity prices has resulted in a very rapid growth in the value of exports. Since 1970 GNP per head in Peninsular Malaysia has risen at about 8 percent per year to reach an estimated \$1,334 per head in 1973.⁽¹⁹⁾

That the Malaysian Economy depends on the primary sector is clear from the fact that in 1973 industry accounted for only 15 percent of GDP against 30 percent for agriculture. The unusual feature of the Malaysian economy is the high proportion of agricultural output coming from large scale developments where value added per person is significantly higher than in traditional farming and a high proportion of the annual production is exported. It is estimated that in 1970 production of palm oil and rubber accounted for 56 percent by value of total agricultural output.⁽ⁱⁱ⁾

(ii) Economic Planning Unit, Provisional Estimate.

However there are weaknesses as well as strengths in this economic composition. Undue reliance on specific world commodity markets results in local hardship when these markets suffer a decline. Concentration on commercial production of primary commodities has tended in the past to take precedence over production for local consumption. The more open the economy the greater the domestic impact of influences outside the control of the National Government.

An additional problem of specialisation lies in the inherent limits to further employment in the traditional sectors once all suitable land is in full production. Employment can only be increased and job opportunities widened by extending crop processing operations within the country and also ensuring the even distribution of value added among the population. Only in this way will local consumption rise to levels adequate to sustain domestic manufacture.

Within Peninsular Malaysia there are large differences between states both economically and socially. To a great extent these existing regional disparities are due to the historical development of Malaysia's uneven national resource endowment.

The western and southern states tend to be richer in both minerals and agriculturally suitable land than those on the eastern seaboard. Exploitation of these natural assets largely employed foreign capital together with expatriate labour and expertise. The result of this has been a growth in infrastructure and industry in these areas and the establishment of a significant non-Malay population. Inevitably a high proportion of the income earning assets such as mines and plantations remain in the hands of foreign investors.

Table 2.1 GDP by Sector — 1970

\$ million.						
	Agriculture ⁽¹⁾	% total State GDP	Ranking	Mining & Manufacture	% total State GDP	Total GDP
Johor	445	40	7	194	17	1,111
Kedah & Perlis	389	57	10	50	7	678
Kelantan	128	43	9	18	6	300
Malacca	98	31	4	20	6	321
Negri Sembilan	169	37	5	81	18	455
Pahang	188	42	8	90	20	450
Penang	136	18	2	108	14	759
Perak	427	29	3	432	29	1,490
Selangor	362	14	1	764	30	2,584
Trengganu	86	38	6	45	20	226
TOTAL	2,428	29		1,802	22	8,374

(1) Includes Agriculture, Forestry and Fishing.

Source: Economic Planning Unit Estimates (Provisional)

Table 2.1 shows the value of sectoral output by State and indicates the relative importance of agriculture in the total domestic product of each. In general a low agricultural content tends to be associated with an above average secondary sector and a relatively high GDP per head. However, because of the substantial difference in productivity between the plantation sector and the traditional farming sector, it is not really meaningful to treat all agricultural sectors as homogenous. For this reason the relatively low proportion of GDP emanating from agriculture in Trengganu is somewhat misleading. Agriculture in Trengganu in 1970 was predominantly of the traditional and smallholder type rather than of the commercial plantation type. One large mining operation in the State was thus able to distort the contribution of the other sectors. Taking employment as a yardstick, agricultural activities absorbed approximately 50 percent of the total employed against 2 percent in mining in 1970.

Associated with the regional emphasis on development of primary resources in the past was the growth of foreign labour. This introduction of non-Malay people is mirrored today in the distribution of population between states by community groups as shown in Table 2.2

Table 2.2 GDP per Head related to Community Group by State — 1970

	Malay as % of population ⁽¹⁾	Ranking	1970 GDP per head \$ ⁽²⁾	Ranking
Johor	53.4	6	835	6
Kedah	70.7	8	605	8
Kelantan	92.8	10	420	11
Malacca	51.9	5	761	7
Negri Sembilan	45.4	4	907	4
Pahang	61.2	7	855	5
Penang	30.7	1	939	2
Perak	43.1	3	911	3
Perlis	79.4	9	605	8
Selangor	34.6	2	1,520	1
Trengganu	93.9	11	536	10

Source: (1) Statistics Department — 1970 Census — Community Groups.⁽²⁶⁾

(2) Economic Planning Unit Estimates (Provisional).

Following the historical development of resources and infrastructure, the current distribution of wealth and income tends to be geographically uneven, as does the racial distribution of the population which has tended to be associated with economic activity. This is brought out in Table 2.2 which indicates the correlation in ranking between non-Malays and GDP per head on a state by state basis. The New Economic Policy aims to correct these regional disparities and to reduce the undue reliance on specific export commodities.

Efforts to stimulate diversification and industrialisation are aimed at widening employment opportunities and stimulating a broader based domestic economy. Encouragement of further processing of locally produced raw materials is intended to raise value added within the nation and such moves may be an increase in specificity

of product and market. It is however a logical step in the process of furthering the basic social and economic objectives of the nation. Further processing and manufacture of locally produced commodities reduces the limits to employment generation imposed by adherence to primary production.

The social objective of equalising opportunity between social groups requires significant amendment to the social environment and education so that differences in attitudes as well as skills are reduced between social and ethnic groups. In rural development schemes, this requires the establishment of urban settlements sufficiently large to support the necessary social and educational infrastructure.

2.3 The East Coast Region and the State of Trengganu

As indicated in Section 2.2 the East Coast region differs socially and economically from the west coast states. The two states of Trengganu and Kelantan have, until recently, been relatively isolated from developments in other parts of Peninsular Malaysia. Lacking rich mineral resources and significant areas of good agricultural land both states have derived their livelihood from timber resources, coastal fishing and traditional agriculture which until recently was largely cash cropping and small scale livestock production. Additionally Trengganu derived a significant income from the iron ore mine at Bukit Besi until its closure in 1971.

During the past decade there has been a large increase in the acreage devoted to plantation agriculture in Trengganu. This has risen from approximately 20,000 acres 10 years ago to over 230,000 acres committed to development in 1974. Analysis of value added within the State in 1970 includes the benefit from the mining activities operating in 1970 but now closed down. Reference to Table 2.3 shows that mining accounted for over 15 percent of gross domestic product in the State in 1970.

Table 2.3 Value added by Sector — State of Trengganu — 1970

Sector	GDP \$ Million	Percent
Agriculture	60.3	29.1
Forestry	9.5	4.6
Fishing	16.5	8.0
Mining	32.7	15.8
Manufacturing and Processing	12.3	5.9
Transport	10.8	5.2
Construction and Utilities	5.3	2.6
Trade (wholesale and retail)	17.0	8.2
Banking, Insurance and Real Estate ⁽¹⁾	2.0	1.0
Government and Community Services	25.3	17.0
All other	5.5	2.6
TOTAL	207.2	100.0

(1) Excludes ownership of dwellings.

Source: EPU Estimate (Provisional)

In 1970 production within the State was 27,928 piculs of tin ore, 1,608 piculs of wolfram and 1.7 million long tons of iron ore. By 1973 production had fallen to 17,734 piculs of tin and 3,903 piculs of wolfram.⁽ⁱ⁾ Given the lower volume of production in 1973 the contribution of the mining sector to the value of domestic product in Trengganu State must have fallen significantly from the 1970 level. Allowing for the absolute decline in the value of mining output and the rise in the volume and price of agricultural output, this latter sector must now constitute a much higher proportion of total State product.

An indication of the relative social importance of the different sectors is given in Table 2.4. This breaks down total employment in the State in 1970 between the major industries. It is apparent that approximately half the total working population was employed directly in agriculture with very low productivity. Equally low is the per capita output from the manufacturing sector due to the preponderance of small scale production in the State.

Table 2.4 Employment by Sector – State of Trengganu – 1970

Sector	Total Employed ⁽ⁱ⁾	Percent of Total	GDP per Head \$
Agriculture ⁽²⁾	66,971	48.9	900
Forestry	1,715	1.3	5,539
Fishing	10,976	8.0	1,503
Mining	3,412	2.5	9,584
Manufacturing	13,669	10.0	900
Transport	3,694	2.7	2,924
Construction and Utilities	2,790	2.0	1,900
Trade	10,816	7.9	1,572
Banking, Insurance	376	0.2	5,319
Government Community Services	10,002	7.3	3,529
Other Services	12,647	9.2	—
TOTAL	137,068	100.0	

(1) Source 1970 Census

(2) Employment includes processing of Agricultural products.

Although the influence of mining was considerable in terms of the value of total production in 1970, the social impact was evidently much less. The generally low level of incomes in Trengganu in 1970 was due more to the relatively unsophisticated type of production within the agricultural and manufacturing sectors rather than the size of the sectors themselves.

(i) Department of Mines - Kuantan

The increase in estimated acreage devoted to plantation crops is shown in Table 2.5. This indicates that the area devoted to rubber and oil palm has risen from 59.7 percent of the total State agricultural acreage in 1970 to 67.5 percent in 1973.

Table 2.5 Agricultural Land Use – State of Trengganu

	1966 ⁽¹⁾		1970 ⁽²⁾		1973 ⁽²⁾	
	Acres	Percent	Acres	Percent	Acres	Percent
Rubber	148,416	54.2	167,977	48.6	192,956	50.4
Oil Palm	3,410	1.2	38,413	11.1	65,415	17.1
Cocoa	1,065	0.4	1,749	0.5	1,749	0.4
All other crops	121,013	44.2	137,695	39.8	122,822	32.1
TOTAL	273,904	100.0	345,834	100.0	382,942	100.0

Source: (1) I.F.T. Wong – Land Use Survey. (96)

(2) Agricultural Department – Annual Reports 1970 – 1973. (91)

Reference to projections made by EPU, shows that Trengganu State is likely to achieve a faster rate of increase in GDP per head by 1990 than any other state if account is taken of present plans for development within the State. By 1990 it is considered that benefits will be felt from the offshore oil discoveries. Adding in the benefits from other known plans would raise gross domestic product per head 4.1 times from \$536 in 1970 to \$2,198 per head by 1990. Trengganu would then rise from 10th position to 7th position in the State League Table measuring per capita income.

Although it is not possible to quantify the total effects on employment and income in Trengganu of the offshore oil discoveries it seems probable that indirectly they will be considerable. If account is taken of the probable expansion of the local marine fishing industry the total effect will be a considerable enhancement in stature of Kuala Trengganu. Should a decision be made to go ahead with the hydro-electric and irrigation scheme on the upper reaches of the Sungei Trengganu, additional benefits would be felt in the town and the surrounding areas.

The development of Trengganu Tengah itself will also benefit the State as the average value added per worker is likely to be substantially above the projected State average. Assuming a participation ratio of 33 percent, then GDP from oil palm growing and processing at maturity would be over \$4,000 per head per year given output per worker of more than \$12,000 per year at full maturity.

The financing of annual expenditure and of public sector developments within the State is dependent to a considerable extent on Federal funds as indicated in Table 2.6.

Table 2.6 State Government Finance — 1972

\$ million	State Expenditure			State Revenue		
	Current	Develop- ment	Total	State Sources	Percent ⁽¹⁾	Federal Sources
Johor	52.5	24.6	77.1	49.2	64	27.5
Kedah	34.6	9.5	44.1	23.4	53	15.9
Kelantan	19.2	5.8	25.0	14.4	58	13.2
Melaka	14.0	6.0	20.0	8.8	44	11.4
Negeri Sembilan	29.8	11.2	41.0	22.7	55	13.5
Pahang	65.3	28.3	93.6	52.4	56	11.0
Perak	66.7	18.7	85.4	59.0	69	35.7
Perlis	5.4	0.6	6.0	2.7	45	3.1
Pulau Pinang	26.2	47.8	74.0	21.3	29	51.7
Selangor	72.0	49.2	121.2	74.3	61	30.4
Trengganu	21.5	7.9	29.4	13.5	46	11.0

(1) Expresses State revenue as percentage of Total State Expenditure.

Source: Economic Report 1973 — 1974 The Treasury Malaysia. (19)

In 1972 revenue from State sources in Trengganu was \$13.5 million (\$31 per head of the population). Current expenditure was \$21.5 million and development expenditure an additional \$7.9 million. State revenue thus accounted for slightly less than half of total expenditure. Federal Government grants, loans and reimbursements totalled \$11.0 million. Until the State tax base rises significantly it seems Trengganu will continue to rely on Federal sources to fund public sector developments.

2.4 Trengganu Tengah

The preceding sections have outlined the major economic features of the nation and the State of Trengganu. This section sets out the economic characteristics of Trengganu Tengah.

Apart from the exploitation of the iron ore deposits at Bukit Besi during the 1950's and 1960's, Trengganu Tengah was largely undeveloped by 1970. The generally difficult terrain and high rainfall together with poor access and communications inhibited agricultural development in all except a few areas. Apart from the few estates in southern Kemaman and the cocoa plantation at Jerangau, the region's agricultural economy was confined to river valley settlement of a largely subsistence nature. Timber from the region was removed for processing at sawmills generally situated outside the area.

An attempt has been made in Table 2.7 to assess the value of output within Trengganu Tengah in 1970. This estimate is no more than a rough indication of the value of output. It has been arrived at by assessing the proportion of State output in certain categories contributed from within Trengganu Tengah. The importance of mining is immediately apparent representing some 66 percent of estimated total output in the region in 1970.

Table 2.7 Estimated Sector Output in Trengganu Tengah
as a Proportion of State Output – 1970

Sector	\$ Million	Percent of State Total	Labour Force ⁽¹⁾	GDP per Person Employed \$
Agriculture				
Oil Palm	2.9	100.0	1,300	2,214
Rubber	4.1	20.6	2,880	1,424
Other	1.4	3.6	2,820 ⁽²⁾	496
Forestry				
Logging and Wood Processing	5.2	54.7	320	16,250
Mining				
All Sectors	32.7	100.0	2,183 ⁽³⁾	14,979
Other Sectors	3.5 ⁽⁴⁾	4.3	2,330 ⁽⁵⁾	1,502
TOTAL	49.8	22.0	11,833	4,208

(1) Chapter 11 Table 11.1

(2) Includes those classified in Fishing.

(3) Includes 723 mine workers not living in area.

(4) Residual estimate related to State total in proportion to employment percentage.

(5) Includes those unemployed seeking work.

Source: Trengganu Tengah Study.

Also obvious is the relatively high average GDP within the region in 1970. Including the mining operations, the estimated GDP per head of \$4,208 in 1970 was more than double the State average of \$1,652. Excluding the mining activities the estimated GDP per person employed was \$1,772 which is still a little above the estimated State average of \$1,436 per head (excluding mining). This must be due to the relatively small subsistence farming element, the comparatively high output achieved per person from forestry, oil palm and rubber and the above average participation rate.

In terms of infrastructure however the region is much worse off than the State generally. The poor communications and the small scattered settlements are not able to provide the minimum social services usually considered necessary to modern living. Thus any evaluation of the region based purely on economic statistics presents a somewhat distorted picture of reality.

Since 1970, the mining operations have declined in importance with the closure of the iron ore mine at Bukit Besi and a reduction in the quantity of tin produced as mentioned above in Section 2.3. The acreage committed to oil palm and rubber has however increased rapidly although production obviously lags some time behind planting. It is estimated that in 1973 production of palm oil within Trengganu Tengah amounted to 32,700 tons worth \$26 million. (See Chapter 8).

Given little change in the value of other agricultural crops during the period it would seem that the rise in the value of total agricultural production in Trengganu Tengah had, by 1973, gone some way to making good the estimated reduction of \$20 million in the value of output from the mining sector since 1970.

CHAPTER 3

Export Revenue

CHAPTER 3

Human Resources

3. HUMAN RESOURCES

3.1 Introduction

This chapter describes the population and labour force of the study area and establishes a basis for projecting their growth. The statistical background and the main conclusions are described here, and the basic data is presented in greater detail in Appendix C. The primary source of information has been the 1970 census, and in particular data relating to the rural areas of Dungun and Kemaman districts within which the study area largely falls. This information forms a basic groundwork for the projections of population and labour force, and it is hoped that it will also prove a valuable source of reference for future planning work in the study area.

3.2 The Size of the Population

Estimation of the population of Trengganu Tengah for the base year of the study, 1970, was complicated by the fact that the boundaries of the region do not in all instances follow established District or even Mukim boundaries. Therefore a list was drawn up of all the kampungs and settlements within the area using as a basis the appropriate ordinance survey maps, 1:63,360 series, modified in the light of known new settlements. This list was submitted to the Department of Statistics, which indicated the exact enumerated population for each kampung and settlement. The total population estimated in this way was 28,585 of which 55 percent was in Dungun, 33 percent in Kemaman and 12 percent in Ulu Trengganu. This accounted for 21.5 percent of the population of these three districts, and 7.1 percent of the total population of Trengganu State. This may be a slight under-estimate since some of the maps used date back to the mid 1960's and it is quite possible that kampungs now exist which are not on the map and about which information was not available; hence they were not included in the list submitted to the Department of Statistics. To allow for this an arbitrarily chosen figure of 1,000 was added to the estimate, bringing it up to 29,575. Table 3.1 shows the 1970 population of the area by District and Mukim.

In Table 3.2 the figures are further corrected for probable under-enumeration and are shown by age group and sex. The proportions of population by community, sex and age group were obtained from a sample of 25,000 using Enumeration District Returns in Trengganu Tengah supplied by the Department of Statistics. The correction for under-enumeration relies on the Census Post Enumeration Survey, ⁽²⁹⁾ and amounted to 1,080, or 3.5 percent of the population; this is slightly below the national average due to the predominantly rural and Malay population of the region. ^(ix)

(i) Population estimates for 1970 were needed for other regions as well (e.g. Kemaman and Dungun Districts); in all cases the same procedure was used to correct for under-enumeration.

Table 3.1 Population of Trengganu Tengah, 1970 — (uncorrected)

District	Mukim	Total Population	Kampungs within Trengganu Tengah	Population in Trengganu Tengah
Dungun	Besul)	11,779	All included	11,779
	Jerangau)			
	Jengai	820	All included	820
	Kumpal	1,603	All included	1,603
	Pasir Raja	821	All included	821
	Rasau)	767	All except Kg. Lubok Penyiram and Ulu Paka	729
	Ulu Paka)			
	Mukims outside Trengganu Tengah	38,562		
Sub-total	Dungun District	54,352		15,752
Kemaman	Banggol	128	None included	—
	Bundi	767	All included	767
	Pasir Semut	1,105	All included	1,105
	Tebak	5,364	All included	5,364
	Ulu Chukai	1,423	Kg. Ibok only	425
	Ulu Jabor	1,779	All included	1,779
		Mukims outside Trengganu Tengah	34,350	
Sub-total	Kemaman District	44,916		9,440
Ulu Trengganu	Penghulu Diman	6,079	Part included	3,383
	Mukims outside Trengganu Tengah	27,585		
Sub-total	Ulu Trengganu Dist.	33,664		3,383
TOTAL		132,932		28,575
Add 3.5% estimate for undercount				1,000
GRAND TOTAL				<u>29,575</u>

Source: Supplied by the Department of Statistics.

3.3 Age and Sex Distribution

In Trengganu Tengah the overall sex ratio is 110.2 males per 100 females. This is considerably higher than similar ratios for either Trengganu State (97.0) or West Malaysia as a whole (98.6). In rural areas alone the rates are 98.8 for Trengganu State and 98.1 for Malaysia, ⁽ⁱ⁾ as shown in Table 3.4. The rate for rural Trengganu State also exceeds the state and national average, indicating a general movement of males into rural areas. However, the overall State figure is less than that of Malaysia suggesting that there may have been a net migration of males out of the State exceeding that of females. There is also the possibility, to which migration data from the 1970 census lends some support, of outward migration of males from urban areas of Trengganu to other states coupled with inward migration of males from other states to the rural parts of Trengganu.

Table 3.2 Estimated Population of Trengganu Tengah by Community, 5 Year Age-Group and Sex in 1970

Age Group	Malay			Non-Malay			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0 - 4	2,450	2,430	4,880	150	160	310	2,600	2,590	5,190
5 - 9	2,220	2,140	4,360	170	130	290	2,390	2,270	4,650
10 - 14	1,510	1,570	3,080	150	100	250	1,660	1,670	3,330
15 - 19	1,410	1,250	2,660	160	90	250	1,580	1,330	2,910
20 - 24	1,320	1,040	2,360	250	70	320	1,560	1,120	2,680
25 - 29	1,400	1,190	2,590	190	70	260	1,590	1,260	2,850
30 - 34	1,160	950	2,110	190	70	260	1,350	1,020	2,370
35 - 39	730	600	1,330	140	50	190	870	650	1,510
40 - 44	610	540	1,160	90	40	140	710	590	1,290
45 - 49	550	510	1,060	70	30	100	620	540	1,160
50 - 54	440	390	820	90	30	120	530	420	940
55 - 59	310	210	510	100	30	130	410	230	650
60 - 64	220	180	400	110	30	140	330	210	530
65 - 69	110	90	200	90	10	100	190	110	300
70 - 74	60	50	110	30	*	30	90	60	140
Over 74	80	60	140	20	*	20	90	70	160
TOTAL	14,550	13,200	27,760	2,000	910	2,910	16,550	14,110	30,660

1. Totals may not add due to rounding.

2. * - less than 5.

3. The estimated percentage breakdown of the non-Malay population is;

	Chinese	Indian	Other
Male	78.8	20.7	0.5
Female	70.6	28.0	1.4
Total	76.2	23.0	0.8

Source: Department of Statistics, Post Enumeration Survey.

⁽ⁱ⁾ In this chapter rural is taken as communities of less than 1,000 persons, in accordance with the census definition given in the 1970 census of population and housing: Age Distribution (Dept. of Statistics, 1973), p. 49. Urban is taken here as 'non-rural.' However, in spite of the existence of a few communities with a population exceeding 1,000 persons, Trengganu Tengah has been taken as a rural area since such settlements are agricultural.

Table 3.3 Population of Trengganu Tengah: Males per 100 Females by Community and 5 Year Age-Group — 1970

Age Group	Malay	Non-Malay	Total
0 — 4	101	96	101
5 — 9	104	132	105
10 — 14	97	145	100
15 — 19	113	193	118
20 — 24	126	331	140
25 — 29	117	281	126
30 — 34	122	291	133
35 — 39	121	318	134
40 — 44	113	209	121
45 — 49	109	206	115
50 — 54	113	297	126
55 — 59	150	385	177
60 — 64	120	452	161
65 — 69	112	478	171
70 — 74	115	833	155
Over 74	121	425	139
TOTAL	110.2	219.6	117.3

Source: As in Table 3.2.

Table 3.4 Comparison of Sex Ratios (Malay)

Age Group	Malaysia		Trengganu State		Trengganu Tengah
	Total	Rural	Total	Rural	
0 — 14	101.6	101.5	101.1	101.7	100.3
15 — 44	94.9	93.2	92.5	94.9	117.7
45 — 69	101.0	100.5	95.1	99.8	118.7
70 +	99.3	102.5	97.2	101.0	116.9
TOTAL	98.6	98.1	97.0	98.8	110.2

Source: 1970 Population census: Age Distributions,³⁰ Tables 5,20 (corrected); Trengganu Tengah from Tables 3.2 of this chapter.

The high ratio of males to females in Trengganu Tengah (Table 3.3) is found in most age-groups above the age of 14; amongst Malays it is mainly concentrated among the 15 — 44 population, but for non-Malays the ratio is both very much higher in *toto* and also occurs in higher age-groups as well. The age distributions of both Malays and non-Malays shows a considerable excess in the 20 — 39 age-group and a corresponding reduction elsewhere. This confirms that substantial migration into the study area has taken place, particularly of males, in the past decade or so. The disproportionate sex

ratio in the area may have resulted in lower marriage rates and a lower crude birth rate, but in the past few years the number of births appears to have increased, no doubt as more families rather than single persons settled.

Looking to the future, the present imbalance of males and females in the reproductive years will gradually be reduced, as those currently in the younger age-groups, amongst whom there is much greater equality among sexes, reach adulthood. This is likely to lead to a more settled family existence with the possibility of an increasing birth-rate for given age-specific fertility rates. An increase in the number of the population under 15 should eventually result, and the age distribution will in time tend to approach more closely the national average. In time there is likely to be an increase in the numbers of persons above the age of 64, particularly males. However, overall population changes may also result from changes in patterns of behavior, such as differing fertility rates, changes in local conditions which may affect existing mortality patterns, and from future migration.

The changing age distribution will inevitably have an impact on the dependency ratio of Trengganu Tengah.⁽ⁱ⁾ At present it is particularly low, being only 80.5 as compared with 95.0 for Trengganu State and 91.4 for Malaysia as a whole. In future it may be expected to rise, implying a gradual increase in the number of dependents to the labour force, provided that existing patterns of family size are maintained, or at any rate do not fall.⁽ⁱⁱ⁾

3.4 Household Size

The average household size in Trengganu State is 4.94, which is well below the national average of 5.70, and the average of the Mukims largely making up Trengganu Tengah is lower still, at 4.55 persons (see Appendix Table C.3). The calculation of household numbers was carried out using the population and family proportion data for Dungun and Kemaman rural areas contained in the 1970 census, which was applied to the known population of Trengganu Tengah. This procedure is described in detail in Appendix C and the results of the analysis are shown in Table 3.5.

Overall family size is 4.55 persons per household for 7,246 households. There were 6,439 Malay households (89 percent of the total) with an average size of 4.63, and 807 non-Malay households with an average size of 3.85. If non-family members are excluded, these figures reduce to 4.49 (Malay) 3.16 (non-Malay) and 4.35 (overall). Of the 7246 households, 5257 were estimated to consist of married families, with an average size of 5.71, there being little difference between Malays and non-Malays. The remaining 1989 households (27 percent) had an average size of 1.48 (1.37 for Malays and 1.98 for non-Malays). The non-Malay single household size was substantially reduced by excluding non-family members.

(i) This is defined as the number of dependents, that is, persons aged 0 - 14 and over 64, as a proportion of those of working age (15 - 64).⁽³⁰⁾

(ii) There are indications that, for Trengganu as a whole, actual family size is relatively low. See Table 3.5.

Table 3.5 Family Size in Trengganu Tengah

	Married households			Single households			Overall		
	No.	Size	Size+ 7.5% ⁽¹⁾	No.	Size	Size+ 7.5%	No.	Size	Size+ 7.5%
(a) Excluding non-family members									
Malay	4848	5.18	5.59	1591	1.15	1.24	6439	4.18	4.49
Non-Malay	409	4.78	5.14	398	1.05	1.13	807	2.94	3.16
Total	5257	5.15	5.54	1989	1.13	1.21	7246	4.05	4.35
(b) Including all persons									
Malay	4848	5.31	5.71	1591	1.26	1.37	6439	4.31	4.63
Non-Malay	409	5.28	5.68	398	1.84	1.98	807	3.58	3.85
Total	5257	5.31	5.71	1989	1.38	1.48	7246	4.23	4.55

(1) The 7.5% adjustments reflects the difference between household heads enumerated in the 1970 census and in the field count summary. For more detailed explanation see notes to Appendix Section C.2.

Source: Appendix C.

3.5 Crude Rates

Estimates of the crude birth rate for the region are given in Table 3.6. The rate in 1970 was 35.0 per 1,000, equivalent to a gross fertility rate of 163.5 per 1,000. The figure for Kemaman is a little higher than that of Dungun. Corresponding rates are 38.3 for Trengganu State and 32.6 for West Malaysia. The low figure for Kemaman and Dungun relative to the state average is probably due to the age/sex distribution of the population.

Table 3.6 Crude Birth Rates (All Communities)
Kemaman and Dungun Districts

Total Population 1970	103,250
Women Aged 15 – 49 ⁽¹⁾	22,080
No. of Births (Average 1969 – 1971) ⁽²⁾	3,609
Crude Births Rate ⁽³⁾	35.0/1,000
Gross Fertility Rate	163.5/1,000
Sex Ratio at birth ⁽²⁾	103:100

(1) Source – 1970 Census Table 2, Kemaman and Dungun Districts, supplied by Department of Statistics, corrected for under-enumeration. See Section 3.2.

(2) "Vital Statistics, West Malaysia," 1969, 1970, 1971 (Department of Statistics), (137) Table 12.

(3) Calculated from above sources. Figures for births by district are also given in "Laporan Tahunan 1972; Jabatan Perkhidmatan Perubatan dan Kesihatan Trengganu," pp 110, 124, but neither the number of births nor the total population agrees with the figures in "Vital Statistics." The latter source has been preferred.

Estimates of various mortality rates are shown in Table 3.7. These are likely to be somewhat less reliable than the birth figures, since they may change more over both time and locality, and because of the relatively small numbers involved. Infant mortality rates appear to be well above the State average; there is a possibility of a decline in 1972, but this source of data is considered less reliable.⁽ⁱ⁾ Figures for toddler and maternal mortality rates do not appear in such a poor light, but with a population of only 100,000 these figures are not very exact.⁽ⁱⁱ⁾ The overall impression is that mortality rates are higher in Dungun and Kemaman than the average for the State of Trengganu as a whole.

Table 3.7 Crude Mortality Rates (All Communities)

		Dungun	Kemaman	Weighted Average	Trengganu State
Infant Mortality Rate (1971) ⁽¹⁾	Male	74.3	66.9	71.0	59.1
	Female	48.6	54.1	51.1	47.4
	Total	61.7	61.1	61.4	53.5
Toddler Mortality Rate (1971) ⁽²⁾	Male	6.0	8.4	7.1	6.7
	Female	8.9	3.5	6.5	7.1
	Total	7.5	6.0	6.8	6.9
Maternal Mortality Rate (1971) ⁽³⁾		2.1	1.1	1.6	1.8
Crude Death Rate ⁽⁴⁾		7.5 ⁽⁵⁾	8.8	8.1	8.8

(1) Source — Vital Statistics 1971, *op. cit.*, table 31.02. Figures are also given in "Laporan Tahunan 1972, Jabatan Perkhidmatan Perubatan dan Kesihatan Trengganu," pp. 2, 110, 124, which are not consistent with the figures given in Vital Statistics nor always with each other.

(2) Vital Statistics, *op. cit.*, Table 37.00.

(3) Vital Statistics, *op. cit.*, Table 38.02.

(4) Vital Statistics, *op. cit.*, Table 39.02. Estimates do appear in "Laporan Tahunan 1972" *op. cit.*, but are apparently based on different population figures and are not taken as so reliable.

(5) This figure is substantially lowered by the fact that the number of deaths reported in 1970 was 13 percent below the numbers in 1969 and 1971.

(i) See Footnotes 1 to 4, Table 3.7.

(ii) An M.M.R. of 1.6/1,000 with 3,609 births implies only 6 material deaths. One extra death would raise the rate to 1.9/1,000.

Furthermore, whilst evidence is somewhat scanty, it is likely that the rates in the study area are rather worse than the average for the two districts. The whole area lies back from the coast, and suffers from poor health facilities. Discussions with officials in the State Health Department suggest that the infant mortality rate might be twice as high in the inland as opposed to coastal regions. It was also reported that, "in Trengganu, the infant mortality rate in the rural areas was almost seven times that of the urban areas."⁽ⁱ⁾ It is likely, therefore, that the data presented in Table 3.7 underestimates the true position.

