MIRI-BINTULU REGIONAL PLANNING STUDY

FOR

THE GOVERNMENT OF MALAYSIA

AND

THE STATE OF SARAWAK

THE PERSPECTIVE PLAN

MARCH 1973

HUNTING TECHNICAL SERVICES LTD.,
LONDON

HOFF & OVERGAARD,
COPENHAGEN

MIRI-BINTULU REGIONAL PLANNING STUDY

FOR

THE GOVERNMENT OF MALAYSIA

AND

THE STATE OF SARAWAK

THE PERSPECTIVE PLAN

MARCH 1973

HUNTING TECHNICAL SERVICES LTD.,
LONDON

HOFF & OVERGAARD,
COPENHAGEN

TING TECHNICAL SERVICES LIMITED
D USE AND AGRICULTURAL CONSULTANTS
TREE WAY, BOREHAMWOOD, HERTS, WD6 1SB,
LAND.
es: HUNTECO BOREHAMWOOD
hone: 01-953-6161 Telex: 23517

HOFF AND OVERGAARD
PLANNING CONSULTANTS
KØBMAGERGADE 47, 1150 COPENHAGEN K,
DENMARK.
Telephone: (01) 110417 Cables: PLANECON

e Chief Secretary
the Government of Malaysia,
onomic Planning Unit,
ala Lumpur.

24th March, 1973.

ar Sir,

Miri-Bintulu Regional Planning Study

In accordance with the Agreement effective from 15th April, 1972, tween the Government of Malaysia and the Association of Hoff & Overgaard Hunting Technical Services Limited, we are now presenting the Per- ctive Plan Report incorporating the Perspective Plan supported by more ailed material.

In addition to the present Report the perspective planning process included four Interim Reports:

- Development Strategies, December 1972;
- Alternative Strategies for Rural Development, January 1973;
- The Human Factor in Development, January 1973;
- Present State - Characteristics of the Study Area, January 1973.

These Reports together with the Perspective Plan Report will form basis for continued discussions with the Government through the Steering mittee and pertinent Government agencies concerning the more detailed nning and programming in Phase II of the Study.

An important aspect in this further work will be the delineation areas for immediate implementation of development schemes. It is ted out in this present Report that the land tenure situation is confused the areas suggested for priority consideration and assistance from the e Government will be necessary to determine accurately the boundaries ween State Land and legally occupied land.

Yours faithfully
for the Consultants

M. Cooper
Hunting Technical Services Ltd.

C. J. Mathiesen
Hoff & Overgaard

C O N T E N T S

Page No.

PART II

THE PLANNING ENVIRONMENT

Page No.

PART III

REGIONAL DEVELOPMENT

Page No.

PART IV

ECONOMIC STRUCTURE

INTRODUCTION

This report is part of the Perspective Planning Process, which commenced with the Zonation Plan of October, 1972 and continued with the Interim Reports:-

- Development Strategies, December 1972;
- Alternative Strategies for Rural Development, January 1973;
- The Human Factor in Development, January 1973;
- Present State - Characteristics of the Study Area, January 1973.

These reports have been submitted to the Steering Committee from which certain reactions have been received and these have influenced the present report. Details from the previous reports will not be repeated here, only short summaries will be given when it is considered appropriate for a fluent understanding of the present text.

This report is intended to give broad outlines of our present findings and ideas concerning the long term general development of the Study Area. The report covers studies and discussions conducted up to the end of February 1973. It emphasises the future situations up to 1990, and gives only short summarised descriptions of the present situation. Details, documentations and methodological considerations will be presented in working papers and in supporting reports which will be issued when investigations have reached a more final stage. Thus the conclusions and situations described here may be changed as a result of new or improved information, revised ideas, and new impulses from the Government. During the next Phase of this Study a report on the Regional Development Plan will be completed which will present a revised version of the fundamental subjects treated in this report.

When making a twenty year perspective for development of any area, it is not possible to produce detailed proofs or arguments for all assumptions used. Looking back twenty years, for example, one becomes convinced that human imagination is insufficient to picture technical, organisational and social possibilities over a time span of that length. Certain general assumptions on development pace and direction must, therefore, be made and based on past local trends or experiences in other countries.

This Perspective Plan Report is divided into five parts, the first of which is a concise exposition of the Plan with a minimum of details and technical explanations. The four other parts contain supporting technical material and considerations.

Although the Perspective Plan is primarily concerned with the broad outlines of development, it has been found both necessary and appropriate to collect and treat many aspects in a more detailed way in order to improve the basis of general estimates. Some of this work has been incorporated into the supporting parts of the report.

In this way we have already commenced the more detailed planning which is part of Phase II of the Study. In order to promote this work and make the best use of the present report we suggest that all Government agencies represented in the Steering Committee, are asked to give written comments on the proposals and development criteria in the Perspective Plan Report. The comments could then be studied as a basis for further direct contacts in Phase II.

PART I

THE PERSPECTIVE PLAN

CHAPTER 1

THE PLAN 1970-1990

The perspectives of development of the Study Area during the period up to 1990 will depend on the mode of development of such internal and external factors as:-

- the natural resources of the area;
- its population, not only in numbers but also in skills, attitudes, receptiveness and creative ability;
- trade and financial relations between Sarawak and the rest of Malaysia;
- trends in world market conditions for export and import products and in supply of international lending capital.

Some of these aspects can be analysed and studied in some detail thus forming a basis for certain assumptions and ideas about the future; others will be so open to discussion that either none or only very subjective judgements of their future size or character can be given.

This report seeks to evaluate the development potentials of the Study Area and to describe alternative courses of action for their utilisation which can contribute to the achievement of general national and particular local goals of development.

1.1 PHYSICAL CONDITIONS FOR DEVELOPMENT

The area to be covered by Regional Planning is shown in the Perspective Plan Map (at the rear of the Report). It is situated in Fourth Division, Sarawak. The total area of the Division is between 15 000 and 16 000 square miles (40 000 square kilometres). This Region, also termed the Study Area, covers 37 per cent of the Division, that is around 3.5 mn acres.

The area has a wet tropical climate and nearly 80 per cent is covered with forest, the remainder being agricultural land, settlements, roads, lakes and other such areas.

1.1.1 Forests

The presently unexploited parts of the mixed dipterocarp forests have been surveyed by a team from FAO, the Forest Industries Development Project. These surveys together with estimates made by us of the swamp forests and the remaining areas of mixed dipterocarp forests show timber resources to be in the range of 2 to 2.5 thousand mn cubic feet. This includes forests in the Kemena and Tatau areas which, when exploited will drain through the Study Area. With an annual exploitation rate of four per cent, corresponding to an exploitation cycle of 25 years, the annual output could be 80 to 100 mn cubic feet. Whether a 25 year rotation period will allow for a natural regeneration of forests is still uncertain, and should be part of an intensive forest research programme.

1.1.2 Agricultural Land

Through air-photo interpretation and additional information on soils, supported by semi-detailed soil surveys of sample areas, the present tentative estimate is that about 750 000 net acres of land - or around 20 per cent of the total Study Area - can be utilised for agriculture. The climate and the topography of the area dictate the need for careful utilisation of the land in order to prevent disastrous erosion. Only a small part of the agriculturally usable land is suitable for arable farming of annual crops, but there appears to be considerable potential for perennial crops.

Shifting cultivation presents special problems. This practice includes clearance of forest-covered land by felling and burning the vegetation; hill rice is grown on the area for one or two years after which the area is left to natural growth of secondary forest. With an increasing population and ever diminishing virgin land the vital forest fallow period, that is the period between two successive plantings of hill rice, is shortened resulting in reduced soil fertility and accordingly lower yields. Also the rate of soil erosion is increased thus accelerating the deterioration of the land. The conditions which formerly permitted shifting cultivation to succeed are rapidly coming to an end and new methods of farming and new activities must be found. The solution should preferably come before an emergency situation arises.

1.1.3 Mineral Deposits

Apart from the off-shore oil and gas deposits, existing information indicates there are no major mineral resources of promising economic value. The oil and gas resources are important and will certainly contribute a significant proportion of the exported goods and may also supply relatively cheap energy for domestic use.

1.1.4 Fish Waters

Fishery development could possibly be based on the sea and fresh water resources, but no reliable records are available for estimating the potentials of sea fishing. Preliminary investigations carried out have shown potentials for fresh and brackish water fishing in the rivers and their estuaries, but especially for pond culture of some fresh water fish species and for turtles. However, the potentials of the rivers are severely threatened by an apparently increasing pollution and by direct poisoning of the fresh waters.

1.1.5 Scenery and Local Life

Sarawak in general has scenic attractions and a special style of local life which, to a limited extent, can attract tourists. But, apart from the great caves at Niah, there are no special scenic or nature attractions in the Study Area, nor are there areas especially suitable for relaxation, swimming and the like which would merit any large scale investment at this time.

1.1.6 Global Location

The Study Area has no immediately advantageous geographical position in relation to external markets and world trade routes. This fact is of special importance for the possibility of attracting the so called footloose industries. These are industries which are not located primarily on the presence of raw materials in the area, but other criteria, such as proximity to significant markets or availability of a reliable, well-trained and relatively cheap supply of labour are more important. With an improved communication system, especially of shipping, the present disadvantage of the Study Area of a rather remote location may be overcome.

1.1.7 Conclusion

The Study Area has physical potentials for supporting and improving the livelihood of a larger population than at present; but the natural resources and amenities will need to be exploited carefully and correctly in order to avoid adverse ecological repercussions such as pollution, soil exhaustion and ultimate destruction.

Studies indicate that primary utilisation activities of the natural resources will be insufficient to obtain a balanced and progressive development of the Region. Industrial and commercial enterprises must be built up to process and market local products also other industries as well as private and public services must be developed to supply and support the growing population, and new footloose industries must be attracted to diversify and enlarge the occupational choices of the population.

The number of people which can be properly sustained within a certain region will be determined not only by the region's physical conditions, but also to a large extent by man-made conditions, such as roads, ports and schools, and through Government decisions, incentives and support. The development goals for a region should, therefore, not be seen as a simple mathematical function of physical conditions but man's will and active endeavours should also play their own independent parts.

1.2 THE 1990 POPULATION

The conclusions reached in the previous section, preclude the need to forecast, by sophisticated statistical methods, the future population of the Region. This population in 1990 will be the result of the natural growth of the population living in the area and of migration into and out of the Region. The natural growth is the number of births less the number of deaths. Although births and deaths could never be totally governed by human will they can be influenced by medical care and by active family planning; the former reducing the death rate, the latter reducing the birth rate.

However, the results of these attempts to influence the future population growth cannot be known. The present natural growth rate in Sarawak is estimated at about 3.0 per cent per annum. We have chosen to use 2.8 per cent as the calculation factor for the next twenty years; this shows expectation of some success for the family planning policy. Applied to the present population in the Region of about 115 000 in 1970 this growth rate roughly implies a population of 200 000 in 1990. Even a growth factor of 2.8 per cent may seem high compared to the intended rate in other countries in this part of the world; for example, Thailand is aiming at 2.5 per cent by 1975 and Indonesia at 1.5 per cent over a somewhat longer period.

However, one of the aims of this Study is to consider the possibilities for absorbing some of the population from other parts of Sarawak into the Region in order to ease unemployment and under-employment, land shortage and land pressure in those areas. In studying this aspect we first tested the results of a high overall growth rate, namely seven per cent per year. This assumption would lead to a regional 1990 population of about 445 000, which is:-

- four times as much as today;
- 26 per cent of Sarawak's total 1990 population, compared to 12 per cent at present;
- 46 per cent of the total growth in Sarawak, leaving the rest of Sarawak with an annual growth rate of only 1.4 per cent.

The assumption and these results were found unrealistic, consequently two other more moderate assumptions have been made; overall growth rates of four per cent and five per cent per annum. The results of these assumptions, for convenience called Situations I and II, are summarised in Table 1.1.

TABLE 1.1 POPULATION GROWTH RATES

	Situation I	Situation II
Population growth 1970/1990	135 000	185 000
Total population 1990	250 000	300 000
Approximate total overall growth rate(1)	4%	5%
Share of Sarawak population	15%	18%
Absorbed from rest of Sarawak	50 000	100 000
Corresponding to	8%	16%
Growth rate in rest of Sarawak	2.6%	2.5%

Note: (1) This includes both natural growth and net-in-migration.

These results have been found sufficiently realistic to be used as a basis for investigations and considerations for the perspective planning of the Region. There is no intention, however, to recommend that the figures are accepted as firm and final aims. They are a result of, and a basis for the present report, and they could be a basis for political and administrative considerations and decisions which have to be made now and in the near future. After some years the whole planning must be reviewed in the light of new facts and new ideas.

1.3 PRODUCTION 1990

1.3.1 General

There is a close relationship between production, natural resources and population, and between these and the overall goals for development. Primary among these goals are; (a) to increase the National Product, and (b) to give all races and all parts of the country a fair chance to participate on equal conditions in the development and to share the prosperity of the country. The latter aim in particular means providing a more even distribution of personal incomes.

These aims will be achieved by utilising and developing existing natural resources, by improving the understanding and skill of the population through education and training, and by expanding infrastructure and public services. It is the object of regional planning to identify projects, procedures and activities which can lead to the goals, and to consider various alternatives.

During a twenty year period many ways will be open to progress and it is impossible to predict all future economic and social fluctuations and changes which will influence the choice of the best way of development. Even where a best way in economic terms can be found it may, for human and social reasons, be necessary to set a lower temporary target to make sure that the population understands, accepts and responds to the chosen line of action. A frequent dialogue between planners or advisers and decision-makers is, therefore, desirable to continually review and adjust if necessary the methods of development and the short-term goals.

Based on these general principles and on our present knowledge and evaluation of such aspects as production patterns, capacities, future market conditions and future technology the two alternative situations have been considered and production calculations made for 1990. Situation I has an occupation structure with a relatively high rate of primary (agriculture and forestry) activity; Situation II has a relatively high rate of secondary (manufacturing) and tertiary (service) activities, or what collectively could be named urban trades.

The occupation structure describes how that part of the population which is working with production of goods and services, that is the labour force, is distributed among the various trades and industries, here called production sectors. The labour force consists of most grown-up men and some of the women. Children, aged, sick and disabled persons are not included. We have estimated that in the future 35 persons out of every 100 will be in the labour force; for the two Situations the corresponding estimates of the labour forces in 1990 are 88 000 and 105 000 respectively.

These estimates assume full employment of the labour force. Although this may not be realistic it has been considered more appropriate to describe this situation and its implications because possible deviations from it can then be discussed and their consequences estimated. If, for example, a five per cent unemployment is assumed to be necessary, and acceptable, the employment in the two Situations would be 84 000 and 100 000 respectively, with a correspondingly lower investment cost and lower regional product but probably higher social expenditures for subsidising the unemployed.

The estimated distribution of the labour force in the two Situations over the main production sectors is shown in Table 1.2.

TABLE 1.2 ESTIMATED DISTRIBUTION OF THE LABOUR FORCE IN THE TWO SITUATIONS

Sector	Situation I			Situation II		
	Thousand persons	Per cent	Growth rate per cent	Thousand persons	Per cent	Growth rate per cent
Agriculture	45	51	4.0) 3.6	45	43	4.0) 3.7
Forestry	4	4	0.6)	5	5	1.8)
Manufacturing	19	22	6.4) 6.2	27	26	8.3) 6.8
Services	20	23	4.0)	28	26	5.5)
Total	88	100		105	100	
Average	-	-	4.1	-	-	5.1

Generally, the assumptions made imply that rural occupations will double over twenty years while the urban trades will double every ten years. Although the economic and social implications of these assumptions are discussed later in this report some comments on the physical and technical background for the estimated occupation structures are given here.

1.3.2 Agriculture

In both Situations agriculture is assumed to have the same total number of employed, which means that agriculture accounts for 51 per cent of the total employment in Situation I and 43 per cent in Situation II. Development of agriculture is envisaged to be based on proper land use and would consist of opening up of State Land as well as improving farming in the already occupied and cultivated areas. The farming activities which are, or could be, suitable in the Region are discussed in Chapters 13 and 14.

New development on State Land is expected to be organised partly as estates and partly as private holdings. The former mainly as public sector estates under the management of the Sarawak Land Development Board (SLDB) and to a lesser extent by Companies such as the Commonwealth Development Corporation (CDC). While the private holdings would consist primarily of small-holders, they would also include some privately owned larger holdings employing hired labour. It is expected that the estate-type development would be largely based on one or two enterprises, while the independent farmers would have a more diversified production, but generally with emphasis on the same crop as a nearby estate. The latter could provide facilities for processing and marketing the produce or this could be arranged as a joint venture between the estate and associated private holders.

With improved general education and improved knowledge of, and skill in, farming it is expected that independent farmers would increase their share of new development as time proceeds, and that this would contribute positively to the growth of the national product and to the general social well-being.

The pre-requisites for success of agricultural development are:-

- suitable land; that is land with good agricultural potential and good access;
- suitable crops; that is crops which will thrive under the climatic and terrain environments and for which there are good markets;
- farmers and agricultural workers with a good, improving and up-to-date knowledge of modern techniques in farming;
- a public service system which can promote and guide the two latter points.

This will demand a substantial increase in training of agricultural extension workers and administrators, for improved and expanded research of a practical nature, for extended social services, for banking and for marketing and processing. The SLDB, on its estates, is expected to supply most of these through its own expanding organisation but for the independent farmers it will be necessary to make other arrangements. We have suggested in an interim report, 'Alternative Strategies for Rural Development', that the services should be supplied through an integrated team of personnel drawn from all the various services and Government Departments and be under the leadership of a senior officer. Such a team, which is thought of as an Integrated Development Organisation, should be stationed within each development area and should form centres in existing or new towns, thus contributing to the general growth of urban and social qualities.

This type of promotional organisation could apply both to independent farmers being settled on new land and to improvement schemes for farmers on Titled or Native Customary Land. It will take time to build up a sufficient number of such teams and centres to cover the whole Region and a gradual continuous expansion is envisaged. Some suggestions on priorities of location for development are given in Chapter 13. The areas where the first centres would be located can be expected to develop faster than other areas, and thus serve as a model for development and innovations. Road based improvement into Native Customary Land could, if successful, influence the reactions of the shifting cultivators who may be convinced that by further re-distributing their land and at the same time attracting more people their social and economic status could be improved.

1.3.3 Forestry

Although we have made the suggestion, in order to meet target development acreages, that some areas of existing hill Forest Reserves and Protected Forests should eventually be developed by agriculture, the ultimate area envisaged under forestry would be greater than at present. It is suggested that the large blocks of unencumbered State Land currently under forest exploitation licences and found unsuitable for agriculture should become Proposed Forest Reserves with all possible speed and put under the jurisdiction of

the Forest Department. This would be a first step to their becoming permanent forests. Smaller blocks of similar forests within or close to agricultural development areas could well become Government Reserves so as to protect them and allow flexibility in administration. Areas of Native Customary Land assessed as unsuitable for agriculture should also be developed to forestry if a viable system can be found.