3.6 Migration

Besides natural increases the other component of population change is migration. For national population, with well-defined and guarded frontiers, this may be relatively important and, where it exists, well recorded by immigration statistics. But in a relatively small region of a state migration trends may be of much greater importance and, indeed, may outweigh natural increase as the prime factor of population growth. Furthermore, migration into or out of a region is not normally recorded in the same way as international migration, and hence a different approach is needed to assess past trends.

For Trengganu State as a whole, the 1970 census recorded a total of 36,959 persons who were enumerated in the State but had been born elsewhere in Malaysia, and 31,011 who were born in Trengganu but enumerated elsewhere in Malaysia; this may be compared with a total enumerated population in 1970 of 405,751. A breakdown of migrants by state is given in Table 3.8 and shown in Figure 3.1. It is clear that Kelantan has in the past been the major supplier of immigrants to, and Pahang the principal receiver of emigrants from, Trengganu. Other important receivers of Trengganu - born persons include Johor, Kelantan, Selangor and Perak, and these states also supplied Trengganu with a substantial number of immigrants. Last-step migration, which is migration from the area of previous residence (as opposed to birth-place), can also be shown, but the magnitude and direction are much the same as for birth place migration, and so this is excluded.

The more important migration figures from the point of view of the study area are those relating the Districts of Dungun and Kemaman, which are given in detail in Appendix C and summarised in Table 3.9. Appendix Table C.6 shows the migratory movements into these districts as recorded by the census. Of the Malays approximately half the rural population was born in the locality of enumeration; for the urban population just over 60 percent had been born in the area of enumeration, indicating a somewhat lower proportion of migrants to total population, than in the rural areas. For non-Malays, the proportion of migrants to total population was even higher, reaching 71 percent for rural males; as with Malays, rural rates exceed urban rates.

⁽ⁱ⁾ Report by the Director of Health Services, quoted in "The Straits Times," 3rd July, 1974.

FIG. 3.1
BIRTHPLACE MIGRATION 1970

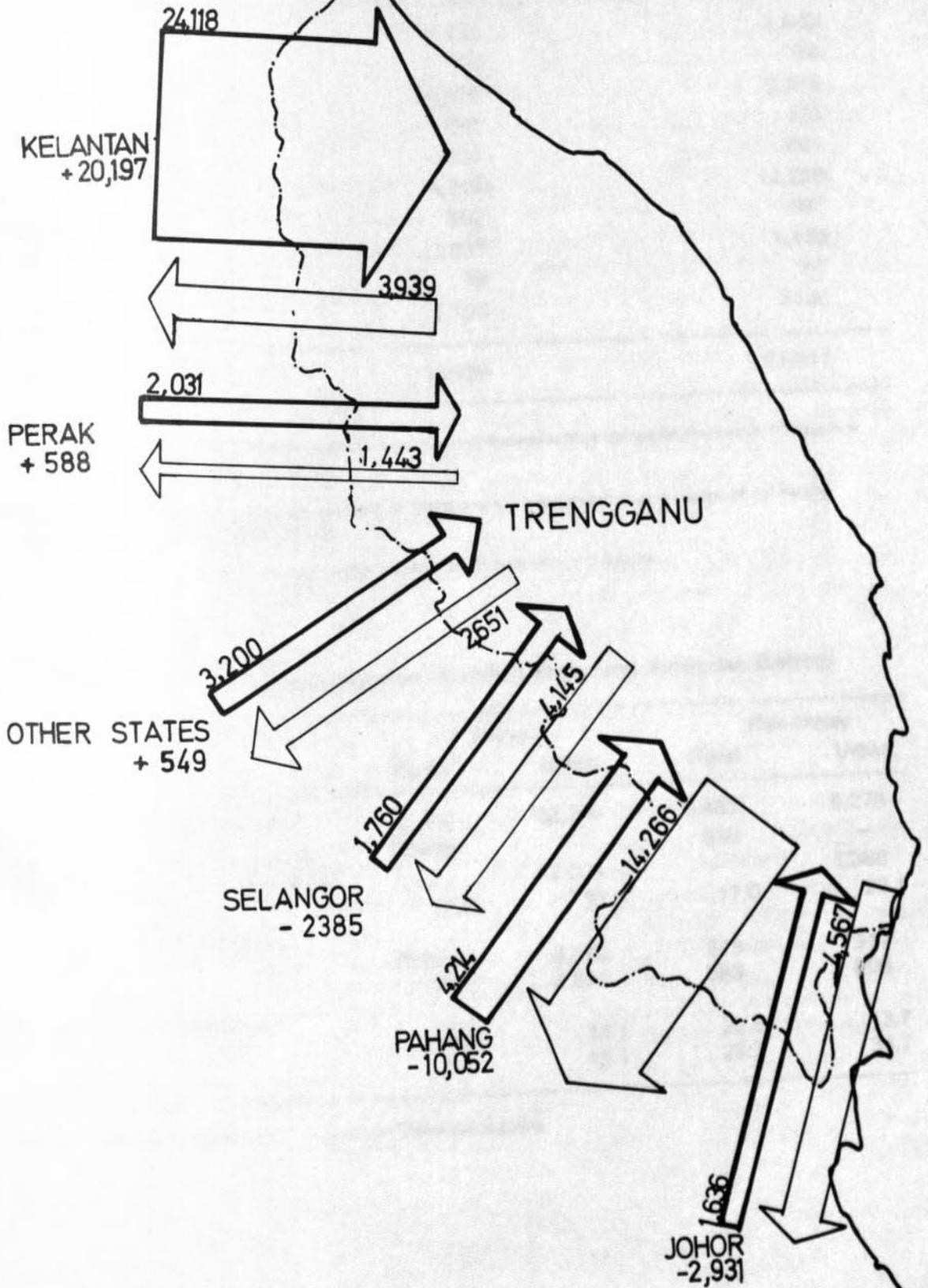


Table 3.8 Lifetime (Birthplace) Migration – Trengganu – 1970

Specified states	Lifetime in-migrants to Trengganu from specified states ⁽¹⁾	Lifetime out-migrants from Trengganu to specified states ⁽²⁾
Johor	1,636	4,567
Kedah	700	796
Kelantan	24,118	3,939
Malacca	682	434
Negeri Sembilan	937	693
Pahang	4,214	14,266
Penang	802	661
Perak	2,031	1,443
Perlis	79	67
Selangor	1,760	4,145
TOTAL	36,959	31,011

(1) "Lifetime in-migrants" refers to persons born in other states of Peninsular Malaysia but enumerated in Trengganu at the time of the 1970 population census.

(2) "Lifetime out-migrants" refers to persons born in Trengganu but enumerated in other states of Peninsular Malaysia in the 1970 population census.

Source: 1970 population and housing census; supplied by Department of Statistics.

Table 3.9 Intra-State Migration Trends, Dungun and Kemaman Districts

	Malay		Non-Malay	
	Rural	Urban	Rural	Urban
Total Enumerated Population	53,563	33,749	5,483	6,276
Total Migrants from rural areas	20,639	—	930	—
Total Migrants from urban areas	—	12,024	—	1,386
Percent of Population	38.5	35.6	17.0	22.1
Migrants by area of origin —				
Rural	15,041	5,598	613	317
Urban	7,093	4,931	583	803
Percent of all migrants —				
Rural	46.0	17.1	26.5	13.7
Urban	21.7	15.1	25.2	34.7

Source: Table 14 of 1970 census, Dungun and Kemaman Districts.

"Last-step" migratory moves can be shown by an analysis of migrants by place of previous residence. For Malays, over 80 percent of the migrants have moved from somewhere else within the State of Trengganu. This reveals a very high rate of intra-state migration as shown in Table 3.9. Over 40 percent of the rural population and nearly one third of the urban population had moved from elsewhere within the State, as opposed to only 9 and 7 percent respectively coming from elsewhere. It seems clear that the population of Trengganu State, or at least of Dungun and Kemaman districts, is highly mobile. This is confirmed by the figures relating to length of residence in previous localities (See Appendix Table C.5) which reveal that approximately a third of Malay males aged over 14 have lived in their present locality for less than six years, and 11 percent for less than one year. These figures are even higher for non-Malay males, but lower for females, especially non-Malays. There appears to have been an increase in migration of Malays around 1966 - 1967 which may have been due to new settlements being set up in the districts around that time, but since the table does not distinguish between rural and urban areas, this cannot be confirmed.

There are a number of ways of looking at future migration. One approach, which appears particularly relevant for Trengganu Tengah, is to examine migration in conjunction with job opportunities. Persons may migrate either with or without having any definite knowledge of what jobs they will obtain at their destination. Those who have no such knowledge will have to seek work upon arrival. Such spontaneous migration is a common feature of migration to urban areas, and any demographic analysis of an urban area would have to take it into account. But migration into urban areas accounts for only a third of all intra-state Malay migrants as Table 3.9 indicated. Furthermore, Trengganu Tengah is a rural area (particularly since the closure of Bukit Besi mine), and one which is sparsely inhabited, relatively underdeveloped, and lies back from the more populated coastal regions. It is hard to envisage very much spontaneous migration into the region in the next twenty years - indeed the possibility of outward spontaneous migration to newly developing urban areas such as Kuantan and the new port at Tanjong Gelang cannot be discounted in spite of past trends.

The second kind of migration is induced migration in which members of the labour force (plus their dependents) migrate because they have definite knowledge of jobs available, or are recruited for specific positions (such as settlers selected by FELDA). Estimation of this form of migration presents quite different problems, since it depends upon estimates of future job opportunities. The approach in this study has been to estimate separately anticipated labour requirements, based on land and other development, and future labour supply using population projections and participation rates. This has been done up to 1990 and the shortfall (if any) between labour requirements and supply has been used to estimate net migration into Trengganu Tengah. From the dependency ratios of migrants derived from Appendix Table C.4 the total number of immigrants produced by a given number of job opportunities has been estimated.

3.7 Present Employment

The occupational breakdown of the population of Trengganu Tengah is based on census data for Kemaman and Dungun districts. Even though rural Kemaman/Dungun includes a good deal of the coastal region outside the study area, it still remains the best available proxy of the area's population characteristics. Nevertheless, the figures contain an obvious bias, since they tend to overstate the numbers of certain occupations found predominantly along the coast, notably fishermen, and underestimate other inland occupations. In addition, that part of the Bukit Besi labour force not living in Dungun is included, since they refer to 1970.

The number of economically active people in the study area during the seven days prior to the 1970 census is estimated to have been 11,620 which represents 56 percent of the population aged 10 and over, 69 percent of the population 15 — 64, and 38 percent of the total population. Participation was highest among non-Malay males (83 percent) and lowest amongst Malay females (30 percent). 76 percent of the labour force was male and 86 percent consists of Malays.

Of the total labour force, unemployment was estimated at 3.6 percent, the rate for Malays exceeding that of non-Malays, and that of females exceeding that of the males. The latter phenomenon was found to be a feature of the 1967/68 Socio-Economic Survey. ⁽²¹⁾

In Appendix C considerable detail is given on the occupational status and industrial breakdown of the labour force. A summary of this data is given in Tables 3.10 and 3.11 below.

Table 3.10 Employment Status of the Population in Trengganu Tengah

	Malay	Non-Malay	Total
Labour force as % of population over 10 years old	53.9	71.0	55.8
Percent of Labour Force			
Employed	96.1	98.6	96.4
Unemployed	3.9	1.4	3.6
Total	100.0	100.0	100.0
Employer	0.8	1.3	0.9
Own Account Worker	33.0	20.5	31.2
Employee	49.9	69.4	52.7
Family Worker	12.2	7.9	11.6
Looking for first job	4.1	0.9	3.6
Total	100.0	100.0	100.0

Table 3.11 Employment by Industry in Trengganu Tengah

Percent	Malay	Non-Malay	Total
Agricultural and Livestock	19.5	5.2	17.4
Forestry and Logging	1.6	10.4	2.9
Fishing	7.0	0	6.0
Rubber	25.4	28.5	25.8
Oil palm	13.0	4.2	11.7
Coconuts	0.2	0.1	0.2
Estate labour contractors	1.8	1.6	1.7
Mining and quarrying	11.1	25.3	13.1
Manufacturing	3.9	8.0	4.5
Construction	1.3	1.3	1.3
Public utilities	0.2	0.2	0.2
Transport	2.2	0.7	2.0
Services	6.5	7.2	6.7
Commerce	5.8	7.0	6.0
Other	0.5	0.3	0.5
TOTAL	100.0	100.0	100.0

The overwhelming impression is one of the dependence of the region on agricultural and livestock production (1,940 persons or 17 percent of total employed), rubber cultivation (1,310 persons or 12 percent) and mining and quarrying (1,460 persons or 13 percent). The latter item is particularly important since the vast majority were at Bukit Besi, which has since closed. In the light of this, and the fact that the numbers in fishing are probably over-stated, the dependence on agriculture, rubber and oil palm undoubtedly now exceeds 55 percent and may well reach 65 percent. The concentration of females employed is even more marked, these three industries accounting for 76 percent of the total. Non-Malays are found particularly in the rubber, mining, quarrying and forestry sectors, and figure less prominently in agricultural and livestock production and oil palm cultivation. Only 500 people are estimated as being in manufacturing, 350 of whom are concerned with the manufacture of wood products and furniture; this slightly exceeds the numbers employed in forestry and logging. However, some processing takes place outside the study area. 660 persons were estimated to be in commerce and 730 in services.

In 1970 Bukit Besi held a principal place in the occupational structure of the region. Total employment of the Eastern Mining and Metals Co. (EMMCO) was 1,889 plus 71 senior staff on 31 October 1970.⁽²⁰⁾ In addition, 223 were employed at Bukit Besi by Trengganu Minerals Ltd., and 850 by Eastern Stevedoring Co. and various joint contractors in Dungun, but this latter figure does not directly involve the study region. However, not all the 2,183 persons who worked at Bukit Besi lived there, since a number commuted daily by train from Dungun. These people will have been enumerated at their place of residence, and so are not part of the population or labour force of Trengganu Tengah given in Table 3.2. The exact numbers who lived in Dungun is unknown, but officials at Bukit Besi suggested up to 40 percent, and

examination of census data indicates a figure of 35 percent of the total labour force. If this is taken as the best available figure, approximately 1,420 of the 2,183 Bukit Besi labour force actually resided in the area, and thus are included in the study area statistics. It amounts to 13 percent of the total employed of the study area.

Details of the entire labour force of Bukit Besi are given in Appendix C. It is not possible to say exactly what proportion of the various grades lived in Dungun. Of the 1,960 EMMCO personnel, 617 were classified as skilled daily rated workers, 725 as semi-skilled and 202 as unskilled; 223 were monthly rated skilled, 122 other monthly rated and 71 senior staff. Of the Trengganu Minerals Ltd. personnel, 38 were skilled, 126 semi-skilled, 9 unskilled and 50 various senior and junior staff.

Discussions with local labour office and other officials indicate that a high but unknown number have left the area since 1970. The report of the Working Committee listed a large number of possible employment prospects, both within and outside the region, in the long and short term. These included logging, a major land development project, copper mining in Sabah, and various settlement schemes. It is very difficult to ascertain how many of the labour force will have remained within the study area, but an estimate has been made and is shown in Appendix C. It was assumed that half the semi-skilled and all the unskilled of EMMCO, and two thirds of the employees of Trengganu Minerals (which still operates) have remained within the study area, and the rest have found employment elsewhere. This implies a net exodus of 955 of the labour force, to which dependents are added giving a grand total of 2,720 of whom 1,800 were made.

3.8 Population Projection

The expected increase in the population of the study area has been calculated from a base count of the population in 1970 net of the assumed emigration of workers from Bukit Besi which took place soon after the 1970 census. The population was projected by the component method, 5 year age-groups by sex comprising each cohort. This method was preferred to the cruder techniques used in the 1968 Regional Economic Development Plan,⁽⁸⁾ since far more is now known about the population as a result of the 1970 census.

No attempt was made to project the population separately by community. This was because the number of non-Malays in the study area at the time of the census was less than 3,000, which is too small for separate treatment; some of the cohorts in Table 3.2 contain less than 50 persons. Furthermore the composition by community of the Bukit Besi emigrants is unknown.

In projecting the population, assumptions are required of the present levels of fertility and mortality, their likely movements during the study period (1970 - 1990), and adequate sources of data. It was decided to make three sets of projections, one of which would be a "best guess" containing the most likely combination of fertility and mortality trends (Projection B). The others would be a High Projection (A) and Low Projection (C) consisting respectively of high fertility and low mortality and falling fertility and rather higher mortality levels.

Table 3.12 Population Projections A, B, C (1970 - 1990)
for Trengganu Tengah

	1970		1980			1990		
	Census	Net	A	B	C	A	B	C
Males								
0 - 14	6,650	6,140	7,900	7,500	7,050	11,200	9,750	7,900
15 - 24	3,140	2,570	3,700	3,650	3,650	4,750	4,600	4,400
25 - 44	4,520	3,980	4,950	4,950	4,900	6,000	5,950	5,850
45 - 64	1,890	1,730	2,250	2,200	2,150	3,500	3,450	3,350
Over 64	370	330	650	600	600	950	900	850
TOTAL	16,550	14,750	19,400	18,900	18,300	26,450	24,600	22,350
Females								
0 - 14	6,530	6,170	7,800	7,450	7,000	10,900	9,550	7,800
15 - 24	2,450	2,200	3,650	3,650	3,600	4,800	4,600	4,400
25 - 44	3,510	3,310	4,200	4,150	4,150	5,700	5,600	5,500
45 - 64	1,390	1,310	1,900	1,900	1,900	3,000	2,950	2,850
Over 64	230	210	400	400	400	850	800	750
TOTAL	14,110	13,200	18,000	17,600	17,000	25,200	23,500	21,300
Total								
0 - 14	13,170	12,300	15,700	14,950	14,000	22,100	19,300	15,700
15 - 24	5,590	4,770	7,350	7,300	7,250	9,550	9,200	8,800
25 - 44	8,030	7,290	9,150	9,100	9,000	11,700	11,500	11,350
45 - 64	3,280	3,040	4,150	4,100	4,050	6,500	6,350	6,200
Over 64	600	540	1,050	1,000	1,000	1,800	1,700	1,600
TOTAL	30,660	27,950	37,400	36,500	35,300	51,650	48,100	43,650

(1) The 1970 net figure is the census total less estimated migrants from Bukit Besi.

(2) Totals may not add due to rounding; 1970 estimates rounded to nearest 10; projections rounded to nearest 50. All subsequent calculations made from unrounded data.

The assumptions appropriate to projections A, B and C are shown in Appendix Table C.22 and they are discussed in some detail in the Appendix. The results of the three projections are shown in Table 3.12. The population, net of Bukit Besi migrants, is expected to grow to between 35,300 and 37,400 by 1980, and to between 43,650 and 51,650 by 1990. The "best guess" estimates of Projection B are 36,500 in 1980 and 48,100 in 1990. It is clear from Table 3.12 that, even with the fairly extreme combinations of assumptions placed on Projections A and C, by 1990 they vary from Projection B only by a small amount (7.4 and 9.3 percent respectively). In 1980 the differences are under four percent. Furthermore, most of this difference is accounted for by the fertility assumptions, since the variation of persons aged 0 - 14 is respectively 14.5 and 18.6 percent from Projection B, whereas the population aged 16 - 64 varies by less than 3 percent. Since alternative fertility assumptions play virtually no part in labour force projections, over a twenty year period, the three projections are consistent with each other and are little influenced by the varying assumptions used. In the planning of health and education, services, housing, and for longer-range planning, of course, this would not be the case.

The projections in Table 3.12 are not broken down by racial groupings. However, an examination of the age-specific fertility rates and survival ratios by individual community⁽³⁵⁾ indicates that Malays have high fertility rates and mortality rates compared to other communities. It is not possible to be certain, but it is likely that the difference in fertility exceeds the difference in mortality within the study area, particularly since overall mortality levels are high anyway and fertility patterns are less likely to change regionally. This suggests that, by natural increase, the proportion of non-Malays will fall slightly in the study area over the next twenty years, in particular amongst the young. This would bring the area closer in line with the State average, which is a reasonable expectation.

3.9 Labour Force Projections

The Labour Force in Malaysia is defined as "those persons between the ages 15 - 64 who are either employed or unemployed." The employed are defined as "those persons who work for pay, profit or family gain at any time during the family week." Thus "employed" include the under employed and those who work less than full time. The unemployed are defined as "those persons who are without work but are actively looking for work and capable of accepting a job if offered one."⁽⁴³⁾ The participation rate is the proportion of the population aged 15 - 64 who constitute the labour force; participation rates may be calculated overall, or by specific community - sex - age groups.

The participation rates implicit in the 1970 census estimates of employment are calculated in Table 3.13. However, these rates differ quite markedly from those calculated by Snodgrass⁽⁴³⁾ for West Malaysia as a whole and used by EPU as a basis for national projections. The explanation for this lies mainly in the fact that the census estimates account only for those who were economically active in the seven day period leading up to the census itself. They do not record the substantial number of people, especially women, who were not active at that time but who would undoubtedly fall within the definition of the labour force as given in the Mid-Term Review.⁽⁵⁾

**Table 3.13 Participation Rates in Trengganu Tengah
as derived from 1970 Census Data**

	Malay			Non-Malay			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Employed	7,090	2,420	9,510	1,380	240	1,610	8,470	2,650	11,120
Unemployed	340	140	480	20	—	30	360	140	510
Total Labour Force	7,430	2,560	9,990	1,400	240	1,640	8,830	2,790	11,620
Population Aged 15 – 64	8,130	6,860	14,990	1,400	500	1,900	9,540	7,350	16,890
Participation Rates	.914	.373	.666	.996	.481	.862	.926	.380	.688

The rates shown in Table 3.13 have therefore been adjusted for conceptual compatibility with broader national planning. New rates have been established for 1970 in accordance with Snodgrass⁽⁴³⁾ and with regional rates for the Eastern zone derived from data contained in Volume I of the SES.⁽²¹⁾ An examination of this data reveals that participation rates in the Eastern zone are quite different from those for Malaysia as a whole. In particular, the rate for females in the Eastern zone (0.53) is much higher than that for West Malaysia (0.40). As a result, total participation in the Eastern zone is 0.70 as against 0.63 for West Malaysia.

The rates used in the present study are shown in Table 3.14. The male rates are modifications of the Eastern zone rates, mainly to allow for participation in 1970 by people in the 10 – 14 and over 64 age groups who were in practice working at the time of the census. Thus in Table 3.14 a rate of more than 1.0 appears for males in the 55 – 64 age group in 1970. For females, it was decided to make separate calculations, using (a) the East zone participation rates unmodified, and (b) the national figures from Snodgrass. This would give a labour force range, the mid-point of which would be used as a working figure. This approach is quite arbitrary, but no satisfactory alternative was available.

The result of applying these rates is to give overall labour force estimates for 1970 of 12,900 using the Eastern zone female rates and of 12,050 using the Snodgrass rates, with an average of 12,500. These may be compared with the figure of 11,620 which was the census-based estimate of the labour force given in Section 3.7.

In projecting the rates over the study period 1970 – 1990, guidance was taken from the national trends shown in the Mid-Term Review. The exact method used is described in Appendix C. Early rapid decreases were projected for the youngest and oldest age groups since it was assumed that the conditions (such as lack of school facilities) which necessitated the corrections for 1970 will not continue to exist for long. For the other age-groups, rates were generally expected to decline for those aged 20 – 24 as greater educational opportunities appear, and to the older age-groups as

early retirement becomes more common. Different treatment was given to the two sets of female rates, since the one set is so much higher than the other. The Snodgrass⁽⁴³⁾ figures were taken to increase as female participation grows, due to the likely long-term trend towards smaller family size and increased awareness of job opportunities for women. The Eastern zone female rates, however, which already exceed the national average by such a large margin, were projected to decline slightly over time.

Table 3.14 Projected Participation Rates in Trengganu Tengah

	1970	1975	1980	1985	1990
Male					
15 - 19	.702	.650	.599	.573	.560
20 - 24	.928	.923	.918	.913	.908
25 - 29	.978	.978	.978	.978	.978
30 - 34	.974	.974	.974	.974	.974
35 - 44	.974	.974	.974	.974	.974
45 - 54	.939	.934	.929	.924	.919
55 - 64	1.249	1.050	.850	.750	.700
Female (a)					
15 - 19	.429	.397	.365	.349	.341
20 - 24	.474	.469	.464	.459	.454
25 - 29	.461	.456	.451	.446	.441
30 - 34	.532	.527	.522	.517	.512
35 - 44	.657	.652	.647	.642	.637
45 - 54	.664	.654	.644	.634	.624
55 - 64	.642	.579	.516	.484	.468
Female (b)					
15 - 19	.349	.318	.288	.273	.266
20 - 24	.381	.376	.371	.366	.361
25 - 29	.367	.367	.367	.367	.367
30 - 39	.452	.457	.462	.467	.472
40 - 49	.514	.519	.524	.529	.534
50 - 59	.446	.441	.436	.431	.426
60 - 64	.589	.448	.307	.237	.232

Projections of the labour force are a combination of the population projections shown in Table 3.12 and the projections of the labour force participation rates shown in Table 3.14. Combining these gives the estimate of the labour force, which is presented in Table 3.15. Two estimates of the female labour force have been made, estimate (a) being based on the Eastern zone female participation rates (weighed average of all communities) and estimate (b) on the Snodgrass Malay female rates. Three totals are given, total (a) being a combination of males plus female (a), total (b) being a combination of males plus females (b), and total (average) being the arithmetic mean of the two. The variation of totals (a) and (b) around total (average) varies from 3 to 4 percent overall, which is a fairly small margin of error in a projection of this nature.

Table 3.15 Labour Force Projections for Trengganu Tengah

	1970 (Census)	1975	1980	1985	1990
Male					
15 - 29	4,100	3,400	3,900	4,700	5,400
30 - 64	4,850	5,050	5,550	6,000	6,600
Total	8,950	8,450	9,450	10,700	12,000
Female (a)					
15 - 29	1,700	1,600	2,000	2,400	2,750
30 - 64	2,250	2,650	2,950	3,300	3,750
Total	3,950	4,250	4,950	5,700	6,500
Female (b)					
15 - 29	1,350	1,300	1,600	1,950	2,200
30 - 64	1,750	2,000	2,300	2,600	3,000
Total	3,100	3,300	3,900	4,550	5,200
Total (a)					
15 - 29	5,800	5,000	5,900	7,100	8,150
30 - 64	7,100	7,700	8,500	9,300	10,350
Total	12,900	12,700	14,400	16,400	18,500
Total (b)					
15 - 29	5,450	4,650	5,500	6,650	7,600
30 - 64	6,600	7,100	7,850	8,600	9,600
Total	12,050	11,750	13,350	15,200	17,250
Total (Average)					
15 - 29	5,650	4,850	5,700	6,850	7,900
30 - 64	6,850	7,400	8,150	8,950	9,990
Total	12,500	12,250	13,900	15,800	17,850

The total (average) labour force is projected to increase from 12,500 in 1970 to 13,900 in 1980 and 17,850 in 1990. The increase in the first decade is low, but this is principally due to the emigration of former Bukit Besi employees at the start of this period. Indeed an absolute decline in the size of the labour force is forecast for the period 1970 - 75. The slow initial rate of increase is also due in part to the initial age structure of the population, which contained relatively few persons aged 5 - 14.

Rates of increase of the labour force are indicated in further detail in Appendix C. There it can be seen that the absolute decrease in the period 1970 - 75 is entirely male, and entirely concentrated among the younger section of the labour force, aged 15 - 29. This is not surprising when the age-distributions of 1970 (census) and of migrants are examined. The rate of increase reaches a peak in the quinquennium 1980 - 85, at an average of 2.6 percent per annum. After the first five years (when migration predominates), the rate is noticeably higher among the 15 - 29 age group than among the 30 - 64 age group, the greatest difference being in 1980 - 85. This is due to the large number of 1970 0 - 4 year olds entering the labour force in that period. The female labour force also increases more rapidly, particularly female (b); this results from the various assumptions used in projecting the participation rates.

These projections constitute the quantitative estimates of the human resources of the study area from the time of the 1970 census up to 1990, which is the time span of this study. A discussions of certain of the qualitative aspects, as existed in 1970, has been included in Appendix C. Together they constitute the human resource potential at present in the study area or anticipated in the future due to natural increase. In Chapter 11 these resources are matched against the labour force requirements which will result from planned agricultural and forestry developments.

CHAPTER 4

Physical Resources and Infrastructure

4. PHYSICAL RESOURCES AND INFRASTRUCTURE

4.1 Land Area

The total land area of Trengganu Tengah is 1,096,840 acres or about 1,714 square miles. This represents 34 percent of the total area of the State of Trengganu. The development area is located mainly in the Districts of Dungun and Kemaman with a small part of Ulu Trengganu District included in the north (Fig. 1.1).

4.2 Topography

The eastern boundary of the development area has been drawn to exclude the coastal strip which is characterised by its low lying land and generally poor sandy soils. The coastal strip also contains most of the population of the two districts of Dungun and Kemaman. The eastern half of the development area consists of a series of hill ranges which seldom exceed 750 feet in height and run roughly parallel to the coast. These hill ranges are separated from each other by several flat inland valleys and small river basins. In this area most of the land with potential for agricultural development is to be found.

Further inland and comprising most of the western half of Trengganu Tengah, the terrain becomes progressively steeper and mountainous. Along the border with the State of Pahang elevations exceed 4,000 feet. Most of this land is unsuitable for agriculture and has been designated as forest reserve under permanent forest either as protective forest or productive forest for sustained yield logging operations.

The river systems in the development area consist principally of the Sungei Dungun and Sungei Kemaman and their tributaries. These drain the northern and southern halves of the area respectively. There are two smaller river systems, those of the Sungei Paka and Sungei Kerteh which drain the eastern central part of the area.

The rivers are characterised by a gradual rate of fall along their courses and by a tendency to flood during the monsoon season.

4.3 Climate

4.3.1 General

The main characteristics of the climate of Trengganu Tengah are a high annual rainfall with considerable intensity during the monsoon period, a high relative humidity and an equable temperature throughout the year.

4.3.2 Rainfall

Rainfall data for the development area is rather limited because there are relatively few recording stations within the area. However, where records have been kept (Fig. 4.1) it can be seen that rainfall within Trengganu Tengah is much higher than that on the coast and coastal rainfall figures are no guide to conditions a few miles inland.

The influence of the monsoon periods is also clearly reflected in the figures. The onset of the north-east monsoon is usually in the middle of November and lasts until March. The south-west monsoon period usually starts in May and lasts until October.

The effect of the north-east monsoon on rainfall is probably greater in Trengganu than in any other state in the country (Fig. 4.2) and the south-west monsoon likewise brings a considerable quantity of rainfall with it. Most of this is precipitated on those areas of Trengganu a few miles inland from the coast. Rainfall intensity is often very high and when this coincides with high tides, flooding of the lower reaches of the major rivers occurs.

The rainfall figures available indicate that average annual precipitation ranges from a maximum of 165 inches to a minimum of 120 inches and overall the area receives an average of 130 inches or more in a year. Of this more than 50 percent usually falls during the north-east monsoon period. The accompanying maps (Fig. 4.2) illustrate some of these points and Table 4.1 gives data for the rainfall recording stations within or adjacent to Trengganu Tengah. To illustrate the difference between coastal and inland rainfall, Table 4.2 gives figures for selected recording stations on the coast.

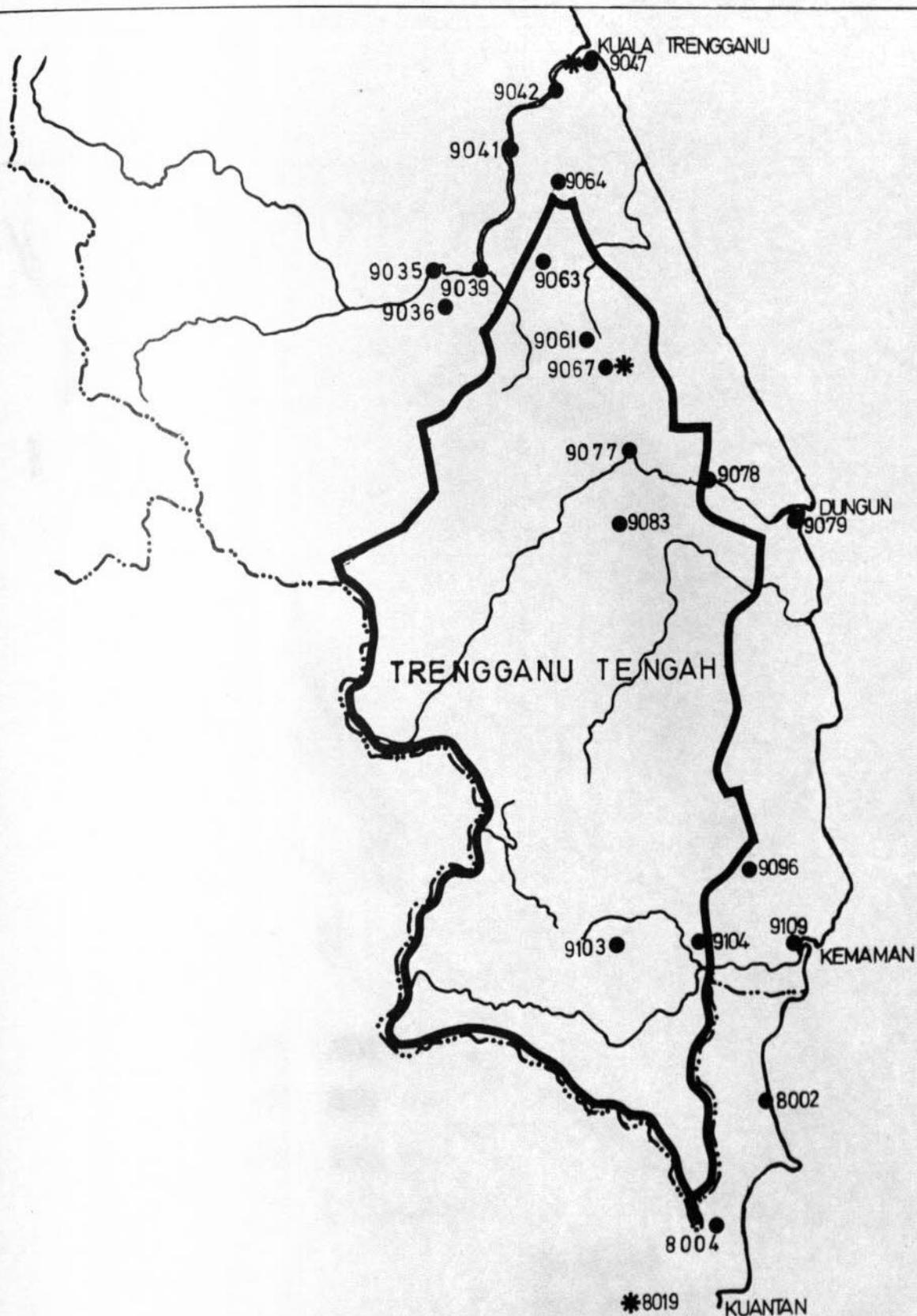
4.3.3 Temperature and Relative Humidity

Temperature is high and mean monthly temperature averages 78.9°F throughout the year varying from an average low of 77.7°F in December to an average high of 80.6°F in May. The average diurnal variation is about 14°F with an average daily minimum of 73°F and average daily maximum 87°F.

The relative humidity is uniformly high throughout the year with a monthly mean value of 85.6 percent. The daily range of relative humidity is between a minimum of 65 percent to a maximum of 98 percent.

4.3.4 Sunshine

There is only one sunshine hour recording point in Trengganu Tengah, that at MARDI FES Jerangau. Recording there started only in 1968 but from data collected so far it is apparent that sunshine in the area is far less than on the coast. The average monthly mean sunshine hours for more than half the year is below the 6.0 hours daily minimum considered to be the optimum for oil palms. Table 4.3 lists the sunshine hours on a mean monthly basis for three recording stations at Kuala Trengganu, MARDI FES Jerangau and Kuantan.



* HOURS OF SUNSHINE RECORDING
 ● INCHES OF RAINFALL RECORDING

RAINFALL RECORDING STATIONS

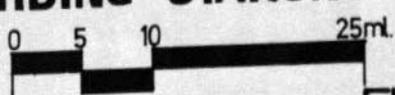


FIG. 4.1

MEAN S.W. MONSOON RAINFALL
MAY — SEPT.

MEAN N.E. MONSOON RAINFALL
NOV. — MAR.

MEAN ANNUAL RAINFALL

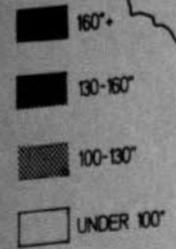
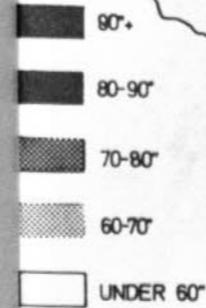
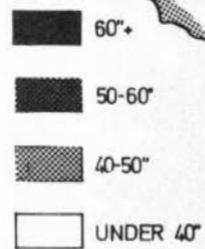


Table 4.1. Monthly Rainfall from 16 Recording Stations within or adjacent to Inaganga Teryak

SOURCE: D.I.D. RESEARCH STATION JAN. 1967



Table 4.1 Monthly Rainfall from 16 Recording Stations within or adjacent to Trengganu Tengah

Station No: ⁽¹⁾	Inches of Rainfall												Recording ⁽²⁾ Period	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.		Total
9042	8.93	6.16	6.54	3.98	4.33	4.56	4.31	8.66	8.81	13.02	24.75	27.25	121.28	1955 - 70
9041	11.64	6.82	5.07	4.53	5.99	7.84	6.38	9.19	10.55	13.38	20.76	32.82	134.96	1960 - 70
9064	11.92	7.62	4.01	3.56	4.22	5.02	4.80	7.36	8.71	12.79	19.80	30.68	120.50	1960 - 70
9035	16.12	9.75	7.97	7.62	8.64	7.93	7.53	9.61	11.51	14.73	22.93	28.27	152.60	1960 - 70
9039	16.92	9.82	6.23	5.34	8.34	7.88	8.03	11.05	13.65	14.84	21.45	30.32	153.59	1939 - 70
9063	12.91	6.18	7.25	3.82	7.69	5.74	6.88	9.03	11.74	12.59	19.71	29.99	133.56	1954 - 70
9036	11.49	7.20	3.97	4.64	5.77	3.95	5.60	7.70	8.35	11.11	15.59	20.89	136.26	1960 - 70
9061	15.84	9.35	6.97	5.32	8.24	8.44	7.35	10.71	12.28	14.73	23.84	32.98	156.34	1951 - 70
9067	14.76	6.99	6.38	4.81	8.42	7.38	6.97	10.07	11.25	14.10	25.13	34.29	150.57	1954 - 70
9077	15.64	9.76	5.92	4.83	9.64	9.60	10.02	11.28	13.82	14.15	20.95	23.33	148.94	1960 - 70
9078	11.62	9.94	5.99	3.56	8.28	6.08	7.19	9.15	10.85	13.92	22.38	35.97	143.64	1960 - 70
9083	15.30	9.79	9.46	6.77	12.63	7.27	8.08	10.67	11.88	15.49	21.07	32.23	165.36	1960 - 70
9096	16.00	6.99	5.86	6.88	10.32	5.77	5.93	11.44	10.56	11.29	13.47	27.80	132.31	1960 - 70
9103	15.16	7.13	7.72	8.84	8.06	7.25	5.87	9.18	11.97	11.66	19.23	25.28	138.05	1960 - 70
9104	13.51	7.54	6.54	4.73	8.37	7.36	6.89	7.41	9.97	11.48	14.02	23.39	121.21	1960 - 70
8004	17.47	8.35	8.42	6.19	7.31	5.59	5.56	7.27	9.15	11.25	14.82	25.38	125.91	1930 - 70
Average	14.08	8.09	6.52	5.34	7.89	6.73	6.71	9.36	10.94	13.16	19.99	28.80	139.51	

(1) For station location see Fig. 41. Stations listed in order from north to south.

(2) Data from Drainage and Irrigation Department Rainfall Records. (61)

Table 4.2 Monthly-Rainfall Records from Selected Coastal Recording Stations East of Trengganu Tengah

Station No. (1)	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Recording (2) Period
Inches of Rainfall														
9047	7.53	5.41	5.09	5.08	4.10	4.25	3.92	5.43	7.42	11.00	25.56	23.51	108.17	1941 - 70
9079	8.54	5.40	4.76	4.61	4.39	4.42	4.19	6.12	6.48	9.82	20.12	23.78	102.65	1943 - 70
9109	13.79	8.22	5.60	4.78	5.36	5.73	5.39	6.40	6.86	9.92	15.76	23.75	111.58	1943 - 70
8002	11.68	5.10	4.46	5.06	4.76	4.58	5.54	4.49	6.39	9.23	10.60	22.68	94.47	1960 - 70
Average	10.39	6.03	4.98	4.88	4.65	4.75	4.76	5.61	6.79	9.99	18.01	23.43	104.22	

(1) For station location see Fig. 4.1 Stations listed in order from north to south

(2) Data from Drainage and Irrigation Department Rainfall Records. (61)

Table 4.3 Daily Sunshine Hours from Three Recording Stations

Hours of Sunshine	Hours of Sunshine												Annual Daily Average	Recording Period	
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.			
Kuala	Mean	5.63	7.65	8.20	8.68	7.66	7.10	6.91	6.63	6.51	5.78	4.81	4.40	6.66	1951 to 1973
	Max.	7.80	9.20	10.16	10.34	9.67	8.44	8.44	7.86	8.02	7.58	6.95	6.69	8.43	
	Min.	2.82	5.81	6.67	7.61	5.07	5.96	5.70	5.44	5.57	4.17	2.84	2.17	4.99	
MARDI FES	Mean	5.18	6.79	7.09	7.66	6.80	5.49	5.65	5.43	5.13	4.79	3.88	2.72	5.55	1968 to 1973
	Max.	6.09	7.61	7.61	9.26	7.72	6.19	6.90	6.27	5.73	5.94	6.09	3.40	6.82	
	Min.	3.67	5.53	6.21	6.83	5.71	4.86	4.52	4.17	4.10	3.89	2.10	1.76	4.45	
Kuantan	Mean	4.83	6.35	6.64	6.97	6.48	6.40	6.46	6.24	5.93	5.31	4.22	3.62	5.79	1951 to 1973
	Max.	7.32	8.57	7.79	9.31	7.54	7.64	7.65	7.79	7.19	6.40	6.27	5.73	7.43	
	Min.	1.82	3.65	5.48	5.82	5.43	5.39	4.88	5.06	4.97	4.39	2.76	1.32	4.25	

Source: Malaysian Meteorological Services Records

4.3.5 Evaporation

There are no records of evaporation values for Trengganu Tengah. However records from adjacent drier areas indicate that there is unlikely to be a deficit between precipitation and evaporation in Trengganu Tengah.

4.4 Soils

4.4.1 Soil Surveys

The State of Trengganu has not yet been fully surveyed to determine accurately the nature and extent of the various soil types present. Current knowledge is based on the reconnaissance survey by Panton,⁽⁸⁴⁾ some observations by the NEDECO consultants⁽⁸⁾ and recent work by soil scientists from the Ministry of Agriculture.

In the Malaysian context a reconnaissance survey is defined by Law⁽⁷³⁾ as one where the traverses (rentis) are two and a half to four miles apart and examinations of the soil are made at quarter mile intervals in the traverse. Reconnaissance surveys identify the approximate location of soil associations. Semi-detailed surveys are those in which the traverses are a quarter to one mile apart with sampling in the traverse at least every 1/8 mile. They can identify and locate soil series and phases.

The only published semi-detailed soil survey work done so far in Trengganu Tengah is that by Panton⁽⁸⁴⁾ of the Jerangau, Sungei Rasau and Sungei Tebak/Bukit Bundi Areas. Other semi-detailed surveys have been made of limited areas in Trengganu Tengah at the request of some public sector agencies such as FELDA.

A semi-detailed soil survey of parts of Trengganu Tengah was started in April this year. It will cover some 200,000 acres of land so far undeveloped but considered to have potential for agriculture. The survey will be completed by mid-1975.

4.4.2 Principal Soil Types

Large areas of the State are unsurveyed because the steep topography is in itself a limiting factor to potential agricultural development. At least half the area of Trengganu Tengah is in this category and the soils there are typically granite derived and rapidly eroded. Other granite derived soils, which do have agricultural potential are those in the Rengam-Jerangau-Kampung Kolam Association. In Trengganu Tengah, these soils are situated in longitudinal bands running north to south and constitute the major part of the area considered suitable for agricultural development. Soils in this Association are generally deep, well-structured and with good drainage. Considerable areas of the soils in this association were surveyed and mapped on a semi-detailed basis by Panton in 1958. The finest soils of all in Trengganu Tengah are in areas in the south of the State bordering on Pahang where a limited acreage of the Kuantan series volcanic soils is to be found. However, most of this type of land is already alienated and cultivated.

Other main soil types in the area have various limitations to agricultural development. The Kuala Brang association, which contains the shallow profiled soil of the Kuala Brang series, is not suitable for oil palm and most other crops, although it will support rubber. In the valley bottoms of the major rivers, the imperfectly drained alluvial soils of the Akob and Merbau Patah series are found. These soils, which are subject to seasonal fluctuation in the water table are only suitable for seasonal cultivation of padi, vegetables and other annual crops. In some of the river valleys, there are areas of soil of mixed origin which remain water-logged throughout the year. They have little agricultural potential unless costly drainage work is carried out beforehand. Finally there are the inland peat swamps which cover a limited area in Trengganu Tengah. At present there is little evidence that drainage and cultivation of these soils would be economic but research work on such peat soils is being done elsewhere in the country.

4.4.3 Soil Suitability Classification

Prior to the present study, soil scientists from the Ministry of Agriculture produced a Soil Suitability Map and a descriptive paper⁽⁸¹⁾ which brought together the available information on the soils and agricultural potential of the land in Trengganu State. This map has been the principal source of information for planning the land development programme in Trengganu Tengah. The map is at a 1:63,360 scale and shows the soils in five classes based on an assessment of the slope of the land plus the characteristics of the soil. These two factors considered together give an indication of the development potential of an area. The information on the soils was based on reconnaissance data plus a few more detailed surveys of certain small areas. The slope assessment was mainly based on a study of the contour lines on the 1:63,360 topographical map. The soil scientists warn users of the map about its obvious limitations and say that it should only be used for planning purposes. They add that any area to be developed should be referred again to the Department of Agriculture for final approval. The recommendations made in this study are based on the information, presently available. Since this information is certainly not complete, recommendations for land use made in this report will be subject to confirmation by further, more detailed survey work.

A revised system of Soil Suitability Classification is being prepared by the Ministry of Agriculture, Soil Science Division. This system takes into account a wider range of factors based on soil characteristics and their situation and it also reclassifies some of the soil series. However, the new classification is not yet published and cannot, therefore, be used as a basis for the present study.

The present Soil Suitability Map shows the soils in five classes. Class I contains the best soils and Class 5 consists almost entirely of land considered completely unsuitable for agriculture, mainly on account of extreme slope (over 20°). Each class is divided into sub-classes which indicate specific limitations to crop growth. The map also has attached to it a table showing the potential suitability of each soil class for a given range of crops. The short description of the soil groups, the limitations to crop growth and the crop suitability tables are reproduced for reference (Appendix D).

Using a planimeter the extent of the various soil groups within Trengganu Tengah has been determined (Table 4.4).

Of the 524,069 acres of land classified as having some agricultural potential (Class 1 to Class 4) 87 percent is in Classes 2 and 3 on which most of the agricultural development in Trengganu Tengah has therefore to be based. The best land, Class 1, is mostly located in the Jabor Valley area and is already developed. The remaining pockets of this land are too small to be considered as viable units in themselves. The Federal Forest Department has recently proposed a permanent forest acreage for the whole State of Trengganu of 1.3 million acres which includes the soils in Class 4 and 5.

Table 4.4 Distribution of Soil Classes in Trengganu Tengah

Soil Class	Area (Acres)	% of Sub-total	% of Total
1G	6,484	32	
1g	13,691	68	
Sub-Total Class 1	20,175	100.0	1.8
2G	215,904	81	
2g	1,606	0.5	
2d	49,026	18	
2O			
2do	1,606	0.5	
2dn/3d			
Sub-Total Class 2	268,142	100.0	24.4
3G	99,285	53	
3d	60,808	33	
3cG	26,504	14	
Sub-Total Class 3	186,597	100.0	17.1
4Gc	38,701	79	
4do	10,453	21	
4sd			
Sub-Total Class 4	49,154	100.0	4.5
5h	7,443	1.3	
5STP	565,329	98.7	
Sub-Total Class 5	572,772	100.0	52.2
TOTAL	1,096,840		100.0

4.5 Forests

The area of forested land in Trengganu Tengah, extracted from the 1972 National Forest Inventory⁽¹¹¹⁾ was 908,000 acres or 83 percent of the total land area. The Broad Forest Types are shown on a scale of 1:250,000 in FAO maps FS 1.3, 1.5 and 1.7. Table 4.5 summarises the areas of the Forest Types found in Trengganu Tengah Development Area as compiled from aerial photographs (1966), ground sampling (1970-72) and (recent logging) Forest Department maps. The area exploited and closed since then is 74,400 acres, of which 60,430 acres has been deducted from the total because it is now released for agricultural development:

Table 4.5 Forest Types in Trengganu Tengah

Type	Area 1966	Exploited 1966-72	Balance end 1972	Est. Balance 1974
Acres				
Superior Dipterocarp	131,500	17,300	114,200	
Good Dipterocarp	175,900	28,500	147,400	
Moderate Dipterocarp	457,900	188,100	269,800	
TOTAL PRIMARY TYPES			531,400	470,970
Disturbed: Exploited as at 1966	48,800		48,800	48,800
Disturbed: Soil Erosion	9,000		9,000	9,000
Water-logged	31,500	12,200	19,300	19,300
Upper Hill and Poor Forest	53,600		53,600	53,600
Partly Exploited Since 1966		246,100	246,100	246,100
TOTAL FORESTED AREA			908,200	847,770

Estimation of the total growing stock in the area is very difficult for many reasons. All estimates of volume in the National Forest Inventory are expressed in broad terms in accordance with the objectives of the inventory which were to provide:

- (i) A national strategy for integrated forest development.
- (ii) Calculations of industrial wood flows within a series of Industrial Planning Units.
- (iii) Identification of areas with development potential by providing states with data for management and harvesting control.

The gross volume in true cubic feet per acre is the basis for calculations and there is warning that the limited number of samples under circumstances of high variability have a standard error of between 10 and 30 percent for total volumes of all

trees of 18" + diameter. Hence data "which is entirely adequate for purposes of perspective planning and to point major trends, must be merely indicative of orders of magnitude of diameter ranges and volumes".

The gross volume is the apparent tree volume (under bark) between the stump and crown point taking no account of defects. Deductions to obtain probable yields have been made in various ways and with various terminology. The net volume⁽¹¹¹⁾ is derived from the gross volume, using different factors for forest types and diameter ranging from 40 to 68 percent of the gross volume to make allowances for defects, felling breakage and harvesting waste. The concept of gross commercial volume is also used⁽¹⁰⁵⁾ which confines gross volume estimates to all species completely acceptable and half the volume of species currently partly acceptable on the market. Half this gross commercial volume is taken to be the "Net Volume which takes fully into account defects, felling damage and other loss". In Table 4.6 net volume conversion factors are used against the gross volumes by forest types with results which should be, in toto, directly comparable with the "Net Industrial Volume" figures, bearing in mind the reduction in confidence limits with reduction in area to which the basic figures are applied. Volumes are gross in the 12" + column because, at present, sizes 12" to 18" diameter are not marketable. Indeed trees of diameter between 18" and 24" are not readily marketable but they are taken into account as marketable because by 1980, 18" + diameter trees will probably fall into this category.⁽¹⁰⁵⁾

Only Primary Types are regarded as exploitable in permanent forest. The Disturbed Partly Exploited Forest since 1966 can be re-exploited for release to agriculture, but in Permanent Forest, such is the damage caused to regeneration by salvage fellings, that no further felling is envisaged before the end of the first post-virgin harvesting period of at least 25 years.

The total growing stock based on data in Tables 4.5 and 4.6 is shown in Tables 4.7 Disturbed (since 1966) forest is shown but none of the other secondary or any restricted types are regarded as containing currently marketable volume because of adverse terrain conditions. Species only partly accepted at present are included as they have an increasing trend of market acceptance. Species with no present market are not included.

Growth response to harvesting is expected⁽¹¹⁶⁾ to be between 50 and 65 cu.ft. at clear bole industrial volume per acre (3.4 to 4.5 m³) per year; but the evidence is not set out. Future silvicultural techniques are also expected to increase the volume per acre of commercially acceptable species; but as yet there are no cost return figures available.

Table 4.6 1972 Volumes per acre by Forest Types and Diameter Classes

Diameter	Forest Type	Cubic Feet True			FD Tons ⁽¹⁾		
		Gross	Net		Net		
		12''+	18''+	24''+	18''+	24''+	
1. PD – Primary Dipterocarp	i. Superior Hill Forest	a) Fully on Market					
		Dipterocarp	1442	603	548	11.0	10.0
		Non Dipterocarp	595	212	157	3.9	2.9
		Total	2037	815	705	14.8	12.8
	b) Partly on Market	334	75	37	1.4	0.7	
	Total a) + b)	2371	890	742	16.2	13.5	
	ii. Good Hill Forest	a) Fully on Market					
		Dipterocarp	1034	421	360	7.7	6.5
		Non Dipterocarp	544	193	148	3.5	2.7
		Total	1578	614	508	11.2	9.2
	b) Partly on Market	305	82	52	1.5	0.9	
	Total a) + b)	1883	696	560	12.7	10.1	
	iii. Moderate Hill Forest	a) Fully on Market					
		Dipterocarp	789	301	251	5.5	4.6
		Non Dipterocarp	471	162	118	2.9	2.1
	Total	1260	463	369	8.4	6.7	
b) Partly on Market	266	72	65	1.3	1.2		
Total a) + b)	1526	535	434	9.7	7.9		
2. Disturbed – Partly Exploited Since 1966	a) Fully Marketable	Dipterocarp	894	297	242	5.4	4.4
		Non Dipterocarp	416	114	64	2.1	1.2
		Total	1310	411	306	7.5	5.6
	b) Partly on Market	217	38	19	0.7	0.3	
	Total a) + b)	1527	449	325	8.2	5.9	
3. Disturbed Eroded, Poor and Upper Hill Forest etc.	a) Fully Marketable	Dipterocarp	272	101	74	1.8	1.3
		Non Dipterocarp	284	92	54	1.7	1.0
		Total	556	193	128	3.5	2.3
	b) Partly on Market	259	68	43	1.2	.8	
	Total a) + b)	815	261	171	4.7	3.1	
4. Disturbed – Exploited 1966	a) Fully on Market	Dipterocarp	296	104	67	1.9	1.2
		Non Dipterocarp	325	70	37	1.3	0.7
		Total	621	174	104	3.2	1.9
	b) Partly on Market	132	22	9	0.4	0.2	
	Total a) + b)	753	196	113	3.6	2.1	

(1) 1 FD Ton = 55 true cubic feet approximately.

Table 4.7 Exploitable Growing Stock, Trengganu Tengah

Forest Type	Fully Marketable		Partly Marketable		Fully and Partly Marketable	
	18''+	24''+	18''+	24''+	18''+	24''+
FD Tons '000's						
1. Primary						
Dipterocarp	4331	3800			4331	3800
Non Dipterocarp	1828	1360	1185	488	3013	1849
Total 1972	6159	5160	1185	488	7344	5649
Total 1974	5438	4559	1040	197	6484	4753
2. Disturbed – Partly Exploited Since 1966						
Dipterocarp	1329	1083			1329	1083
Non Dipterocarp	509	285	170	86	679	371
Total	1838	1368	170	86	2008	1454
True Cubic Feet, Millions						
1. Primary						
Total 1972	339	284	65	27	404	311
1974	299	251	57	11	357	261
2. Disturbed 1974	101	75	9	5	110	80

4.6 Present Land Use

The natural vegetation covering the development area consists mainly of virgin tropical forest and at the time of the Present Land Use Survey of Trengganu,⁽⁹⁶⁾ about 90 percent of the area was thus classified. Since then, large areas of the forest have been opened for logging operations and are in various stages of deforestation or recurrent exploitation. At 1970, there were few large scale agricultural activities in the area (the photography on which the Land Use Report is based was taken in 1966). At present (1974), large scale agricultural projects on which crops are already planted or which are under development account for an area of about 160,000 acres. There is an estimated 60,000 acres of alienated land which is mainly situated along the river valleys and associated with the kampung settlements in the area. Much of this land is covered by secondary growth (belukar) indicating a system of shifting cultivation. Some land is under rubber, mostly low productivity seedling trees but in

the Jabor Valley there are two Organg Asli reserve areas totalling 2,000 acres which are planted with clonal material. Some land in swampy areas and adjacent to rivers is partly used for seasonal padi production. On the basis of available records, a reasonable assumption is that not more than 20,000 acres of the alienated land is devoted to productive agriculture at the present time. Mining activity in the area covers about 1,500 acres and is confined mainly to a few small alluvial tin mines in the south. The open-cast iron working at Bukit Besi covered about 2,000 acres but the mine is now closed and the only activity there is a small alluvial tin operation.

A summary of the present land use including developments in progress is shown in Table 4.8.

Table 4.8 Present Land Use in Trengganu Tengah — 1974

	Acres	
Agriculture		
Estates	98,405	
Settlement Schemes	60,104	
Research Station	989	
Other Alienated Land	60,000	219,498
Forestry		
Permanent Forest Potential		
Productive Forest	567,360	
Protective Forest	36,070	
Amenity Forest	1,830	605,260
Forest Clearance for Agricultural Development		
Complete	74,400	
Incomplete	122,310	
Available after 25 years plus	26,500	223,210
Unproductive Swamp		19,300
		847,770
Other		
Rivers, Road, Mining, Settlement, Minor Areas of Steepland etc.		29,572
	TOTAL	1,096,840

4.7 Present Infrastructure

4.7.1 General

The East Coast States are short of the basic transport, communications and engineering services. Trengganu Tengah is virtually an undeveloped area and suffers from an even greater lack of basic services.

4.7.2 Port Facilities

At present there are no real port facilities on the whole of the East Coast. Transfer of cargo from the main coastal towns to ocean going ships is by lighter. This method obviously limits the volume of goods moved particularly during the monsoon season. It is also an effective constraint to the production and shipment of primary resource products and manufactured items but the proposed port at Tanjong Gelang should alleviate these problems.

4.7.3 Road System

The road system serving the East Coast is inadequate due to the extensive flooding which generally occurs during the monsoon season. There are many poorly designed and dangerous curves and large sections of road suffer from surface deterioration. Also roads pass through the centre of many communities. Trengganu Tengah itself has very few all-weather highways. The northern and north eastern sections of the study area are served by a road linking Dungun and Ajil via Bukit Besi. In the south eastern section there is a road going north from Kuantan serving Jabor Valley and another from Chukai which runs west as far as Kg. Ayer Puteh. Much of the area however is served by private logging trails which become impassable during wet periods. There is a proposal to link Jerangau and Jabor Valley with a new road and a number of spurs branching from this main road will serve the hinterland. At present there are about 55 miles of surfaced roads in the study area.

4.7.4 Air Services

The area is at present served by air through MAS scheduled service at Kuala Trengganu and Kuantan although there are airfields suitable for light aircraft located at Dungun, Bukit Besi and on the NADEFINCO Oil Palm Estate.

4.7.5 Railways

Neither Trengganu Tengah nor Trengganu State are provided with rail services by Malayan Rail. However there is a private narrow gauge railway linking Bukit Besi and Dungun which was used to transport iron ore. It is understood that the track is being torn up and the equipment offered for sale.

4.7.6 Telephone System

At present the telephone services to the Trengganu Tengah area are limited to the extreme north and south areas. Jerangau is served from Kuala Brang along the main road between these two points with an eventual link up to Kuala Trengganu. Jabor Valley is served from the Kuantan Exchange while NADEFINCO is served from the Kemaman exchange. Bukit Besi is linked by a private line where interface occurs with the public system.

All the coastal towns are linked with the main regional exchange at Kuala Trengganu by a line running along the main coastal road. Kuala Trengganu is linked to Kuantan and other main exchanges through a microwave relay system.

4.7.7 Electricity Services

One of the major limitations to development on the East Coast is the lack of an integrated power production and distribution system. The Lembaga Letrik Negara (LLN) has diesel generating plants operating on a 24 hour basis at several locations. The Kuala Trengganu station provides low voltage services as far south as Marang. The Dungun station serves the sawmill complex a few miles north of town and as far south as the Golf Course while the Kemaman station distributes power within the town council area proper, north west and south. The LLN provides diesel generated power on a 12 hour basis for local concentrated distribution at Merchang, Kuala Paka, Kuala Kerteh and a number of similar sized coastal communities in Pahang.

All the electrical power produced within Trengganu Tengah is generated and distributed by private estates for their own use. The services which they provide to their workers are very restricted, being limited to a few hours daily and for a few purposes only. LLN are at present building a major power line to extend the national grid to Kuantan and Tanjong Gelang Port. After this is done it is their intention to extend this line to Dungun and finally to Kuala Trengganu. Initially the line was to run along the coast but in light of the proposed development of Trengganu Tengah it was decided to investigate the feasibility of building the high voltage line along the proposed Jerangau-Jabor road and thus serve the new development areas and communities. The existing coastal towns would then be served utilizing lower voltage distributions from this mainline.