The growth of employment in primary forestry in the two 1990 Situations is very modest because the logging operations are capital intensive. However, considerable development and employment is expected in industries processing the timber from the forests. In 1970, about 50 mn cubic feet of logs were taken out of the Study Area. This amount would support four to six of the timber complexes proposed by the FAO Forest Industries Development Team, and would create about 1 000 job opportunities. In 1990, however, the total annual extraction of logs from the Study Area in Situation II could be in the order of 70 to 80 mn cubic feet, of which only 20 to 30 per cent would be log export. There would be a corresponding increase in employment in the industrial complexes.

A proper management of the forest areas in order to preserve the resources and protect the land from erosion is essential and will require a large expansion of the Forest Department. Not only should the administrative side be increased but also more intensive research and investigations should be made into such problems as:-

- silvicultural techniques for natural or artificial reforestation of logged forest;
- utilisation possibilities, not only for present commercial tree species but also for all the other numerous species which are not used at present;
- possibilities for establishing plantations either for special timbers or as raw material for industrial purposes such as paper, particle board, plywood and veneers.

If plantation-type forestry is found feasible it could be of importance in some areas of Native Customary Land found generally unsuitable for agriculture. The inhabitants could then take up plantation work as their primary activity.

1.3.4 Urban Trades

The urban trades are expected to grow substantially. Only part of this growth would be associated with direct processing of primary products from agriculture and forestry. A considerable part would consist of small scale industries and services supplying and servicing the local population. Another part would be footloose industries which would be deliberately located here in order to promote a balanced and diversified growth of the area. The visualised growth of urban trades would depend on a number of deliberately established conditions:-

- a well developed internal and external transport network including roads, airports, seaports etc.;
- special sites for factories, shops, offices and workshops all well provided with water and power supply at reasonable rates, disposal of effluent water and other waste materials without adverse influence on the environment;
- an efficient town planning organisation which would coordinate the input of services to prepare the local environment for the industries;
- a good supply of adequately educated and trained labour force including manual, technical and administrative personnel.

Introduction of new industries into the area may in addition require all kinds of supporting activities such as have already been established in Malaysia for promoting industrial development.

1.3.5 Manpower Training

An appropriate education system is essential to a successful development both of total employment and of productivity per worker. Although primary and secondary education should still have a broad practical and cultural scope it will need to be orientated to start preparing the students for the many, especially new, sides of working life which they will encounter after leaving school. This change of approach would have to originate with the training of teachers and an alteration of text books. Furthermore, vocational training of manual, technical and administrative personnel must be

organised, not only on a much larger scale than today but also in a more flexible way. Training in schools should be combined with further schemes such as on-the-job-training, correspondence courses and adult education courses. Some idea of the order of magnitude of the effort required in vocational education after formal education ends can be gauged from the following rough calculations.

The number of new required jobs per year in the beginning of the planning period would be about 1 500, and at the end for Situation I about 3 500 and for Situation II about 4 200. If the average time of vocational education per employee increases from six months at the beginning to 18 months at the end of the planning period the Region's demand for vocational education would grow from 700 education-years to 5 300 and 6 300 in the two Situations. If each teacher could cater for 20 education-years per year there would be a need for 265 and 315 teachers respectively in the two Situations in 1990. In addition there would be a corresponding increased requirement for classrooms, workshops and other facilities.

1.4 GEOGRAPHICAL DISTRIBUTION OF DEVELOPMENT

In any country the distribution of the population over the territory is an essential aspect of development, especially during a period of increased urbanisation. History has shown that in a typical agricultural society the occupation and habitation of new territory results from demands of an increasing population and is directed by the suitability of the land for the prevailing type of agriculture, usually the nearest suitable land is occupied first. Historically this pattern has often been influenced by invasions or threats of invasions. This pattern of expansion can be seen in the Study Area.

With the appearance of industrialisation and urbanisation a new pattern can be expected to emerge. Towns with particularly good situations for markets and raw materials will expand, thus often further adding to their attractiveness for new industries. The result will be that some towns will grow very fast, sometimes too fast, while other parts of the country will experience a decrease in population and accordingly in social amenities.

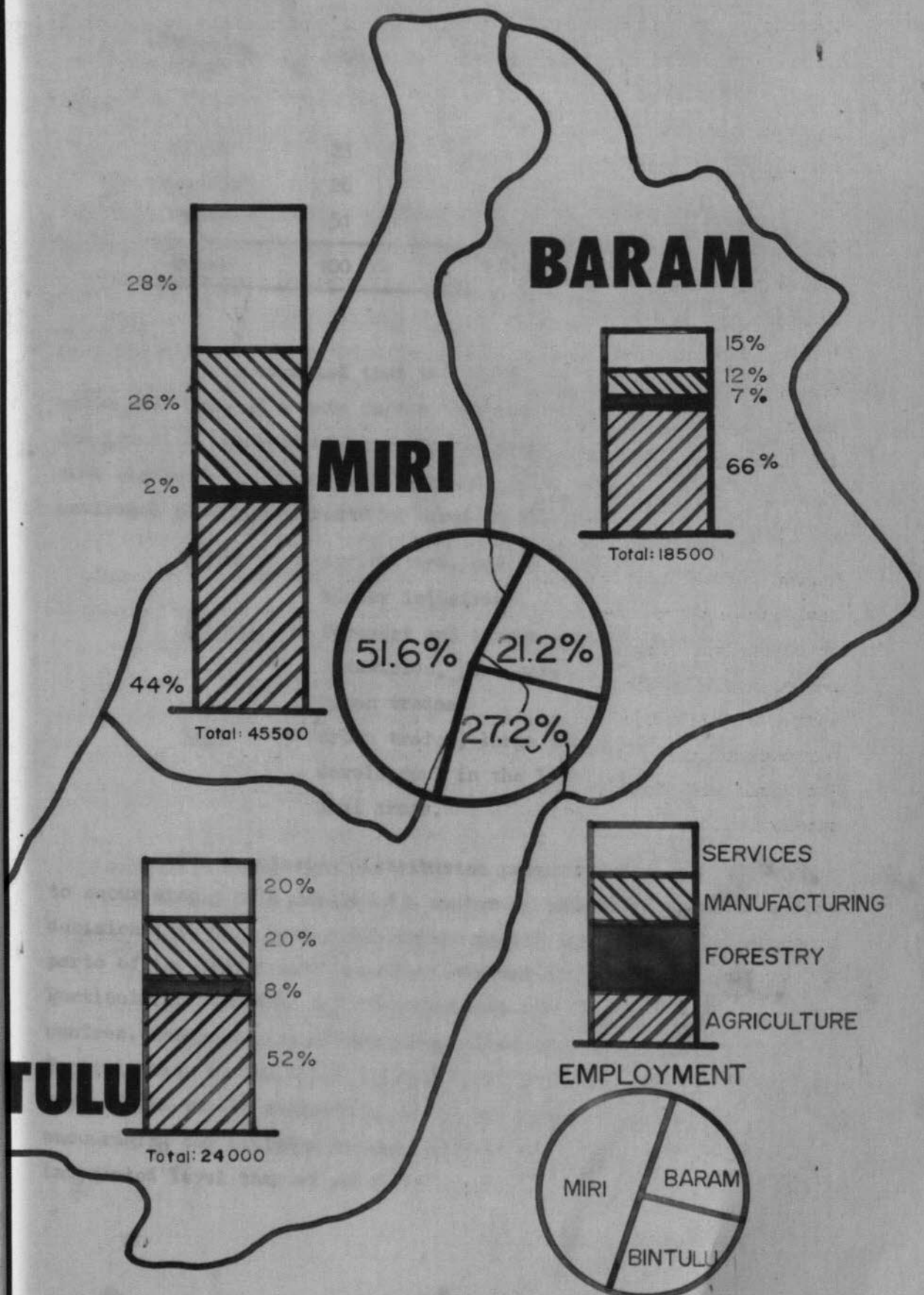
The fast growth of the towns will be due to the higher economic efficiency which they offer to public and private enterprises and to the higher quality of social, commercial, occupational and recreational opportunities for the population. This trend of increasing concentration of development can, and usually does, result in growing social and economic inequality between the urban and the rural populations. In our considerations for development it has been an important aim to reduce this inequality without losing the efficiency and quality provided by large towns.

The geographical distribution of development is envisaged to be still influenced by the location of areas suitable for agricultur forestry, mining, fishing etc. In the proposals, diagramatically shown in the Perspective Plan Map, the aim has been to build new towns, or expand existing ones, so that most people would be no more than 20 miles from the nearest town of 5 000 to 10 000 inhabitants, and by improving the roads and bus services the larger towns of Miri and Bintulu would be within the reach of most people for periodical visits.

The urban population in 1970 was about 35 per cent of the Region's total population. By 1990 this percentage is expected to have increased to around 55 per cent. Miri and Bintulu are expected to be the two largest towns with 63 000 and 42 000 inhabitants respectively in Situation II. Although Miri is foreseen to be the larger of the two,it is thought that Bintulu will grow faster; 10 per cent annually compared to 4.3 per cent for Miri. Together the two towns will contain approximately 65 per cent of the total urban population.

For planning purposes the Region has been divided into subdivisions, or planning units, and the population in these units is shown in Figure 1.1,which also shows the occupational structure, and summarised in Table 1.3.

G UNITS. EMPLOYMENT BY SECTOR AND SHARE OF TOTAL
TION 1990. SITUATION I



ployment Structure is based
le 4.4

TABLE 1.3 PRESENT AND FUTURE POPULATION OF PLANNING UNITS - PERCENT

Planning Unit	1970	Situation I 1990	Situation II 1990
Baram	23	21	21
Bintulu	26	27	30
Miri	51	52	49
Total	100	100	100

It is expected that the population in all the three planning units will grow at a rate faster than the natural growth because net in-migration is expected into all the units, but as shown in Table 1.3 some change in the relative importance of the units is predicted. The envisaged population growth is based on the following main activities:

Baram : agriculture, and in Long Lama forestry and timber industries.

Bintulu : forestry and timber industries, footloose industries, port services, agriculture, urban trades.

Miri : urban trades, large scale agricultural development in the Lambir-Subis and Niah-Suai areas.

The population distribution presented here is not likely to occur simply as a result of a number of independent, individual decisions; it will need a deliberate policy to provide the different parts of the Region with essential private and public services. Particularly important will be transport facilities, schools, health centres, integrated development organisations and recreational areas. Participation by the local population in providing and administering some of the public facilities should be considered as a means of encouraging the citizens to take part in public life on a more integrated level than at present.

1.5 TRANSPORT AND TRAFFIC

This Perspective Plan visualises an increasing economic activity in the Region; for Situation I about seven per cent growth per year, and about eight per cent for Situation II. The development is based on, and will lead to, a substantial increase in the division of labour, that is specialisation, and accordingly to a more intensive exchange of goods, which involves transport. Also the predicted rise in personal incomes can be expected to lead to a proportionally higher increase in passenger transport. Thus the demand for transport of goods is expected to grow at rates around eight to ten per cent per year, which implies a four to seven fold expansion in twenty years, and the passenger traffic might grow even more.

A characteristic feature of the Region is its difficult present transportation situation. The system is based mainly on the rivers, which give a rigid, slow and often expensive system with little or no connection between the various transport areas. The building of the road networks in Miri District has already improved the situation for the communities served and has contributed to a significant increase in road transport. The Miri-Bintulu road has connected a number of previously separated areas and has thus tied the Region more closely together but the road is not yet satisfactorily surfaced for taking dense and heavy traffic.

The Perspective Plan, therefore, foresees the construction of approximately 125 miles of new main roads and of 375 miles of feeder roads. The location and approximate alignment of these roads are shown in The Perspective Plan Map. It is recommended that 250 miles of roads which will be extensively used by timber trucks and palm oil tankers should be surfaced with bitumen and that the structural standards should be increased from the present maximum axle loads of eight tons on single and 13 tons on tandem axles to 10 and 16 tons respectively. The total road development costs are estimated at about $120 to $140 mn, which would be an average annual investment twice as great as the average during 1967 to 1972.

Air transport to and from the Study Area is expected to increase considerably though at a decreasing rate as time proceeds. The number of passengers entering or leaving via the airports of Miri and Bintulu is predicted to increase about 15 to 20 times by 1990, while the air traffic within the Study Area is expected to become progressively less important as the road network expands.

The foreseen economic development would put great emphasis on improved connections with the outer world, that is with the rest of Sarawak, West Malaysia and foreign countries. At present there is no road connection with the rest of Sarawak and the road to Brunei is poor. It is assumed that the construction of the Pan-Sarawak Highway will be continued during the present and completed during the next Five Year Plan period. It is especially important that the road is extended south of Bintulu to connect the town with its natural hinterland, especially if a deep sea port is to be built in the Bintulu area.

The majority of goods movement into and out of the Region will continue to be seaborne; therefore improved port facilities and good access on land to them will be of crucial importance. Port facilities in this context can cover a wide range of installations from small wharves and jetties at upriver landings to deep sea ports for ocean going ships.

With the expected extensions of the road network, the importance of the smaller ports and landings, and the corresponding type of shipping - the Chinese launch - will be reduced and eventually disappear. This tendency towards concentration of port services into a few ports can be observed all over the world. It is due to economic and technical advantages of large units - economics of scale - with respect to both ports and ships. At the moment Sarawak has two main ports: Kuching and Sibu, but neither can be extended to become proper deep sea ports.

These considerations lead to the conclusion that for many years there is likely to be a need for only one deep sea port in Sarawak. The need then is to find the best location for this port. The selection should be based on two main aspects. Firstly on physical or natural conditions, that is on the climate, the sea, the sea bottom and the adjacent land. Secondly on economic or commercial conditions, that is the volume and character of actual and potential goods to be transported, and the access to the hinterland of the port, which in this case would be the whole of Sarawak.

The whole coast of Sarawak is characterised by a wide stretch of shallow coastal water complicated by constant siltation and emergence of sand bars outside the river mouths. Thus there are apparently no natural deep sea harbour sites, but one area which, from a physical point of view, may be promising for the location of a deep sea port is Tanjong Kidurong, north of Bintulu. The overall problem of locating a port for Sarawak has not been investigated by us, but it is recommended that a special port study is undertaken of this site before any final decisions concerning a port are made.

It is evident that building a deep sea port at Tanjong Kidurong would have a considerable impact on the development of the Region. This possibility has been considered in the Perspective Plan and it becomes clear that improvements must also be carried out of port facilities in other parts of the Region to cater for the continuing coastal shipping, including sea transport between East and West Malaysia. Miri seems to be in a position to sustain a considerable shipping activity and this aspect will be further investigated during Phase II of the Study.

The development of the required transport infrastructure is discussed in Chapter 7 where it is also suggested that the Government should be responsible for the creation and current extension of an efficient and socially adequate transport system. In this connection a review should be undertaken of the present transport policy and its implementation of the regulations governing transport and of taxes affecting the transport sector.

1.6 HOUSING, PUBLIC SERVICES AND TOWN PLANNING

These are topics of utmost importance to the progress of industries and commerce, to the well-being of the population and to the public budgets.

We have considered housing in the rural areas as a part of the agricultural development. In the towns, however, the provision of housing has been considered a public responsibility through planning, development and regulation of residential areas and through financing of low income housing. The layout of residential areas should allow for future improvements in standards with a minimum of extra costs. The housing standard should strike a balance between the desirable and the economically realistic, but the design should provide for possible later improvements.

Public services and utilities cover a wide range of institutions and supplies. Some, such as schools, health centres, administration centres and integrated development organisations are offered to the citizens free of charge or at charges below cost price, while others, such as the supply of water and electricity, are sold at market or cost prices.

The supply and pricing of these services is important because they are a basis for production and are essential elements in the creation of social amenities as well as in considerations of a social welfare policy. Together with tax policy the public services constitute an essential instrument for influencing the distribution of real income. A careful location of the individual supply and service units will contribute to the realisation of the intended regional structure.

In order to make the towns efficient places for commerce and industry as well as pleasant places to live in or to visit for business and recreation, a continuous, careful and professional town planning is necessary. The purpose should be an appropriate distribution of the various urban functions as well as the creation and preservation of urban amenities.

Because of their expected size and importance Miri and Bintulu will require special town planning attention. In both cases the terrain presents a particular problem. For Bintulu there is an additional problem in that the development of the present Bintulu town will perhaps need to be combined with a new urban area associated with the possible location of a Liquified Natural Gas (LNG) plant, a port, and new timber industries around Tanjong Kidurong.

Preliminary and tentative attempts to calculate the investment costs necessary for building new urban areas have shown costs of about $4 000 per person or approximately $65 000 per acre of built-up urban land. The costs include roads, supplies, residential houses, shops, factories etc. and current urban renewal. This would imply an approximate total investment in a 20 year period of $365 mn for the urban growth envisaged in Situation I and $460 mn for Situation II. In both cases the investments would amount to about six per cent of the total Gross Regional Product (GRP) in the 20 year period.

The land required for new urban areas in Situation I amounts to about 5 500 net acres and 7 500 net acres in Situation II. Public ownership of land in developing towns is recommended as a means of controlling physical development and land prices. Land speculation may lead to an increasing cost level without contributing anything to the national development. To prevent future land speculation publicly owned land could be either sold on special terms or rented out on long lease terms.

1.7 ECONOMIC SITUATION 1990

1.7.1 Gross Regional Product

Although the fundamental purpose of all production is a physical product or service which can satisfy human needs, for practical reasons it is appropriate to describe this production by its common denominator: money. In this way it is possible to refer to the Gross Regional Product (GRP) as the money value of all productive work carried out in the course of one year within the Region. Comparisons can then be made between the various industries and between various years in the planning period. The GRP is the equivalent to Gross National Product (GNP) on the national level.

Estimating twenty years ahead is uncertain; thus certainty and exactitude should not be considered primary objectives of long range planning. More important is the establishment of priorities for different lines of action and the maintaining of consistency between the various assumptions and between them and the consequences.

The basis for our forecasts has been a study of the present economic situation, including estimates of the money value of production, investment and consumption, and the relationships between the various sectors of production. The results of these studies have been summarised in an input-output matrix (see Appendix IV.1) which attempts to show how on one hand the GRP is generated by the contributions from each sector of production and from import, and how on the other hand the GRP is used for investment, export, consumption and current production materials. The main results are summarised in Table 1.4.

TABLE 1.4 DEVELOPMENT OF GROSS REGIONAL PRODUCT 1970 TO 1990

	Present	Situation I		Situation II	
	1970	1990	Annual growth rate	1990	Annual growth rate
GRP, total	$ 142 mn	$ 534 mn	6.8%	$ 689 mn	8.2%
GRP per employed	$3 900	$6 100	2.3%	$6 600	2.7%
GRP per capita	$1 225	$2 135	2.8%	$2 300	3.2%
Investment/saving rate as percentage GRP	11.5%	17.2%		17.1%	

The total GRP is expected to grow by about seven and eight per cent annually in the two Situations. This is due to the combined effects of the increased number of employed and the increased productivity per employed. The latter has been estimated at a rather conservative level because during the planning period the constraints imposed by a rather remote global location and of a rather low level of productivity will have to be overcome.

1.7.2 Investment and Saving

Financing of the envisaged development would partly be based on regional savings and partly on borrowed money, that is capital import. The present level of saving in the Region is not known but there is evidence that it is significantly higher than indicated by the present investment rate, which for 1970 was calculated at 11.5 per cent.