4.7.8 Water Supply

At present there is no major public water supply system in Trengganu Tengah. By agreement, all FELDA settlement schemes have independent water supply and distribution systems constructed by the Public Works Department (JKR) which are similar to those serving the coastal towns and villages. However the vast majority of the water used in Trengganu Tengah is obtained from private wells or streams.

4.7.9 Health Facilities

Due to the scattered distribution, small size and inaccessibility of the communities in Trengganu Tengah it is difficult for the State Health Department to provide adequate health services. The following thresholds are currently used for the planning of health services:

Service	Threshold Population
Midwife Clinic	2,000
Health Sub-Centre	10,000
Village Hospital	30,000
Major Hospital	60,000
Regional Hospital	100,000

The current objective is to provide two hospital beds per 1,000 population for the State as a whole. Trengganu Tengah does not meet this standard because the hospitals serving it are located in Dungun and Chukai, which are outside the study area. The existing health facilities are listed in Table 4.9 and their location is shown in Fig. 6.1

Table 4.9 Present Health Services, Trengganu Tengah

Service	Location
Midwife Clinic	FELDA Bukit Bading
	FELDA Jerangau
	Bukit Besi
	Kg. Jengai
	Kg. Durian Mentangau
	Pasir Raja
	Padang Kubu, NADEFINCO Estate
	FELDA Seberang Tayor
	Kg. Ayer Puteh
	Jabor Valley Orang Asli Settlement (Proposed) Jabor Valley Estate (Proposed) Kg. Tebak
Health Sub-Centre	FELDA Jerangau
	Bukit Besi
	Kg. Ayer Puteh
Hospital	Dungun
	Chukai

The hospital in Dungun has recently been extended and now has a total of 78 beds. The former mining company hospital located at Bukit Besi, now run by the Health Department as a Health Sub-Centre, is planned for expansion to a maximum of 130 beds. This and other proposed expansion plans will ultimately be dependent upon the settlement pattern proposed in this report.

At present there is a midwife clinic located in the Orang Asli settlement area at Jabor Valley which it is proposed to upgrade to a Health Sub-Centre. The midwife clinic in Ayer Puteh stands on a recently acquired 10 acre site. It is planned to upgrade the clinic to a Health Sub-Centre and ultimately to a Village Hospital. This final step from Health Sub-Centre to Village Hospital should be re-considered in view of the present development programme. Two new towns with ultimate populations greater than that of Ayer Puteh are likely to be located within a 10 mile radius of Ayer Puteh. It may therefore be desirable to locate the hospital in one of these larger communities.

Pasir Raja has a midwife clinic and there is a proposal to upgrade this facility to a Health Sub-Centre if it is justified by development of the surrounding agricultural area.

The Health Sub-Centre located at FELDA Jerangau serves the surrounding area. At present there are no plans to expand the facilities there as there is little possibility of further major agricultural development in the immediate vicinity.

4.7.10 Education

In 1970, the number of children of primary school age in Trengganu State was approximately 122,000 of whom 62,601 (51 percent) were attending primary schools. Of the 63,000 children of secondary school age, 15,520 (25 percent) were attending secondary school. From 1970 - 1974 primary school attendance increased 13 percent from a total 62,601 to 70,760 while secondary school attendance for the same period increased 60 percent from 15,530 to 25,020.

School attendance figures for Trengganu Tengah in 1970 are not available and since the 1970 Census is used as the demographic base for this study it has been necessary to project back from the 1974 attendance figures for the area (which are available, Table 4.10) using the school attendance growth rates for the whole State between 1970 and 1974. Thus, of the 8,050 children of primary school age in 1970, 2,854 (35 percent) attended school and of the 4,326 children of secondary school age only 130 (3 percent) were attending secondary school in the study area.

However, the eastern boundary of Trengganu Tengah crosses mukim and other statistical boundaries and in 1970 the majority of the population lived near these boundaries. It is likely, therefore, that there was a substantial number of primary and secondary school aged children attending school outside the study area who are not included in the study area statistics. It is also probable that the school attendance figures for 1970, especially for secondary enrolment, would be lower than the State average because in 1970 the population of Trengganu Tengah was scattered, educational

facilities were limited and lack of roads and public transport restricted mobility. Thus a truer estimate of enrolment in primary schools would lie between the two rates previously discussed of 35 percent and 51 percent i.e. about 40 percent. Similarly, the estimate of secondary school enrolment in Trengganu Tengah would lie between 3 percent and 25 percent or about 15 percent.

Table 4.10 Schools in Trengganu Tengah — 1974

Type	Location	No. of Classrooms	No. of Students
Primary Schools	FELDA Jerangau	18	746
	FELDA Bukit Bading	4	176
	Bukit Besi	9	231
	Lelong	6	151
	Kg. Jerangau	6	128
	Lendang	6	79
	Kg. Tepus	6	44
	Kg. Jengai	6	76
	Jongok Batu	6	41
	Pasir Raja	6	43
	Kg. Syukur	6	39
	Kg. Durian Mentangau	6	60
	Pasir Gajah	6	200
	Seberang Tayor	6	72
	FELDA Seberang Tayor	10	354
	Ayer Puteh	9	343
	Kg. Ibok	6	193
	Padang Kubu	6	164
	Jabor Valley	5	105
Jabor Valley Estate	2	35	
Sub-total		135	3,280
Secondary Schools	Landas	9	320
TOTAL		146	3,600

Source: State Education Department, Kuala Trengganu.

In future school attendance figures will increase with population and higher living standards. Target enrolments up to 1990 for planning purposes are as follows:

Percentage of children enrolled to total school-age children.

	Primary	Secondary
1970	40	15
1975	50	20
1980	60	35
1985	100	50
1990	100	65

CHAPTER 5

Institutions in Trengganu Tengah

5. INSTITUTIONS IN TRENGGANU TENGAH

5.1 Introduction

In its efforts to promote a Malay industrial and commercial community and to realise the objectives of the New Economic Policy, the Government has created a number of institutions to encourage development in the various sectors of economic activity. Although technically the functions of these various institutions are different, the fact that they all have the same basic objective does lead to considerable overlap of function. This sometimes makes it difficult to select the particular agency which should be responsible for a certain type of development.

Spearheading development in the commercial and industrial sector are MARA,⁽ⁱ⁾ FIDA, PERNAS, UDA and the SEDC's all of which offer with varying degrees of emphasis, a complex package of financial, technical, investment and infrastructural services to assist Malay and other indigenous businessmen. In the agricultural sector FELDA, FELCRA and RISDA are the main agencies involved in the implementation of agricultural projects, FIMA promotes food processing, FAMA is responsible for agricultural marketing and the Bank Pertanian for providing credit.

In their operations many of these agencies straddle or impinge upon development in both the agricultural and industrial sectors. Thus FELDA which is primarily a land development agency has considerable industrial investment in palm oil processing and commercial investments in marketing facilities. FIMA is primarily concerned with processing of food products but in order to obtain raw materials is prepared to make considerable investments in agricultural projects. The SEDC's in their efforts to promote Bumiputra business are prepared to invest in all sectors. MARA, although not directly involved in the agricultural sector is generally interested in increasing Malay ownership and management in business in all sectors while PERNAS has a wide range of investments in the industrial and commercial sectors. The UDA although primarily concerned with commercial and property development in Kuala Lumpur and other large towns could become involved in the promotion of commercial development in settlements and townships primarily based on agricultural settlement.

Economic development is a process of complex interaction. Most of the institutions designed to promote it in Malaysia reflect this complexity and they are continually adapting their functions according to the needs and demands of particular circumstances as they arise. Apart from the agencies such as FELDA which are already established in Trengganu Tengah and primarily concerned with agricultural development, it is difficult to select and forecast with complete accuracy all of the institutions which will play an important role in the overall development of Trengganu Tengah. In this section however an attempt has been made to define what are thought to be the most relevant institutions for the immediate and potential development of Trengganu Tengah. Starting with the Lembaga Kemajuan Trengganu Tengah, (The Trengganu Tengah Development Authority) which is the agency central to all development, a brief description is given of the function and actual or potential role of each agency thought to be of direct relevance to the development of the region.

(i) All abbreviations used will be found in the Glossary at the beginning of Vol. I.

5.2 Lembaga Kemajuan Trengganu Tengah (LKTT)

LKTT, the Development Authority for Trengganu Tengah was formed in 1973 as a result of the Federal-State Joint Task Force Report⁽⁴⁾ on Trengganu Tengah in 1972. The objectives of the Authority are defined as follows:—

“To carry out economic and social development within Kawasan Trengganu Tengah in accordance with the objectives of the New Economic Policy as contained in the Second Malaysia Plan.” To achieve these objectives the major development effort will concentrate on the following:—

- (i) The opening up of land for agriculture through existing agencies such as FELDA, FELCRA, RISDA and the private sector.
- (ii) The promotion of agricultural diversification.
- (iii) The development of urban centres.
- (iv) The provision of infrastructure and social facilities in these centres.

The Authority has been granted, subject to final approval by the State Government Executive Council, wide ranging executive powers to recommend, co-ordinate, control and implement social and economic development. There is also a requirement for the Authority to become self-financing in the longer term and in order to do so it is empowered to control and direct investment and to hold equity on behalf of Bumiputras. At present the Authority has two divisions under the General Manager namely, the Project Programming and Evaluation Division and the Land Development and Settlement Division.

The functions of the Project Programming and Evaluation Division are as follows:—

- (i) To formulate a development strategy and development programmes suitable to the area in accordance with best land use principles, resource availability and manpower in the State.
- (ii) To co-ordinate the land development and agricultural programmes of the various agencies responsible for implementation.
- (iii) To identify new project possibilities for feasibility study.
- (iv) To monitor progress in the implementation of various projects.

The Land Development and Settlement Division has the following responsibilities:—

- (i) To deal with land alienation and undertake the preparatory work for establishment of urban centres in the area.
- (ii) To assist and maintain close liaison with the implementing agencies on all matters pertaining to land, paying particular attention to location and pattern of settlement.
- (iii) To be responsible for proper physical layout plans for urban centres and to ensure effective co-operation between agencies and ministries in the implementation of the development programme.

As the central authority in the development of Trengganu Tengah, LKTT has a wide range of responsibilities to undertake. At present the staffing complement is seven professionals with three vacant posts. The latter are those of Assistant Director of Survey, Assistant Director of Town and Country Planning and Engineer.

The Trengganu Tengah development area had not been the subject of a master plan study when LKTT was set up. The present organisational structure is the basic minimum necessary to supervise developments initiated before LKTT began operations and to process committed developments not yet initiated. Before LKTT came into being there were, either developed or in the process of being developed; five FELDA Schemes, the SEDC rubber estate at Bukit Besi and five private estates. A further two FELDA Schemes one RISDA estate, one FELCRA Youth Scheme and one SEDC/private sector estate were also committed for development. Since 1973 LKTT has approved another 13 projects of which five are private oil palm estates, two public sector oil palm estates, one an annual crop estate, two castor pilot projects, a grass protein scheme, a sago palm estate and a MARDI research station.

5.3 State Economic Development Corporation (SEDC)

SEDC's have been set up in all states to promote and engage in various industrial, agricultural, commercial and social projects. Their activities include the provision of industrial estates, business and office premises and housing. They also participate in wholesale and retail trading, hotels, transport and mining ventures. The aim of the SEDC's is to widen opportunities in less developed states for Malays and other indigenous people to engage in a wide range of commercial and industrial activities. In the Second Plan Period the allocation for all SEDC's was revised upwards from \$45.6 million to \$192.9 million to provide them with:-

- (i) Financial assistance on reasonable terms.
- (ii) Expertise in market assessment and project identification, preparation and evaluation.
- (iii) Facilities to provide training programmes for state officials.
- (iv) The machinery to co-ordinate requests for foreign technical and financial assistance.

The major objective of the State Economic Development Corporations is to promote and undertake projects which will contribute to the economic and social progress of the Bumiputras. The primary role envisaged for the Corporation is to promote projects as trustees to the Bumiputra and to ensure that these projects are being effectively run before they are handed over to the future owners.

In Trengganu, the State Economic Development Corporation has three major aims which are, the attraction of industry to the State in order to create employment, the promotion of Bumiputra projects and the increase of State revenue by the creation of revenue earning projects. At the moment the Corporation is engaged in a wide range of activities including the provision of industrial estates and other forms of

assistance to potential investors and is also engaged in a programme of direct investment through subsidiary companies. In the agricultural sector, SEDC Trengganu has invested directly in an oil palm estate at Sungei Tong to the north of Trengganu Tengah and a rubber estate at Bukit Besi within the project area. It also has an interest in a joint venture oil palm estate in Kemaman district and a 79 percent share in a new logging complex at Kemaman.

In its future planning, the Trengganu SEDC intends to shift the emphasis in its projects from the agricultural to the industrial sector, which will include processing of agricultural produce. The Corporation's current and proposed projects include wholesale and retail trading, the development of industrial sites, housing, airports and fishing ports, and mining. SEDC has an important role to play in Trengganu Tengah in some of these fields and could also play a major role in establishing central palm oil processing mills and possibly, at a later date, further manufacture of palm oil products. It maintains a close liaison with FIDA, which licences the construction of palm oil mills and conducts technical studies as well as promoting industrial development in less attractive areas.

5.4 The Federal Land Development Authority

Since its inception in 1956 FELDA has been the single most important land development agency in Peninsular Malaysia. By the end of 1974 FELDA will have developed approximately 627,000 planted acres of settler schemes, plus 60,000 acres of village land, mainly in large scale projects which offer economies in clearing, land development and product processing. Of the total acreage 384,000 acres will be under 78 oil palm schemes, 232,000 acres under 69 rubber schemes, 8,600 acres under one sugar cane scheme and 1,200 acres under one cocoa scheme. Preliminary estimates for the Third Malaysia Plan envisage a development rate of 60,000 acres annually which may be substantially increased when the Plan comes to be implemented.

Although FELDA has developed and intends to develop more sugar and cocoa schemes and is experimenting with other crops, the primary aim is successful settlement and not agricultural diversification. The main potential for development is therefore still foreseen in oil palm and rubber planting, although any crop will be considered provided that it is found that it can be successfully cultivated and meet the settler income targets. The holding size on rubber and oil palm settlements has recently been raised to 12 and 14 acres respectively. On conservative price projections for oil palm and rubber it is estimated that on holdings of these sizes the settler will receive an annual net income of over \$3,000 annually, after paying for land development costs, his house and houselot, 35 percent of village area costs and the operating costs of processing and marketing.

In its aim to promote successful settlement FELDA has made major investments in palm oil mills and marketing facilities and by 1974 accounted for 13 percent of national palm oil production. As immature areas come into production and further investments are made in processing and marketing facilities this percentage share of the market is likely to increase. Implementation is backed by considerable research into and development of agricultural extension, processing, marketing, credit, technical and

management services. FELDA is also becoming increasingly involved in the development of more sophisticated urban communities associated with its settlement schemes, and is encouraging the settlers to become involved in trading and to engage to a greater extent in the processing of main crops and any subsidiary crops they grow. Possibly because of all these activities management has become over-extended and this has resulted in a relatively low rate of settlement in the Second Malaysia Plan period. Between 1956 and 1973, 29,000 families were settled but of the target of 20,000 in the Second Plan period only 8,400 families were actually settled by the end of 1973. It is now generally recognised that if FELDA is to achieve its ambitious programme of settling new lands at a rapid rate, while at the same time enhancing the quality of settlement, the recruitment and training of adequate management staff will be a major task in the Third Plan period.

With 627,000 acres developed and 29,000 families settled to date, FELDA's achievement has been impressive. In the future it will continue to be the most important agency for achieving the aims of the New Economic Policy in the agricultural sector. Largely through the FELDA programme 47.1 percent of domestic non-corporate assets in the modern agricultural sector is owned by Malays. Under the projected future FELDA Development Programme this share will show a substantial increase. This will result, in line with the aims of the New Economic Policy, in a substantial expansion of employment, (both quantitatively and qualitatively), further redistribution of the ownership of economically productive assets and the provision of a wide range of social services especially designed to raise the living standards of low income groups.

In Trengganu Tengah, FELDA has four oil palm settlement schemes at Jerangau, Bukit Bading, Jerangau Barat and Neram and one palm oil mill at Jerangau. There is one rubber scheme at Seberang Taylor. Apart from the main crop there have been no developments on the "dusun" areas set aside for the farmer to grow other crops and on the oil palm schemes these areas have been planted up with oil palm. The total planted area of these schemes is about 23,500 acres of which about 22,000 acres is under oil palm and 1,500 under rubber. In addition two oil palm schemes are being developed in the Rasau Kerteh area and at Neram which will bring the total area under oil palm to more than 40,000 planted acres. At present there are 1,239 FELDA settlers in Trengganu Tengah and the developing projects will provide a further 2,015 smallholder lots which should all be settled by 1980. More than one thousand additional lots are needed to satisfy present demand from Trengganu applicants to FELDA.

5.5 The Rubber Industry Smallholders Development Authority (RISDA)

RISDA was set up in January 1973 to take over the former responsibilities of the Rubber Industry Replanting Board and the Smallholders' Advisory Services Division of the Rubber Research Institute. The authority is responsible for the issue and supervision of replanting grants to smallholders and administers replanting grants to estates which have applied for them.

Smallholders who wish to replant are given a grant of \$900 per acre in materials and cash with the proviso that they plant with clonal material and follow approved cultivation techniques. Alternatively the smallholder can replace his rubber with other crops from a list of twelve approved by RISDA. The farmer is provided with an extension service to give him advice on the best planting, cultivation and husbandry methods.

In 1974 the Authority began a programme along with the Malaysian Rubber Development Corporation to improve the quality and marketing procedures of smallholder rubber. Smokehouses and stores will be set up by RISDA at Group Processing Centres to help the smallholders improve the quality of their product by packing and selling dry sheet themselves instead of selling wet sheet to an agent as formerly. MRDC, which previously confined its operations to the production and marketing of SMR grades from latex and slab coagulum, will now market RSS grades for the farmer and also buy some RSS grades for conversion into SMR 5. Both RISDA and MRDC are examining methods of improving credit management by obtaining repayment from the sales of rubber by smallholders to the Corporation.

From 1956 the Rubber Industry Replanting Board also gave grants to smallholders to encourage new planting. Between 1956 and 1967 only 80,226 acres of new planting had been undertaken and by 1970 it was realised that if new planting was to be speeded up smallholders should be encouraged wherever possible to plant in new blocks. Under the Second Malaysia Plan the annual target for new planting was set at 30,000 acres between 1971 and 1975. In order to speed up new planting a Plantation Development Division was formed within RISDA. Now the smallholder who owns seven acres or less of rubber has the option through this division, to use his eligibility for a new planting grant to own shares in a block planting scheme of up to a maximum of five acres. The block new planting schemes will be run on estate lines with management supplied by RISDA, thus the smallholders will not initially play any direct part in management.

Although RISDA's replanting and marketing schemes will be of importance to the existing smallholder rubber growers in terms of overall development in Trengganu Tengah, Block New Planting in the area will be the major undertaking of this agency. At the moment it has started development in an area of 25,000 acres for block planting with oil palm. Preference will be given to natives of the State to purchase shares but smallholders in other states are eligible too, and Trengganu residents can likewise get a share in schemes outside their State.

The main advantage of this type of scheme is that it can be implemented more rapidly than FELDA schemes, which have the more ambitious aim of setting up viable new farming settlements. It also achieves a quick redistribution of assets to the poorer members of the rural agricultural sector, although it does not directly engage them in modern productive processes. It would not be a suitable form of development where there is land shortage but in Trengganu Tengah, where there is a shortage of farmers, it is a reasonable method of combining rapid development with a wider distribution of ownership.

5.6 Federal Land Consolidation and Rehabilitation Authority (FELCRA)

FELCRA was set up in 1966 to rehabilitate land schemes developed by State Governments which had failed and to develop land on their behalf. The Authority was never actually empowered to carry out land consolidation although, since it has been asked to do so in the Kemubu irrigation scheme in Kelantan, the feasibility of legally enabling the Authority to carry out this function is being examined. At present FELCRA's activities are concentrated on the unsuccessful state land schemes and the opening up of land for fringe alienation and youth schemes.

The unsuccessful land schemes are normally fringe alienation schemes where State Governments have attempted to augment uneconomic smallholdings by giving the farmer another plot of land adjacent to or on the fringe of existing settlements. Of the 26,600 acres developed under this system over 20 percent have failed, largely because of inadequate planning, lack of implementation resources and poor supervision. FELCRA has now taken the rehabilitation of these failed schemes over and subjects each to feasibility study before any reconstruction is undertaken. Once it has been proved that it would be profitable to rehabilitate a scheme the work is either performed by contractors (using the participants as labourers if possible), or by the participants and locally recruited workers under FELCRA supervision free of charge but the costs of the rehabilitation are charged to the participant. At the end of 1973, 27 schemes totalling 23,885 acres had been rehabilitated including 20,442 acres of rubber, 1803 acres of palm oil, 1470 acres of paddy and 170 acres of pineapple.

The management of fringe alienation schemes directly opened up by FELCRA is carried out on an estate type basis. Schemes are managed as one unit with FELCRA controlling all operations from land preparation to harvesting and marketing. Participants in the scheme do not have defined holdings but are given shares in the scheme which are equivalent to eight acres of land on the rubber and oil palm schemes.

Youth land schemes are based on the concept of promoting collective participation of youths in developing new land on a co-operative share system similar to that for Fringe Alienation. The youths selected are usually educated but unemployed and between 17 and 23 years old. They are given training in land development and settlement although the actual land development is undertaken by contractors. Initially only temporary accommodation is provided and sites for villages and basic infrastructure are set aside for later development. A typical scheme would consist of 2,000 acres of land with 200 acres set aside for future village development and 1,800 acres planted to rubber or oil palm. Each participant, is given ten acres of the main crop planted and projects such as poultry farming, fish rearing and vegetable gardening are actively encouraged.

At the moment all youth land schemes are opened up as pilot projects and are in the form of social experiments to note the capacity of the youth labour force to carry out development and to determine suitable forms for this type of scheme.

At the end of 1973 FELCRA had developed 18,000 acres for youth schemes out of a target of 75,000 acres during the Second Malaysia Plan period. Increasing development costs and shortage of suitable land for fringe development have been increasingly constraining FELCRA's programme and activities.

FELCRA has 6,000 acres in Trengganu Tengah of which it is proposed to develop 4,000 acres as a youth scheme starting with 1,000 acres in 1975 as a first phase. It is envisaged that the development will be fairly gradual until basic infrastructure in the area is built up and the scheme becomes relatively less isolated from urban communities.

Although FELCRA is unlikely to contribute further to large scale development in Trengganu Tengah it could be an important agency in the later years of development for opening up small pockets of land which are of no interest to large investors. Initially it is envisaged that the Farmers Organisation Authority will be the most important agency in developing the existing smallholding community within the area, but FELCRA could become important at a later date if expansion and consolidation of smallholdings is considered necessary.

5.7 Farmers Organisation Authority (FOA)

The Authority was set up in 1973 to merge the functions of the Farmers' Associations and the Agriculture Based Co-operatives. The former were associations set up at State level with Boards of Directors consisting of farmer members under the supervision of the Ministry of Agriculture. The Agriculture Based Co-operatives were small co-operatives set up in areas where farmers wished to form a local co-operative and were supervised by the Ministry of Rural Economic Development. Both bodies extended technical expertise, credit and marketing advice to their farmer members and the newly formed FOA has the same objectives. It will be supervised by the Ministry of Rural Economic Development. These authorities are solely concerned with smallholder farmers and do not deal with rubber or livestock which remain the responsibility of RISDA and the Veterinary Department respectively.

The FOA has a national head office, state offices and, in each state, a number of Farmers' Development Centres (FDC). Each FDC is situated in an area which has been selected for its current need for smallholder farmer development and where farmers have shown a positive interest in joining this kind of organisation. There are 16 FDC's in Trengganu and two of them include farmers in the Trengganu Tengah area: the Dungun FDC (Ikatan Muhibbah) set up in 1972 and the Kemaman FDC (Jaya Murni) set up in 1972. A new FDC is to be established in Kijal in 1974 and another in Jerangau in 1975, while more FDC's may be established in the future to serve other areas.

Both FDC has a permanent staff consisting of a General Manager, Finance Officer, Agribusiness Officer, Extension Officer and an Administrative Officer. These officers are appointed by the Government and their presence in one place ensures close co-operation between the various services offered in one location.

The Farmers' Associations found that interest in improved agriculture could most easily be stimulated by the introduction of new crops. It was in this way that the Farmers Association in Kuala Brang was started with the introduction of maize, groundnuts and most recently, soya beans. The Association extended advice and credit services to cover all crops grown by their members and the FOA will continue this practice.

In May 1974 the Ministry of Rural Economic Development allocated \$14 million for projects under the FOA in Trengganu. This sum is to be used for the setting up of Farmers' Development Centres, to subsidise the purchase of tractors, to build tobacco drying sheds, to purchase a groundnut processing plant and provide credit to groundnut farmers.

In the context of Trengganu Tengah, the FOA will continue to extend its activities to encourage participation by farmers already settled in the area. In addition, it may be that a number of new alienations will be made to open up additional land to smallholders for the production of food crops to supply the increased demand within the development area. The FOA has also requested an area of land for estate development (oil palm) in which its members will hold shares and also give employment opportunities to members' families.

In terms of existing and possible new smallholder settlement, FOA will be the most important agency for promoting development. It should be the basic organisation with which to encourage diversification and more effective smallholder farming and will provide the link between the farmer and other agencies promoting diversification and improved farming such as MARDI and FIMA.

5.8 Malaysian Agricultural Research and Development Institute (MARDI)

MARDI was set up in 1968 to accelerate applied research work on all agricultural crops other than rubber. In 1970 MARDI took over a number of agricultural research stations from the Department of Agriculture and Headquarters have been established at the Central Experimental Station, Serdang. Besides conducting research on all crops (except rubber), livestock and fisheries, the Institute extends technical services to the Government and other organisations and liaises with food processing industries. There are separate research facilities for rice, rotation crops and water management, cocoa, pineapple, livestock and other crops, soil engineering and crop protection. In Trengganu Tengah MARDI runs the former Department of Agriculture research station at Jerangau. The MARDI Station at Sungei Baging in Pahang is just east of Trengganu Tengah but its work is concentrated solely on the Bris soils of the coastal region.

In terms of future agricultural diversification in Trengganu Tengah, MARDI's operations will be of prime importance since it is the agency which will select suitable soils for potential diversification crops, select and breed suitable varieties, conduct growing trials and disseminate the results to the potential implementing agencies.

5.9 National Livestock Development Authority (MAJUTERNAK)

MAJUTERNAK was formed to promote the commercialisation and rapid development of the livestock industry and so far has commenced the implementation of beef and dairy projects in Pahang, Perak, Trengganu, Johor and Sarawak. The Trengganu scheme was started in 1973 and it is hoped to have planted approximately 2,500 acres with grasses by the end of 1974.

It is unlikely that a large scale cattle scheme can be introduced in Trengganu Tengah until further considerable research has been undertaken. However the experience of the MAJUTERNAK project in Kuala Brang will be an important part of that research and the project a potential source of stock if it is decided to promote cattle development in Trengganu Tengah.

5.10 Malaysian Rubber Development Corporation (MRDC)

MRDC was set up in 1971 to bring the benefits of new developments in rubber processing to smallholder rubber growers. So far eight factories for the production of SMR (Standard Malaysian Rubber) and three factories for production of latex concentrates have been set up. The Corporation's factories are expected to run as commercially viable units financing their current cash requirements and paying back the capital costs of their plant. The nearest of these factories to Trengganu Tengah and the only one on the east coast so far, is situated in Kuala Brang. It is making SMR 20 from cup lump, scrap and sheet collected throughout Trengganu and as far afield as Kelantan. Eventually, the Corporation plans to set up similar factories at Jerteh and Kemaman and it is proposed in this report (Chapter 10) that the latter should be located within Trengganu Tengah.

5.11 Food Industries of Malaysia Sdn. Bhd. (FIMA)

FIMA is a wholly owned government holding company with an authorised capital of \$50 million, which sets up enterprises for the production, processing, marketing and packaging of food products. FIMA's socio-economic objectives include: the acceleration of rural industrialisation to create more jobs; the development and expansion of food processing industries using local raw materials and the provision of market outlets for the agricultural produce of farmers and fishermen.

To achieve these goals FIMA has embarked on a campaign to promote the consumption of locally processed food. The campaign is supported by identification and evaluation of economically viable projects for implementation by FIMA or as joint ventures. The company also undertakes market research and the preparation of marketing plans for both domestic and overseas outlets and will provide technical management and marketing management for food processing enterprises. At present FIMA has a large cashew nut project under development on the east coast Bris soils covering 9,000 acres in Trengganu and 6,000 acres in Pahang. In Johor a fruit project of 500 acres has been started to grow durian, rambutan, papaya and bananas. Fruits suitable for canning will be processed in the company's subsidiary, the Pineapple

Cannery of Malaysia. It is also setting up a vegetable growing project in Johor to supply the Johor Baru and Singapore markets with fresh vegetables and any surplus produced over and above the fresh market requirement will be canned. The company is also investigating a further fruit project in Pahang Tenggara, running a small pilot project to produce castor bean at Temerloh in Pahang and is setting up a poultry farm in Selangor for the production of broilers. A proposed grass pelleting project has now been shelved because of recent increases in the cost of fuel oil and fertilizers.

FIMA is thus prepared to engage in a wide range of activities to promote agricultural diversification. It would be the ideal organisation to investigate and promote certain agricultural diversification activities in Trengganu Tengah, particularly fruit production and processing and possibly, as the population in the area rises, intensive vegetable and poultry production.

5.12 The Federal Industrial Development Authority (FIDA)

FIDA was established in 1967 to promote industrial activities of government and private organizations. Particular stress is laid on pre-investment, project and regional studies in the less developed states, and the assessment of potential for a wide range of processing and consumer goods industries. Technical and managerial services are available to existing firms and overseas promotional campaigns are organized to expand overseas markets for Malaysian products and to attract foreign investment to Malaysia. FIDA has established offices in Kuala Lumpur and certain other towns to undertake industrial promotion activities in various regions and to provide the services required by investors. In this respect close co-operation is maintained with SEDC's in the establishment and management of new industrial estates in order that they are designed in accordance with the needs of potential investors.

FIDA is also concerned to ensure that measures to establish new growth centres and townships are fully incorporated in regional development plans and that specific opportunities for manufacturing and other industrial activities in these townships and centres are fully identified.

Through FIDA, MARA and the SEDC's the Government has undertaken to establish small industries in smaller towns and rural areas. FIDA also provides assistance to existing small industries for marketing and bulk purchasing of raw materials and to upgrade technical and business management.

In the first six months of 1974 FIDA approved 262 applications to set up manufacturing companies with a total called up capital of \$384 million, of which approximately 60% was contributed by local industrialists. Of these projects, 32 were located in free trade zones and 183 in other industrial areas in order to obtain as wide a dispersal of industrial development as possible. Of the total projects approved, 27 were Bumiputra companies with a total capital of \$118.4 million and 59 of the companies set up will be engaged in the processing of the country's raw materials.