The rates shown in Table 1.4 for 1990 are the assumed saving rates. A saving corresponding to those rates will not be sufficient to cover the total expected investment requirements. Thus a net capital import is expected as is explained in Chapter 11.

The calculated investment need is based on industrial investments of an average size per worker. More expensive investments and larger individual investments, for instance in a deep sea port or in highly sophisticated industrial equipment, would raise the net capital import. But this would at the same time contribute to an increased GRP which in turn would meet the increased expenditures on capital repayment and payment of interest, so that a new balance could be reached at a higher level.

1.7.3 Gross Regional Product By Sectors

The contributions to the GRP expected from the various sectors of production are shown in Table 1.5.

TABLE 1.5. PRODUCTION SECTOR CONTRIBUTION TO THE GRP

	GRP per employed dollars			Share of GRP per cent		
	Present	Situation		Present	Situation	
	1970	I 1990	II 1990	1970	I 1990	II 1990
Agriculture	800	2 500	2 500	12	21	17
Forestry	18 400	27 300	27 300	45	20	20
Manufacturing	4 000	7 200	7 200	8	26	25
Services	5 300	8 700	8 700	35	33	35
Average	3 900	6 100	6 600	-	-	-
Total	-	-	-	100	100	100

In both future Situations agriculture is expected to increase its share of the GRP because although its share of employment is decreasing the productivity per employed is expected to be above average. For forestry the extraordinarily high 1970-share of the GRP is foreseen to decrease relatively in both Situations.

1.7.4 Private Consumption

Private consumption has been forecast to grow at a lower rate than total GRP is shown to grow in Table 1.4. This is because the GRP also covers the requirements for investment and public consumption, and these items are planned to grow at a higher rate than GRP. Private consumption has been assumed to develop as is shown in Table 1.6.

TABLE 1.6 PRIVATE CONSUMPTION

	1970 present	1990 Situation I	1990 Situation II
Total consumption	$ 110 mn	$ 370 mn	$ 477 mn
Annual growth rate		6.2%	7.6%
Consumption per capita	$ 955	$1 480	$1 590
Annual growth rate		2.2%	2.6%

1.7.5 Income Distribution

The future income distribution will depend on a series of economic, social and political factors which are unpredictable. The difficulties of forecasting future distributions are further complicated by the absence of any contemporary statistics or analyses on incomes and their distribution. However, an attempt has been made to calculate, for Situation II only, a possible income distribution in 1990. This is shown in Table 1.7.

TABLE 1.7 A POSSIBLE 1990 INCOME DISTRIBUTION FOR SITUATION

Income group Dollars per annum	Annual average income dollars	Income earners		Total inco	
		Thousand persons	Distribution per cent	$ mn	per c
Less than 4 000	2 500	32	30	80	1
4 000 - 5 999	5 000	37	35	175	3
6 000 - 9 999	8 000	26	25	200	3
10 000 and over	14 500	10	10	145	2
Total		105	100	600	10

Because a more even income distribution is a major aim of development it is recommended that in future statistics on the subject should be kept and analyses periodually published.

1.8 HUMAN FACTOR AND ORGANISATION

Although these two aspects of development are dealt with separately in several chapters in the report they are discussed together here because they are, in fact, closely related.

By human factor is meant the culture, the attitudes and the aspirations of the people whether they are, for example, new settlers, old timers, young first-time factory workers or hospital nurses. All these people will have to face new situations and new challenges in circumstances where traditions will not be a sufficient basis for decisions and actions. Imagination, open-mindedness and ability for innovation will be called for.

By organisation is meant all the deliberate and conscious efforts exercised by public, semi-public, cooperative and private bodies to achieve the goals of development. These organisations should not be bureaucratic machines but groups of devoted and sympathetic persons geared to guiding and helping the population on its way to a better life.

Although this report and many other documents coming from this Study are primarily concerned with the material aspects of development such as production and transport facilities, the fundamental aim of all development is to improve the general well-being of the people. This does not depend only on sufficient supplies of material goods; equally important are human, social and cultural factors such as:-

- a feeling of security for oneself and one's family;
- personal dignity and responsibility for one's own affairs with a chance of improving one's status by one's own effort;
- access to social companionship, to religious worshop and to recreation; and
- the chance to participate in and influence communal affairs.

In fact, these aims are of both a cultural and a political nature but they must be an integral part of any planned development; and the general success of planning will, to a large extent, be judged on the fulfilment of these aspirations. For these reasons the sociological investigations in this Study are dealing with:-

- the type and character of people suitable for participation in new settlements of various types;
- the expectations and aspirations of new-settlers, and consequently the difficulties they are likely to meet in adapting themselves to new circumstances;
- the types of organisation suitable to select these people and to handle their migration.

These investigations are not yet completed but some preliminary observations can be made. Predictions of future population growths and occupation structures in the Region indicate that the approximate number of new settlers within agriculture over a period of 20 years might be about 65 000 persons corresponding to about 25 000 employed. The annual number of new settlers, an average of about 3 250 persons, would be only a small fraction of the total population of Sarawak. Thus, we believe, there will be no difficulty in attracting a sufficient number of settlers. On the contrary the problem will be more of establishing an adequate organisation which will be capable of contacting and selecting people in their present

locations, then helping and supporting them during the move to the settlement schemes. To make recommendations for setting up this organisation will be part of Phase II studies.

For the public estate-type of development the organisation for management, once settlers reach a scheme, already exists, namely the SLDB. With the growing consolidation of this organisation, it is our opinion, however, that a strengthening of settlers' associations should be aimed at by giving them greater responsibility, particularly in community affairs thus gradually reducing the role of management in these matters. The position of settlement officer has been recently created by the SLDB in their Lambir Subis Development Area estates. One of the tasks assigned to these posts should be to continuously assess the aspirations of the settlers and arrange that conditions are changed to meet the new requirements.

The organisation for managing the settlement of small holders and private investors has already been described as the integrated development organisation.

The decision to migrate will be, to many people, a very difficult one to make and it might help if representatives of prospective new settlers could visit the new area or similar development schemes so as to provide first hand information to their group. In addition films and slides with lectures and a chance of asking questions could be useful ways of easing migrations. Adequate information and explanations seem to be of utmost importance for the creation and maintenance of the confidence of the settlers.

The ability and willingness of the shifting cultivators to accept a change of their traditional life is sometimes questioned. But shifting cultivation has been a step in development in most parts of the world and it has been abandoned whenever circumstances made it necessary. This will happen too eventually in Sarawak, but by then it could have resulted in unnecessary suffering and lack of social and economic development for numerous people as well as in exhaustion or even destruction of the land. The crucial point seems to be to convince the shifting cultivators that the time is coming when a change will be necessary, and that it is better to undertake this change deliberately and in a planned way before it becomes a bitter necessity.

Broad suggestions for methods to improve farming techniques and living conditions in the Native Customary Lands are given in Chapters 13 and 14. It is believed that the way to convince the people is to demonstrate the alternative ways of farming and living and to make sure that these alternatives, when they are accepted, become successes. There is no evidence, that the shifting cultivators are not able and prepared to change their habits under such circumstances; in fact there is more evidence to the contrary.

Urban migration is expected to cause rather different problems. In the first place this migration is spontaneous; it does not need any promotion, in fact it is often desirable to check it by making rural life more attractive. In addition, in order to establish a racially balanced migration, it may be necessary to introduce special measures such as housing schemes, support to small-scale industries and labour force training to help the less developed sections of the population. Technical and vocational education would be most important. Significant urban migration is foreseen in both future Situations and it would be desirable to establish a social welfare system to care for rural in-migrants until they become successfully adopted to urban life. Special communal facilities would also be needed to bring people together and facilitate the integration of the various races.

Over and above the organisations required to provide for the human factor in development there is the general organisational framework for public administration of development. Although it is outside the scope of this Study to go into any detail with this aspect we have given recommendations for special organisations to deal with management of agricultural and forestry development. But for the general direction and administration of the total regional development we have only reviewed the existing administrative apparatus which, in our opinion, is well geared to tackle these problems. The individual departments should remain in charge of their specific aspects of development and the coordination taken care of by the State Action Committee and the Divisional Action Committee (DAC). The five-year plans are important instruments for working out adequate implementation programmes.

However, with an accelerated development as is visualised in this Report it will be necessary to strengthen the secretariat of the DAC and probably also of the local branches of the various Government Departments. A close liaison between the central administration, the officers in the field and the population will be essential for successful operations.

1.9 RECOMMENDATIONS

A summary of the more important recommendations contained in the supporting parts of the Report is given in this Section, but the reasons and motives for the recommendations are not repeated here.

Phase II

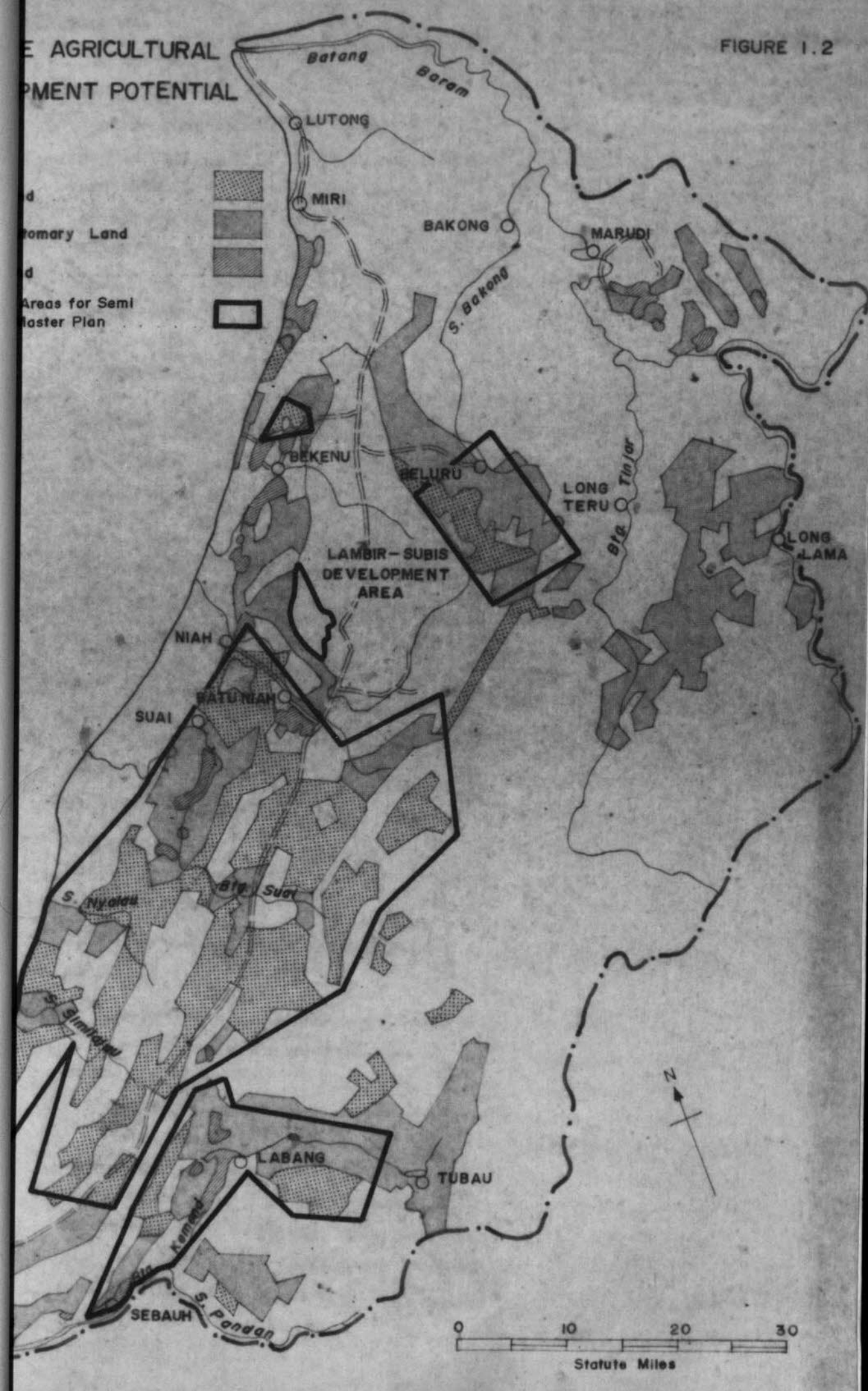
a) It is recommended that Government deliberate the consequences of increasing by 1990 the number of jobs in agriculture, forestry and urban trades in the Study Area by 50 000 to 65 000.

b) The areas within which the broad transect soil surveys are being carried out are shown in Figure 1.2. The total acreage is more than 250 000 and the majority will be mapped as the semi-detailed Master Plan Area.

c) The areas of unencumbered State Land where priority agricultural development is most likely to be recommended are shown in the Perspective Plan Map. These areas, totalling more than 50 000 acres, are mainly remnant and/or non gazetted forests and are located around Bekenu, Beluru, Temedak, Labang and within the Lambir-Subis Development Area.

d) It is recommended that action programmes are worked out for all sectors of the economy for the period up to 1980, and

- that the present Perspective Plan is broadly reviewed in the light of our findings in Phase II, the results being presented in a final report, The Regional Plan. This report will, in addition to the long term review, contain a short summary of other recommendations presented in separate more detailed reports;


E AGRICULTURAL
PMENT POTENTIAL
FIGURE 1.2
d
Primary Land
d
Areas for Semi
Master Plan
Batang Baram
LUTONG
MIRI
BAKONG
MARUDI
S. Bakong
BEKENU
BELURU
LONG TERU
Big. Tinjar
LONG LAMA
LAMBIR – SUBIS DEVELOPMENT AREA
NIAH
BATU NIAH
SUAI
S. Nyalau
Big. Suai
S. Similigau
LABANG
TUBAU
Big. Kemedi
SEBAUH
S. Pandan
N
0 10 20 30
Statute Miles

- that an attempt is made to produce detailed studies and development plans of pilot areas representative of different terrain and methods of development. These plans, which would be in addition to the requirements laid down in the Terms of Reference, would indicate how improvement and development could be implemented in larger areas of Native Customary Lands as well as in the 50 000 acres of State Land which are presently covered by forest;

- that an attempt be made to prepare manuals for development programming.

Regional Structure and Transport

a) The recommended urban structure and the road transport network are shown on the Perspective Plan Map.

b) In all urban areas special provisions should be made for development of residential areas including financing of low cost houses. The growth of the towns should be guided by:-

- adequate town planning;
- public ownership of land;
- control of land prices.

c) Bintulu should become the major timber town and should include processing, export and training.

d) Reconsideration should be made of the FAO Forest Industries Development Teams' recommendation to locate a timber complex 40 miles northeast of Bintulu on the road to Miri; a location in Labang is suggested instead.

e) For transport development it is recommended that Government should:-

- actively guide and control transport development;
- reduce tax on gasoline for outboard motors used by people in the interior;
- reduce yearly licence fees on buses;
- significantly increase the road development efforts based on a master plan for road development;
- reconsider the Bakong spur road either to be part of a direct road link to Marudi, or to down-grade its present priority;
- defer further development of Marudi airport until the possibilities of a direct road link to Miri have been investigated;

- co-ordinate forest and agricultural road planning and construction;

- arrange for a feasibility study of the development of a new airport at Bintulu and for a feasibility study of port development and improvements including a deep sea port at Tanjong Kidurong or elsewhere in or near the Study Area;

- consider foreign financing and contractors' assistance for transport development.

Natural Resources

a) The protection and preservation of the physical environment including forest land, agricultural land, rivers, lakes and coastal waters should be provided for by appropriate legislation.

b) The development of land should be based on proper land use, not only at the farm level but also at the regional level for which a Government decision is required concerning the eventual development of land suitable for agriculture in existing Forest Reserves and Protected Forests.

c) A coordinated production and marketing plan should be worked out for the whole of Malaysia to prevent over supplying of sensitive markets.

d) A scheme should be mounted to collect comprehensive resource inventory data of the sea fishery potential for the whole of Sarawak. Included in this, or as a separate undertaking, should be a complete survey of the brackish water potential, covering the resources, their protection and their development.

Agriculture

a) New large scale development should be carried out on about 220 000 net acres of State Land while road based improvement of existing farming should be undertaken on about 50 000 net acres in selected legally occupied areas.

b) The development and improvement of agriculture should be carried out by:-

- SLDB for public estates;

- private estates such as CDC;

- Integrated Development Organisations supporting small holders and individual investors.

c) Research should be continued and expanded to cover:-

- practical trials integrated with commercial development of beef production, cocoa and tapioca;
- further testing of production methods for pepper, essential oil crops, certain annual spices and swamp rice;
- long term investigations of many possible crops.

In addition centres for practical research and demonstration should be established in the main development areas.

d) The long term viability of the rubber industry should be maintained by:-

- continued planting of high yielding material and, in selected areas, the replanting and up-grading of old plantations;
- organised collection and processing of latex and coagulum from new and existing plantings.

Forestry

a) Timber processing complexes should be established with the object of handling locally the majority of the forestry products.

b) Selectively logged forest outside reserves classified as unsuitable for agriculture should be speedily protected and brought under the jurisdiction of an enlarged Forest Department.

c) Forest policy should be amended to include reforestation of Native Customary Land assessed as unsuitable for agriculture, after research has shown the techniques and sociological studies the opportunity.

d) Illegal occupation of land must be tackled resolutely from every angle by the authorities.

e) Intensive research and investigations should be made into such aspects as:-

- silvicultural techniques for natural or artificial reforestation of logged forest;
- utilisation possibilities for present commercial tree species and species not at present used;
- possibilities of establishing plantations either for special timber or as raw material for industrial purposes;
- pending natural resources protection legislation, logging rules should include cross-ditching of forest roads before abandonment.

Industry

a) During Phase II preliminary investigations should be made of the viability of attracting to Sarawak subsidiaries of West Malaysian footloose industries.

b) Miri and Bintulu should develop into important industrial centres by establishing planned industrial estates provided with adequate public utilities and services.

c) For the following industries pre-feasibility studies should be undertaken in Phase II:-

- forestry based industries (to be wholly or partly carried out by the FAO team);
- housing industry, especially pre-fabrication of modular type houses;
- glass manufacture;
- fishery based industries;
- the utilisation of petro-chemical products, especially the viability of a fertiliser industry;
- some footloose industries.

Social Development

a) Further studies should be undertaken into the establishment of organisations designed to select and guide migrants settling either in agriculture or urban trades.

b) Vocational training including adult education should be expanded in close cooperation with formal education and the industries as they become established.

c) Life should be made more attractive and meaningful for people working on public estates by increasing their participation in community affairs.

d) The Integrated Development Organisations should be designed to provide independent farmers and longhouse communities in selected areas with a wide range of agricultural, economic and welfare inputs.

Statistics

In order to enable economic planning to be more effectively coordinated and carried out statistical data should be collected and published on:-

- price structure and price development;
- income distribution;
- internal trade pattern;
- employment.

PART II

THE PLANNING ENVIRONMENT

PART II

PLANNING ENVIRONMENT

INTRODUCTION

The development of the Region will be considerably influenced by the existing physical and social environment. The physical environment consists of three main groups:-

- the climate;
- the land in its present state of usage for agriculture and forestry;
- the natural and man made infrastructure such as rivers, the coast line, roads, industries, service facilities and markets.

The capability for utilising these resources relies heavily on social environment, that is the human resources and the way in which they are organised. The organisation of human resources refers to all types of formal and informal systems, rules and habits governing and guiding human interrelationships in social and productive activities. These interrelationships are constantly changing. It is important that they develop in a way which can be promotional for the general development goals. The influences that these environmental factors have had in the past and may have in the future on the potential for development are outlined in this Part of the Report.

CHAPTER 2

THE PHYSICAL ENVIRONMENT

2.1 INTRODUCTION

The planned development of the Region must be considerably influenced by the existing conditions and historical background. Constraints to arable farming are imposed by certain climate and terrain features, while the year-round favourable growing conditions enhance the possibilities for forestry and the expansion of perennial and semi-perennial agricultural undertakings including livestock and fish culture enterprises.

The main characteristics of present agriculture are:-

a) the shifting cultivation of hill rice by the longhouse people;

b) the settled agriculture of the Malays, Melanaus and Chinese;

c) the predominantly small holder farming;

d) the almost complete absence of any form of on-the-farm transport or mechanical aids;

e) the recently started large scale estate-type production in the Lambir-Subis Development Area.

Development of land resources is envisaged to be based on proper land use, a concept which if accepted will entail considerable interchange of land presently under agriculture with present forest land.

2.2 THE PRESENT AGRICULTURAL SITUATION

2.2.1 Historical Background

In the past the opening up of land for settlement and for agriculture in the Fourth Division and the Study Area has been similar to the rest of Sarawak. The rivers have been the highways of the country and people have settled along their banks forming narrow bands of villages, longhouses and cleared land from the estuaries to far inland. The majority of the remaining land between the larger rivers has been left relatively undisturbed. This was particularly true in the Study Area and only recently have some roads been constructed, often in conjunction with the logging of hill forests, resulting in settlements spreading away from the rivers.

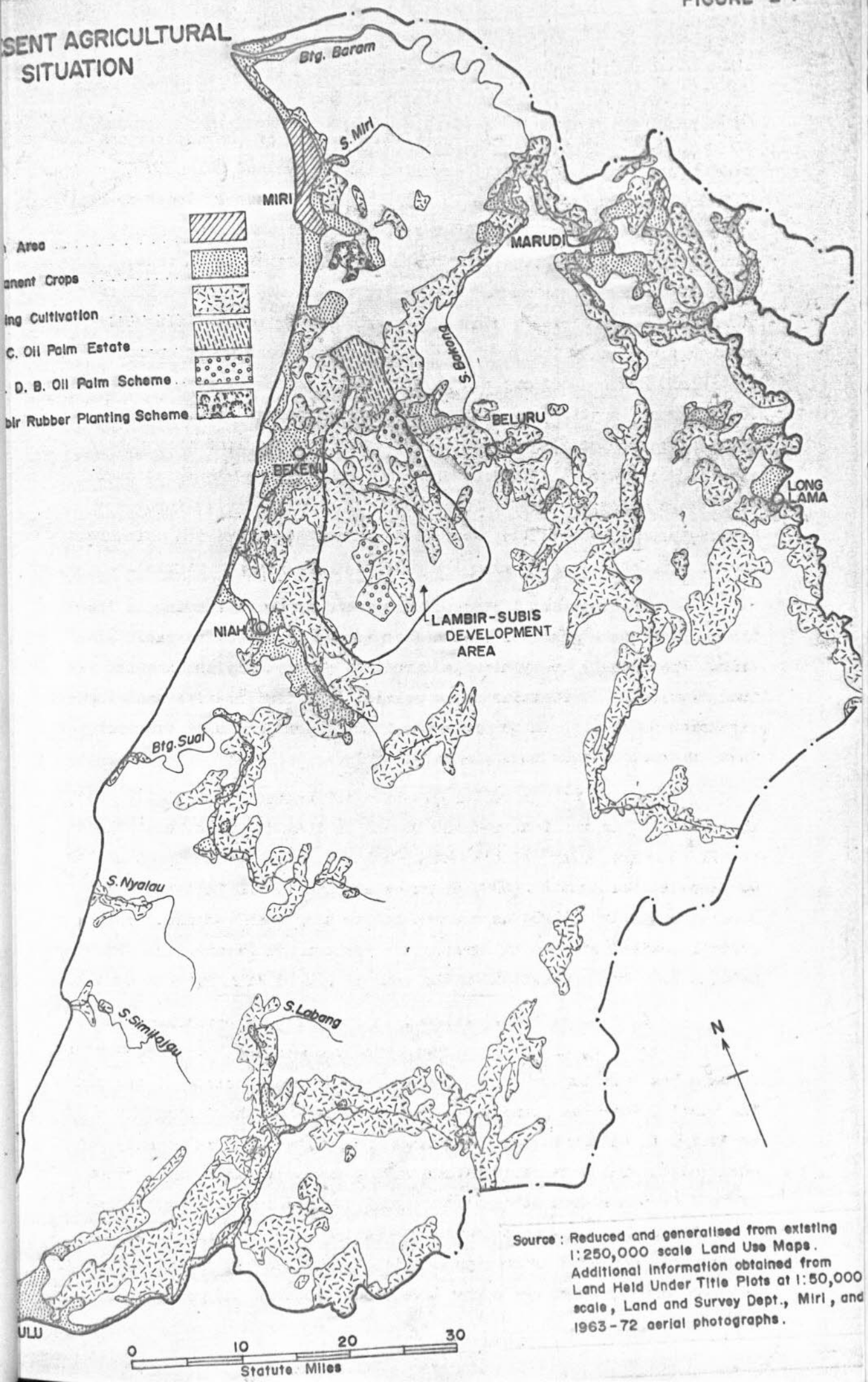
The river estuaries were the gateways of the country and became important sites for villages of the Malays and Melanaus, relics of the Muslim invasion in the Fifteenth Century. These coastal settlements are generally in a swamp environment where the main occupations of the peoples are fishing, the cultivation of rice, coconuts and sometimes sago. The hilly, rugged and forested inland areas close to the rivers form the background for the shifting hill rice cultivation of the longhouse people. The areas where coastal and inland groups meet are also generally the sites of immigrant Chinese rural settlements. These settlements though often predominatly Chinese, who hold title to much of the land they work, also contain farmers of the other main ethnic groups who to a large extent are adopting the Chinese pattern of settled agriculture. Rubber, pepper, vegetables, swamp rice and coconuts are the main crops grown. The Chinese in particular also rear poultry and pigs.

An important feature of all these types of farming is the almost complete absence of on-the-farm transport and of mechanical aids. Practically everything is moved and operated by the humans themselves. These features have restricted diversification and expansion of farming in the past and future planning must overcome them in order to make real progress.

A type of agriculture, at present unique to the Study Area, is developing in the Lambir-Subis Development Area. Here pure stands of oil palm are being established on a large scale by the Commonwealth Development Corporation (CDC) as an estate and by the Sarawak Land Development Board (SLDB) as a share holder settlement scheme. This overall pattern of present agriculture is shown in Figure 2.1. Further details have been presented in the interim report 'The Present State'.

The almost total absence, in the past, of estates, either public or private, or of large farms run by economically independent farmers has been important in constraining diversification of cropping. The small holder has usually neither the means nor the technical knowledge to undertake new or unknown enterprises. He is usually too occupied obtaining his subsistence living and very often any surplus of food or other produce is in too small a quantity or too scattered to enable efficient processing and marketing to be organised. These constraints can be overcome by organising, adjacent to the already occupied areas, large scale new development schemes and using them

FIGURE 2·1



Source : Reduced and generalised from existing 1:250,000 scale Land Use Maps. Additional information obtained from Land Held Under Title Plots at 1:50,000 scale, Land and Survey Dept., Miri, and 1963-72 aerial photographs.

as centres from which to expand new farming techniques and enterprises. The centres can also be used as processing and marketing centres.

2.2.2 Illegal Land Occupation

The longhouse people hold their land generally under Native Customary Law which in the past has been established by the felling of virgin jungle. Since the promulgation of the Land Code in 1954, amendment of the Land (Classification) Ordinance the establishment of Native Customary Rights to land has, in theory, been restricted to areas where Government permission for such aquisition has been granted. In practice, however, considerable illegal occupation of land has occurred in many parts of the Area and is continuing. Particularly conspicuous is the haphazard occupation of land along the forest logging roads and the recently completed Miri-Bintulu trunk road. This indiscriminate claiming of land has already caused disruptions in the smooth opening-up of the Lambir-Subis Development Area and, if it is accepted and allowed to continue, could become a serious constraint to planned development of State Land. Very often the type of agriculture introduced into these illegally occupied areas is shifting cultivation of hill rice. Under conditions of low population density and abundant land, this type of agriculture is not particularly destructive to the land, but these conditions are fast disappearing and development will accelerate the process in all parts of the Area. Thus the pressure on the land will increase resulting in progressively shorter periods of essential forest fallow between successive crops. The resultant progress to disaster is well known.

(see also p.254

2.2.3 Agricultural Research

This is relatively new in Sarawak and until recently reliance for information has had to be placed mainly upon West Malaysian experience which covers chiefly rubber and oil palm. Although the Research Stations at Semongok and Stapok, in the First Division, are fully operative and Kabuloh in the Study Area is being built-up rapidly, there is virtually nothing known about most of the crops and enterprises which could be suited to the area. This is a serious constraint to large scale diversification of activities and in the early years of development will limit the choice of enterprises. The work at Kabuloh must continue to expand and be orientated mainly towards specific practical research. However, Kabuloh is not representative

of all soil and terrain conditions of large parts of the Study Area where new development is likely to take place. Provision will need to be made for practical research and demonstration within the development areas. Where public or private estate-type development occurs trials could be undertaken by those organisations.

2.2.4 Communications

At present road communications are poor. Many parts of the Study Area are considered remote and are accessible only by longboat. In the past the lack of roads has been a constraint to agricultural development. Even now the majority of agricultural inputs and marketed produce are still transported by river despite the completion of the Miri-Bintulu road. But this is only a temporary situation. The construction of the roads planned as part of the overall State network together with those built as part of the envisaged agricultural and forestry development will change the orientation of movement of goods.

Coastal traffic is overwhelmingly the most important for movement of goods in and out of the Study Area. Sand bars at the mouths of the rivers and the shallow continental shelf along the whole coast are features which hinder the easy development of sea borne transport. Nevertheless improvements in port and shipping facilities together with the road building programme must be considered as vital, integral parts of overall development.

2.2.5 Markets

Before planning to increase production from existing activities or before the introduction of new enterprises it is essential to ensure that there is a market outlet, either local or export, for the produce. For those enterprises which, for one reason or another, must rely on the local market there is a definite constraint in that the population of Sarawak is not great and no large scale immigration is contemplated. Thus the local demand for goods will be determined largely by:

- growth of population and its location in centres or settlements;
- growth of incomes and thus the ability of people to pay for the consumer goods they require for a better standard of living.

Export orientated production must be carefully planned and efficiently operated because it will generally be necessary to compete on established markets in which prices and quality standards are already fixed. For markets such as Singapore, Hong Kong, Thailand, Vietnam and Japan, a comparative advantage of position would exist for the Study Area and Sarawak as a whole compared to many other countries capable of producing tropical products and industrial commodities, provided an efficient transport outlet from the area is established. Every endeavour should be made to take advantage of this. In Chapter 13 the market potential for possible agricultural activities is further considered.

2.3 THE CLIMATE

The Study Area has a tropical, wet climate with constantly high relative humidity and temperature. Although influenced by the northeast and the south or southeast monsoons there is no distinct dry season. In fact, there are no clearly definable seasons. Heavy rains or several weeks of drought can occur at any time of the year, though the wettest period tends to be October to January, the period of the northeast monsoon. The range of mean annual rainfall is from 98 to 196 inches and high intensity rainstorms are common. Sunshine hours tend to be inversely related to rainfall; Bintulu with a higher rainfall than Miri, has considerably less sunshine than Miri. Over the period 1959-68 the average annual sunshine hours per day were 5.8 and 6.7 respectively for Bintulu and Miri.

These climatic conditions impose certain limitations as well as providing potentials for agricultural development. The year-round expectation of rainfall generally favours perennial crops and forest trees which can take advantage of the practically continuous growing weather. Conversely, most annual crops are not well favoured in that a predictable dry period to promote and permit crop ripening and harvesting is absent.

No large scale irrigation schemes are foreseen but numerous small and medium sized drainage or water control projects will be necessary to improve the agronnomic conditions for rice in the flood prone alluvial flats.

Water supplies for villages and the smaller towns will generally be based on direct supplies from rivers and streams. In some cases reservoirs may become necessary because the recent unprecedent drought has shown that some of the smaller streams can become completely dry. The prospects of underground water have not yet been assessed but the water supplies for the main villages and towns is a study already started and will continue in Phase II. At the same time the possibilities for hydro-electric power supplies will be considered.

2.4 LAND RESOURCES

2.4.1 Topography and Soils

Since the publication of the Zonation Plan (October 1972), which contained mainly an account of land resources possibly suitable for agriculture, only soils and terrain information has been collected from limited areas of this land category and even less from areas unsuitable. These semi-detailed studies were made on four areas totaling about 35 000 acres. This is considered too small a sample to justify extrapolation of all information to the entire 863 000 acres assessed as possibly suitable (excluding the Lambir-Subis Development Area). However, certain soil and terrain factors, which have only been tentatively tested have been taken as the basis for an account of the constraints and potentials likely to be encountered in the Study Area as a whole.

In the Zonation Plan the division between land possibly suitable for agriculture and land unsuitable for agriculture was thought to lie between the photo-interpretation mapping Units B2 and B3. This assumption was based on terrain characteristics which suggested that in Unit B3 the slopes would be generally less than 25 degrees. Data, obtained during the studies of the sample areas, to test these aspects, are presented in Appendix II.1 and although they represent too small a sample for complete reliability they suggest that the original assumption was correct. Other evidence obtained from the semi-detailed sample surveys and from previous surveys in other parts of the Fourth Division suggests that between 10 and 20 per cent of

the area assessed as possibly suitable for agricultural development will subsequently be found unsuitable for agriculture.

In general, the terrain and soil constraints to agricultural development are considerable, especially in relation to attempts to diversify cropping away from large scale perennial crop development. The paucity of flat or very gently sloping land, and the problems associated with flooding and poor drainage on such land, will restrict the possibilities for arable annual cropping. In addition, it has been found that in the undulating and hilly areas a high percentage of the land with slopes between 21 and 25 degrees has soil depths of less than 24 inches. This could be rapidly reduced by erosion once the natural vegetation has been cleared. Thus conservation measures to control erosion will be a necessity. These facts place constraints on the type of crop that can be recommended, and where the depth is generally less than 24 inches, restrict cropping altogether.

Where reasonably deep soil does occur on the more gently sloping land the conditions are generally satisfactory for many perennial crops including pasture, while on areas in the same terrain class which have more shallow soils the conditions appear suitable only for pasture. However, under both deep and shallow soil conditions the early establishment of a complete ground cover after clearing the natural vegetation will be vital as a soil conservation measure.

Slope can also place other serious constraints on agricultural planning. For example, the steeper the slope the higher will be the cost of road construction and the more difficult will be the harvesting of oil palm fruit bunches, the tapping of rubber and the application of fertilisers. The size of small-holder farms too could be affected because the total area required to provide sufficient land from which a target income can be obtained will be less on the more gently sloping land than on the steeper terrain due to the high occurence of shallow soils on the steep land.

Hill land which was assessed unsuitable for agricultural development in the Zonation Plan was eliminated on the basis of the rugged and steep nature of the terrain: small areas of possibly suitable land within these areas were excluded for development because these were either too small to map on the Zonation Plan Map (scale 1:250 000) or had very poor accessibility. These scattered and often

isolated patched are unlikely to prove suitable for development on a purely agricultural basis but they could possibly be developed as a food base for a population predominantly working in forestry.

Peat swamps were excluded from the possible agricultural development areas because up to the present time research has failed to show a satisfactory large scale method of developing such areas for agriculture. However, the peat swamps and the hilly land too steep for agriculture are considered generally suitable for permanent forestry development. These forestry aspects are further discussed in Chapter 15.

No attempt can be made at this stage of the Study to appraise the chemical and physical qualities of the soil. The limited investigations on soil texture indicate that marine and alluvial terraces in most instances are sandy textured which results in a poor water holding capacity and, under certain circumstances, podzols have formed which have poor internal drainage. Similar restrictions may occur in the coarser residual soils.

River valley soils are often suitable for a range of crops, but almost all valleys in the Study Area are subjected to unpredictable flooding which makes these tracts of limited suitability for most crops unless flood control is undertaken.

2.4.2 Present Land Use

The Study Area covers approximately 3.5 mn acres of which roughly 165 000 acres are included in the Lambir-Subis Development Area. Forest covers nearly 2.3 mn acres, and about 700 000 acres are, or have been, under cultivation of some sort. Settlements and non-agricultural lands total roughly 50 000 acres. A further approximate breakdown of these acreages are given in Table 2.1.

TABLE 2.1 ACREAGE OF LAND CATEGORIES IN THE STUDY AREA

Land type	Approximate acreage
A) Forest Areas	
Reserved Forests(1)	
Hill Forest Reserves or Protected Forests	1 000 000
Swamp Forest Reserve	327 700
Communal Forests	500
Non-Reserved Forest(2)	
Hill Forest	1 081 700
Including: Licenced remnant and exploitable hill forests	389 000
Swamp forest	327 700
B) Cultivated Land(2)	
Shifting cultivation	495 200
Wet padi	14 800
Permanent crops	56 600
C) Settlements and Non Agricultural Land(2)	53 500

Note 1) Forestry Department Gazetted acreages.

2) Areas obtained by planimeter measurement from 1:250 000 scale published land use maps (1968) and Zonation Plan (October 1972).

2.4.3 Availability of Land for Development

The Terms of Reference stated that new agricultural development should be located as far as possible on unencumbered State Land (see glossary (Appendix V.4) for the interpretation given to this category of land). The area assessed as possibly suitable for agricultural development totals about 121 700 acres, some of it in rather small, isolated blocks not ideal for large scale development. Thus if the target remains to develop 250 000 acres then development will have to include suitable land in the Forest Reserves Protected Forests and Proposed Forest Reserves. There are roughly 200 000 acres of possibly

suitable land so far identified in these forest categories. None of the Native Customary or Titled Land is considered at this stage to be available for new development involving settlement of people other than those having rights or title to the land. Nevertheless, there is considerable potential for improvement in the agriculture on about 447 000 acres of these areas. This aspect together with development possibilities on State Land are discussed in Chapter 13.