FIDA's promotional and investigatory activities are particularly relevant to the question of palm oil processing in the initial stages of development in Trengganu Tengah. In a few years time the area will be producing very large quantities of ffb from a number of estates and settlement schemes and it would appear logical that these should be centrally processed, since this should reduce unit costs and provide a basis for further manufacture of palm oil products. However, combining the processing of different estates in central units raises some technical, locational and managerial problems, which would be subject to detailed study before any final recommendations could be made. FIDA with its technical resources and experience of promoting and organizing industrial investment in less developed areas would be the most appropriate organization to carry out this study and to develop centralized processing if it was proved to be viable.

5.13 The Federal Agricultural Marketing Authority (FAMA)

The Federal Agricultural Marketing Authority has been in operation since 1965. It has been actively engaged in improving padi marketing and has conducted research in the marketing of fish, pepper and coffee. It has also been implementing measures to raise incomes of coconut smallholders through the provision of improved copra processing facilities. In Pahang, Trengganu, Kelantan and Perak FAMA has been undertaking the marketing of maize and groundnuts as part of an integrated development to boost production of these crops. A recent significant development has been the decision to set up a cocoa bean processing factory in Sabak Bernam which will be allied to an 8,000 acre plantation in Selangor. Further cocoa schemes are also being considered in Perak and it is hoped that a total of 10,500 acres of cocoa will be in cultivation by 1975.

At present FAMA's activities are not particularly relevant to Trengganu Tengah as most of the initial output will be palm oil and rubber which have their own highly developed marketing systems. However as cocoa is regarded as one of the most promising diversification possibilities in Trengganu Tengah, FAMA's decision to engage in cocoa bean growing and processing could be of direct relevance to the development of Trengganu Tengah in future. Coconut is another possible diversification crop which also requires a modern processing and marketing system if it is to be successfully introduced, while, if certain annual crops are to be grown on land already alienated to smallholders, FAMA's marketing organisation and experience would form a necessary link in future development.

CHAPTER 6

Committed Developments

6. EXISTING AND COMMITTED DEVELOPMENTS IN TRENGGANU TENGAH

6.1 Agriculture

6.1.1 The Present Situation

The agricultural development which has taken place in Trengganu Tengah is basically of two kinds; large scale projects (estates or settlement schemes) and small scale alienations (Fig. 6.1). The latter are estimated to cover an area of about 60,000 acres and this study does not deal with them in any detail because information concerning the cropping and economy of such areas is very limited and collection of such information would be a study in itself. However, from observation and discussion it is concluded that much of the alienated land is under secondary growth and the areas cultivated are mostly under low yielding rubber. There are some areas of low lying land where padi is cultivated during the monsoon season. It is estimated that small-holder farming of this kind provides employment for about 5,000 people but many of them may be engaged in part time work as contract labour on development projects or as casual labour on estates.

The large scale projects, most of which are greater than 1,000 acres in area and several more than 10,000 acres, are either estate type developments or FELDA settlement schemes; there is also one agricultural research station. Prior to the present study a number of large scale projects of this kind were either established or are presently in the process of development. These projects are listed in Table 6.1 and classified by type and crop in Table 6.2. They amount to a total of 96,688 acres of which 92,666 acres will be developed by the end of 1974.

These projects have already been described by the Consultants (Interim Report Section 3.1.2) and the following is a condensed version updated where necessary.

6.1.2 The Major Projects

(a) FELDA Oil Palm Schemes (101, 105, 106, 122)⁽ⁱ⁾

FELDA has four settlement schemes planted with oil palm in the Trengganu Tengah area.

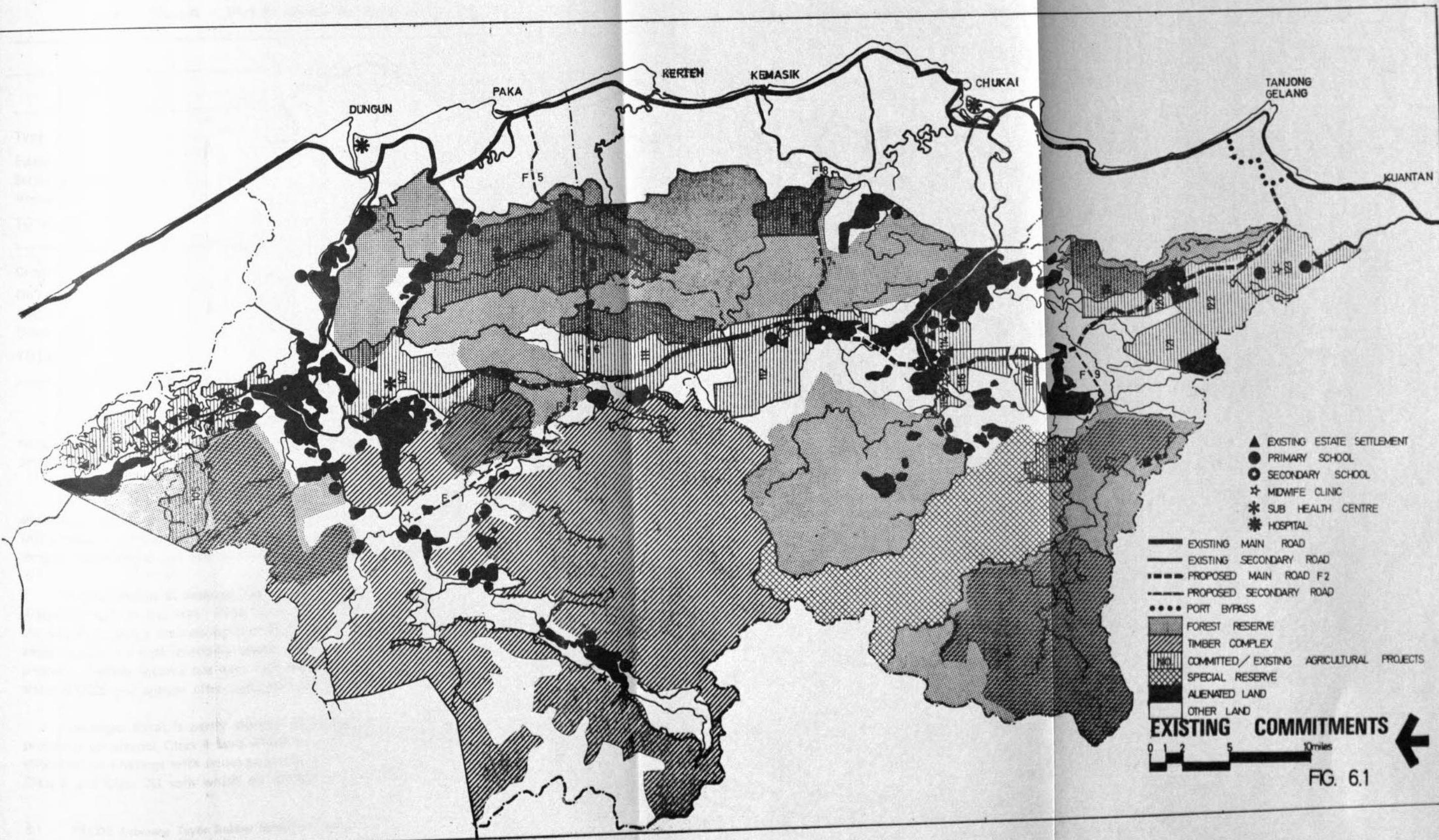
Of the three schemes in the north of Trengganu Tengah at Jerangau, the Jerangau (106) and Bukit Bading (101) schemes are fully settled with 1,065 settlers. The area originally intended as an orchard (dusun) of two acres per settler, has now been planted to oil palm and is run on estate lines by FELDA using direct labour. The settlers share in the income from this area. FFB is processed at the FELDA mill on Jerangau which at present has a capacity of 27 tons/hour.

(i) Numbers in brackets refer to Project Location Map: Fig. 6.1

Table 6.1 Developed and Partially Developed Agricultural Projects in Trengganu Tengah

No:		Area			Type		
		To 31 Dec. 1973	1974	1975		Gross	Planted	Acres
Public Sector							
101	FELDA Bukit Bading	5,766			5,766	5,489	Settlement Scheme
106	FELDA Jerangau	8,405			8,405	6,649	Settlement Scheme
105	FELDA Jerangau Barat	2,998		3,422	6,420	3,899	Settlement Scheme
114	FELDA Seberang Tayor	2,483			2,483	1,622	Settlement Scheme
122	FELDA Neram I	10,290			10,290	5,798	Settlement Scheme
107	SEDC Bukit Besi Estate	12,697	4,600	600	17,897	15,380	Estate
103	MARDI F.E.S. Jerangau	989			989	675	Research Station
	Sub-total	43,628	4,600	4,022	52,250	39,512	
Private Sector							
102	Jerangau Estate	1,200			1,200	999	Estate
104	Landas Estate	1,439			1,439	980	Estate
112, 115)							
116, 117)	TDMB/NADEFINCO	27,392			27,392	24,904	Estate
118	Chenderong Concession	3,597			3,597	3,000	Estate
123 118	Jabor Valley Estate ⁽¹⁾	9,810	1,000		10,810	4,152	Estate
	Sub-total	43,438	1,000		44,438	35,609	
TOTAL		87,066	5,600	4,022	96,688	75,121	

(1) Gross Area for Jabor Valley as measured on 1:63,360 map includes some 4,000 acres of small rubber estate and other alienated land in the area. Jabor Valley Estate actual gross area is 6,100 acres.



- ▲ EXISTING ESTATE SETTLEMENT
- PRIMARY SCHOOL
- SECONDARY SCHOOL
- ☆ MIDWIFE CLINIC
- * SUB HEALTH CENTRE
- * HOSPITAL

- EXISTING MAIN ROAD
- EXISTING SECONDARY ROAD
- - - PROPOSED MAIN ROAD F2
- - - PROPOSED SECONDARY ROAD
- PORT BYPASS
- ▨ FOREST RESERVE
- ▨ TIMBER COMPLEX
- ▨ COMMITTED / EXISTING AGRICULTURAL PROJECTS
- ▨ SPECIAL RESERVE
- ▨ ALIENATED LAND
- ▨ OTHER LAND

EXISTING COMMITMENTS ←



FIG. 6.1

Table 6.2 Classification of Current Agricultural Projects in
Trengganu Tengah — 1974 by Sector, Management Type and Crop

	Acres (Gross)		
	Public	Private	Total
Type			
Estate	17,897	44,438	62,335
Settlement Scheme	33,364		33,364
Research	989		989
TOTAL	52,250	44,438	96,688
Crops			
Oil Palm	30,881	35,141	66,022
Rubber	20,380	6,658	27,038
Other	989	2,639	3,628
TOTAL	52,250	44,438	96,688

Development of the Jerangau Barat (105) area started in 1973 and should be completed by the end of 1976. This scheme will provide smallholdings for about 280 settlers on the basis of 14 acre lots. FFB will processed in the Jerangau palm oil mill.

The Neram I (122) area, in the south of Trengganu Tengah, is being developed and about half the area was planted in 1973. It should be completed this year and will provide smallholdings for about 410 settlers. A new palm oil mill will be built to serve this scheme and nearby FELDA schemes in Pahang.

The oil palms at Jerangau and Bukit Bading are growing well on the good (Class 2G) soils in the area. Peak yields of nearly 10 tons/acre ffb are expected and the earlier plantings are nearing this level. There is loss of fruit in the monsoon season which is also the peak cropping season and at this time field to factory transport is a problem. Settler income has been high during recent months and in 1973 it averaged about \$3,000 per annum after deduction of loan repayments.

Jerangau Barat is partly situated on Class 2G soil but the second phase of this project is on steeper Class 4 land which may give rise to difficulties in planting and allocation of holdings with equal potential to the settlers. Neram I is mostly sited on Class 1 and Class 2G soils which are suitable for oil palm.

(b) FELDA Seberang Tayor Rubber Settlement Scheme (114)

FELDA has developed one rubber settlement scheme in Trengganu Tengah at Seberang Tayor in Kemaman district.

The scheme was slow to start due to poor growth of the trees which were brought into tapping in 1971 and 1972. The present stand is now about 110 trees/acre. There are no serious disease problems but unskilled tapping has led to bark damage. Yields of latex have been running about 40 percent below estimates. The scheme is sited on Class 2 soil and its poor performance so far is hard to justify. It is understood that nearby estates offer alternative employment to some settlers which results in lost tapping days on the scheme and loss of tapping days through rain, particularly in December, is heavy. Latex is sent to the Kampung Awah factory in Pahang for processing into SMR. There are currently 174 settlers on this scheme.

(c) **SEDC Bukit Besi Estate (107)**

This estate has a gross area of 17,897 acres. Planting started in 1971 and should be completed by the end of 1975 when the total planted area will be 15,380 acres.

The estate development programme is up to schedule. Tapping should start in 1978 and the estate will be fully mature in 1982. The capital cost of the project will be \$18.5 million. A rubber factory (probably for SMR) will be built in 1977.

The project is sited mostly on Class 2G and Class 4Gc land. The Class 4 land is very steep, in some areas up to 60° slope. Much of the area has been terraced before planting. It is interesting to note that maps supplied to the estate before development started showed the maximum slopes to be only 25°, whereas after clearing these slopes were found to be at least double this figure. It is possible that similar anomalies will be found elsewhere in the Trengganu Tengah area. Growth of the rubber is satisfactory. Yields of 1,500 lbs/acre are forecast at maturity taking into account the losses expected due to heavy rainfall in the monsoon season.

Management will be based on four field divisions, each of 3,500 to 4,500 acres and one factory division. Each field division will have a manager, an assistant manager, two senior conductors and four junior conductors. Staff positions will therefore number over 45 when the estate is fully planted and production starts. It is interesting to note that with the opening of larger projects in Trengganu (such as Bukit Besi Estate and Sungei Tong Oil Palm Estate), Trengganu Malays who have been working in management positions in other states are being attracted back to their home State by the prospects of enhanced position and increased earnings.

(d) **MARDI Jerangau Research Station (103)**

This research station, situated on the Ajil-Dungun road, was started in 1952 by the Department of Agriculture. It was taken over by MARDI in 1970. The total area of the station is 989 acres of which about 380 acres is planted (Table 6.3) the remainder is under forest with some swamp areas.

Table 6.3 MARDI Jerangau Research Station

Crop	Acres
Oil Palm	281
Cocoa	44
Durian	20
Coconuts	2
Fruit Trees	32
Sub-total	379
Houses, buildings etc.	60
Swamp	156
Unfelled Jungle	394
Sub-total	610
TOTAL	989

There are no research officers on the station at present and it is under the control of a Farm Manager. In addition, there are 12 staff, a permanent labour force of 13 and 49 casual workers. The work of the station consists of recording data on the oil palms and cocoa and maintaining the other crops. All data from the station is sent to MARDI headquarters at Serdang.

This is the only MARDI station in Trengganu and the only agricultural research establishment in Trengganu Tengah. It is sited on Class 2 soils which are typical of a large part of the land in the area suitable for agriculture and it is subject to the high rainfall common over most of Trengganu Tengah. It would thus seem to be an ideal proving ground for crops in Trengganu Tengah particularly those about which little is known.

The Consultants have already recommended (Interim Report) that this research station should be fully activated to implement a programme of research directed to the immediate needs of Trengganu Tengah. This is discussed further in Chapter 8.

(e) Jerangau Estate, Landas Estate (102, 104)

These two cocoa estates, with a combined planted area of 1,979 acres, are both managed by a private sector company. Jerangau Estate (102) was started in 1950 in response to a request by the Government (of Malaya) for information and guidance on the growing of cocoa in the country. The planting material used then was Amelonado from West Africa. After a few years the trees were attacked by "die-back" the cause of which has since been identified as vascular streak fungus. In spite of these indications, Landas Estate (104) was planted in 1956 using the same material. Later on, Upper Amazon clones were introduced and more recently hybrid material from Sabah, both of which have shown resistance to "die-back" disease. However, at least half the acreage on the estates is still under Amelonado trees and the average yield is

very low. Until recently, the estates were the only pure stands of cocoa in Peninsular Malaysia (on the west coast it was always planted under coconuts or rubber). The Jerangau/Landas estates are being used as a testing area for the Sabah hybrids to determine their resistance to "die-back."

The estates have a manager and six field assistants. The permanent labour force consists of 50 males and 40 female workers; 120 casual workers are employed at peak harvesting periods in November – December, when 40 percent of the total crop is collected.

(f) **TDMB/NADEFINCO (112, 115, 116, 117)**

The National Development Finance Corporation (NADEFINCO) came to Trengganu in 1966 and was given a grant of land by the State Government totalling 33 000 acres on a 46 years plus 46 years lease, for the planting of oil palms. The estate is now managed by the Trengganu Development Management Berhad (TDMB) and to diversify the shareholding, some of the equity is now held by various insurance companies and other individuals.

Most of the company's land is in several blocks in the Kemaman district near Ayer Puteh and these areas are already planted. The company has a further 10,000 acres of land, so far undeveloped, in the Rasau-Kerteh area (110). In addition to the 24,904 acres planted under their agreement with the State Government, NADEFINCO have also planted 3,000 acres of oil palms in the Chenderong Concession (118).

The soils in these areas are mixed Class 2G, Class 3G and some Class 1g. Growth of the palms is satisfactory but some of the land is subject to prolonged flooding and this has resulted in the death of trees from spear rot. The wide area from which fruit has to be collected gives rise to transport problems in the monsoon season and up to 50 percent of a month's crop has been lost because of the inaccessibility of some areas due to flooding. Total crop for 1973 was some 20 percent lower than might have been expected from conservative (the Consultants') estimates.

The company has a palm oil mill sited in the main estate area at Padang Kubu on the Sungei Terbak. The mill is presently rated at 40 tons/hour ffb but there are provisions to expand it progressively to 80 tons/hour capacity as the area reaches peak production. A kernel oil mill with a capacity of 20 tons/kernels per day is under construction. The company hopes to buy ffb and kernels from nearby estates for processing in their factory.

The estate has five divisions, each with a manager and two or three Field Assistants. There are 25 junior supervisors for each division. The mill and engineering services are managed by three engineers and two more are to be recruited.

Labour availability is a problem and the company has about 3,000 workers but poor daily turn out results in an overall shortage of labour particularly when other activities such as padi planting are going on. Some of the work force is housed on

the estate, some live outside and some come from the nearby FELDA rubber scheme at Seberang Taylor. The estate is not well served by the present road system and it is thus not an attractive work place for those to whom the amenities of town life are important. This situation and the difficulties of ffb transport during the monsoon season should be greatly eased when the Jerangau-Jabor trunk road is completed.

(g) **Jabor Valley Estate (123)**

This is a long established private sector estate. The area totals 6,100 acres of which 1,574 acres is under rubber planted between 1955 and 1966. This area will remain under rubber which will continue to be processed into Michelin sheet in a factory on the estate. Production in 1973 was about 1.6 million lbs and this is expected to rise slowly to around 2 million lbs/year.

The area formerly under old rubber is now being re-planted to oil palm and 912 acres planted in 1969 and 1970 are now in production. Final oil palm area will be about 4,500 acres. At present ffb is processed at the FELDA Bukit Goh mill but it is planned to build a 10 tons/hour palm oil mill on the estate. Peak annual yields of 9.5 tons/acre ffb are expected.

The estate is situated on the only large block of Class 1g soil in Trengganu Tengah. It is the Kuantan series volcanic soil which is free draining and of high nutrient status. The free draining nature of the soil can give rise to moisture stress on the higher ground during relatively dry periods but tree crops can root deeply in this soil and in mature crops drought is no problem. There are about 250 acres of swamp, which are suitable for oil palm where drainage is possible.

The estate has not experienced labour problems in spite of the proximity of the urban area of Kuantan with its burgeoning industrial sites. The work force totals 396 including factory workers. In addition to the Manager, there is one Assistant Manager and four Field Conductors.

6.1.3 Agricultural Development Projects committed prior to the Present Study

Following the report⁽⁴⁾ of the Federal-State Task Force on Trengganu Tengah in 1972, certain areas of land with agricultural potential were committed by the State Government for development by public sector agencies. In addition, two private sector projects were approved by the State Executive Council prior to the arrival of the Consultants for the present study. During the first few months of the study period a further eleven projects were committed by the Board of LKTT. The Consultants have been instructed to consider these commitments as fixed in the development plan for the area.

In some cases areas have been allocated to those projects but in one or two instances, the Consultants feel that there is a strong case for a review of the past commitments. In other cases, the Consultants have located the projects on land considered to be suitable according to present information. The firmly sited projects, some of which have begun development this year are listed in Table 6.4 and are briefly described in the following Section.

6.1.4 Sited Projects

(a) FELDA Rasau-Kerteh (108)

This area, of 21,300 acres gross, is situated on the eastern side of Trengganu Tengah. Felling of the first phase will start this year and planting of oil palms will start in 1975. The development will be done in three phases each about 6,700 gross acres giving a total planted area of 15,000 acres. This will provide smallholdings for about 1,050 settlers who will enter the first phase in 1978.

The scheme is situated in the largest block of undeveloped Class 2G soil in Trengganu Tengah. The State Government has proposed that the Rasau-Kerteh scheme should be reserved for people now engaged in marine fishing but who will be displaced by the current programme of modernisation for the east coast fishing industry. If the former fishermen are to be resettled in agriculture this is a favourable location for such a project because it is only a few miles from the seaside where they have their cultural and social links. Such a programme will, however, increase the pressure from other Trengganu people who have already applied in great numbers for places in FELDA schemes in the State. It is therefore recommended that serious consideration be given to finding a further area for FELDA in Trengganu Tengah and this is discussed in Chapter 8.

(b) FELDA Neram II (121)

This area, of 6,720 acres gross, is situated immediately north of the Neram I Project. Felling will start this year and the whole area will be planted to oil palm in 1975. The area is mostly on Class 2G soil but there are some patches of Class 3G which are steeper and two areas of Class 5STP which will be too steep for planting. The extent of these areas will only be determined after felling. The scheme will provide smallholdings for about 275 families in 1978 on an estimated planted area of 3,900 acres.

(c) RISDA (111)

RISDA applied for 25,000 acres of land for a Group New Planting Scheme in Trengganu Tengah. The area allocated to them in Ulu Paka in fact totals about 24,000 acres gross. They propose to plant this to oil palm and run it on an estate basis. Felling has started on the first phase of 4,000 acres for planting in October this year. Originally RISDA proposed to develop the area in three years but logging operations are a constraint to this. It has thus been phased by the Consultants over four years to give a total planted area of 18,000 acres coming into production at the end of 1977.

The project is sited on several soil classes. About one third of the area is on Class 2G soil which, together with a small area of Class 1G soil, should be suitable for oil palms. The remaining two thirds is on soils in Class 3G, 3d and 3cG which are all soils with limitations to oil palm cultivation. It is recommended that RISDA commission a semi-detached soil survey of their area and possibly consider planting some of it to rubber.

Table 6.4 Sited Committed Agricultural Projects in Trengganu Tengah

No.	Crop	Acres											Type		
		1974	1975	1976	1977	1978	1979	1980	Gross	Planted					
Public Sector															
108	FELDA Rasau Kerteh	6,667	6,667	7,966									21,300 ⁽¹⁾	15,000	Settlement Scheme
121	FELDA Neram II	6,720											6,720 ⁽¹⁾	3,900	Settlement Scheme
111	RISDA Ulu Paka	4,000	6,667	6,666	6,666								24,000	18,000	Estate
113	FELCRA Ulu Chukai	—	1,340	1,340	1,340	2,120							6,140 ⁽¹⁾	4,000	Youth Scheme
109	SEDC Rasau Kerteh	—											4,480	—	—
	Sub-total	17,387	14,674	15,973	8,006	2,120							62,640	40,000	
Private Sector															
119	Ladang Tenggara	1,250	1,500	1,500	1,500	1,500	1,500	2,040	1,500	1,500	2,040		10,790 ⁽¹⁾	7,500	Estate
120	Private Estate Crops	—	200	400	680								1,280 ⁽¹⁾	1,000	Estate
110	SEDC/NADEFINCO Rasau Kerteh	—											10,000	—	—
	Sub-total	1,250	1,700	1,900	2,180	1,500	1,500	2,040	1,500	1,500	2,040		22,070	8,500	
	TOTAL	18,637	16,374	17,873	10,186	3,620	1,500	2,040	1,500	1,500	2,040	84,710	49,400		

(1) Area measured by planimeter from 1:63360 map.

(d) **FELCRA (113)**

This agency has an area of more than 6,000 acres in Ulu Chukai for development as a youth scheme based on oil palms. It is proposed to develop the area in four phases, each of 1,340 acres which will give a total planted area of 4,000 acres. Most of the area is on Class 2G soils but there is a tract of Class 3cG soil in the north and some Class 3G land in the south. It may be necessary to exclude these from the planted area because of the need to provide holdings with equal potential. The land will be cleared and planted under contract but maintenance and harvesting will be done by the young settlers who will be given lots of 10 acres each.

(e) **Ladang Tenggara Oil Palm Estate (119)**

This is a private sector estate located in the south east of the development area. The gross area is about 10,000 acres giving a planted area of 7,500 acres which will be developed in seven phases, starting with 1,250 acres in 1974. The area will be fully planted by 1981. The project area contains about 7,000 acres of Class 2G soils, but there are two small patches of Class 1G soil which together total less than 1,000 acres. The remainder is Class 3d soil some of which may be planted if it can be drained.

(f) **Private Estate (120)**

This is a private sector development which proposes to grow annual crops such as maize, soyabeans and groundnuts on a rotational basis. The Consultants have already expressed doubts ⁽¹³³⁾ about the wisdom of growing annual crops on an extensive scale on the sloping terrain of Trengganu Tengah. However, an area of 1,280 acres has been allotted to this project on 2G soil in the south of Trengganu Tengah. It is understood that the developer is fully aware of the consequences of regular cultivation on slopes of more than 6° in a monsoon rainfall area. However, the Consultants feel that even such soil conservation measures as contour ridges and bench terraces will be inadequate to eliminate the serious erosion hazard posed by this type of cultivation.

(g) **SEDC Rasau Kerteh (109)**

The State Economic Development Corporation has an area of about 4,500 acres in Rasau-Kerteh immediately south of the FELDA area. The Consultants are not aware of any definite plans for this tract at present and it is our recommendation that this land be reallocated to FELDA to enlarge their settlement scheme. This recommendation is discussed in Chapter 8. The area is on Class 2G soils and will be well-served by the new feeder road F5/F6. It is thus suitable for development early in the programme.

(h) **NADEFINCO/SEDC (110)**

Under the terms of their agreement with the State Government (now represented by SEDC) NADEFINCO have an area of 10,000 acres in Rasau-Kerteh, south of the SEDC area described above. So far the company has not indicated when they propose

to develop it or with which crop, although their agreement specifies that it should be oil palms. Only one third of the area is on Class 2G soil and the remainder is on Class 3G, 3d and 3cG soils. Thus only about 3,000 acres is suitable for oil palm planting.

The Consultants propose that this area be reallocated and that the piece of Class 2G soil should be given to the FELDA Rasau-Kerteh scheme. NADEFINCO could be allocated another area of more suitable land near to their present estate and mill. This is further discussed in Chapter 8, which deals with the proposed agricultural development programme.

6.1.5 Committed Projects to be sited by the Consultants

Some of the agricultural projects approved by the Board of LKTT have not yet been definitely allocated suitable areas of land. These projects are listed in Table 6.5 and the Consultants' comments on them follow in this section. Proposed locations and revised acreages are given in Chapter 8 as part of the development plan.

Table 6.5 Committed Agricultural Projects to be sited by the Consultants

Name	Crop	Area Requested (Acres Gross)	Type
Public Sector			
Perbadanan Persatuan Peladang (FOA)	Oil Palm	10,000	Estate
Perbadanan Ladang-ladang Tabung Haji	Oil Palm	10,000	Estate
Yayasan Pelajaran MARA	Castor	5,000 ⁽²⁾	Estate
MARDI	Research	2,500	Research Station
Sub-total		27,500	
Private Sector			
Private Estate	Grass Protein	3,000	Estate
" "	Oil Palm	10,000	Estate
" "	Oil Palm	10,000	Estate
" "	Oil Palm	10,000	Estate
" "	Oil Palm	10,000 ⁽¹⁾	Estate
" "	Castor	3,000 ⁽²⁾	Estate
" "	Sago	400	Estate
Sub-total		46,400	
TOTAL		73,900	

(1) A further 5,000 acres has been requested for oil palm development.

(2) The two castor projects have been given areas of 200 and 300 acres respectively for pilot projects prior to approval for total area. If the pilot projects are unsuccessful the land will be returned to LKTT for reallocation.

The total gross area requested for these projects is 73,900 acres of which 46,400 acres would be in the private estate sector and 27,500 in public estate sector. 60,000 acres would be under oil palms and 11,400 in other crops with 2,500 for the MARDI station.

In the Consultants' opinion there is not enough suitable land to accommodate the six 10,000 acre oil palm estates. We have, therefore, reduced the size of each of these projects to about 6,700 (gross) acres which will give at least 5,000 planted acres. The estates will be allocated numbered areas on the planning map so that the Development Authority may allot these areas to individual developers.

The Grass Protein Project is a private sector development with an area of 3,000 acres which will be planted to a sorghum/grass hybrid for the production of grass pellets and leaf protein concentrate. The Consultants have reservations about the immediate implementation of this project. Apart from several technical and economic drawbacks there is really no suitable land (Class 1) in the area where the regular cultivation and mechanised harvesting proposed for the project could be satisfactorily carried on throughout the year. However the Consultants have been asked to consider this project as being an irreversible commitment by the Development Authority and the Government and it has tentatively been sited on a piece of Class 2G land near the Bukit Bauk Forest Reserve.

Following a detailed soil survey in 1974, development will start in 1975 on 450 acres. Due to logging activities on the selected land, the full 3,000 acres will not be completely released until 1979. This should allow time for experience to be built up and in case of adverse economic conditions or technical difficulties in the immediate future, it would also allow revision of the project before all capital is fully committed. A factory to make grass pellets and extract the protein concentrate will be built on the site. It is estimated that about 100 people will be employed on the project, which is highly capital intensive.

The two projects to grow castor totalling 8,000 acres (gross) have been sited by the LKTT. So far approval has been given for pilot projects on two areas of 300 and 200 acres respectively and the Consultants do not consider it likely that these projects will get beyond this stage. The limited experience of growing castor in Trengganu has indicated that the crop is susceptible to bacterial wilt which is an absolute limiting factor to its success. Furthermore, the yields so far obtained in Malaysia of not much more than 1,000 lb/acre per annum fall far short of the yield expectations put forward by the developers to justify the economic viability of their projects.

Even if the pilot projects encourage further growing of the crop it would have to be located elsewhere in Trengganu Tengah because the present sites allow no room for expansion (they are in areas proposed for forest reserve on Class 4Gc land). While there will be land available to resite these projects if necessary, the Consultants do not consider it practicable to take the castor projects into account for planning purposes at this stage.