2.4.4 Potential Future Land Use

Development of the land is envisaged to be based on proper land use. The high, often intense, rainfall combined with the undulating, hilly and often steep nature of the terrain dictate that forms of land use must be adopted that will protect the soils from erosion. In general it is recommended that land suitable for agriculture should be given priority to be developed as such, and land unsuitable for agriculture should remain under forest or be developed to forestry. Because of the erosion hazard the maximum slope accepted for development to agriculture is 25 degrees. In general, land on which the majority of slopes are in excess of this have been excluded from agricultural development. In addition the large areas of peat swamp have been excluded for reasons previously explained. Altogether between 2.5 mn and 2.8 mn acres have been assessed as unsuitable for agricultural development and should remain under forest or be developed to forestry of some sort.

The possible developments for the forest areas are discussed in Chapter 15 and the use of land for urban areas in Chapter 6.

2.4.5 Potential Agricultural Activities

Agriculturally there can be no visions of large tracts of mechanised, arable farming based on annual crops. The picture envisaged is rather one of largely permanent or semi-permanent crops, including pasture and forest trees, growing on the steeper parts of undulating country, with relatively small areas of annual crops growing on the gently sloping land, and bunded padi fields on the flat, floodprone areas. Even where estate-type development takes place which is expected to be based largely on mono-enterprise undertakings it is believed that a move will occur towards encouraging the labourers or shareholders to cultivate small patches of vegetables or rice. Shown in Table 2.2 are the potential crops which have been

selected after considering the climatic environment and agronomic aspects, also tentatively indicated is the slope range within which each should be restricted mainly because of the erosion hazard.

TABLE 2.2 POTENTIAL AGRICULTURAL ACTIVITIES

Slope range (degrees)	Crop		Remarks
0- 2	Swamp rice Sago		
0- 6	Groundnuts Vegetables Tapioca Yams Sweet potatoes	Pulses Sorghum Maize Chillies Ginger Turmeric	If terraced, small patches could be grown on steeper land. Erosion control measures are necessary on slopes above 4 degrees
0-12	Bananas Sugar Cane Papaya Pineapple Vanilla Essential oil crops		
0-20	Anatto Coffee Cocoa Citrus Mango Oil Palm	Cinnamon Cardamon Coconuts Pasture for cattle	The tree and bush crops will need to be contour planted on slopes 4-12 degrees. Terraces or platforms will be required on slopes above 12 degrees. Complete ground cover necessary during establishment.
0-25	Rubber Tea Pepper Cloves Nutmeg Cashewnut Durian Mangosteen Rambutan		Terraces or platforms will be required above 12 degrees. Between 4 and 12 degrees contour planting will be necessary. Complete ground cover necessary during establishment.

Other enterprises for which the physical environment is suitable are poultry and pig rearing, pond culture of fresh water fish, turtles and shrimps, also, but on a much more limited scale, the culture in brackish water of crustacia.

CHAPTER 3

THE SOCIAL ENVIRONMENT

This chapter deals with human resources and the framework of social institutions, societal values and goals to which development plans are addressed. The types of people most likely to participate in new settlements of various types are described. The aspirations of the people are outlined and suggestions made for the forms of organisation best suited to achieve the desired social and economic ends.

3.1 SOCIAL STRUCTURE

The Study Area is part of a multi-racial society made up of diverse cultural and linguistic groups. A basic goal of development is to restructure society so that interrelationships between groups are strengthened by reducing their identification with economic function, accelerating modernisation and expanding the participation of all communities in an integrated, developing economy.

Development needs - as defined by integration and economic modernisation - vary between the groups making up society. The least integrated segment in the present population consists of rural communities dependent on shifting cultivation. The situation that faces many of these communities: - inadequate access to markets, low productivity and deterioration of basic conditions due to the destructive nature of traditional farming methods; - is well known, and a series of programmes have been designed to persuade shifting cultivators to adopt more permanent forms of agriculture.

Success of these programmes, although limited in some respects, is evidence of a general receptivity to new methods. Tradition itself, in most cases, appears to be less of a hinderance to development than technical and economic factors. The cultural values generally stress individual resourcefulness and foster an outlook open to innovation. On the other hand, traditional methods offer a degree of security and are likely to be abandoned only when the relative advantage of new methods has been demonstrated. Greater progress is frequently limited by a lack of knowledge of alternative crops, unsuitable land

resources, unstable prices or inadequate market facilities. Government programmes are often thinly spread and, in some cases, narrowly conceived, for example, those that focus on a single crop or lack marketing or other supporting services. Their effectiveness could be enhanced if extension, credit and other services were integrated in a comprehensive way as described in the interim report, 'Alternative Strategies for Rural Development', and their delivery linked, through local agricultural centres, to other infrastructural development.

Local communities typically consist of longhouse settlements oriented along rivers or streams as the principal avenues of communication. This pattern of settlement is likely to change as road transport increases in importance. Population concentrations are likely to shift away from rivers towards areas of greatest agricultural potential as these are opened, and linked to road-supplied trade networks. Demand for consumption goods will grow and can be expected to increase incentives for cash crop production and the adoption of better methods of farming.

Communities dependent on sedentary agriculture are highly varied and the practice of settled farming, like shifting cultivation, is not exclusive to any one ethnic group, but may be viewed as a rough index of modernisation. For settled farmers growing basic crops, such as rice, the economic returns on labour are frequently low and considerable scope exists for improving productivity and diversifying output. Intensive market farming is already highly diversified, and those engaged in this form of agriculture are keenly aware of the value of land improvement and careful management. However, land holdings are typically small and often fragmented.

In a sample survey of over 4 000 acres of titled land in the Study Area, the mean holding size was found to be less than 10 acres divided, on the average, between three parcels of slightly over three acres each. Modal size of holdings is four to six acres and the majority of smallholders own less than six acres of land in total. There are local variations and, in some areas, these figures are significantly reduced. Chinese smallholders, in particular, face difficulty obtaining land due to restrictions on ownership.

Underemployment exists and from some places there is a heavy outflow of persons into urban areas and the dependence of rural families on non-farm earnings. For those leaving the farm there are often no ready employment opportunities. For most people, possession of land and engagement in agricultural pursuits represents the only practicable outlet, and considerable need exists to make more land available for intensive farming on an independent, smallholder basis. While Chinese are the most conspicuous element presently engaged in this type of farming, other groups are moving in this direction and the expansion of educational, extension and credit services which is envisaged as an integral part of rural development will help accelerate this trend.

Provision of a strong infrastructure could stimulate a complementary private investment in larger, more highly capitalized farm ventures. Special encouragement needs to be offered to this development because available evidence indicates that private funds exist that could be channeled into agriculture.

In contrast to other farming communities, Chinese smallholders have adopted a dispersed pattern of settlement focused around schools or secondary rural bazaars. The absence of village organization is compensated for by easy access to larger population centres, ties of clanship and the existence of formal associations based on dialect or common interests. Most Chinese farmers have considerable experience with formal organisations such as school or cemetery committees; however, those organisations designed specifically to promote farming interests have been slow to develop, although, once they take form they are often highly effective.

A move to sedentary farming will allow for greater concentration of the rural population. In order for the Government to take advantage of this concentration to improve amenities it is necessary that there exist centres of sufficient size and density to sustain such development; thus agricultural improvement and the emergence of service centres is closely linked.

A significant urban migration is foreseen. In recent years an accelerated movement of indigenuous peoples to towns and other centres of wage employment has begun, and, in this respect, the Study Area appears to be somewhat in advance of the rest of Sarawak. Two major towns of over 3 000 inhabitants, Bintulu and Lutong, the latter

considered in this connection as separate from Miri, already have nati majorities, and the trend is likely to continue. It may be desirable therefore to establish special welfare facilities to assist rural inmigrants in finding jobs, housing and in adjusting to other aspects of town life. Community centres should be provided, perhaps along the lines of existing Rumah Dayak or Chinese community organisations, to promote social contacts. Existing urban services will need to be expanded, and special measures may be necessary such as housing schemes business loans, encouragement to small industries and labour force training to promote this expansion. Technical and vocational educatio appears to be particularly important in this connection and should be open to both newcomers and present townspeople.

It may be necessary to control urban migration, and here the improvement of rural conditions is likely to be an important way of holding people in the countryside.

3.1.1 Human Resources for Development

With this structural background in mind it is possible to outline the basic development needs of different segments of the population.

For the urban sector, migration is likely to be largely spontaneous. As the urban population grows - and in order to promote racial balance in this growth - public investment in service and welfare facilities will be required. The present and potential urban population is insufficiently supplied with the skills needed for the development of urban manufacturing and trade industries, and the role of technical and vocational education will therefore be of special importance.

For the rural sector, there are basically three major categories of people who must be catered for:

(a) Those in immediate need of assistance, that is the landless, those without access to modern amenities or with particularly low productivity and income levels.

(b) Those with few resources, but with experience in commercial farming or educational training in modern farm methods who are capable of taking risks and appreciate the rewards of land improvement.

(c) Those who have financial resources or are creditworthy and can, or are willing to, invest private funds in agricultural development.

It is expected that the first group will be drawn largely, although not exclusively, from those currently engaged in shifting cultivation. In particular from those people living in areas where land resources are inadequate, reserves are exhausted and where there is little or no potential for in-place improvement schemes. Included should be those who have already moved from their home areas, or are eager to move, in search of better opportunities. Because these people lack experience, or success, with settled forms of agriculture the type of development best designed to meet their needs is likely to be one which incorporates, at least initially, a well developed management structure. For this reason it is suggested that these people could best be accommodated in a public estate type of development.

Within the rural population there are other people, particularly persons already engaged in intensive farming, who are capable of making an important contribution to economic growth, but for whom estate development holds out little attraction or would inadequately utilise their skills or training. It is suggested that these persons be accommodated in smallholder schemes. Finally, as a complement to public investment, provision needs to be made for private development of larger holdings.

These aspects of development have been discussed in the interim report "Alternative Strategies for Rural Development" and are summarised in Chapter 13 of this Report.

3.1.2 Legal Structure

Development is certain to increase the Government's presence at the village level. For this reason it is important that the existence of legal mechanisms embedded in village institutions be recognised, and that government officers responsible for implementing development programmes be sensitive to the social norms of the people with whom they work. Besides departmental training, a training programme in community development might be desirable and could provide a common background for all officers working in development at the local level.

There are several areas in which the divergence of customary and formal legal norms is likely to be particularly significant. One such area is land tenure. While a thorough treatment of land tenure is beyond the scope of work of this Study, it appears that the rationalisation of future land use will require reform of existing land laws and a clearer definition of native rights. As population pressures increase and larger areas are permanently cropped, the relationship between customary systems of tenure and the Land Code is certain to emerge as a major problem, particularly where the two diverge. Already a serious enforcement problem has taken shape in the form of illegal infringement and transfer of land use rights.

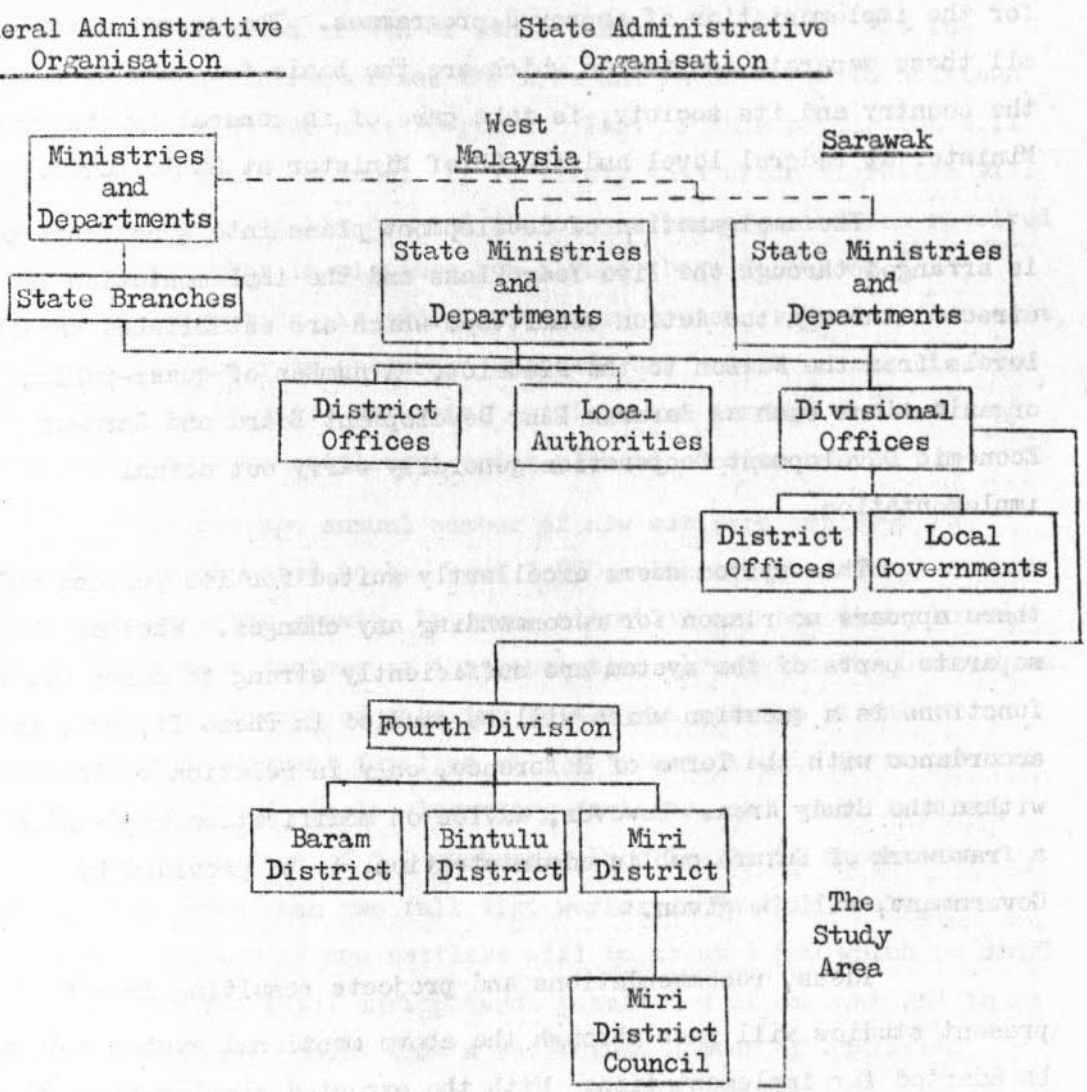
Without going into detail, several general observations might be made. First, the greatest obstacle to improved land use is likely to be the notion that rights of disposal, in contrast to rights of use, are vested in the local community, and any programme that appears to jeopardise this principle is apt to be resisted or seen as a threat to future security. Existing patterns of rights in the use of land appear to present less of a hinderance and are generally responsive to shifts in farming practice. Landlessness is relatively uncommon in the Study Area, and the fragmentation of holdings, where it poses the most serious potential problem as among sedentary cultivators such as the Kedayan, is frequently overcome by a tradition of sharing and cooperative work. However, fragmentation is the norm among both shifting and sedentary cultivators and these traditions may prove inadequate in the future.

Three codes of customary law are currently recongised for the indigenous people of the Study Area: Undang2 Mahkamah Melayu (Malay), Tusun Tunggu (Iban), and the Orang Ulu Customary Code of Fine (Kenyah, Kayan). Continued amendment is needed to adapt these codes to changing conditions and the emergence of new types of planned communities, some with culturally heterogeneous populations.

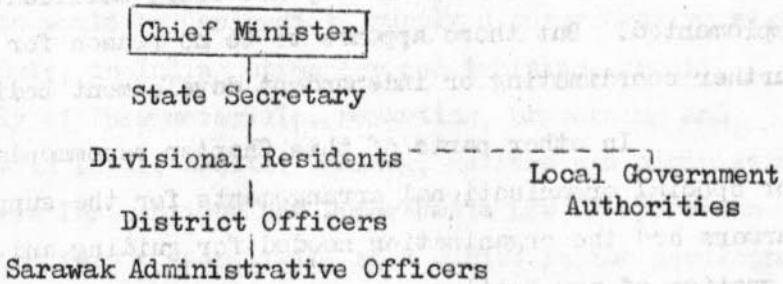
3.1.3 Administration of Development

The government of public affairs in Sarawak is divided between Federal, State and Local Authorities. The organisation is shown diagrammatically in Figure 3.1 which also traces the linkage to the Study Area.

FIGURE 3.1 MALAYSIA'S GOVERNMENT ORGANISATION



The chain of command in the hierarchy of State Administration is as follows.



Each ministry is responsible for the preparation of plans, budgets and programmes within its sphere of government, and eventually for the implementation of approved programmes. The coordination of all these separate activities which are the basis for development of the country and its society, is take care of in general by the Prime Minister at Federal level and the Chief Minister at State Level.

The amalgamation of development plans into a national policy is arranged through the Five Year Plans and the implementation is directed through the Action Committees which are established on all levels from the Nation to the District. A number of quasi-public organisations such as Sarawak Land Development Board and Sarawak Economic Development Cooperation generally carry out actual implementation.

This system seems excellently suited for its purpose and there appears no reason for recommending any changes. Whether the separate parts of the system are sufficiently strong to carry out the functions is a question which will be studied in Phase II, but, in accordance with the Terms of Reference, only in relation to development within the Study Area. However, advice on modification of details of a framework of future public administration, to be provided by Government, will be given.

Ideas, recommendations and projects resulting from the present studies will pass through the above mentioned system and thus be adapted for implementation. With the expected acceleration of regional development foreseen in this Report there will be a need to use the executive powers of the Divisional Action Committee to the full. A planning and monitoring unit will need to be attached to the Committee so that the progress and results of development can be kept continuously under study and any necessary modifications planned and implemented. But there appears to be no reason for recommending further coordinating or independent development bodies.

In other parts of this Chapter recommendations are given for special organisational arrangements for the support of independent farmers and the organisation needed for guiding and helping the migration of new settlers.

3.2 MIGRATIONARY TRENDS

The present report assumes that the Study Area will absorb some of the population growth of other parts of Sarawak. Net in-migration already characterises the Area and is expected to continue to do so throughout the next 20-years. Part of this population will be absorbed in urban centres. It is likely that urban migration will take place largely on its own and the supporting organisation required to accommodate urban in-migrants has already been discussed (3.1). For rural in-migration, in addition to unsupported, voluntary movement, it will be necessary to encourage migrants and create an organisation that is able to identify potential settlers and arrange for and facilitate, their re-settlement under planned conditions.

The average annual number of new settlers employed in agriculture is expected to be about 1 250, although the actual number will depend on urban growth, internal migration and the distribution between employment sectors of the population already in the Study Area. Based on the experience of existing settlement schemes it can be expected that in-migrant families will be young, simple in compostion consisting mainly of single elementary families, and small in size, at or below an average of 5.2 members. Each family is expected to consist of no more than two full time workers. On this basis, the total annual number of new settlers will be about 3 500 which is small in relation to the total agricultural population of Sarawak and there appears to be little doubt that a sufficient number of qualified settlers exists. What is needed is an adequate organisation to locate and select these people. Also required will be sufficient incentives built into development schemes to attract and hold the people.

For settlers to be accommodated as smallholders the supporting organisation is described as an 'Integrated Development Organisation'. Such an organisation would be designed to supply a comprehensive system of agricultural inputs, including extension and training, credit, cooperatives, supply of farm materials, marketing, processing and storage, together with legal, health, banking, welfare and administrative services. Staff from Institutions and Departments now in operation would be incorporated into a team living in a centre in the development area. Coordinated, complementary operation of the team would be the responsibility of the team leader. It would be desirable for settlers to participate in running the services provided at the centre, and to

gain involvement it would be essential that farmers participate in training activities and in the various aspects of operating the project from the outset.

For the public estate-type of development an organisation already exists in the form of SLDB which is in the process of further consolidation. Present SLDB schemes in the Lambir Subis Development Area are designed to open blocks of currently unoccupied land and entail the movement of settlers from other areas onto the land which is developed prior to their arrival. Settlers are called upon to adapt rapidly to the new and highly planned living conditions, and persons of different ethnic backgrounds are frequently brought together in a single settlement complex, thus creating social integration often prevented by existing land restrictions. Recruitmen priority is given particularly to those persons without land or person inadequately supplied with modern amenities under their existing circumstances. These selection guidelines, and others, are incorporat in a point system. The system now used is under review and will require constant re-evaluation in the future. In addition, a thorough assessment is needed of the potential settler population, as defined by these guidelines, in order to identify the most disadvantag areas and communities where local development schemes are difficult, or impossible, to implement. Such an assessment is required as a background to the establishment of an expanded programme of publicity and recruitment that is likely to be needed as public development organisations grow in scale.

For some communities there already exist firmly established patterns of migration. This is particularly true for Iban, coming mainly from the Second and Third Divisions, and for Chinese from the First and Third Divisions. Most of these migrants face difficulties securing an adequate livelihood in their home areas and perceive the possibility of bettering themselves in the Study Area. Motivation for migration therefore exists and could be further channeled by organised planning. For Iban in particular, migration to most of the Study Area has been relatively recent and ties with previous home communities are frequently maintained and often serve as a means by which newcomers are absorbed in existing local communities. This pattern could be utilised in drawing new settlers to development schemes, although there are disadvantages that would have to be carefully considered.

Creating new patterns of migration is likely to prove more difficult and will require an understanding of the potential migrants, their needs and current conditions. A more detailed consideration of migration will be taken up in Phase II.

For the potential settlers the decision to migrate is an important one that is certain to have a profound effect on his future and that of his family. It is critical therefore that the decision be an informed one. For this reason, established settlers might be used to recruit others. Alternatively selected settlers, or their representatives, could be given an opportunity to visit the new area, or similar development schemes, prior to taking up permanent residence. Films, lectures and question-and-answer sessions with established settlers, as well as with government development personnel, might be helpful to prepare selected settlers for movement.

In addition, new settlers should be given an orientation course in which the terms of scheme entry are fully described. Misconceptions, or unrealistic expectations, are certain to create dissatisfaction. Orientation should include, besides a discussion of the objectives of scheme development, a frank airing of the difficulties that new settlers are likely to experience and the responsibilities they assume in joining a scheme.

3.3 NEW SETTLEMENT DEVELOPMENT

The basic aim of settlement schemes is to improve the social and economic standards of the rural population. Where schemes involve re-settlement, careful attention must be given to the harmonious integration of new settlers with the existing rural population. This will require a balanced effort to raise agricultural standards and stimulate the better use of presently occupied land, if basic conflict over resources is to be averted. In addition, in planning settlement schemes, it may be desirable to improve transport facilities to a level that allows for a concentration of settlers in relatively large population centres that provide more varied social surroundings and, at the same time, make available a high level of service to the neighbouring farming population. The linkage of improvement schemes in already occupied land with the social amenities as well as the processing and market facilities created at these centres could be particularly important.

Income creation and its adequate distribution through time are critical to the success of a scheme, and careful planning is needed to meet the heavy development costs required to establish a scheme without indebting settlers beyond their ability to repay or to the determent of immediate earning levels.

Social considerations are equally, if not more, important and it is essential that planned settlements exert a positive impact by creating an environment that provides education, health and other services as well as teaching self-help and cooperation. In order to foster initiative and community responsibility the growth of settler organisations is vital, and these groups should participate in decisions and eventually take direction of all matters pertaining to community affairs. In this way technically trained personnel might be left to deal more effectively with the physical and economic aspects of scheme management. On schemes of the public estate type the role of the settlement officer is certain to be important as a communication link between settlers and scheme staff. Settlers' aspirations are certain to change as schemes evolve and an important task of the settlement officer, as his duties are further defined, will be to reassess these changes and assist settler organisations in translating them into effective action.

Tightly managed schemes of an estate type exact a social cost in terms of loss of individual initiative in the economic sphere and this cost may be deemed unacceptable in the future in terms of social goals. Therefore, alternative social environments need to be considered and, in some cases, are already being planned for through schemes to provide common ownership, cooperative management, shares or transfer of established holdings to individual ownership. Individual ownership is a feature of existing schemes initiated under Rubber Planting Scheme 'B'. Some of the weaknesses of these schemes, such as non-residence or poor maintenance of scheme lots, have been attributed to this feature but it is uncertain, at the moment, that this is justified in all cases or that these weaknesses cannot be overcome, by for example, tightened selection procedures or by appending stricter conditions to the transfer of title. SLDB is presently considering settler share-holding systems incorporating continued agency ownership and control to be carried out in order to ensure a continuance of high standards of management. Such schemes

eliminate individual land ownership and a major incentive attracting settlers to existing schemes. They also entail, despite profit sharing provisions, a considerable social cost factor. Ultimately careful thought must be given to the kind of social environment that is most desirable from the standpoint of societal values and, in these terms, creation of a variable pattern of owner-cultivator communities may be the desired objective of long-term settlement planning.

APPENDIX II.1

AN EVALUATION OF SOME IMPORTANT AERIAL PHOTO INTERPRETATION UNITS

II.1.1 INTRODUCTION

Semi-detailed field investigations have been carried out in four sample areas which were chosen mainly to identify and solve certain soil classification problems. Thus the samples are not necessarily representative of the terrain classes in the Study Area. However, within the 35 000 acres investigated there were roughly 20 000 acres contained in photo-interpretation units B2 and in complexes of B2/B3 Unit. Units B2 and B3 are of particular importance because it is thought that the division, based on terrain factors, between suitability and unsuitability for agricultural development lies between them; B2 generally having slopes too steep and B3 generally having acceptable slopes.

Data collected from the sample areas has been used to test this assumption. Although the results indicate that it was correst this conclusion is based on too small a sample to be considered completely reliable.

II.1.2 STEEPNESS OF SLOPE

In the B3 mapping units within 2 of the sample areas investigated a concentration of low hills - less than 130 feet - with gentle slopes were found. More than 80 per cent of all observation sites on slopes less than 20 degrees fell within this mapping unit for which the main slope range appears to lie between 9 and 15 degrees. Confining the selection of sample areas to land assessed as possibly suitable for agriculture resulted in mapping Unit B2 occuring in only one sample area in sufficient size to give the data required for similar slope calculations. The findings for this unit are:-

a) maximum hill height 210 feet above local alluvial level;

b) 80 per cent of all observation sites are in excess of 20 degrees, 60 per cent in excess of 24 degrees and 48 per cent in excess of 25 degrees;

c) main slope range lies between 21 and 30 degrees.

A presentation of terrain characteristics of the aerial photo-interpretation units is given in Figure II.1.

II.1.3 DEPTH OF SOIL

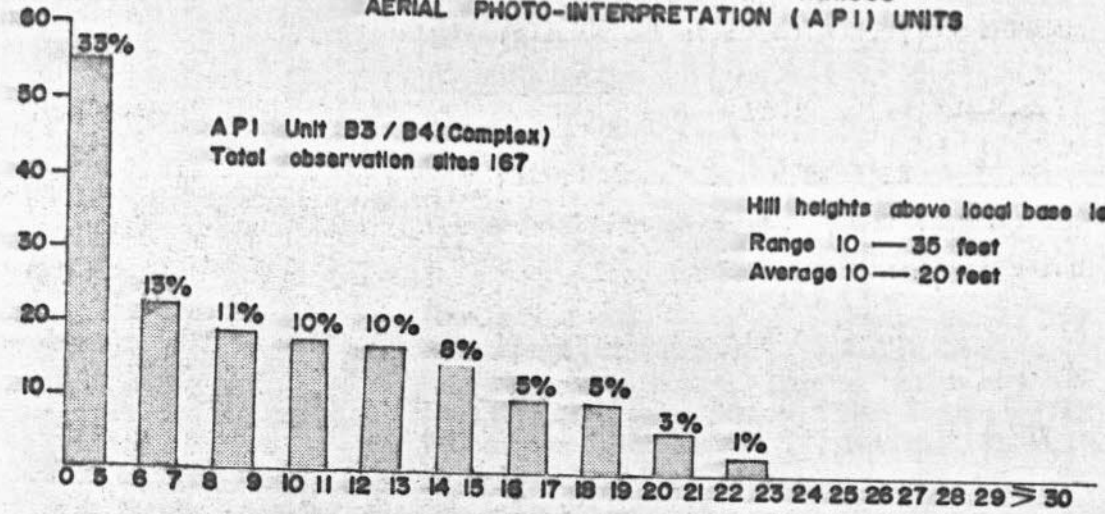
Effective soil depth or the volume of soil in which rooting has occured under natural conditions are important criteria in selecting land suitable for agriculture.

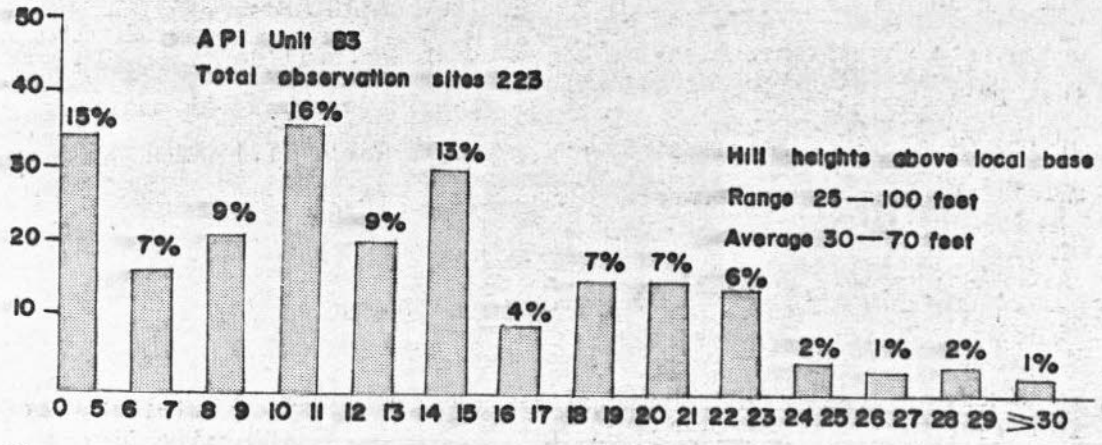
Field evidence collected so far has shown that soil depth, both in terms of pedological depth and rooting depth, is related to slope. It was found that generally the steeper the slopes the shallower the soils. The reverse, however, does not hold true, not all gentle slopes have deep soils. In the sample areas studied some 50 percent of the investigation sites which had soil depths of less than 20 inches were on slopes of less than 20 degrees. An analysis of the findings from this study are given in Table II.1 which shows th relationship between slope class and soil depth.

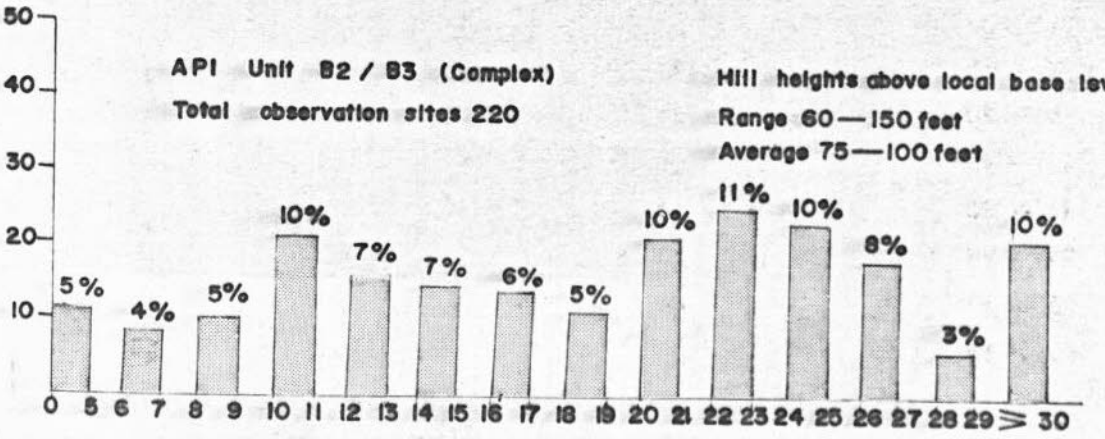
II.1.4 SLOPE RANGE AND EFFECTIVE SOIL DEPTH

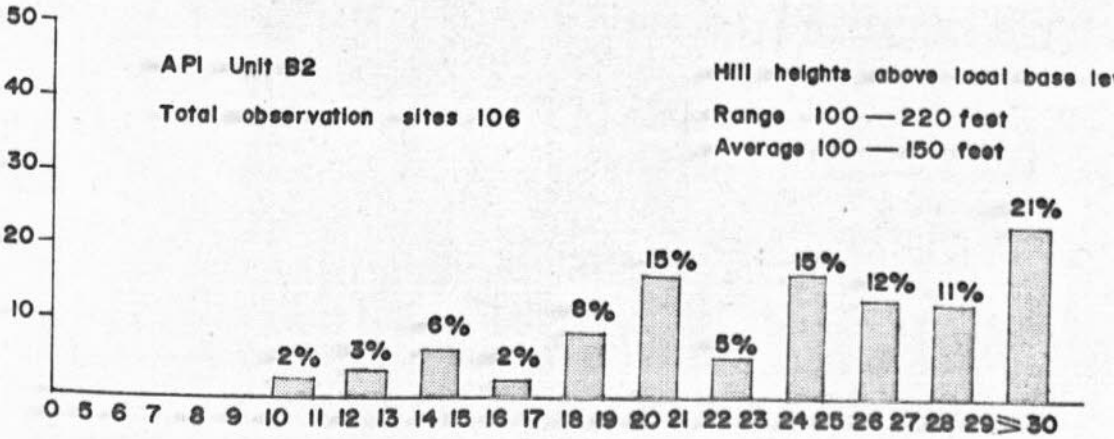
Slope Range in degrees	Percent of sites ≤24 inches Effective Depth	Percent of sites ≤20 inch Effective Soil Depth
0 - 5	11	7
6 - 10	22	12
11 - 15	25	18
16 - 20	32	19
21 - 25	41	33
26 - 30	62	52
over 30	65	62

TERRAIN CHARACTERISTICS OF VARIOUS AERIAL PHOTO-INTERPRETATION (API) UNITS









NUMBERS OF SITES MEASURED

SLOPE RANGE IN DEGREES

NOTE

Total area studied for Units: B3 / B4, B3 and B2/B3 is 14 950 acres
For Unit B2 5 200 acres

APPENDIX II.2

REFERENCES

Cooper, M.	1972	Alternative Strategies for Rural Development	M-B Study. Interim Report.
Lee Yong Leng	1970	Population and Settlement in Sarawak	Asia Pacific Press. Singapore.
Mathiesen C. J.	1972	Land Tenure, Cultivation Practices; Land Code.	M-B Study, Draft. Internal Paper.
Morris H. S.	1972	Preliminary Note on Land Tenure in Sarawak.	M-B Study, Draft. Internal Paper.
Sather C. A.	1973	The Human Factor in Development	M-B Study. Interim Report.
Wycherley P. R.	1972	Conservation in Malaysia	Planter, Kuala Lumpur.

PART III

REGIONAL DEVELOPMENT

PART III

REGIONAL DEVELOPMENT

INTRODUCTION

Part III deals with the future population, the settlement pattern, the occupation structure and the transport system. The ideas and estimates presented are founded on the presently identified natural resource potentials of the Study Area and on development considerations outlined in Chapters on agriculture, forestry and urban trades.

CHAPTER 4
REGIONAL STRUCTURE

4.1 INTRODUCTION

Regional structure is basically the location of economic and social activities, that is the distribution over the territory of the population, the towns, the main industries, the transport lines and transport terminals. The future regional structure, envisaged as a result of considerations of possible agricultural, forestry, industrial and transport developments, is shown diagramatically in the Perspective Plan Map and in Figure 1.1.

It is envisaged that the urban population will increase from 35 to 55 per cent of the total population and that the urban trades, manufacturing and services, will grow significantly. This implies tendencies towards concentration of the population, but it has been a major aim in our considerations to counteract these tendencies by recommending a number of new or expanded service towns and by establishing sufficient public institutions and recreational facilities over the Region.

For planning purposes the Study Area has been divided into planning units and sub-units. The development potentials are then described with reference to these units, which are shown in Figure 4.1. The Figure also shows the FAO Forest Units, which indicate the hill dipterocarp forest areas identified by the FAO Forest Industries Development Team for exploitation. The development potentials of the three planning units can be summarised as follows (confer figure 1.1).

Baram: mainly agricultural development along the future road from Beluru to Long Lama supported by forest exploitation east and south of Long Lama as the basis for a timber complex in that town. The population growth of the unit would be slower than in the other units and the degree of urbanisation relatively lower. A shift of importance, from Marudi as the present service centre of the unit to Long Lama in the future is envisaged.

Bintulu: promising and diversified potentials for development of forestry, agriculture and manufacturing industries in the unit. Bintulu town is envisaged as a future timber centre, which would contain timber processing industries and related activities like forest vocational training schools and greatly expanded Forest Departmental offices. The expected emergence of Bintulu town into a growth pole assumes a deliberate Government policy to establish footloose industries in the area, preferably connected with some kind of a port outlet at Tanjong Kidurong, which also is the possible site for a Liquified Natural Gas (LNG) plant.