While the above three projects have been approved by the Board, the Consultants feel it is their duty to draw attention to the high risks involved. They feel that substantially more investigation is required before commercial implementation of these projects should be undertaken.

6.2 Forestry

6.2.1 Introduction

Forestry commitments are confined to the provision of tracts of forest for exploitation over a period. Only the agreement for the wood-based industries complex (located in Kemaman District) extends as long as 25 years. Other agreements provide for areas to be worked by companies owning sawmills in or near the study area and covering periods of 4 to 12 years. There are two other companies without prospects of sawmill licences who have agreements for 7 and 20 years respectively. Under all these agreements the current working area is covered by a normal permit which, like the forest license, can be renewed from year to year.

6.2.2 The Kemaman Agreement

A productive area of 50,000 acres in Cherul Forest Reserve is allocated to the Kemaman Wood-based industries Complex primarily for the supply of logs to the company's projected timber complex to be located in Kemaman town. The Broad Based Forest Type Classification⁽¹¹¹⁾ puts the productive area at more than 81,000 acres, but this includes 26,000 acres of land suitable for agricultural development from which the Forest Department hopes to obtain a second harvest of timber before clearance for cultivation. The allocated annual felling area of 2,000 acres is to be worked under the newly adopted "bi-cyclic" system, under which all logs of 24" diameter at breast height (or above buttresses) will be felled and trees other than the Dipterocarps may be felled down to 18" diameter. Logging is being contracted out initially. The company will be responsible for post-logging silvicultural treatment, and is carrying out an inventory. Figures in Table 6.6, based on the National Forest Inventory provide, in the meantime, some indications of yields to be expected. These are considerably less than the company hoped (15 tons per acre) and suggest that diameter limits, within the range of practicality, can have insignificant effect on the total outturn.

The Forest Department Staff is too small for operational control and the company itself is expected to ensure that the rules are obeyed. A similar sort of control is used under the Philippines Selection System and has not proved satisfactory.⁽¹²⁶⁾ Both systems have the intention of replacing the present crop over the chosen harvesting period. The evidence for success in this country is theoretical not experimental, but replicated experiments have been initiated to fill the information gap. Fortunately the area of Cherul Forest Reserve appears to be larger than gazetted and probably big enough to provide for a lengthening of the first harvesting period from 25 to 35 years if that course should prove advisable at a future date.

Table 6.6 Bicyclic System: Yield Indications from Primary Forest Trengganu

Volumes Per Acre Net ⁽¹⁾								
Type	Cubic Feet True Diameter Classes			FD Tons ⁽²⁾		Weighted ⁽³⁾ FD Tons		
	15"-18"	24"+	Total	Fully	Fully and Partly on Market	Factor	Fully	Fully and Partly on Market
(i) Superior Hill						x.38		
(a) Fully on Market								
Dipterocarps		548						
Non-Dipterocarps	73	157						
Total	73	705	778	14.1			5.4	
(b) Partly on Market	86	37						
Total (a) & (b)	159	742	901		16.2			6.2
(ii) Good Hill						x.27		
(a) Fully on Market								
Dipterocarps		360						
Non-Dipterocarps	67	148						
Total	67	508	575	10.5			2.8	
(b) Partly on Market	66	103						
Total (a) & (b)	133	611	744		13.5			3.7
(iii) Moderate Hill						x.35		
(a) Fully on Market								
Dipterocarps		251						
Non-Dipterocarps	63	118						
Total	63	369	432	7.9			2.7	
(b) Partly on Market	57	65						
Total (a) & (b)	120	434	554		10.1			3.5
TOTAL PRIMARY FOREST:				FD Tons			10.9	13.4
				True Tons			12.1	14.7
				True Cubic Feet			602	737
COMPARE YIELD INDICATIONS FOR:								
1. As recommended by FAO for 40 years					) FD Tons		11.5	13.0
First Harvesting Period - All 18"+					) True Tons		12.7	14.3
					True Cu. Ft.		605	715
2. As originally proposed for Bicyclic System								
Dipterocarps 24"+					) FD Tons		10.5	11.7
Others 18"+					) True Tons		11.5	12.9
					True Cu. Ft.		575	645

(1) NET VOLUME is calculated as in the National Forest Inventory 1972: The 15" to 18" diameter class is calculated as 50 percent of half the figures for the 12" to 18" diameter class (INV. UNIT D) as FAO does not regard diameters below 18" as marketable.

(2) One FD ton = approx. 55 true cu. ft. (conversion factor 1.10).

(3) Proportions of SUPERIOR, GOOD, MODERATE weighted as in TRENGGANU DISTRIBUTION.

There are a number of considerations inseparable from the application of any polycyclic system to tropical rain forest which require thought. The most salient are:—

- (i) Trees of merchantable quality but under 24" diameter damaged by felling (and there could be many) can hardly be allowed to be extracted, for this would scarcely encouraged care to avoid damage in felling.
- (ii) If there are sufficient stems of adequate size left below 24" diameter to give promise of a short first harvesting period there will be less likelihood of that happening in future periods of the same length because their shade will more adversely affect the faster growing than the slower growing species and individuals below them: in effect there will be selection in favour of slower growth.
- (iii) The distinction between Dipterocarps and non Dipterocarps demands much time, and a rare standard of knowledge and integrity in those identifying and marking trees for felling.

6.23 Sawmill Agreements

The thirteen agreements involved are listed in Table 6.7 and cover a total of 69,000 acres of which 33,300 acres remain to be exploited. The table also gives information from which to estimate future log requirements based on actual return during a prosperous year (1973) Most sawmill companies regard their agreement areas as insurance for the future while they continue to shop around amongst independent licence holders for the type of logs they require. In good times they can afford to pay for the better quality 'peeler grade' logs for sawing and in bad times the number of licence holders hawking logs ensures a cheap market. Both circumstances encourage the creaming of the forest of the best quality logs. These agreements frequently become constraints on the rate of clearing land for development. Their legal force is sufficient to make preferable the phasing of agricultural development with exploitation rather than the reverse, wherever such a constraint applies.

Table 6.7 Sawmills and Agreement Areas

No. (2)	Name	Forest Reserve	Area (acres)		Number of Saws		1973		Conversion factor %	Annual Coupe ⁽¹⁾ Acres	Year of Expiry
			Remaining	Annual	Breakdown	Resaw	Input FD/tons	Output Tons (Solid)			
1	Jerangau	Jerangau	735	300	—	3	10,033	6,381	64	900	1974
2	Pinang	B. Bauk	3,074	500	—	3	3,631	2,575	71	300	1981
3	Dungun Lumber	Besul	877	500	1	4	14,624	8,125	58	1,300	1975
4	Leung Huat	Bukit Bauk	2,800	700	1	4	12,598	7,571	61	1,100	1979
5	Ong Kian Teck	(planned only)									
6	Paka Kerteh	Rasau Kerteh	3,458	400	—	4	3,230	1,989	64	300	1983
7	Austasia	(planned only)									
8	Kapor	—			—	2	3,036	2,123	70	300	—
9	Balok Timor	Rasau Kerteh	2,521	500	1	4	11,352	6,812	60	1,000	1979
10	Jaya Seberang Takir	Rasau Kerteh	2,000	500	1	6	8,111	4,864	60	700	1978
	Yayasan Trengganu										
11	Chye Hin	Rasau Kerteh	1,284	600	1	4	6,021	3,135	52	500	1974
12	Tah Ah Tong	—			—	2	9,228	6,484	69	800	—
13	Kemaman	Jabor	2,103	500	1	4	16,333	12,062	74	1,500	{ 1976 1977
	Yayasan Trengganu		1,397	1,000							
14	Winsome Veneer	S. Nipah	7,397	1,000	1	6	43,272	29,662	68	3,900	1975
15	Syarikat Perusahaan dan Pemborong	Jabor	3,657	800	—	6	6,548	4,498	68	600	1978
	Yayasan Trengganu										
(16)	Eastern Sawmill (Trengganu Barat)	Rasau Kerteh	2,000	500	1	5	9,566	5,732	60	900	1974
	TOTAL		33,303				157,583	102,014		14,100	

(1) At 11 FD tons per acre: Table 6.6. Figures are estimated from 1973 Input and National Inventory figures for net volume of fully marketable species in Primary Forest, 18" + diameter.

(2) For location see Fig. 9.1.

6.3 Infrastructure

6.3.1 Introduction

In order for Trengganu Tengah to develop to the fullest extent possible and thereby to meet the requirements of the Terms of Reference for this study, it will be necessary to expand the existing engineering and social infrastructural services greatly. Some plans to achieve this objective already exist and these are discussed in turn.

6.3.2 Tanjong Gelang Port

Following a detailed study⁽⁴⁷⁾ of economic and physical factors it has been decided to construct sea port facilities at Tanjong Gelang, just north of Kuantan in Pahang State. This port will serve the east coast states in general, including the Pahang Tenggara, Jengka Triangle and Trengganu Tengah development areas; its development is therefore relevant to this study.

Assuming that the building programme proceeds on time, the first phase of the port, including the facilities for handling and transhipment of palm oil should be functioning by 1976. The port is designed to handle ships of 35,000 D.W.T. and 34 foot draught. It is estimated that the cargo volume will increase from 1,330,000 tons in 1976 to 3,200,000 tons by 1990 and that palm oil products will account for at least 50 percent of these tonnages.

Ultimately, there will be eight general cargo berths and one dolphin berth for palm oil shipment. About 500 workers will find employment during the construction phase and the labour force required for cargo handling will increase from about 500 in 1976 to more than 1,200 by 1990. The number of staff employed at the port will increase from 160 to 300 during the same period.

The port at Tanjong Gelang will be located a few miles east of the southern extremity of Trengganu Tengah and will be directly accessible from within the area through the Jerangau-Jabor road. The influences of this development on Trengganu Tengah will be considerable. Firstly, the direct shipment of products to export markets will eliminate much of the cost previously incurred when all products had to be transported either by road before ocean shipment from west coast ports or by lighter directly to east coast vessels for shipment. Secondly, there should be an equivalent saving in the cost of bulk imports such as fertilizers. Thirdly, the port will be a major source of employment adjacent to Trengganu Tengah and will no doubt draw on the manpower resources of Trengganu as well as Pahang. Furthermore, it is likely that an industrial area immediately adjacent to the port could become a greater employer of manpower than the port itself.

6.3.3 The Jerangau-Jabor Road

Following a detailed study⁽⁵²⁾ of two possible routes for a major road from Jerangau in the north of Trengganu Tengah to Jabor Valley in the south, it has been decided to adopt the western alignment (Fig. 6.1). This route best serves the current development projects in the area and those areas where agricultural development will take place in the near future.

The northern end of this main road will start at the point between the 7th and 8th milestone on the Ajil-Kuala Dungun road where there is a turning to the Bukit Besi mine. It will continue south, passing through the SEDC Bukit Besi Rubber Estate and the RISDA (Ulu Paka) project area. It will then pass through the NADEFINCO oil palm estate and cross the existing Chukai-Ayer Puteh road near Kampong Ayer Puteh. The trunk road will then continue south, crossing the southern divisions of NADEFINCO's oil palm area and part of the newly developed FELDA Neram 1 area. It will follow the eastern boundary of the Jabor Valley Estate and leave the Trengganu Tengah area a few miles north of its southernmost point. The road will meet the proposed Tanjong Gelang Port-Kuantan bypass road and thereby link up with the existing east coast main road. The total length of the Jerangau-Jabor trunk road will be about 65 miles.

There are to be nine feeder roads (Fig. 6.1). Feeder road F2 will be a north-east branch off the main road near Kampong Durian Mas approximately 15 miles south of Bukit Besi. It will skirt the Sungei Angka and will continue as F1 along an alignment parallel with the S. Jengai to a point on the S. Dungun a mile or two north of the junction between that river and the S. Jengai (Kampong Kuala Jengai). At this point, F1 feeder road will connect with a new road at present under construction along the S. Dungun from a point upstream of Jerangau. Ultimately, it is foreseen that there will be a crossing of the S. Dungun to bring F1 into Mukim Jengai area on the west bank of the river and in the long term, to connect with a road across the country from Pahang.

A mile south of where F2 branches off the main road, another feeder road, F5/F6 branches eastward. This road crosses the Rasau Kerteh area and as F5, it joins the present coast road at a point just south of the town of Paka. North and south from F6/F5 are more feeder roads, F4 and F3 respectively. F4, to the north will serve the Rasau Valley area currently being developed by FELDA and, to the south, F3 will serve the Kerteh Valley area and the large proposed FELDA development area.

Further south on the main road, at a point about 30 miles south of Bukit Besi, there is a feeder road running to the east. This is F7 which continues as F8 to join the existing Kemasik-Ayer Jerneh-Kijal road about 7½ miles from Kemasik. F7 and F8 will serve the Ulu Chukai development area where FELCRA has a committed area for a Youth Scheme.

The southernmost feeder road, F9, will branch south-west off the main road at a point just north of its crossing of the Sungei Cherul (approximately 48 miles south of Bukit Besi). This road will serve the Cherul Forest Reserve area in which some of the land may ultimately be released for agricultural development. Its immediate function will be to provide access to the Kemaman Forest Industry Complex area.

If the tendering procedure is on schedule, work on the road project should begin in March 1975 and the whole system should be completed by the end of 1977. Contractors will undoubtedly be hindered by the conditions prevailing during the monsoon season which could effectively reduce their working period by several months in each year.

At present most of the development areas in Trengganu Tengah are accessible by poor quality existing roads and logging tracks during the drier months of the year. There may be some disruption of these communications during the road construction period.

6.3.4 Electrical Services

There is a general plan by the L.L.N. to extend the national grid to the east coast states. At present only centralized coastal communities in eastern Trengganu are provided with electrical services through the use of local diesel generators. In order for Kuala Trengganu to be connected to the national grid it will be necessary to extend the main line which is now being constructed to Kuantan. Because Trengganu Tengah will be a major development in the area, it is logical that this transmission line should follow the Jerangau-Jabor main road as it passes through Trengganu Tengah. In this way it will traverse the area of maximum development and settlement density on its way to Kuala Trengganu.

6.3.5 Telephone Services

The Telecommunications Department have planned for expansion of telephone services to Trengganu Tengah and are awaiting a firm commitment by Government of the likely population distribution and locations. The department plans to utilise central exchanges serving local districts with overhead telephone lines. These central exchanges would then be connected by micro-wave link to the rest of the system through the main Kuala Trengganu exchange.

6.4 Other Developments

6.4.1 Introduction

Within the development area the only major activity not already described is mining. Freshwater fishing does not constitute a full time activity or provide a significant contribution to the diet of most people in the area.

6.4.2 Mining

(a) Bukit Besi

Until its closure in 1971 the Bukit Besi iron ore mine was the most important single revenue producing enterprise in the State with an annual production of over 3 million tons. The former operators of the mine, Eastern Mining & Metals Company Sdn. Bhd. (EMMCO) have indicated remaining reserves of 92,000 tons high grade iron

ore and 366,000 tons of low grade iron-ore.⁽⁵⁸⁾ Further large scale mining is currently uneconomic because of the reported high sulphur content and thickness of over burden. There is presently some limited activity at the site by another company engaged in the extraction of tin deposits. At the end of 1970, estimated reserves were 900,000 tons of tin tailings averaging 0.6 percent tin and 136,000 tons of lode material averaging 1.0 percent tin.

(b) **Other Areas**

Iron Ore

Reserves at Machang Satahun are estimated at 328,000 tons (57 percent Fe). Other areas prospected in Kemaman show reserves of 704,000 tons of iron ore at Kemasik (55 to 62 percent Fe), 250,000 tons of iron ore at Kampung Chenoh (54 percent Fe) and 318,000 tons of iron ore at Kampung Kongsi (50 to 65 percent Fe). Small deposits have been discovered in other areas.

Tin

The Bundi Area appears to have potentially valuable tin deposits and the 1972 Geological Survey Report recommends more detailed mapping and exploration of this area. Tin is also associated with the Sungei Ayam, Sungei Tebak, Sungei Angka and Bukit Besi areas.

Tungsten

Limited quantities of wolframite have been mined at Bukit Lentor and further mapping of this area is recommended.

Other Minerals

These include small occurrences of ilmenite and bauxite near Kuala Brang, and graphite in Chukai. Deposits of bauxite, molybdenite, silver, gold and bismuth are also known to exist. Limestone deposits at Bukit Besi and Bukit Biwah may be adequate to meet local agricultural requirements. Adequate supplies of granitic rock and laterite are available for road making purposes.

The main recommendations of the Geological Survey Report are that future exploration be carried out along the Bukit Bundi-Bukit Besi belt which has potential deposits of tin, tungsten and iron ore. At this stage it appears that all deposits are fairly small although improvements in communications may stimulate more extensive prospecting which in turn may reveal greater mineral resources within the region. From information presently available it is not possible to quantify the employment effect of mining development in the future.

6.4.3 Inland Fisheries

Freshwater fishing⁽¹³²⁾ is not much practised in Trengganu Tengah and is nowhere on a commercial scale. This is partly due to the generally unfavourable environment but also because of the abundance of relatively cheap and accessible marine fish from the nearby coastal towns. Present inland fishing activity is confined to river fishing, fishing in swamps, padi fields and disused mining pools and to the few stocked fish ponds in the area. There are only fourteen of the latter with a total area of 6 acres. The Department of Fisheries distributes free fry to those who wish to stock ponds. However, the losses caused by monsoon floods and the generally low level of management results in low productivity. There is a pilot project for fish farming in the NADEFINCO estate but results are not yet available.

The present catch from all sources of freshwater fish in Trengganu Tengah is estimated at about 110 tons annually. This is lower than the potential yield much of which is in low yielding swamp areas where the effort of fishing is not repaid by the size of the catch. The present consumption of freshwater fishes by the population of Trengganu Tengah constitutes about 10 percent of their total fish diet.

APPENDIX C

Demography

APPENDIX C

DEMOGRAPHY

1. Introduction

This Appendix contains the statistical tables which support the conclusions reached in Chapter 3 on the population and labour force in Trengganu Tengah.

The information was gathered and collated during two months of study, and the sources are clearly identified. The principal statistical source was the 1970 census and in particular those parts of it relating to the Districts of Dungun and Kemaman, in which the major part of the study area is located.

2. Community, Age and Sex Groupings

Table C.1 shows the population of Trengganu Tengah distributed by community, age and sex. Non-Malays in 1970 amounted to under 3,000 persons, or less than 10 percent of the population. This is a little higher than the proportion for Trengganu State (6 percent), but much less than the national figure of nearly 50 percent. Two characteristics of the non-Malay population distinguish it both from the Malay population of the study area and from the non-Malay population of Malaysia. These are the extremely high ratio of males to females and the very high percentage of adult to total persons. The sex ratio for non-Malays is 216:100 (240:100 for Chinese and 159:100 for Indians). The excess is found in all age-groups except 0-4; between 20 and 59 it frequently exceeds 300, and above 60 years it is over 450.

The age distribution shown in Table C.1 also reflects the inward migration of non-Malay males which has taken place. The proportion of non-Malay males found in all age-groups of 19 and above exceeds that of Malays, and indeed that of any population group of Malaysia or Trengganu State. In comparison with Malays, the difference is particularly marked over 29 years, suggesting that the average age of non-Malay immigrants to the region was somewhat higher than that of Malays or that it occurred longer ago.

There are considerable variations in age and sex distributions within Trengganu Tengah. This is seen by careful comparison of data by enumeration district. Table C.2 illustrates the disparity which can occur within a region of only 30,000 persons by comparing six different enumeration districts. Of the six, only in 110468 and 110471 are there sizable non-Malay populations, and only the latter has a large Indian community. But in 110468 the non-Malay population is almost entirely male, whereas in 110471 the sex ratio is close to unity, indicating a more balanced and probably longer settled community. The sex ratio for Malays also varies from 87.5 to 369.9 (the latter in the same district as the almost exclusively male non-Malay population). The sex ratio for age-groups, 15 - 44 (the principal fertile years) varies even more, from 75.2 to 572.1; making use of a crude birth rate under such conditions would be extremely hazardous.

Table C.1 Population of Trengganu Tengah: Percentage Distribution by Age, and by Community, 1970

Age Group	Malay			Non-Malay ⁽²⁾			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	16.8	18.4	17.6	7.6	17.4	10.6	15.7	18.3	16.9
5-9	15.2	16.2	15.7	8.3	13.9	10.1	14.4	16.1	15.2
10-14	10.4	11.9	11.1	7.5	11.3	8.7	10.0	11.8	10.9
15-19	9.7	9.5	9.6	8.2	9.4	8.6	9.5	9.5	9.5
20-24	9.0	7.9	8.5	12.3	8.1	11.0	9.4	7.9	8.7
25-29	9.6	9.0	9.3	9.7	7.6	9.1	9.6	8.9	9.3
30-34	8.0	7.2	7.6	9.6	7.3	8.9	8.2	7.2	7.7
35-39	5.0	4.6	4.8	7.2	5.0	6.5	5.2	4.6	4.9
40-44	4.2	4.1	4.2	4.6	4.8	4.7	4.3	4.2	4.2
45-49	3.8	3.8	3.8	3.3	3.5	3.4	3.7	3.8	3.8
50-54	3.0	2.9	3.0	4.5	3.3	4.1	3.2	2.9	3.1
55-59	2.1	1.6	1.9	5.2	3.0	4.5	2.5	1.7	2.1
60-64	1.5	1.4	1.4	5.7	2.8	4.8	2.0	1.5	1.7
65-69	0.7	0.7	0.7	4.3	2.0	3.6	1.2	0.8	1.0
70-74	0.4	0.4	0.4	1.3	0.3	1.0	0.5	0.4	0.5
Over 74	0.5	0.5	0.5	0.9	0.4	0.7	0.6	0.5	0.5
TOTAL⁽¹⁾	87.9	93.6	90.5	12.1	6.4	9.5	100	100	100

(1) Totals may not add due to rounding.

(2) The estimated percentage breakdown of the non-Malay population is:-

	Chinese	Indian	Other
Male	78.8	20.7	0.5
Female	70.6	28.0	1.4
Total	76.2	23.0	0.8

Sources: Department of Statistics
1970 Census
Post Emuneration Survey

Table C.2 Population of Selected Enumeration Districts in Trengganu Tengah

	Enumeration District Number					
	110301	110321	110415	110434	110468	110471
Total Population	993	591	637	461	426	801
Percent non-Malay	1.5	2.1	10.0	3.5	46.0	69.7
Percent Indian	0.6	0.2	0	1.3	0.9	12.2
Males per 100 females	105.2	91.5	99.7	199.4	535.8	111.9
Males per 100 females (Malay)	104.6	87.5	92.3	190.8	369.4	109.5
Males per 100 females (non-Malay)	150.0	(1)	204.8	1,500.0	988.9	133.0
Males per 100 females (aged 15 - 44)	177.9	75.2	116.0	254.7	572.1	107.7
Percent aged 0 - 14	46.5	46.2	43.2	26.7	9.2	43.2
Percent aged 15 - 44	47.8	34.1	40.3	66.2	67.8	40.4
Percent aged 60+	1.1	3.3	4.2	1.1	9.4	6.7
Percent aged 15 - 44 (males)	50.5	30.6	43.4	71.3	68.5	39.7
Dependency ratio (2)	89.1	90.8	85.2	36.9	14.5	87.6

(1) Only 10 non-Malays, all male.

(2) This is defined as the number of dependents, that is persons aged 0 - 14 and over 64, as the proportion to those of working age (15 - 64). See 1970 census of population: Age Distributions, (30) p. 66.

Source: "An Interim Report on the Post Enumeration Survey" (26) Department of Statistics, 1972, Table 3.

Age distributions show similar fluctuations. For example, children of pre-school and primary school age (0 – 14) amount to 43 – 46 percent of the total in four of the districts, but only 27 and 9 percent in the other two. The proportion aged 15 – 44 varies from 34 to 68 percent, and from 31 to 71 percent for males. Interestingly, district 110468 has very few children but the largest proportion of persons aged 60 and over. The possible variation of a single 5 year age group is shown by those aged 15 – 19 who account for a twelfth of the population in 110321 and nearly a quarter in 110434.

These variations, for more than 50 enumeration districts in the region, should suffice to warn against detailed planning of local services based on national, state or even regional age and sex distributions. Close examination of local kampung or enumeration district data for 1970, plus allowances made for local changes since 1970, are an essential pre-requisite for detailed local planning. In some cases sample surveys or enumerations of the population will be required.

3. Household Size

Table C.3 gives average sizes of households for selected areas of West Malaysia. The average for Trengganu State is 4.94, which is clearly below the national average of 5.70, and the average of the Mukims largely making up Trengganu Tengah is lower still at 4.52.

A more detailed analysis of family structure was based on Census Table 15 for the rural areas of Dungun and Kemaman Districts. The population of these areas totalled 59,050 persons (uncorrected for under-enumeration), of whom 53,560 were Malays. The analysis was carried out separately for Malays and non-Malays, and the method was to apply the proportions thus derived to the population of Trengganu Tengah. Table C.4 describes the steps by which this was done for the Malay population.

For all communities, the average family size is 4.23, including non-family members, which is lower than the figures given in Table C.3. This is due to the rather high number of heads of household recorded in Census Table 15 compared to the number of households given in the field count summary, the difference being 7.5 percent. Upgrading the average household sizes give an overall total of 4.55 which is almost identical with that in Table C.3 for the selected Mukims.

Table C.3 Average Size of Household in Malaysia⁽¹⁾

Persons Per Household			
Selected States			
Johor	6.18	Trengganu	4.94
Kelantan	4.91		
Pahang	5.34	Average West Malaysia	5.70
Districts in Trengganu			
Besut	4.89	Kuala Trengganu	5.11
Dungun	4.99	Marang	4.65
Kemaman	4.87	Ulu Trengganu	4.47
		Average Trengganu State	4.94
Selected Mukims in Trengganu Tengah			
Besul	5.14	Bungai	5.47
Jengai	4.78	Pasir Semut	4.36
Jerangau	4.63	Tebak	4.42
Kumpal	4.29	Ulu Jabor	4.53
Pasir Raja	4.12	Penghulu Diman	4.44
Rasau	4.29	Average of above	4.52
Non-Town Council/Local Council Areas			
Dungun	4.88		
Kemaman	4.68		
Gazetted Towns			
Kuala Lumpur	5.63	Johore Bahru	5.94
Kuala Trengganu	5.63	Malacca	6.36
Kuantan	5.84	Average of 10 gazetted towns	5.84

(1) These figures have been corrected for under enumeration by a flat increase of 4.2 percent.

Source: 1970 Population and Housing Census, ⁽²⁴⁾ Field Count Summary (Department of Statistics, 1971) Table 2, 13, 26, : 1970 Population and Housing Census, Gazetted Towns, ⁽²⁵⁾ Table 12.

Table C.4 Malay Family Structure in Trengganu Tengah

Total Malay population	27,760	
Of which: 0 – 19 years adult.	14,980	
	12,780	
Adult family population (93.7% of adults)	11,970	
Heads of household (53.8% of adult family population)	6,439	
Of whom male (84.8%)	5,460	
female	979	
Average persons per household (total population/household heads)	4.31	
	Married	Single
Male household heads (87.5% married)	4,778	682
Female household heads (7.2% married)	70	909
Total households	4,848	1,591
Unmarried children (92% of 0 – 19 years old)	13,910	–
Other younger generation relatives ⁽¹⁾	910	150
Other family members ⁽²⁾	590	80
Non-family members ⁽³⁾	650	170
Total persons other than household heads	16,060	400
Total persons per household (including household heads)	5.31 ⁽⁴⁾	1.26 ⁽⁴⁾

(1) Local advice was taken in apportioning this figure amongst married and single households. Some single household heads could be looking after other young children; in addition, some unmarried children of household heads might be in single households (headed by widows or divorcees), although the number of divorced/widowed persons was quite small (see Census Table 28 'Marital Status').

(2) Other family members consisted of persons of an older generation, who were all placed with married families, and persons of the same generation as the household head who were apportioned in the same ratio as married/single households (3:1).

(3) Non-family members included visitors – all placed with married families, servants – apportioned 3:1 to married/single households, and boarders – apportioned 3:2 to married/single households. Local advice was taken in these apportionments.

(4) The equivalent figures for non-Malay families are 5.28 and 1.84.

4. Migration

Table C.5 shows the length of residence in the place of enumeration of adults by age-group, community and sex. This table does not give an exact indication of the number of migrants by year of arrival, since mortality rates have not been applied to the present figures to allow for deaths of previous migrants. Nonetheless, it is a useful guide to trends which have been taking place. Approximately a third of Malay males aged over 14 have lived in their present locality for less than six years and 11 percent for less than 1 year. These figures are even higher for non-Malay males, but lower for females, especially non-Malays. There appears to have been an increase in migration of Malays around 1966-67, which may have been due to new settlements being set up in the Districts around that time, but since the table does not distinguish between rural and urban areas, this cannot be confirmed.

There was a further, very marked, increase in migration in the twelve months prior to the census; this applies to all groups, but particularly to non-Malay males. This may have been partially connected with the running down of Bukit Besi mine in Dungun, although employment there as late as November 1970 (after the census) was still high. However, the increases occurred in both districts. Other possibilities include the development of further settlement schemes or the seasonal movements of fishermen (but these would not include non-Malays), or movement of contract labour gangs. But these do not satisfactorily explain why the figure should have been so much higher in 1969 - 70 than in earlier years. It would be very useful to know whether this turns out to be an exceptional occurrence or an increased rate of migration. This can be found out only by a special survey.

Finally, Table C.5 shows clearly that migration in recent years has been largely concentrated amongst the 15 - 34 age-groups; this applies to Malays and non-Malays and is particularly noticeable among males.

Table C.6 gives an estimated age distribution of migrants in Kemaman and Dungun by sex and community. It was not possible to distinguish between urban and rural areas, but this is probably of little importance. The basis of the table was the migrants who had lived in their present locality for less than one year. Using only this group meant that problems of mortality among migrants could be ignored without any serious loss of accuracy. The special treatment of the 0 - 1 age-group is described in the footnote to the table. The table requires little comment except to note that its principal features - an excess in the 15 - 34 age groups, particularly of males, and a high male-female ratio - fit well with earlier analysis.

Table C.4 Malay Family Structure in Trengganu Tengah

Total Malay population		27,760
Of which: 0 – 19 years adult.		14,980 12,780
Adult family population (93.7% of adults)		11,970
Heads of household (53.8% of adult family population)		6,439
Of whom male (84.8%) female		5,460 979
Average persons per household (total population/household heads)		4.31
	Married	Single
Male household heads (87.5% married)	4,778	682
Female household heads (7.2% married)	70	909
Total households	4,848	1,591
Unmarried children (92% of 0 – 19 years old)	13,910	—
Other younger generation relatives ⁽¹⁾	910	150
Other family members ⁽²⁾	590	80
Non-family members ⁽³⁾	650	170
Total persons other than household heads	16,060	400
Total persons per household (including household heads)	5.31 ⁽⁴⁾	1.26 ⁽⁴⁾

(1) Local advice was taken in apportioning this figure amongst married and single households. Some single household heads could be looking after other young children; in addition, some unmarried children of household heads might be in single households (headed by widows or divorcees), although the number of divorced/widowed persons was quite small (see Census Table 28 'Marital Status').

(2) Other family members consisted of persons of an older generation, who were all placed with married families, and persons of the same generation as the household head who were apportioned in the same ratio as married/single households (3:1).

(3) Non-family members included visitors – all placed with married families, servants – apportioned 3:1 to married/single households, and boarders – apportioned 3:2 to married/single households. Local advice was taken in these apportionments.

(4) The equivalent figures for non-Malay families are 5.28 and 1.84.

Sources: 1970 Census, Study population estimates, Local information.

4. Migration

Table C.5 shows the length of residence in the place of enumeration of adults by age-group, community and sex. This table does not give an exact indication of the number of migrants by year of arrival, since mortality rates have not been applied to the present figures to allow for deaths of previous migrants. Nonetheless, it is a useful guide to trends which have been taking place. Approximately a third of Malay males aged over 14 have lived in their present locality for less than six years and 11 percent for less than 1 year. These figures are even higher for non-Malay males, but lower for females, especially non-Malays. There appears to have been an increase in migration of Malays around 1966-67, which may have been due to new settlements being set up in the Districts around that time, but since the table does not distinguish between rural and urban areas, this cannot be confirmed.

There was a further, very marked, increase in migration in the twelve months prior to the census; this applies to all groups, but particularly to non-Malay males. This may have been partially connected with the running down of Bukit Besi mine in Dungun, although employment there as late as November 1970 (after the census) was still high. However, the increases occurred in both districts. Other possibilities include the development of further settlement schemes or the seasonal movements of fishermen (but these would not include non-Malays), or movement of contract labour gangs. But these do not satisfactorily explain why the figure should have been so much higher in 1969 - 70 than in earlier years. It would be very useful to know whether this turns out to be an exceptional occurrence or an increased rate of migration. This can be found out only by a special survey.

Finally, Table C.5 shows clearly that migration in recent years has been largely concentrated amongst the 15 - 34 age-groups; this applies to Malays and non-Malays and is particularly noticeable among males.

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Table C.5 Length of Residence in Present Locality —
Kemaman and Dungun Rural Population

Length of residence as percent of total age group									
Age Group	<1yr	1yr	2 yrs	3 yrs	4 yrs	5 yrs	6-10 yrs	11-20 yrs	Over 20 yrs
Malay Males									
15 - 24	16.1	4.9	5.0	5.3	3.2	2.9	8.5	40.8	13.2
25 - 34	11.2	5.0	6.3	8.9	3.6	5.1	15.2	9.8	24.4
35 - 44	8.8	3.7	5.0	6.6	3.4	4.7	13.7	16.9	37.3
45 - 54	5.6	2.4	3.3	3.9	2.2	3.8	12.6	16.6	49.6
Over 54	4.5	2.2	2.4	2.0	2.0	1.9	7.7	11.7	65.9
Total over 15	10.9	4.1	4.8	5.8	3.0	3.8	11.5	22.0	34.2
Malay Females									
15 - 24	11.6	4.7	5.7	5.8	2.9	3.9	10.8	42.4	12.2
25 - 34	8.0	4.0	5.4	6.9	3.9	4.9	16.1	14.6	36.0
35 - 44	5.8	2.5	3.5	5.1	2.2	4.0	13.1	17.6	46.3
45 - 54	5.5	1.9	2.4	2.8	2.4	2.5	9.9	14.3	58.3
Over 54	6.6	1.4	2.0	1.9	1.6	1.4	5.4	7.7	72.2
Total over 15	8.3	3.4	4.4	5.1	2.8	3.7	11.9	23.2	37.2
Non-Malay Males									
15 - 24	22.0	8.2	6.4	3.5	1.2	1.4	5.8	28.3	13.2
25 - 34	20.9	8.6	6.7	6.7	3.1	3.3	11.1	11.1	28.6
35 - 44	13.8	4.7	7.0	3.9	2.8	1.7	14.0	22.9	29.3
45 - 54	8.1	4.5	5.7	4.9	1.5	2.1	10.0	16.4	46.8
Over 54	11.5	2.6	3.6	3.1	1.7	3.3	5.3	13.5	55.5
Total over 15	16.3	6.0	5.8	4.4	2.0	2.4	8.7	21.0	33.4
Non-Malay Females									
15 - 24	10.7	4.1	4.5	2.6	1.7	1.6	8.0	55.1	11.8
25 - 34	7.1	5.6	5.6	4.7	3.7	2.9	19.0	18.1	33.2
35 - 44	5.0	1.9	3.5	2.8	2.4	1.7	10.2	23.4	49.2
45 - 54	6.4	1.9	2.2	0.6	1.1	1.9	5.8	17.8	62.1
Over 54	3.0	2.0	1.0	0.4	0.6	1.6	5.4	12.2	73.8
Total over 15	7.0	3.5	3.7	2.5	2.0	2.0	10.3	29.3	39.7

Source: Table 15 of 1970 population census, Kemaman and Dungun Districts, supplied by the Department of Statistics.

Table C.6 Age Distribution of Migrants

Persons residing in present locality for less than 1 year ^(1, 3)							
Age Group	Males			Females			Males per 100 females ⁽²⁾ (Total)
	Malay	Non-Malay	Total	Malay	Non-Malay	Total	
0-4	13.7	6.5	12.4	15.5	23.3	16.3	98
5-9	9.9	3.3	8.7	12.2	8.0	11.8	95
10-14	8.1	3.9	7.3	11.4	5.5	10.9	87
15-19	15.7	12.0	15.0	14.4	14.4	14.4	134
20-24	16.4	17.3	16.5	13.0	15.0	13.2	161
25-29	11.5	14.7	12.1	9.1	9.8	9.2	169
30-34	7.5	11.1	8.2	6.7	5.2	6.5	161
35-39	5.1	7.5	5.6	3.5	3.7	3.5	206
40-44	3.6	4.2	3.7	3.1	3.4	3.1	154
45-49	2.9	2.4	2.8	3.0	4.6	3.1	115
50-54	2.1	2.8	2.2	2.7	2.5	2.7	107
55-59	1.0	5.3	1.8	1.3	1.5	1.3	176
60-64	1.0	5.1	1.7	1.8	2.1	1.8	122
Over 64	1.5	3.9	2.0	2.4	0.9	2.3	113
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	128.6

(1) The original census table gave totals for individual years for ages 0 to 19. Clearly the 0-1 age-group had all been resident for less than one year, though not all were migrants. It was necessary to subtract from the total an estimate of the number of locally born 0-1 year olds. This estimate was obtained, for Malays/non-Malays and males/females, by calculating the number of births for 1969 - 70 and applying to them the infant mortality rates for Kemaman/Dungun. In accordance with national trends, the I.M.R. for non-Malays was taken as half that of Malays (Vital Statistics, West Malaysia, Tables 12.00, 30.02, 31.02). This gave locally born 0-1 year olds, and the residue was taken as migrants 0-1 year olds.

(2) Males/100 females (all age groups combined); 115.9, Non-Malay 250.6, Total 128.6.

(3) Distribution by community:

	male	female	total
Malay	81.6	90.6	85.5
Non-Malay	18.4	9.4	14.5

Source: Table 15 of 1970 Population Census, Kemaman and Dungun Districts, supplied by the Department of Statistics.

5. Health, Birth Rates and Mortality

Table C.8 shows a selection of vital rates for each state of West Malaysia, several of which are useful indicators of existing health conditions. A composite health index is also included, based upon the values of the crude death rate and the neo-natal, infant, toddler and maternal mortality rates relative to the West Malaysian average. In addition, the crude birth rate and rate of natural increase are shown, together with percentage of Malay to total and rural to total population. The health index suggests that health conditions in Trengganu, as measured by the various mortality rates, are worse than in any other state of West Malaysia. In addition to this, Trengganu has the highest crude birth rate and rate of natural increase.

An examination of the rankings, shown in Table C.8 suggests a high degree of correlation between states with a high proportion of Malays and poorer health conditions as measured by the health index. Using the Spearman Rank Correlation Coefficient, a correlation of +85, significant at the 1 percent confidence level, is calculated between the "percent Malay" and "health index" rankings of states. For the "percent rural population" against "health index" the correlation is less significant, at +0.44.

A further measure of the position of Trengganu vis-a-vis the rest of Malaysia is obtained by comparison with past rates. This is done in Table C.7. It seems that the 1971 Trengganu rates correspond with those which existed in West Malaysia as a whole in about the mid 1960's — that is, health conditions as measured here are roughly seven years behind the national average and even further behind the more advanced states. Furthermore, although the crude death rate has fallen by nearly as much in Trengganu as in West Malaysia, the birth rate has fallen very little, with a result that the rate of natural increase has risen since 1957 in Trengganu in stark contrast to the overall position in West Malaysia.

The figures for Trengganu are of course averages for the whole State and as such include above and below average areas just as do the West Malaysia figures. It has already been suggested that health conditions in Kemaman and Dungun are below average for the State as a whole, and the Trengganu Tengah area is likely to have even poorer conditions. Infant mortality certainly appears to be high in Dungun and Kemaman, exceeding 60/1,000.

Table C.7 Crude Rates 1957 - 1971 in West Malaysia and Trengganu State

		Rates per 1,000 population			Percent fall
		1957	1967	1971	1957 - 71
Birth Rate	W.M.	46.2	35.3	32.6	29.4
	Tr.	41.6	39.2	38.3	7.9
Death Rate	W.M.	12.4	7.5	6.8	45.2
	Tr.	14.4	10.2	8.8	38.8
Rate of N.I. ⁽¹⁾	W.M.	33.7	27.8	25.8	23.4
	Tr.	27.2	29.0	29.5	+8.5
Infant M.R. ⁽²⁾	W.M.	75.5	45.1	38.5	49.0
	Tr.	n.a.	n.a.	53.5	-
Toddler M.R.	W.M.	10.7	5.4	4.0	62.6
	Tr.	n.a.	n.a.	6.9	-
Neo-Natal M.R.	W.M.	29.6	23.8	22.5	24.0
	Tr.	n.a.	n.a.	25.7	-
Maternal M.R.	W.M.	2.8	1.7	1.2	65.7
	Tr.	n.a.	n.a.	1.8	-

(1) N.I. = Natural Increase

(2) M.R. = Mortality Rate

Source: Vital Statistics West Malaysia, 1971 (Department of Statistics, 1973) Tables 1.00, 5.02, 9.02, 39.02.

Table C.8 Crude Rates by State, West Malaysia 1971

State	Total Population 30.6.71	of which:		Crude Birth Rate per 000	Crude Death Rate per 000	Rate of Natural Increase percent	Neo-Natal Mortality Rate per 000	Infant Mortality Rate per 000	Toddler Mortality Rate per 000	Maternal Mortality Rate per 000	Composite Health Index	Ranking by State		
		Malay	Rural									Health Index ⁽²⁾	Percent Malay	Percent Rural
	000	percent	percent	per 000	per 000	percent	per 000	per 000	per 000	per 000				
Johor	1,437.8	50.5	57.5	32.0	5.9	2.6	22.2	37.6	3.6	0.9	4.48	5	5	4
Kedah	1,028.5	68.3	77.3	32.3	6.9	2.5	25.2	42.1	4.5	2.0	6.02	7	8	10
Kelantan	753.8	91.8	75.9	36.8	7.9	2.9	25.2	47.9	5.6	2.3	6.84	10	10	9
Malacca	455.8	50.9	68.0	31.1	6.5	2.5	23.2	38.3	2.7	0.4	3.99	3	6	8
Negeri Sembilan	562.8	42.7	66.7	30.1	6.3	2.4	22.0	35.6	2.9	0.5	3.97	2	4	7
Pahang	479.5	57.6	65.3	37.7	8.4	2.9	21.8	40.8	5.9	1.6	6.07	8	7	6
Penang	820.9	29.1	40.8	29.1	6.8	2.2	23.7	33.8	2.7	0.9	4.36	4	1	1
Perak	1,808.0	40.8	52.9	30.3	6.7	2.4	22.0	38.5	4.4	1.1	4.98	6	3	3
Perlis	128.1	77.1	85.7	27.2	7.2	2.0	30.1	42.7	3.3	2.3	6.25	9	9	11
Selangor	1,587.7	30.7	43.0	34.5	6.1	2.8	18.4	29.8	2.8	0.8	3.86	1	2	2
Trengganu	424.8	92.8	61.0	38.3	8.8	3.0	25.7	53.5	6.9	1.8	7.05	11	11	5
West Malaysia	9,847.5	49.0	58.1	32.6	6.8	2.6	22.5	38.5	4.0	1.2				

(1) The composite health index is based on the following five indicators: the crude D.R., neo-natal M.R., infant M.R., toddler M.R., and maternal M.R.

(2) For each state, H.I. = $\frac{\text{State value of indicator}}{\text{W.M. average of indicator}}$

Sources: % rural from 1970 Population Census: Age Distribution 30, Table 7, 10 - 20.
All other data from "Vital Statistics West Malaysia 1971" (Department of Statistics, 1973).

6. Education

The main features of educational attainment of the population of Trengganu Tengah are shown in Table C.9. This table was obtained by examining census tables of school attendance, level of schooling attained, and literacy levels for Dungun and Kemaman rural areas. The proportions by sex and Malay/non-Malay community were then applied to the population of Trengganu Tengah. There is not likely to be much inaccuracy in this approach.

The table shows the very high numbers of persons in the study area aged over four who have never attended school, particularly amongst Malays and amongst females where the proportion reaches nearly half. It also shows the level of education attained by those who have been or are currently at school. Over 56 percent of these persons have not completed primary school; 8 percent have had some secondary education but not reached LCE; 3 percent have LCE; and 2 percent have SC. At all levels of completed primary education or above, Malays exhibit lower proportions of educational attainment than non-Malays, and females lower proportions than males. Indeed Malay males tend to be more poorly educated than non-Malay females.

The table also contains three rows indicating the percentage of persons entering or reaching a certain educational level who complete that standard or go on to the next level. Only a third of those entering primary school have completed (although some of these are still attending); 45 percent of those who completed primary entered secondary education; and 16 percent of those entering secondary obtained SC. The drop-out rates are clearly high, especially amongst women and Malays. Finally, the table shows the proportion of the population aged 10 and over considered literate in the census (semi-literates being excluded); just over 50 percent were literates, again with males and non-Malays predominating over females and Malays.

The numbers of persons with tertiary education was too small to apportion to Trengganu Tengah in the same way. In rural Dungun and Kemaman a total of 19 university graduates were enumerated of whom 15 were non-Malays; there were three with a medical degree, one agriculturalist and 11 in engineering or science. In addition, there were 40 persons, of whom 21 had education training (17 Malays), four were in agriculture, 10 engineering or science and two medicine. The population of the region, corrected for under-enumeration, was approximately 40,450. This gives an average of one doctor to 13,480 persons, and no doubt a number of these were connected with Bukit Besi.

Table C.9 Educational Attainment of the Population of Trengganu Tengah

	Malay			Non Malay			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Population over 4 years	12,100	10,770	22,870	1,850	750	2,600	13,950	11,520	25,470
Number never attended school as percent of population over 4	4,330	5,230	9,560	480	300	780	4,810	5,530	10,340
No. currently attending school	35.8	48.6	41.8	25.9	40.0	30.0	34.5	48.0	40.6
No. completed school	2,690	2,320	5,020	310	180	490	3,000	2,500	5,500
	5,080	3,220	8,300	1,060	270	1,330	6,140	3,500	9,630
Of those currently attending or completed school, level of education completed (percent)									
Some primary	54.7	60.3	57.0	49.0	53.1	50.0	53.8	59.8	56.2
Completed primary	30.7	28.9	30.0	31.1	31.4	31.2	30.8	29.1	30.1
Some secondary but no LCE	8.6	7.4	8.1	8.4	9.3	8.6	8.6	7.6	8.2
LCE (or equivalent)	3.6	2.4	3.1	5.1	3.3	4.7	3.8	2.5	93.3
SC (or equivalent)	2.3	0.8	1.7	5.4	2.5	4.7	2.8	0.9	2.0
HSC (or equivalent)	0.1	0.1	0.1	1.0	0.4	0.9	0.2	0.1	0.2
Percent of primary entrants who complete	36.0	32.4	34.4	38.8	37.2	38.3	36.3	32.8	34.8
Percent of those completing primary who enter secondary	47.7	37.2	43.3	63.9	49.2	59.2	49.9	38.4	45.2
Percent of secondary entrants obtaining SC	16.4	8.3	13.5	32.0	18.3	28.4	19.2	9.5	15.8
Percent literate (of population aged 10 or more years)	59.3	41.1	50.8	73.4	51.2	67.4	61.3	41.8	52.6

Source: Educational/literacy data from Census Table 7 (School Attendance), Table 8 (Level of schooling) and Table 26 (Literacy), x community x sex x section, Dungun and Kemaman districts, supplied by the Department of Statistics.

7. Economic Activity

Table C.10 breaks down total population by economic activity. It is based on the census question 'During the last 12 months what did you do most of the time?'. 35 percent of the population come in to the category of employer/self-employed, wage earner or family worker. This amounted to 10,860 persons, of whom 8,240 were males (50 percent of all male persons) and 2,620 females (19 percent of all females). Higher proportions of non-Malays than Malay were in these categories, due no doubt to the different age/sex structure of the non-Malay population discussed earlier, as well as to possible variations in participation rates. Non-Malays were particularly predominant as wage-earners, accounting for 17 percent compared to 9.5 percent of the employed sub-group. Persons looking after the house amounted to 16 percent of the total population, but one third of all women; students amounted to 18 percent and children not at school to 25 percent of all persons.

Table C.11 gives the usual industry during the past twelve months of the sub-group in Table C.10 whose usual activity was employer/self-employed, wage earner or family worker. Column totals in Table C.11 equal the sub-totals in Table C.10. The most common industry, amongst all groups was rubber, amounting to 2,780 persons or 26 percent of the total (61 percent of non-Malay females). This was followed by padi and other agriculture (15 percent each), totalling 3,160 persons. Padi cultivation turns out to be an exclusively Malay occupation with a high proportion of females (46 percent of the total) relative to total employed (26 percent of the Malay total). The very high numbers of persons listed as 'other' or 'not stated' should be noted, as this may invalidate some of the other figures in the table.

Tables C.12 to C.15 are based upon questions put only to persons aged 10 years and over. They relate to the **previous 7 day period** only, and the figures are not therefore directly comparable with those in Table C.10 and C.11. Table C.12 gives an estimate of the labour force, defined in the census as those employed plus those unemployed. The total labour force of the study area is estimated to have been 11,620 in 1970, which represents 56 percent of the total population. It exceeds the sub-total of Table C.10 by 6.5 percent, a variation spread fairly evenly amongst Malays and non-Malays, males and females. Participation is highest amongst non-Malay males (83 percent) and lowest amongst Malay females (30 percent). 76 percent of the labour force is male and 86 percent consists of Malays; the corresponding figures for the population of 10 years and above are 56 and 89 percent.

Tables C.13 and C.14 give details of the labour force by occupation and industry. In both cases the full single-digit listing is given, together with selected two-digit occupations or industries. The total 'not working but looking for work/blank' exceed the unemployment figures in Table C.12 probably due to additional blank answers. The overwhelming impression is one of the dependence of the region on agricultural and livestock production (1,940 persons or 17 percent of total employed), rubber cultivation (2,870 or 26 percent), oil palm cultivation (1,310 persons or 12 percent), and mining and quarrying (1,460 persons or 13 percent). The latter item is particularly important since the vast majority were at Bukit Besi, which has since closed. In the light of this and the fact that the numbers in fishing are probably over-stated, the dependence upon rubber, oil palm and other agriculture undoubtedly now exceeds the 55 percent given in Table C.13 and may well reach 65 percent. The concentration

of females employed is even more marked, these three industries accounting for 76 percent of the total. Non-Malays are found particularly in the rubber, mining and quarrying and forestry sectors and figure less predominantly in agricultural and live-stock production and oil palm cultivation. Only 500 people are estimated as being in manufacturing, 350 of whom are concerned with the manufacture of wood products and furniture. This slightly exceeds the numbers employed in forestry and logging. However, some processing takes place outside the study area. The study area figures for manufacturing and certain sectors may be an over-estimate. 660 persons were estimated to be in commerce and 730 in services.

Table C.14 gives the labour force by occupation. The most useful information is in the first three lines which consist of professional, administrative and clerical workers in all industries. These figures may also be over-estimates, although Bukit Besi employed many persons in these categories (see below). Professional workers no doubt consist mainly of teachers and medical staff such as nurses, midwives etc. Comparison of this table with Table C.13 reveals few inconsistencies. Only 570 miners were counted, as compared to 1,460 in the mining industry; the remaining 900 presumably include managerial, professional and clerical staff, transport operators, labourers and others classified elsewhere. The existence of a large number of cells with very few persons means that these two tables must be treated with some caution; but it does help to indicate the present lack of economic diversification in Trengganu Tengah.

In view of the Government's N.E.P., it is worth examining the occupational and industrial classification by community. Some information on this is shown in Table C.15. Since non-Malays make up 14 percent of the estimated labour force, (as against 11 percent of the population aged 15 - 64), any figure substantially greater than 14 indicates excessive non-Malay participation, and any below 14 represents a relatively low rate. Taking this as a guide, non-Malay participation appears excessive amongst administrative and managerial workers in particular, and also among clerical workers; it is also apparent among service workers (especially personal service), forestry workers, miners, and in manufacturing. Low non-Malay participation is particularly noted in fishing, padi, oil palm estates, other agriculture, transport, Government service and amongst the unemployed. It is noticeable that, except for Government service, excessive non-Malay participation is in sectors requiring higher degrees of education and/or skill, whereas Malays predominate in the unskilled sectors. This is no doubt due very largely to the lower educational level of the Malay population which was noted in Table C.9. Any policy designed to achieve greater parity of community-occupation ratios must take this as a starting point.

Table C.10 Usual Activity, all Persons in Trengganu Tengah, 1970

Usual Activity	TOTAL												PERCENT							
	Malay						Non-Malay						Malay			Non-Malay			Total	
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total		
Employer/self employed	2,470	820	3,290	290	60	350	2,770	880	3,640	17.0	6.2	11.9	14.6	6.3	12.0	16.7	6.2	11.9		
Wage earner	3,990	860	4,850	930	100	1,020	4,910	960	5,870	27.4	6.5	17.5	46.4	10.7	35.2	29.7	6.8	19.1		
Family worker	510	710	1,220	50	70	130	560	790	1,350	3.5	5.4	4.4	2.7	8.1	4.4	3.4	5.6	4.4		
Sub-total	6,970	2,390	9,360	1,270	230	1,500	8,240	2,620	10,860	47.9	18.1	33.7	63.7	25.1	51.6	49.8	18.6	35.4		
Looking after house	250	4,490	4,740	30	240	270	270	4,730	5,010	1.7	34.0	17.1	1.3	26.7	9.3	1.6	33.6	16.3		
Student	2,690	2,320	5,020	310	180	480	3,000	2,500	5,500	18.5	17.6	18.1	15.4	19.5	16.7	18.1	17.7	17.9		
Child not at school	3,700	3,340	7,040	310	210	520	4,000	3,550	7,560	25.4	25.3	25.3	15.3	23.5	17.9	24.2	25.2	24.6		
Other	950	660	1,610	90	50	130	1,030	710	1,740	6.5	5.0	5.8	4.3	5.2	4.6	6.2	5.0	5.7		
TOTAL	14,550	13,200	27,760	2,000	910	2,910	16,550	14,110	30,660	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		

Source: Census Table 4 (Kemaman and Dungun) and Trengganu Tengah population statistics (Chapter 3).

Table C.12 Type of Activity and Employment Status of Persons Aged 10 and Over in Trengganu Tengah

	T O T A L												P E R C E N T						
	Malay			Non-Malay			Total			Malay			Non-Malay			Total			
	male	female	total	male	female	total	male	female	total	male	female	total	male	female	total	male	female	total	
In Labour Force	7,150	2,450	9,590	1,380	240	1,610	8,530	2,680	11,210	96.2	95.8	96.1	98.7	98.2	98.6	96.6	96.0	96.4	
Employed	290	110	390	20		20	300	110	420	3.8	4.2	3.9	1.3	1.8	1.4	3.4	4.0	3.6	
Unemployed																			
Total in labour force	7,430	2,560	9,990	1,400	240	1,640	8,830	2,790	11,620	75.1	29.6	53.9	83.2	38.3	71.0	76.3	30.2	55.8	
Of whom:																			
Employer	70	20	80	20	*	20	80	20	100	0.9	0.6	0.8	1.4	0.9	1.3	1.0	0.6	0.9	
Own account worker	2,600	700	3,290	280	50	340	2,880	750	3,630	35.0	27.2	33.0	20.2	21.8	20.5	32.6	26.7	31.2	
Employee	4,090	900	4,990	1,030	110	1,140	5,120	1,000	6,120	52.0	35.1	49.9	73.8	44.0	69.4	58.0	35.9	52.7	
Family worker	400	820	1,220	50	80	130	460	890	1,350	5.4	32.0	12.2	3.8	31.1	7.9	5.2	31.9	11.6	
Looking for first job	280	130	410	10	10	20	290	130	420	3.7	5.0	4.1	0.7	2.0	0.9	3.3	4.8	3.6	
Not in Labour Force																			
Looking after house	180	4,370	4,540	20	240	270	200	4,610	4,810	7.5	73.3	54.7	8.4	64.4	40.9	7.6	72.8	53.7	
Student	1,400	1,110	2,510	170	90	270	1,600	1,200	2,770	58.3	18.7	30.2	62.8	24.7	40.7	59.7	19.0	30.9	
Other	780	480	1,260	80	40	120	860	520	1,380	33.2	8.0	15.2	28.8	10.9	18.4	32.7	8.2	15.4	
Total not in labour force	2,360	5,960	8,310	280	380	650	2,630	6,330	8,960	23.8	69.0	44.9	16.4	60.4	28.3	22.7	68.4	43.0	
Not stated	100	120	220	10	10	20	110	130	240	1.0	1.4	1.2	0.4	1.3	0.7	0.9	1.4	1.1	
Grand Total	9,890	8,630	18,520	1,680	630	2,300	11,560	9,260	20,820	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: Census Tables 17.21 (Kamaman and Dungun)

Table C.14 Labour Force by Occupation in Trengganu Tengah

	Malay				Non-Malay				Total	
	male	female	total	male	female	total	male	female	total	
Total labour force (persons) of whom: employed looking for work	7,340 7,080 340	2,560 2,420 140	9,900 9,510 480	1,400 1,380 20	240 240 —	1,640 1,610 30	8,830 8,470 360	2,790 2,650 140	11,620 11,120 510	
Occupational Breakdown (percent of total labour force)										
Professional, technical and related workers	2.0	1.9	2.0	2.7	1.3	2.5	2.1	1.8	2.1	
Administrative and managerial workers	0.3	.8	0.2	2.1	0	1.8	0.6	.8	0.5	
Clerical and related workers	2.2	0.5	1.8	3.7	0.7	3.3	2.4	0.5	2.0	
Sales workers	4.3	7.9	5.2	6.4	5.6	6.3	4.6	7.7	5.4	
Catering and lodging managers and proprietors	0.3	0.7	0.4	0.8	1.3	0.9	0.4	0.8	0.5	
House keepers, cooks, maids	0.4	2.7	1.0	3.1	8.2	3.9	0.8	3.2	1.4	
Laundresses	.8	0.2	0.1	0.1	0.6	0.1	.8	0.2	0.1	
Hairdressers	0.2	0	0.1	0.1	0.6	0.1	0.2	.8	0.1	
Protective service workers	1.5	0.1	1.1	0.7	0.2	0.6	1.4	0.1	1.1	
Other service workers	0.4	0.2	0.3	0.3	0.4	0.3	0.4	0.2	0.3	
Total service workers	2.7	3.8	3.0	5.1	11.2	6.0	3.1	4.5	3.4	
Farm managers and supervisors	0.9	.8	0.7	3.8	0.4	3.3	1.4	0.1	1.1	
Farmers	23.0	19.0	22.0	13.4	17.4	14.0	21.4	18.9	20.8	
Agricultural and animal husbandry workers	28.0	57.2	35.4	13.4	54.5	19.4	25.6	57.0	33.1	
Forestry workers	2.1	.8	1.6	8.4	0	7.2	3.1	.8	2.4	
Fisherman, hunters	9.3	0.1	7.0	0	0	0	7.8	0.1	5.9	
Total agricultural, animal husbandry, forestry, fisherman, hunters	63.2	76.4	66.6	38.8	72.2	43.7	59.2	76.0	63.3	
Miners related workers	5.6	0.1	4.2	11.6	2.6	10.3	6.6	0.3	5.1	
Wood preparation workers and paper makers	2.0	.8	1.5	2.4	0	2.0	2.1	.8	1.6	
Food and beverage processing	0.3	1.2	0.5	1.7	1.1	1.6	0.5	1.2	0.7	
Spinners, weavers, tailors, dressmakers	0.1	1.0	0.3	0.2	1.9	0.4	0.1	1.1	0.3	
Bricklayers, carpenters and construction workers	1.6	0.1	1.2	1.0	0	0.9	1.5	0.1	1.2	
Transport equipment operators	4.8	.8	3.6	5.6	0	4.8	4.9	.8	3.8	
Total production and related workers, transport equipment operators and labourers	24.9	7.9	20.6	40.6	7.5	35.8	27.4	7.9	22.8	
Activities not adequately described	0.4	1.6	0.7	0.5	1.5	0.7	0.4	1.6	0.7	
Total employed	95.4	94.5	95.2	98.4	98.3	98.4	95.9	94.9	95.6	
Not working but looking for work/blank	4.6	5.5	4.8	1.6	1.7	1.6	4.1	5.1	4.4	

Notes: As in Table C.12
Source: As in Table C.12

Table C.15 Trengganu Tengah: Selected Occupation and Industries by Community

Occupation	Percent of Total	
	Malay	Non-Malay
Total employed	85.5	14.5
Not working but looking for work/blank	94.9	5.1
Total labour force	85.9	14.1
Not in labour force	92.7	7.3
Total population aged 10 and over	88.9	11.1
Occupational breakdown		
Professional, technical and related workers	82.5	17.5
Administrative and managerial workers	43.1	56.9
Clerical and related workers	76.0	24.0
Sales workers	83.1	16.9
Service workers	74.7	25.3
Farmers, agricultural and animal husbandry workers	91.0	9.0
Forestry workers	56.4	43.6
Fisheries	99.7	0.3
Miners	70.6	29.4
Industrial breakdown		
Agriculture and livestock production	95.7	4.3
Forestry and logging	47.3	52.7
Rubber	84.0	16.0
Oil palm	94.9	5.1
Padi	100.0	0.0
Manufacturing	74.2	25.8
Construction	85.3	14.7
Transport and communications	94.5	5.5
Government service	98.5	1.5
Personal services	70.6	29.4

Source: As in Tables C.12 and C.13.