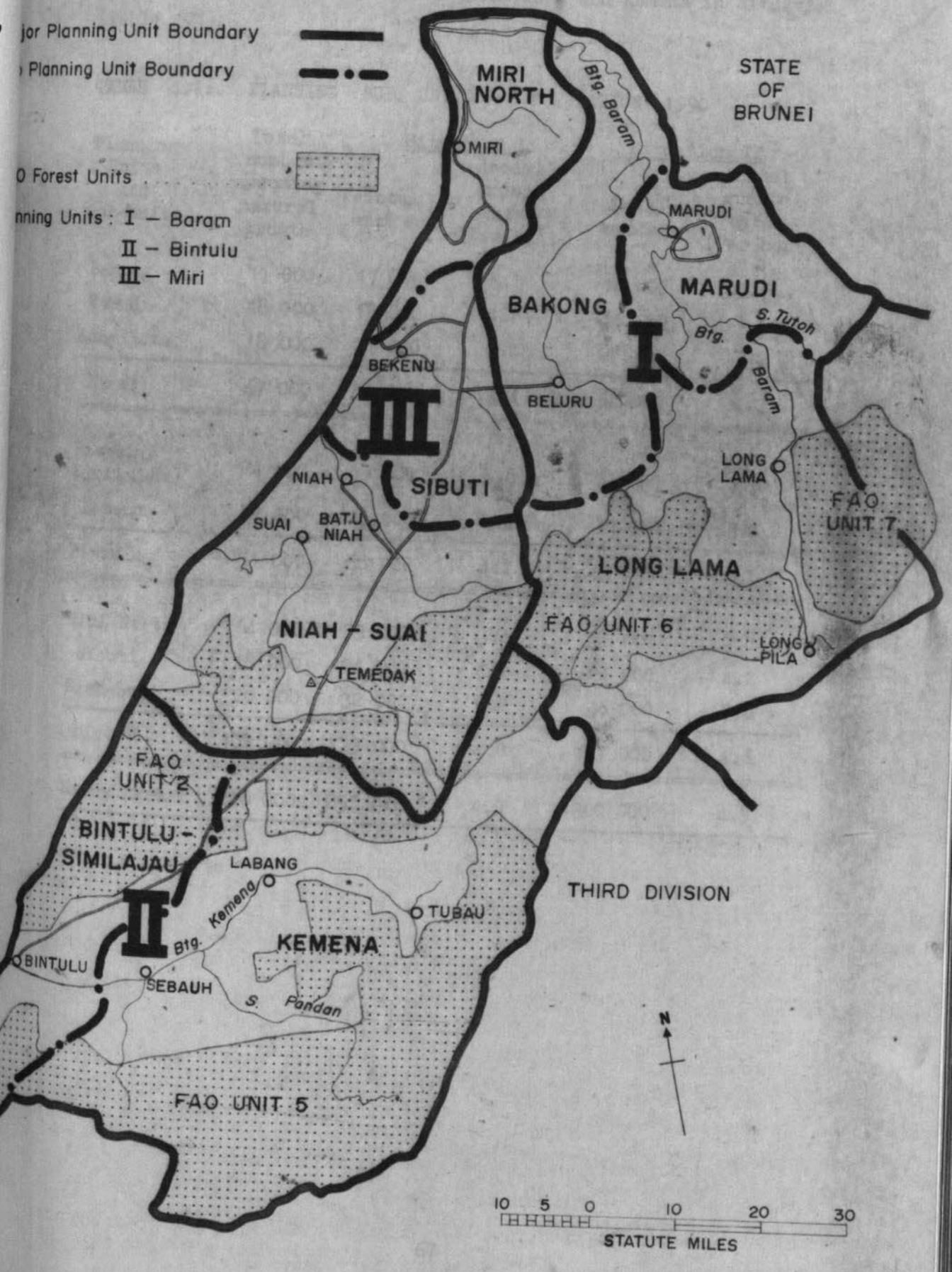
Miri: sustained growth of manufacturing and service industries in Miri town, which for many years will continue to be the major generator of economic growth in the whole Region. Further spread of large scale agricultural development from the present Lambir-Subis area southwards along the Miri-Bintulu road to the Niah-Suai area, where the future agricultural and forestry population will form the basis for a new centre. The growth of this unit is expected to be slightly slower than that of the Bintulu planning unit.

4.2 POPULATION GROWTH

The future population and its expected rate of growth within the planning sub units has been based on the presently identified development potentials of the units. However, in setting up a 20 year perspective for development of these areas it has not been possible to produce detailed proofs or reasons for all assumptions because, the human imagination cannot cover all future technical, organisational and social possibilities over such a time span. Hence it is not a mathematical relationships between the identified development potentials of the planning units and the employment and population figures, but rather hypothetical relationships based on present knowledge and possible development undertakings. Continual checking and re-ostimation of the future positions will therefore be required.

FIGURE 4.1

LANNING UNITS AND SUB-UNITS



The populations in all planning sub units are envisaged to grow in both Situations I and II; Marudi is expected to expand by less than its natural growth in both Situations and Kemena in Situation I (Table 4.1).

TABLE 4.1: PLANNING SUB UNITS - POPULATION 1990

Planning Units and Sub-units	Total number assuming natural growth	Situation I		Situation II	
		Total number	Annual growth rates (Per cent)	Total number	Annual growth rates (Per cent)
Bakong	11 000	17 000	5.2	19 000	5.7
Marudi	18 000	15 000	1.8	15 000	1.8
Long Lama	18 000	21 000	3.4	28 000	5.0
Baram	47 000	53 000	3.4	62 000	4.2
Bintulu/ Similajau	24 000	43 000	5.6	61 000	7.5
Kemena	27 000	25 000	2.4	30 000	3.4
Bintulu	51 000	68 000	4.2	91 000	5.6
Miri North	64 000	73 000	3.4	77 000	3.7
Sibuti	18 000	24 000	4.2	24 000	4.2
Niah-Suai	20 000	32 000	5.2	46 000	7.0
Miri	102 000	129 000	4.0	147 000	4.6
Study Area	200 000	250 000	4.0	300 000	4.9

The highest annual growth rate is expected in the Bintulu planning unit, which would more than double its population in Situation I and triple it in Situation II. The second fastest growing planning unit is foreseen to be Miri, which in Situation I would double its population but would not grow as fast as Bintulu.

Based on the scarcity of unencumbered land for agricultural development and the relative inaccessibility of the Baram area, this planning unit has been envisaged as the one growing most slowly. Nevertheless, in Situation II the unit is seen to more than double its present population.

4.3 URBAN GROWTH

The idea behind the regional structure suggested in this Perspective Plan is a compromise between the two, sometimes conflicting goals, efficiency of operation and equality of opportunity within the Region. A compromise between the two goals would be to concentrate the development in a limited number of well equipped urban growth poles.

As a result of a rapid expansion of the urban trades, a considerable growth in the urban and semi urban population of the Region has been assumed, namely from about 41 000 urban dwellers in 1970 to 133 000 and 165 000 persons in Situations I and II respectively (Table 4.2).

The Bintulu planning unit is assumed to increase its urban population from less than 7 000 in 1970 to about 35 000 in Situation I and more than 50 000 in Situation II. This is due to a particularly rapid growth of Bintulu town itself, which if backed by a deliberate industrialisation policy would turn into a growth pole of major importance. The rapid growth of Bintulu town presupposes an efficient port outlet in the area.

TABLE 4.2: STUDY AREA - URBAN POPULATION 1970 AND 1990 BY PLANNING UNITS

Planning Unit	Urban/Semi-urban areas	1970 population	1990 Situation I Population	1990 Situation I Annual growth rates (per cent)	1990 Situation II Population	1990 Situation II Annual growth rates (per cent)
Baram	Beluru		4 000		5 000	
	Marudi	3 900	6 000	2.2	6 000	2.2
	Long Lama	600	7 000	13.0	10 000	15.0
Sub Total		4 500	17 000	6.8	21 000	8.0
Bintulu	Bintulu	6 200	25 000	7.2	42 000	10.0
	Labang		8 000		8 000	
	Sebauh	700	2 000	5.4	2 000	5.4
Sub Total		6 900	35 000	8.4	52 000	10.5
Miri	Miri-Lutong	27 000	60 000	4.1	63 000	4.3
	Bekenu	700	3 000	7.5	3 000	7.5
	Lambir-Subis		7 000		7 000	
	Niah	1 000	1 000		1 000	
	Batu Niah	1 000	3 000	5.7	5 000	8.4
	Temedak		7 000		13 000	
Sub Total		29 700	81 000	5.2	92 000	5.6
Study Area		41 000	133 000	6.0	165 000	7.1

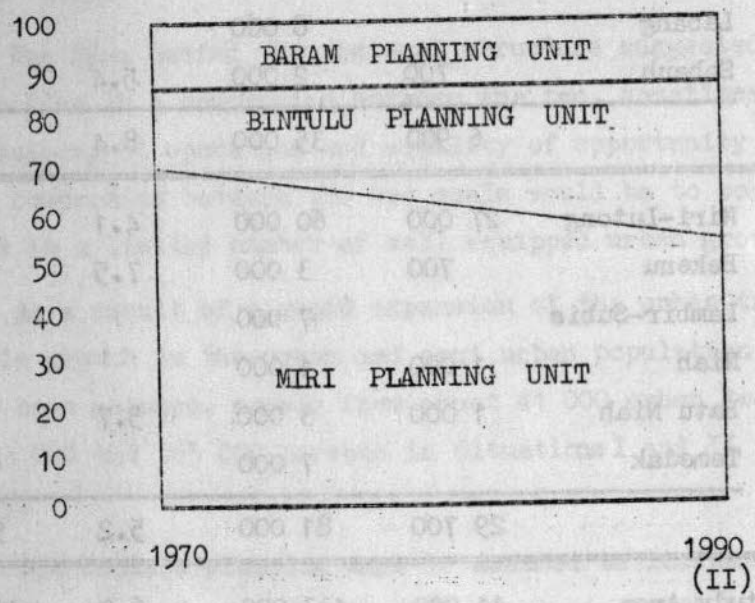
The major urbanisation in the Miri planning unit will take place naturally in Miri-Lutong, which is already a growth pole. In absolute figures the urban Miri would grow more than Bintulu town in Situation I and about the same in Situation II, but relatively it would be less in both alternatives.

In the Baram planning unit most of the urban or semi-urban population growth is expected to occur in Long Lama, which is seen as the future service centre for the Baram District. The town is envisaged to provide improved services to people living in the more remote areas of the Upper Baram; especially so when the town is eventually connected to the Region's road network.

Of the three existing relatively large towns in the Study Area, Bintulu is expected to have the highest growth rate (seven to ten per cent) compared to four per cent for Miri-Lutong and about two per cent for Marudi.

The relative growth of the urban population from 1970 to 1990 for each planning unit in Situation II is illustrated in Figure 4.2.

FIGURE 4.2: SHARE OF URBAN POPULATION BY PLANNING UNIT (SITUATION II)



Bintulu planning unit would in Situation II increase its share of the total urban population from less than 20 per cent in 1970 to more than 30 per cent in 1990, which would presuppose a major effort in investment and administration. Baram's share is expected to remain about stable throughout the period while the share of the Miri unit is seen to drop from 70 per cent in 1970 to 55 in 1990.

In both Situations I and II the urban and semi-urban populations are forecast to grow faster than the total population growth of the Study Area, which implies a net migration from rural to urban areas. Thus, the percentage of people living in urban and semi-urban areas would increase from 35 per cent in 1970 to about 54 per cent in 1990, as shown in Table 4.3.

TABLE 4.3: PLANNING UNITS - DEGREE OF URBANISATION 1970 AND 1990

Planning Units	Urban population 1970 (per cent)	1990 urban population Situation I (per cent)	1990 urban population Situation II (per cent)
Baram	16	32	34
Bintulu	23	51	57
Miri	50	63	63
Study Area	35	53	55

4.4 OCCUPATION STRUCTURE

Chapter 1 contains a description of two possible future occupation structures for the whole Region. In this section and Chapter 5 it is sought to distribute to the planning units and sub units the total employment by sectors in accordance with the presently identified development potentials of the units. Both Situations are considered but the distribution, especially with regard to the sub-units, must be accepted as uncertain and tentative because;

- a more final assessment of the development potentials and the actual planning of the development cannot be completed until Phase II;
- most of the development potentials outside the agricultural and part of the forest sectors are not confined to a certain planning sub unit. Hence, a political decision to canalize development to certain areas could change the picture considerably.

However, the relative figures showing the occupation structure in Table 4.4 and the absolute figures presented in the Tables 5.1 to 5.3 are consistent with the population figures and the growth of urban areas previously postulated.

Table 4.4 gives both the vertical (28/-) and horizontal (-/66) percentages, i.e. the Baram unit has 28 per cent of the total agricultural employment in the Study Area and 66 per cent of the employment in the unit is in agriculture in Situation I.

TABLE 4.4: OCCUPATION STRUCTURE BY SECTOR AND PLANNING UNITS SITUATIONS I AND II

PERCENTAGE DISTRIBUTION 1990

Planning unit	Agriculture		Forestry		Manufacturing		Services		Total	
	I	II	I	II	I	II	I	II	I	II
Baram	28/66	28/57	31/7	30/7	12/12	12/15	14/15	17/21	21/100	21/100
Bintulu	28/52	28/39	50/8	53/8	26/20	35/29	23/20	27/24	27/100	30/100
Miri	44/44	44/39	19/2	17/2	62/26	53/28	63/28	56/31	52/100	49/100
Study Area	100/51	100/43	100/4	100/5	100/22	100/26	100/23	100/26	100/100	100/100

In both Situations agriculture would play an important part in the Baram unit as manufacturing and service employments are kept on a rather limited scale.

In Situation I more than half of the employment in the Bintulu planning unit would be in agriculture. The relative importance of agriculture would be reduced considerably in Situation II, as this alternative is based on a major development of manufacturing industries in Bintulu town itself, with a corresponding increase in service employment.

More than half of the employment in the Miri planning unit would, in both Situations, be in the urban trades, and the unit would have about 50 to 60 per cent of the total manufacturing and service employment of the whole Region.

CHAPTER 5

DEVELOPMENT POTENTIALS OF PLANNING UNITS AND SUB UNITS

5.1 INTRODUCTION

The early stages of the future development of the Study Area will mainly be based on the exploitation of natural resources. The growth of the Region will therefore be heavily dependant on how fast these resources are exploited and, even more important, to what extent they will form the basis for local processing industries. It is therefore important that agricultural products, the vast forest resources and the valuable oil and gas deposits should form the basis of manufacturing industries in the Study Area. These industries could then be the growth generators in an industrialisation process which could create new employment by investment of capital for further development into the Region.

An example of a better utilisation of the natural resources would be to utilise, secondary timber from hill forests already logged for export purposes as a basis for a prefabrication plant of modular type houses and for the manufacturing of general wooden articles, such as packing cases and simple furniture. The already logged forests are known to contain moderate quantities of trees suitable for such production. These trees are at present merely felled and burnt when the area is cleared for agricultural development. A plant for prefabrication of modular type houses or building elements could in fact be a considerable asset during development because it is envisaged that between 1 600 and 1 900 houses would be needed per year.

5.2 BARAM PLANNING UNIT

The growth of the Baram planning unit would be based mainly on agricultural development and forest exploitation, the bulk of which would occur in the Bakong and Long Lama sub units where exploitable natural resources are already, or soon could be, accessible by road. Especially for agriculture road accessibility is seen as a prerequisite for any large scale development.

The future agricultural development in Bakong is seen as an extension of the Lambir-Subis Development Areas into the State Land (15 000 acres) and Native Customary Land (53 000 acres) in Block A3 (see Figure 5.1). The envisaged development and improvement schemes

in this block could in future cater for an agricultural population of 10 to 15 000, who would rely on Beluru for their supply of services.

By an extension of the Beluru road via Long Teru to Long Lama, the agricultural and forest potentials of this sub unit could be easily exploited. These potentials include more than 90 000 acres of Native Customary Land in Block C2, 180 million cubic feet of valuable timber in FAO Unit 7 and 330 million cubic feet in FAO Unit 6. The timber flow from FAO Unit 6, however, would be divided between Long Lama and the Niah-Suai sub unit (Temedak). The forest resources of FAO Units 6 and 7 could easily support a timber complex in Long Lama which would then become the main timber and service centre for most of the Baram planning unit and the Ulu Baram. However, the wisdom of locating the whole of the timber processing complex in Long Lama is in doubt. To arrange for so large a part of an urban settlement to depend on only one kind of industry could be unwise, especially when this kind of industry is rather vulnerable to changes in the world market demand and prices. Therefore the possibility of splitting the complex should be considered; part of the preprocessing in Long Lama and a part in Miri or Bintulu.

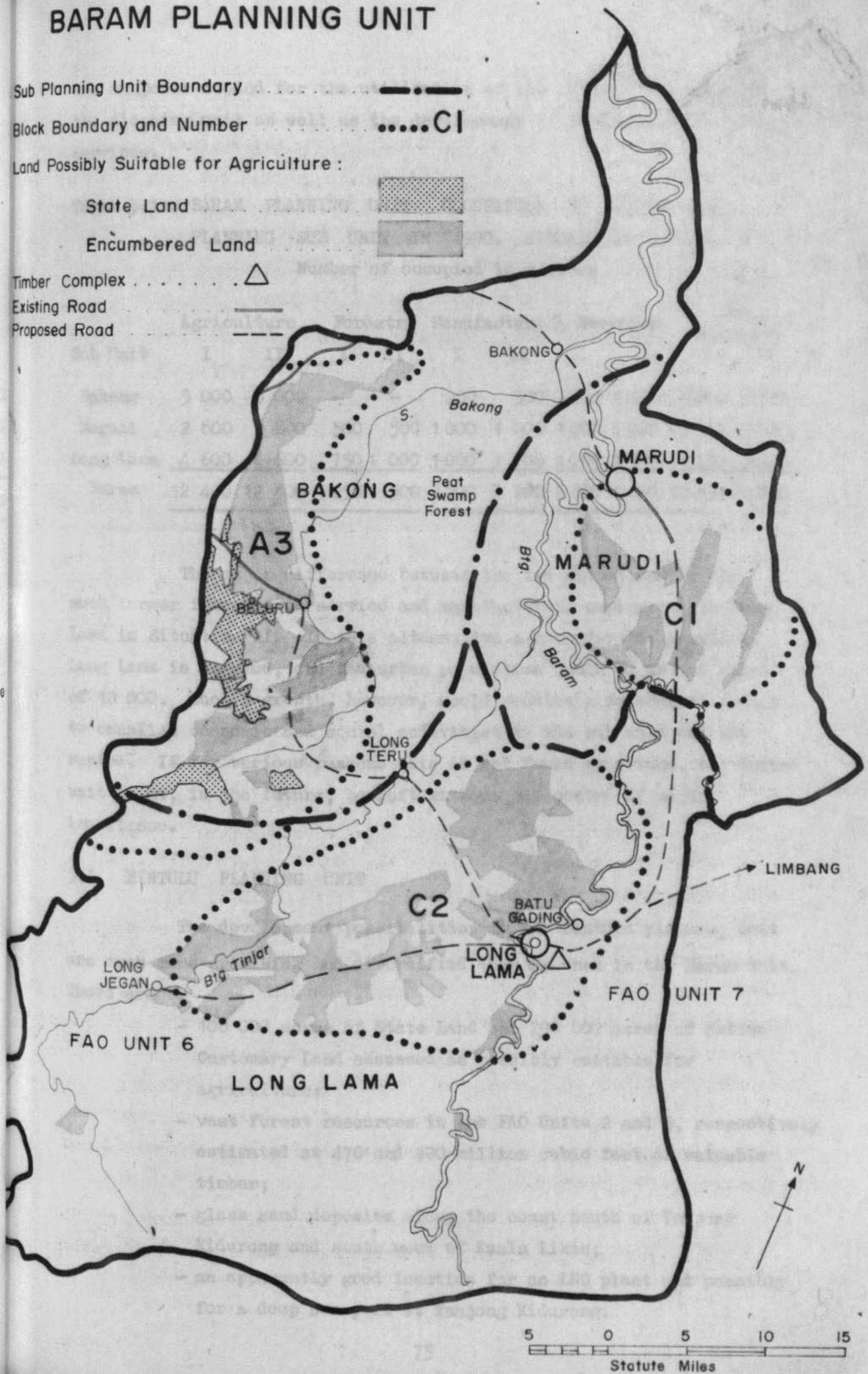
As an incentive to introduce a more modern type of agricultur in the south-western part of C2 a road from Long Lama to Long Jegan should be built. This road would also serve as a timber extraction road for FAO Unit 6.