8. Bukit Besi Labour Force

In 1970 Bukit Besi held a principal place in the occupational structure of the region. Total employment of the Eastern Mining and Metals Co. (EMMCO) was 1,889 plus 71 senior staff as on 31st October, 1970.⁽²⁰⁾ In addition 223 were employed at Bukit Besi by Trengganu Minerals Ltd. and 850 by Eastern Stevedoring Co. and various joint contractors in Dungun, but this latter figure does not directly involve the study area. However, not all the 2,183 persons who worked at Bukit Besi lived there, since a number commuted daily by train from Dungun. These people have been enumerated at their place of residence, and so are not part of the population or labour force of Trengganu Tengah. The exact number who lived in Dungun is unknown, but officials at Bukit Besi suggested up to 40 percent and examination of census data indicates a figure of 35 percent of the total labour force. If this is taken as the best available figure, approximately 1,420 of the 2,183 Bukit Besi labour force actually resided in the area, and thus are included in the study area statistics; this matches the figure in Table C.13. It amounts to 13 percent of the total employed of the study area.

Details of the entire labour force of Bukit Besi are given in Table C.16. It is not possible to say exactly what proportion of the various grades lived in Dungun. Of the 1,960 EMMCO personnel, 617 were classified as skilled daily rated workers, 725 as semi-skilled and 202 as unskilled; 223 were monthly rated skilled, 122 other monthly rated and 71 senior staff. Of the Trengganu Minerals Ltd. personnel, 38 were skilled, 126 semi-skilled, 9 unskilled and 50 various senior and junior staff.

A major question is, what has happened to these people since 1970? Discussions with local labour office and other officials indicate that a high but unknown number have left the area. The Report of the Working Committee listed a large number of possible employment prospects, both inside and outside the region, in the long and short term. These included logging, a major land development project, copper mining in Sabah, and various settlement schemes. It is very difficult to ascertain how many of the labour force will have remained within the study area, but an attempt has been made.

Details of this estimate are in Table C.17. It was assumed that half the semi-skilled and all the unskilled employees of EMMCO, and two thirds of the employees of Trengganu Minerals (which still operates) have remained within the study area, and the rest have found employment elsewhere. This implies a net exodus of 955 of the labour force, to which dependents are added giving a grand total of 2,720, of whom 1,800 were male. The age distribution of Table C.1 may be applied to this total.

Table C.16 Labour Force at Bukit Besi in 1970

EMMCO

Daily Rated Workers

Skilled		<u>617</u>
of whom	fitters	276
	railway drivers	67
	plant attendants	59
	servicemen	51
	welders	50
Semi-skilled		<u>725</u>
of whom	operators	311
	plant attendants	181
	servicemen	101
	railway personnel	65
Unskilled		<u>202</u>
of whom	apprentices	69
	general labourers	77

Monthly Rated Workers

Skilled		<u>223</u>
of whom	foremen	116
	electrical chargemen	30
	railway personnel	31
Others		<u>122</u>
of whom	clerical	48
	medical	10
	education	10
	storekeepers	20
Senior Staff		<u>71</u>
of whom	expatriate	14
	local	57
TOTAL		<u><u>1,960</u></u>

Trengganu Minerals Ltd.

Skilled	38
Semi-skilled	126
Unskilled	9
Skilled Junior Staff	22
Other Junior Staff	20
Senior Staff	8
TOTAL	<u><u>223</u></u>

Table C.17 Estimated Emigrants from Bukit Besi

	Number	Proportion leaving (assumed)	Total leaving
(a) Labour Force⁽¹⁾			
EMMCO Personnel			
Senior staff	71	All	71
Monthly rated skilled	223	All	223
Monthly rated other	122	All	122
Daily rated skilled	617	All	617
Daily rated semi-skilled	725	50%	363
Daily rated unskilled	202	0	0
Trengganu Minerals Staff	223	33%	74
Estimated net migration of labour force			<u>1,470</u>
Net emigration of labour force from study area ⁽¹⁾			<u>955</u>
(b) Dependents			
Total labour force on study area			11,620
Total no. of households			7,246
Labour force/household			1.60
Households emigrating (955/1.6)			597
Average household size			4.55
Total number of emigrants (597 x 4.55)			<u>2,716</u>
of whom: dependents			1,761
assumed male (@ 50%)			880
assumed labour force male (out of 955)			920
Total male emigrants			1,800
Total female emigrants			<u>916</u>

(1) 65% of labour force assumed to have lived in the study area.

9. Natural Population and Labour Force Projections

In projecting the population from 1970 (Table C.18) to 1990, assumptions are required of the present levels of fertility and mortality, their likely movements during the study period (1970 – 1990), and adequate sources of data. It was decided to make three sets of projections, one of which would be a 'best guess' containing the most likely combination of fertility and mortality trends (Projection B). The others would be a high projection (A) and low projection (C) consisting respectively of high fertility and low mortality and falling fertility and rather higher mortality levels.

Table C.18 Population of Trengganu Tengah in 1970 net of Bukit Besi Migrants

Age Group	Male		Female		Total	
	Persons	Percent	Persons	Percent	Persons	Percent
0 – 4	2,380	16.1	2,440	18.5	4,820	17.2
5 – 9	2,230	15.1	2,160	16.4	4,390	15.7
10 – 14	1,530	10.4	1,570	11.9	3,100	11.1
15 – 19	1,300	8.8	1,200	9.1	2,510	9.0
20 – 24	1,260	8.6	1,000	7.5	2,260	8.1
25 – 29	1,370	9.3	1,180	8.9	2,550	9.1
30 – 34	1,200	8.2	960	7.3	2,160	7.7
35 – 39	770	5.2	610	4.7	1,380	4.9
40 – 44	640	4.3	560	4.2	1,200	4.3
45 – 49	570	3.9	510	3.9	1,080	3.9
50 – 54	490	3.3	390	3.0	880	3.1
55 – 59	380	2.6	220	1.7	600	2.2
60 – 64	300	2.0	190	1.4	490	1.7
65 – 69	180	1.2	100	0.8	280	1.0
70 – 74	70	0.5	50	0.4	120	0.4
Over 74	80	0.5	60	0.5	140	0.5
TOTAL	14,750	100.0	13,200	100.0	27,950	100.0

Evidence presented earlier indicates a rather high level of fertility, with a crude birth rate of at least 35.0/1,000 and a gross fertility rate not less than the average for Dungun and Kemaman districts (163.5 per 1,000). This corresponds quite well with the 1967–1972 figures in the national population projections.⁽³⁵⁾ It was decided to use Assumption I (constant age-specific fertility rates) of Cho *et al* for Projection C. There is evidence to suggest that the birth-rate in rural areas may not fall quite as rapidly as Assumption II in Cho *et al* (which in any case is for national projections)

implies. Accordingly, Projection B utilised a modification of Assumption II in which the age-specific fertility rates were made to fall more slowly over time. For the projections special age-specific fertility rates by sex were derived from the community rates given in Table 6.1 of Cho *et al.*, using the weights in Table C.1 of this Appendix to form a composite set of 'total community' rates for the study area. This was because the community composition in Trengganu Tengah differs markedly from the national average upon which the "All Races" rates on p. 65 of Cho *et al.* are based. The resultant fertility rates were generally somewhat higher than the "All Races" rate for West Malaysia, but a little below those for Malays.

There is more uncertainty regarding mortality in the region; but the evidence in section C.5 points to the conclusion that mortality in Trengganu State is higher than in the country as a whole, and it is even higher within the study area. In view of this high mortality, it was decided not to use the tables of survival ratios for 1967 - 97 given in Appendix C of Cho *et al.*; instead, use was made of the United Nations model life tables,⁽⁴⁶⁾ which consists of a set of 24 mortality levels, ranked by life expectancy, for each sex, based on different mortality conditions. The range of levels is sufficiently wide to find an appropriate one coinciding reasonably well with the assumed conditions of Trengganu Tengah, to allow for variation on this initial level, and to project the various levels through time. There is a much greater range of flexibility in these tables than in those of Cho *et al.*: this was an important reason for not using the latter, additional to the fact that they were based upon the much lower mortality levels pertaining to the country as a whole.

The method of choosing the appropriate level was by matching the infant mortality rate against the life tables mortality rates (m_x) for age 0, and to choose by this means the most appropriate model life table.^(41, 42) Evidence given in Section C.5 suggests an IMR for the region of at least 61.4/1,000. This corresponds most closely with level 85, equivalent to life expectancy at birth of 63.2 years. But mindful of the fact that infant mortality is probably much higher in the study area, it was decided to take level 75 as the starting point for Projection B, and to vary this by using levels 80 and 70 as initial conditions for Projection A and C respectively. These levels were then projected over time such that in Projection A the relatively low initial mortality rates fell rather more rapidly than those in Projection B, whilst the relatively high initial rates of Projection fell more slowly. These assumptions are shown in Table C.19. Projections A and C form extreme limits to the 'best guess' of Projection B, and thus constitute a type of sensitivity test. Together they act as limits for any combinations of fertility and mortality trends likely to occur in the study area during the next 20 years. A special test projection was also made using the survival ratios in Cho *et al.*, but the results fell outside the limits of Projection A, indicating that the survival ratios used in the national projections do exceed those which the existing conditions within the study area appear to warrant; the results are not included here.

Table C.19 Assumptions Used to Project Population

	Projection A (high)	Projection B (medium)	Projection C (low)
	Cho <i>et al</i> ⁽²⁾ Assumption I	Cho <i>et al</i> Assumption II	Cho <i>et al</i> Assumption II
Fertility ⁽¹⁾			
1970	1967 - 97	1967 - 72	1967 - 72
1975	1967 - 97	1967 - 72	1972 - 77
1980	1967 - 97	1972 - 77	1977 - 82
1985	1967 - 97	1972 - 77	1982 - 87
1990	1967 - 97	1977 - 82	1987 - 92
Proportion of sex at birth ⁽²⁾			
Male	.50998	.50998	.50998
Mortality ⁽³⁾	level 0 ⁽⁴⁾ e_0	level 0 e_0	level 0 e_0
1970 - 75	80 60.4	75 57.6	70 55.0
1975 - 80	85 63.2	80 60.4	70 55.0
1980 - 85	90 65.8	80 60.4	75 57.6
1985 - 90	95 68.2	85 63.2	75 57.6

(1) The assumptions are taken from Cho *et al*, ⁽³⁵⁾ p. 9. Since the population distribution by community in Trengganu Tengah is quite different from the national distribution, age-specific fertility rates for each community were used to obtain a specially weighted average figure, the weights being the distribution by community of females shown in Table 2.3 and note 3 to the table.

(2) Cho *et al*, Table A.1: Weighted Average for Communities.

(3) United Nations Model Life Tables, see footnote 4.

(4) e_0 represents the life expectancy at birth (male and female average) corresponding to the various levels of the U.N. model life tables.

Table C.20 shows the crude rates for the three sets of projections. These were calculated residually, and too much note need not be taken off the slight ups and downs of the rates, which result both from changing age and sex distribution patterns, and from the explicit assumptions listed in Table C.19. The overall trends throughout the period are of greater importance. None of the rates shown in this table appear at all implausible. It is interesting to note the effect of constant age-specific fertility rates used in Projection A on the birth and gross fertility rates; the variations are due to the changing age and sex structure of the population.

Table C.20 Crude Rates of Projections

	1970	1975	1980	1985	1990
Percent natural increase (5 yearly average)					
A	2.91	3.00	3.20	3.38	
B	2.70	2.72	2.74	2.85	
C	2.47	2.27	2.25	2.03	
Crude birth rate (5 yearly average) (per 1,000)					
A	37.4	37.0	38.1	39.1	
B	36.7	35.7	36.2	36.2	
C	35.8	33.8	32.6	30.9	
Crude death rate (5 yearly average) (per 1,000)					
A	8.8	7.6	6.7	5.9	
B	10.1	8.9	9.2	8.1	
C	11.4	11.5	10.3	10.8	
Gross Fertility Rate (per 1,000 women aged 15 - 49)					
A	176.4	171.2	164.5	168.0	175.3
B	172.1	167.3	152.4	155.5	150.5
C	172.2	158.5	140.3	128.9	117.9

Table C.21 Population of Trengganu Tengah, 1975 (Projection B)

Age Group	Male		Female		Total		Male per 100 females
	Persons	Percent	Persons	Percent	Persons	Percent	
0 - 4	2,500	14.9	2,450	16.0	4,900	15.4	102
5 - 9	2,300	13.7	2,350	15.5	4,650	14.5	97
10 - 14	2,200	13.2	2,150	14.0	4,350	13.6	103
15 - 19	1,500	9.1	1,550	10.2	3,050	9.6	97
20 - 24	1,300	7.7	1,200	7.8	2,450	7.7	108
25 - 29	1,250	7.4	1,000	6.4	2,200	6.9	127
30 - 34	1,350	8.0	1,150	7.6	2,500	7.8	116
35 - 39	1,200	7.0	950	6.2	2,100	6.6	125
40 - 44	750	4.5	600	3.9	1,350	4.2	124
45 - 49	600	3.7	550	3.5	1,150	3.6	114
50 - 54	550	3.2	500	3.2	1,050	3.2	110
55 - 59	450	2.7	350	2.4	800	2.6	122
60 - 64	350	2.0	200	1.3	550	1.7	167
65 - 69	250	1.5	150	1.1	400	1.3	152
70 - 74	150	0.8	100	0.5	200	0.7	165
Over 74	100	0.5	50	0.4	150	0.5	137
TOTAL	16,700	100.0	15,250	100.0	31,900	100.0	109.5

Table C.22 Population of Trengganu Tengah, 1980 (Projection B)

Age Group	Male		Female		Total		Males per 100 females
	Persons	Percent	Persons	Percent	Persons	Percent	
0 - 4	2,800	14.9	2,750	15.7	5,550	15.3	103
5 - 9	2,400	12.8	2,350	13.4	4,800	13.1	102
10 - 14	2,250	12.0	2,350	13.3	4,600	12.6	97
15 - 19	2,200	11.5	2,100	12.0	4,300	11.8	103
20 - 24	1,500	7.9	1,550	8.7	3,000	8.3	97
25 - 29	1,250	6.7	1,150	6.6	2,400	6.6	108
30 - 34	1,200	6.4	950	5.4	2,150	5.9	126
35 - 39	1,300	6.9	1,150	6.4	2,450	6.7	116
40 - 44	1,150	6.1	900	5.2	2,050	5.6	125
45 - 49	700	3.8	600	3.3	1,300	3.6	124
50 - 54	600	3.1	500	3.0	1,100	3.0	112
55 - 59	500	2.6	450	2.6	950	2.6	108
60 - 64	400	2.1	350	1.9	750	2.0	118
65 - 69	300	1.5	200	1.0	450	1.3	161
70 - 74	200	1.0	150	0.8	350	0.9	145
Over 74	150	0.7	100	0.5	200	0.6	147
TOTAL	18,900	100.0	17,600	100.0	36,500	100.0	107.6

Table C.23 Population of Trengganu Tengah, 1985 (Projection B)

Age Group	Male		Female		Total		Males per 100 females
	Persons	Percent	Persons	Percent	Persons	Percent	
0 - 4	3,300	15.2	3,200	15.8	6,450	15.5	103
5 - 9	2,750	12.7	2,700	13.2	5,400	13.0	102
10 - 14	2,400	11.1	2,350	11.6	4,750	11.3	102
15 - 19	2,250	10.4	2,300	11.4	4,550	10.9	97
20 - 24	2,150	10.0	2,100	10.3	4,250	10.1	103
25 - 29	1,450	6.8	1,500	7.4	2,950	7.1	97
30 - 34	1,250	5.7	1,150	5.6	2,400	5.7	108
35 - 39	1,200	5.5	950	4.6	2,150	5.1	126
40 - 44	1,300	5.9	1,100	5.4	2,400	5.7	115
45 - 49	1,100	5.1	900	4.4	2,000	4.8	124
50 - 54	700	3.2	550	2.8	1,250	3.0	122
55 - 59	550	2.5	500	2.4	1,050	2.5	110
60 - 64	450	2.1	450	2.1	900	2.1	105
65 - 69	350	1.6	300	1.5	650	1.5	114
70 - 74	250	1.0	150	0.7	350	0.9	154
Over 74	200	0.9	150	0.7	350	0.8	139
TOTAL	21,500	100.0	20,300	100.0	41,800	100.0	106.0

Table C.24 Population of Trengganu Tengah, 1990 (Projection B)

Age Group	Male		Female		Total		Males per 100 females
	Persons	Percent	Persons	Percent	Persons	Percent	
0 - 4	3,850	15.6	3,750	15.9	7,600	15.8	103
5 - 9	3,200	13.0	3,150	13.3	6,350	13.2	102
10 - 14	2,700	11.0	2,650	11.3	5,400	11.2	102
15 - 19	2,350	9.6	2,350	9.9	4,700	9.8	102
20 - 24	2,200	9.0	2,300	9.7	4,500	9.4	97
25 - 29	2,100	8.6	2,050	8.8	4,150	8.7	103
30 - 34	1,450	5.8	1,500	6.3	2,950	6.1	97
35 - 39	1,200	4.9	1,150	4.8	2,350	4.9	108
40 - 44	1,150	4.7	900	3.9	2,100	4.3	126
45 - 49	1,250	5.0	1,100	4.6	2,300	4.8	115
50 - 54	1,050	4.3	850	3.7	1,900	4.0	122
55 - 59	650	2.6	550	2.3	1,150	2.4	120
60 - 64	500	2.0	450	2.0	950	2.0	107
65 - 69	400	1.6	400	1.6	750	1.6	101
70 - 74	250	1.1	250	1.1	500	1.1	109
Over 74	250	1.0	200	0.8	450	0.9	139
TOTAL	24,600	100.0	23,500	100.0	48,100	100.0	104.8

Table C.25 Labour Force Projections

	1970 (census)	1975	1980	1985	1990
Male					
15 - 19	1,100	1,000	1,300	1,300	1,350
20 - 24	1,450	1,200	1,350	1,950	2,000
25 - 29	1,550	1,200	1,250	1,450	2,050
30 - 34	1,300	1,300	1,200	1,200	1,400
35 - 44	1,550	1,850	2,400	2,400	2,300
45 - 54	1,050	1,100	1,200	1,650	2,100
55 - 64	950	850	750	750	800
TOTAL	8,950	8,450	9,450	10,700	12,000
Female (a)					
15 - 19	550	600	750	800	800
20 - 24	550	550	700	950	1,050
25 - 29	600	450	550	650	900
30 - 34	550	600	500	600	750
35 - 44	800	1,000	1,350	1,300	1,300
45 - 54	650	650	700	900	1,200
55 - 64	300	350	400	450	450
TOTAL	3,950	4,250	4,950	5,700	6,500
Female (b)					
15 - 19	450	500	600	650	600
20 - 24	450	450	550	750	850
25 - 29	450	350	450	550	750
30 - 39	750	1,000	950	950	1,250
40 - 49	600	600	800	1,050	1,050
50 - 59	300	400	450	450	600
60 - 64	100	100	100	100	100
TOTAL	3,100	3,300	3,900	4,550	5,200
Total (a)					
15 - 29	5,800	5,000	5,900	7,100	8,150
30 - 64	7,100	7,700	8,500	9,300	10,350
TOTAL	12,900	12,700	14,400	16,400	18,500
Total (b)					
15 - 29	5,450	4,650	5,500	6,650	7,600
30 - 64	6,600	7,100	7,850	8,600	9,600
TOTAL	12,050	11,750	13,350	15,200	17,250
Total (average)					
15 - 29	5,650	4,850	5,700	6,850	7,900
30 - 64	6,850	7,400	8,150	8,950	9,990
TOTAL	12,500	12,250	13,900	15,800	17,850

Table C.26 Rate of Increase of Labour Force

	1970 - 75	1975 - 80	1980 - 85	1985 - 90
Male				
Increase	- 500	1,000	1,250	1,350
Percent	- 5.7	11.9	13.0	12.6
Female (a)				
Increase	300	750	750	750
Percent	7.2	17.2	15.2	13.5
Female (b)				
Increase	200	600	650	650
Percent	7.1	17.4	16.6	14.8
Total (a)				
Increase	- 200	1,750	2,000	2,100
Percent	- 1.7	13.6	13.7	12.9
Total (b)				
Increase	- 300	1,600	1,850	2,000
Percent	- 2.4	13.4	14.0	13.2
Total (average)				
15 - 29				
Increase	- 800	900	1,150	1,000
Percent	-14.2	18.2	20.3	14.7
30 - 64				
Increase	550	750	750	1,050
Percent	8.0	10.4	9.3	11.8
All ages				
Increase	- 250	1,650	1,900	2,050
Percent	- 2.0	13.5	13.9	13.1

Table C.27 Detailed Age Distribution of Labour Force

		Percentage of total				
		1970 (census)	1975	1980	1985	1990
Male						
15 - 19		12.3	11.6	13.8	12.0	11.0
20 - 24		16.2	14.0	14.4	18.4	16.7
25 - 29		17.4	14.3	13.0	13.4	17.2
30 - 34		14.7	15.5	12.5	11.3	11.7
35 - 44		17.1	22.1	25.3	22.5	19.2
45 - 54		12.0	12.7	12.8	15.5	17.5
55 - 64		10.3	9.8	8.1	7.0	6.6
Female (a)						
15 - 19		14.5	14.6	15.6	14.1	12.2
20 - 24		13.4	13.1	14.3	16.8	16.0
25 - 29		14.7	10.5	10.6	11.8	14.0
30 - 34		13.8	14.3	10.1	10.3	11.7
35 - 44		20.5	23.7	26.7	23.0	20.1
45 - 54		16.0	15.9	14.3	16.1	18.7
55 - 64		7.1	7.8	8.4	7.8	7.2
Female (b)						
15 - 19		15.1	14.9	15.7	13.9	11.9
20 - 24		13.7	13.4	14.6	16.9	15.9
25 - 29		14.9	10.8	11.0	12.2	14.5
30 - 39		24.3	28.9	24.8	21.5	23.6
40 - 49		18.7	17.9	20.2	23.3	20.5
50 - 59		9.3	11.4	11.0	10.0	11.4
60 - 64		3.9	2.7	2.7	2.2	2.1
		Mean Age of Labour Force				
Male		34.2	35.0	34.5	34.3	34.4
Female (a)		34.3	35.0	34.8	34.6	34.9
Female (b)		34.1	34.4	34.3	34.2	34.5

APPENDIX D

**Soil Suitability Classification of Trengganu Tengah Prepared
by Soil Science Division, Ministry of Agriculture, Kuala Lumpur.**

APPENDIX D

SOIL SUITABILITY CLASSIFICATION OF TRENGGANU TENGAH PREPARED BY SOIL SCIENCE DIVISION, MINISTRY OF AGRICULTURE, KUALA LUMPUR.

This brief Soil Suitability Classification Report and the accompanying maps⁽ⁱ⁾ is a preliminary report of the Trengganu Tengah Region. This has been extracted from a more detailed report being prepared by the Soils and Analytical Services Branch of the Department of Agriculture for the whole of Trengganu State.

This report is based on the soils information gathered by the staff of the Department of Agriculture in the past. The Trengganu Tengah Region itself was examined in greater detail in the last few months. However it must be pointed out that due to the paucity of information the accompanying maps are subject to improvement as and when more information is gathered. It is also proper to point out that the map will thus obviously have some limitations. The map should only be used for planning purposes and any area to be developed should be referred again to the Department of Agriculture for final approval.

Since a more detailed report is being prepared it is not intended to describe in detail the various Soil Suitability Classes. The Classification used in preparing the maps is that drawn by I.F.T. Wong (1970) "A Soil Suitability Classification for Malaysia."⁽⁹⁶⁾ The limitations to crop growth used in this report is reproduced as Table D.1.

Based on these limitations the soils are divided into 5 Soil Suitability Classes as follows:—

- Class 1 — Soils with no limitation or one or more minor limitations to crop growth.
- Class 2 — Soils with one or more moderate limitations to crop growth.
- Class 3 — Soils with one serious limitation to crop growth.
- Class 4 — Soils with more than one serious limitation to crop growth.
- Class 5 — Soils with at least one very serious limitation to crop growth.

(i) The Soil Suitability Map is not presented as part of this Appendix. Copies may be obtained from the Soil Science Division, Ministry of Agriculture, Kuala Lumpur.

Brief Description of Soil Suitability Classes

CLASS 1

Soils with no limitation or one
or more minor limitations to crop growth

Sub-class 1G

These are generally deep friable soils with slightly sandy textures. The terrain is generally 2° – 6° slopes. This group of soils includes Rengam and Bungor Series on gentle terrain. This group is generally well suited to a wide range of crops.

Sub-class 1g

These are generally also deep friable soils with clayey textures occurring on 2° – 12° slopes. Soils in this group include Munchong and Kuantan Series. These are also generally well suited to a wide range of crops.

Sub-class 1d

The soils in this sub-class suffer from slightly excessive drainage. Included in this group are the levee soils like the Telemong Series and some of the higher terrace soils. This group of soils although marginal for padi are generally suitable for a wide range of crops.

CLASS 2

Soils with one or more moderate limitations to crop growth

Sub-class 2G

This sub-class consists of sandy soils on slopes 6° – 12° . Included in this group are soils of the Rengam, Bungor and Serdang Series. Crops like oil palm and other tree crops are well suited to this sub-class. Annual crops like maize, and sorghum can be grown if terracing or soil conservation is practiced.

Sub-class 2g

This sub-class is characterized by heavy textured soils on slopes of 12° – 20° . The more dissected terrain therefore limits the range of crops which can be grown. Included in this are soils like Apek and Durian Series.

Sub-class 2d

Soils which are imperfectly drained like the Akob and Merbau Patah are included in this group. Most of the areas currently under padi have been included in this group.

Sub-class 20

This sub-class consists of organic clays and muck soils. It has a wide tolerance of crops provided drainage is not a problem.

Sub-class 2do

Shallow peat areas which are mainly still poorly drained or partly drained form this sub-class. With effective drainage these soils can be improved.

Sub-class 2dn/3d

This sub-class consists of two soil series namely the Rudua and Rusila which are commonly known as the 'Bris Soils.' The Rudua Series is excessively drained and has acute nutrient deficiencies while the Rudua is very poorly drained and can be used for padi.

CLASS 3

Soils with one serious limitation to crop growth

Sub-class 3G

This sub-class consists of sandy textured soils on hilly terrain (12° – 20°). Included in this group are soils of the Bungor, Serdang and Rengam Series. Due to the terrain and sandy texture soil erosion can become a serious problem and soil conservation measures are essential.

Sub-class 3d

Soils which are waterlogged throughout the year are generally included in this sub-class. Drainage of these areas such as inland swamps can be costly.

Sub-class 3cG

Soils having a shallow profile or those having a compact layer between 10 to 20 inches e.g. Kuala Berang Series are included in this group. The terrain is often not a serious limitation but the compact layer is.

CLASS 4

Soils with more than one serious limitation to crop growth

Sub-class 4Gc

Sandy textured soils occurring on hilly terrain and also having shallow profiles fall into this category. The Kuala Berang Series is a good example of this sub-class. This sub-class can be planted with shallow rooted tree crops but soil conservation practices are imperative. Wherever possible these areas should be left as forests.

Sub-class 4do

Deep peat which has not been drained belongs to this category. Very little examination has been carried out in these areas and most of the information is based on the work of the Dutch Team.

Sub-class 4sd

The areas inundated by the tides and covered mainly by mangrove swamps belong to this sub-class. These areas generally occur at the mouth of the larger rivers. They suffer from salinity and poor drainage. If drained these soils could develop into acid sulphate soils.

CLASS 5

Soils with at least one very serious limitation to crop growth

Sub-class 5h

This category consists of areas disturbed by man and includes mined and urban land. Mined lands can with intensive care support annual crops.

Sub-class 5STP

This group consists of areas unsuitable for agricultural development due to their steep terrain. These must remain as forests.

Table D.1 Limitations to Crop Growth

Symbol	Type	Very Serious	Serious	Moderate	Minor
G	Gradient and Texture	> 20° or 25° slopes with light textured soils or >35° slopes with heavy textured soils	12° - 20° or 25° slopes with light textured soils or 20° or 25° - 35° slopes with heavy textured soils	6° - 12° slopes with light textured soils or 12° - 20° or 25° slopes with heavy textured soils	2° - 6° slopes with light textured soils or 2° - 12° slopes with heavy textured soils
d	Drainage	-	Very poorly to poorly drained	Imperfectly drained or excessively drained	Somewhat excessively drained
C	Depth to Strongly Compacted Layer	Less than 10 inches (25 cm)	10 to 20 inches (25 - 50 cm)	20 to 40 inches (50 - 100 cm)	40 to 50 inches (100 - 125 cm)
s	Salinity	-	Strongly saline	Moderately saline	Weakly saline
a	Acid Sulphate Layer	0 to 10 inches from the surface	10 to 20 inches from the surface	20 to 40 inches from the surface	40 to 50 inches from the surface
o	Organic Horizon	-	(Water logged) any thickness	(Drained) 4 ft. thick at the surface	(Drained) 2 to 4 ft. thick at the surface
r	Rockiness	Extreme (> 75% of soil volume)	Moderately extreme (50 - 75% of soil volume)	Moderate (25 - 50% of soil volume)	Slight (10 - 25% of soil volume)
n	Nutrient Imbalance	Toxicity caused by extremely high contents of certain elements	-	Acute nutrient deficiencies	Moderate nutrient deficiencies
h	Human	Disturbed land	-	-	-

Table D.2 Indications of Soil Suitability for Various Crops.

Soil Suitability Class	Rubber		Oil Palm		Coconut		Coffee		Tea (Lowland)		Cocoa		Citrus (Mango-teen)		Bananas Durian Group 1		Pepper	Tapioca Vegetables Group 2		Maize Sorghum Group 3		Papaya Guava Group 4		Pine-apple	Sago Palm	Padi (Wet)	Pastures			
	Rubber	Palm	Coconut	Coffee	Tea	Cocoa	Chiku	Mango-teen	Bananas Durian Group 1	Pepper	Cashew	Vegetables Group 2	Sugar-cane	Sorghum Group 3	Papaya Guava Group 4	Pine-apple	Sago Palm	Padi (Wet)	Pastures											
1G	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
1g	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
1d	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
2G	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
2g	S	M	M	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
2d	S	S	S	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
2o	S	S	M	S	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
2do	M	M	U	M	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	
2dn/3d	U	U	M	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	
3G	S	M	M	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
3d	U	M	M	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
3cG	M	U	U	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
4Gc	M	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4do	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
4sd	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5h	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
5STP	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

S = Suitable
 M = Marginal
 U = Unsuitable
 STP = Steepland

Bananas, Durian Group 1
 including: Rambutan, Langsat, Duku, Soursop, Jackfruit, Cempedak, Avocado, Kunchangan

Tapioca, Vegetables Group 2
 including: Sweet Potatoes, Soya Beans, Chillies, Watermelons

Maize, Sorghum Group 3
 including: Groundnut, Tobacco, Fodder Grasses

Papaya, Guava Group 4
 including: Passion Fruit, Salak