As previously mentioned the Marudi sub unit will possibly grow slower than its natural growth, i.e. the sub unit will experience net out-migration. This belief is based on two points; the lack of land possibly suitable for agriculture in the area and the assumption that Marudi town will be connected to the Miri-Bintulu road only via Long Lama. This picture of growth could, however, be changed if the planned road to Kampong Bakong could be extended through the peat swamp area to Marudi. If this is not considered realistic during the 20 year period, the Bakong road should be reconsidered because it does not pass through land with agricultural potentials and because logs from the peat swamp forest west of Marudi could be floated down to Kuala Baram for processing or export.

The occupation structure of each sub unit is shown in Table 5.1. The estimates underlying the table have taken into consideration

DEVELOPMENT POTENTIALS OF THE BARAM PLANNING UNIT

FIGURE 5·1



the manpower needed for the utilisation of the natural resources of the planning unit as well as the development of manufacturing and services.

TABLE 5.1: BARAM PLANNING UNIT: OCCUPATION BY SECTOR AND PLANNING SUB UNIT IN 1990. SITUATIONS I AND II

Number of occupied in sectors

	Agriculture		Forestry		Manufacturing		Services		Total No. occupied	
Sub Unit	I	II	I	II	I	II	I	II	I	II
Bakong	5 000	5 000	-	-	200	500	800	1 150	6 000	6 650
Marudi	2 800	2 800	500	500	1 000	1 000	1 000	1 000	5 300	5 300
Long Lama	4 600	4 600	750	1 000	1 000	1 700	1 000	2 500	7 350	9 800
Baram	12 400	12 400	1 250	1 500	2 200	3 200	2 800	4 650	18 650	21 750

The major difference between the two Situations is the much larger increase in service and manufacturing employment in Long Lama in Situation II. In this alternative a considerable growth of Long Lama is assumed, and the urban population could be in the range of 10 000. Such a growth, however, would require a determined policy to canalise economic and social activities to the sub unit and the centre. If for various reasons this is not found opportune, the Baram unit might, in the future, be left without any centre of major importance.

5.3 BINTULU PLANNING UNIT

The development possibilities in the Bintulu planning unit are much more promising and diversified than the ones in the Baram unit. There are

- 106 000 acres of State Land and 200 000 acres of Native Customary Land assessed as possibly suitable for agriculture;
- vast forest resources in the FAO Units 2 and 5, respectively estimated at 470 and 400 million cubic feet of valuable timber;
- glass sand deposits along the coast south of Tanjong Kidurong and south west of Kuala Likau;
- an apparently good location for an LNG plant and possibly for a deep sea port at Tanjong Kidurong.

These development possibilities coupled with a deliberate policy to establish footloose industries in the Bintulu urban area could possibly support a population in the planning unit of 70 000 (I) to 90 000 (II) in 1990. The occupation structure corresponding to such a large scale development is shown in Table 5.2.

TABLE 5.2: BINTULU PLANNING UNIT: OCCUPATION BY SECTOR AND PLANNING SUB UNIT IN 1990. SITUATIONS I AND II

	Number of occupied in sectors									
	Agriculture		Forestry		Manufacturing		Services		Total No. occupied	
Sub unit	I	II	I	II	I	II	I	II	I	II
Kemena	6 500	6 500	500	700	1 000	1 300	1 000	2 000	9 000	10 500
Bintulu/ Similajau	6 000	6 000	1 500	1 950	3 900	8 050	3 650	5 500	15 050	21 500
Bintulu	12 500	12 500	2 000	2 650	4 900	9 350	4 650	7 500	24 050	32 000

The Kemena sub unit, which is mainly based on agriculture, is expected to remain roughly the same level in both Situations while the Bintulu/Similajau unit in Situation II would double its employment in manufacturing compared to Situation I. In Situation II, which presupposes an efficient port outlet in the area, manufacturing would be the major single employer while agriculture is the most important in the other Situation.

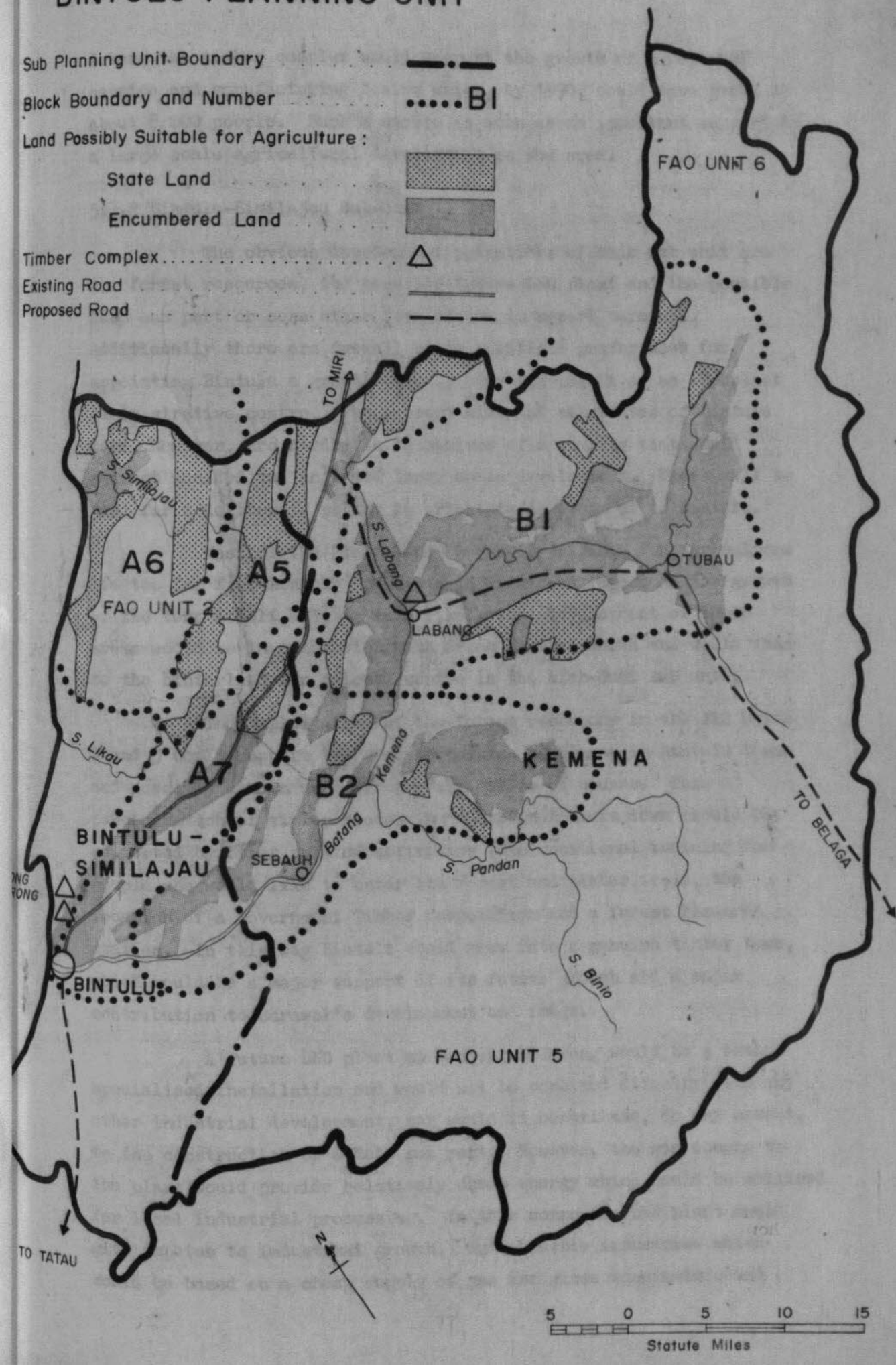
5.3.1 The Kemena Sub-Unit

Future agricultural possibilities of this sub unit lie partly in improved farming in approximately 135 000 acres of Native Customary Land and partly in the development of the single parcel of about 14 000 acres of unencumbered State Land in Block B1 (see Figure 5.2). The area lies between Labang and Tubau, and, after a connecting road to the Miri-Bintulu road has been constructed, this area and the forests in the eastern part of FAO Unit 2 together with the northern part of FAO Unit 5 will be easily accessible.

The south-eastern part of the FAO Unit 2 is proposed by FAO as the basis for the immediate establishment of a timber complex located at the junction of the future road to Labang and the Miri-Bintulu road (see Figure 5.2). For regional development reasons, however, the complex would have a better location directly in Labang because there is a need for a sub unit centre in this area. In

FIGURE 5·2

DEVELOPMENT POTENTIALS OF THE BINTULU PLANNING UNIT



Labang the timber complex would support the growth of a regional service and manufacturing centre which, by 1990, could have grown to about 8 000 people. Such a centre is seen as an important support to a large scale agricultural development in the area.

5.3.2 Bintulu-Similajau Sub-Unit

The obvious development potentials of this sub unit are the forest resources, the possible future LNG plant and the possible deep sea port or some other form of sea transport terminal. Additionally there are overall state political preferences for appointing Bintulu a growth pole by establishing it as an important administrative centre. The present size and attributes of Bintulu town, however, are hardly in themselves of a quality that would attract unaided and unguided large scale development. There will be need for a deliberate policy to orientate development to Bintulu.

Most of the State Lands possibly suitable for agriculture lie too far from Bintulu to have a major direct impact on the growth of the town itself. It is more likely that development of those areas would be in connection with areas further north and would thus be the hinterland for a local centre in the Niah-Suai sub unit.

The exploitation of the forest resources in the FAO Units 2 and 5 could support two wood processing complexes in Bintulu town and possibly also a unit for prefabrication of houses. This concentration of timber processing units in Bintulu town should be supported by other related activities like vocational training for people who would like to enter the forest and timber trade, the location of a Government Timber Corporation and a forest research station. In this way Bintulu could grow into a genuine timber town, which would be a major support of its future growth and a major contribution to Sarawak's development and image.

A future LNG plant at Tanjong Kidurong would be a rather specialised installation and would not be combined directly with any other industrial development, nor would it contribute, to any extent, to the construction of a deep sea port. However, the gas coming to the plant would provide relatively cheap energy which could be utilised for local industrial processing. In this sense the LNG plant could give impetus to industrial growth. Two possible industries which could be based on a cheap supply of gas are glass manufacture and

nitrogen fertiliser production. To meet the employment target in manufacturing, however, the establishment of other large scale energy consuming industries including footloose industries are necessary. Such industries are already established in West Malaysia and it might be desirable to induce some of them to sub-contract some of their processing to this area and to establish branch factories. Employment in public administration and services could be expected to grow substantially if Bintulu is chosen as a future centre of a new Administrative Division.

The rural population in the sub unit would consist of people engaged in market gardening around Bintulu and people in new agricultural schemes in the southern parts of Blocks A5 and A6. The combined acreages of such schemes could be of 30 000 to 40 000 acres with a minimum population directly and indirectly connected with the schemes of 10 000 to 14 000. However, because the location of State Land possibly suitable for agriculture is too far north for its development to have any direct influence on the growth of Bintulu the possibilities of developing encumbered land in Block A7 and in the western part of Block B2 should be considered. Furthermore, an intended preliminary assessment of the agricultural potentials of the area south of the Kemena river has not yet been undertaken.

The timber and the possible agricultural development within the Bintulu planning unit and its present catchment area may possibly justify a deep sea port in Tanjong Kidurong. However, in order to obtain an optimal utilisation of this port other industries or activities should be established within,or in the hinterland of, Bintulu.

The urban development of Bintulu is likely to present some intricate as well as specific problems because the range of possibilities is wide, and some of the important elements in the development pattern are still very uncertain,for example;

- the establishment of an LNG plant has not yet been finally decided;
- the possible number and size of derived industries is not easily gauged;
- the question of whether or when a deep sea port should be built, is open, which in turn also leaves open the question of the optimal location of the timber complexes, i.e. whether they should be located on the Kemena river near Bintulu or in the Tanjong Kidurong area;

- the location of a Kemena bridge for the Pan-Sarawak Trunk Road.

A port, an LNG plant and timber complexes developed in the Tanjong Kidurong area would necessitate considerable investments in urban facilities there, including roads, telecommunications, hospitals, housing etc. At the same time old Bintulu must maintain and expand its function as a trade and service centre for its hinterland and probably also provide land for various manufacturing industries. Such expansion will be influenced by a new bridge over the Kemena river, the location of which is likely to be upriver from the present town. Hence, the town area would also be stretched in this direction.

The problem to be faced will be how to unite the development of the Tanjong Kidurong area and the present urban area considering there is a distance between them of about 10 miles. The object should be to ensure that the future town emerges as one important centre and growth pole. To ensure this will require careful town planning together with especially strong administrative powers to guide and direct this development.

5.4 MIRI PLANNING UNIT

The development potentials here lie in the creation of basic industrial employment connected with oil, gas and timber in the Miri North sub unit, the agricultural development of the Lambir Subis Development Area in the Sibuti sub unit, and the potentials for agricultural and forest development in the Niah-Suai sub unit (see Figure 5.3). The priorities for development of the various areas will be influenced by the fact that Miri is already a centre offering private and public services of considerable quality. At present the town is a growth pole and a magnet for further development. Any additional population resulting from development with good access to this town would not only enjoy its services, but also contribute to a further increase and refinement of the service level of the town. Therefore, it appears that Miri will be the leading service centre of the Study Area for a considerable time regardless of any opposing effects of other development requiring new towns or the expansion of existing ones. Hence, the growth of Miri urban area is considered to be sustained at a high level, although lower than it has been in the 1960's.

Based on the development potentials described later the occupational structure of each planning sub unit could be as shown in Table 5.3.

TABLE 5.3: MIRI PLANNING UNIT: OCCUPATION BY SECTOR AND PLANNING SUB UNIT IN 1990. SITUATIONS I AND II

Number of occupied in sectors

Planning Sub Unit	Agriculture		Forestry		Manufacturing		Services		Total No. occupied	
	I	II	I	II	I	II	I	II	I	II
Miri North	5 000	5 000	-	-	11 000	11 200	9 750	10 550	25 750	26 750
Sibuti	6 500	6 500	-	-	400	400	1 300	1 300	8 200	8 200
Niah-Suai	8 600	8 600	750	850	500	2 850	1 500	4 000	11 350	16 300
Miri	20 100	20 100	750	850	11 900	14 450	12 550	15 850	45 300	51 250

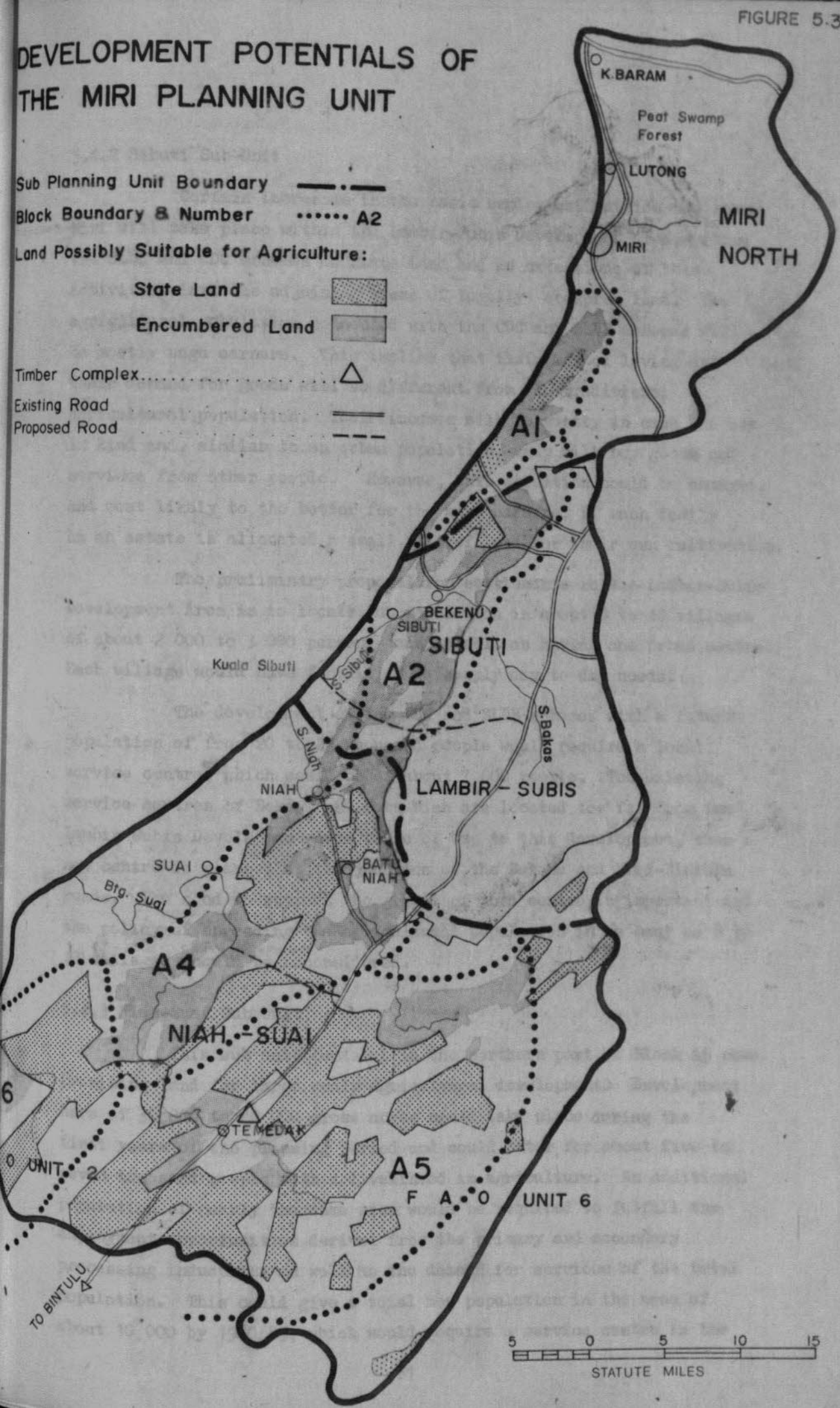
Real differences between Situations I and II occur only in the Niah-Suai sub unit, where in Situation II the employment in manufacturing and services is more than tripled. This growth is matched by an urban population in 1990 of about 20 000, which possibly is low compared with the employment figures.

5.4.1 Miri-North Sub-Unit

The oil and gas potentials around Miri will give rise to new employment either in connection with the expansion of existing activities off-shore or with derived industries using the cheap gas in the area. The gas here will probably be even cheaper than that connected with an LNG plant.

The growing urban population in Miri, which in 1990 could be close to 60 000, would be the basis for market gardening around Miri town, along the Miri-Bintulu road and the coast south of Miri. Hence, most of the future population growth will be in the urban area of Miri-Lutong and in the market garden and livestock producing areas supplying the urban people. Therefore, in the future there could be conflicts in the demand for land for urban development and for market gardening. A careful long-range and short-range town planning of Miri must be undertaken to assure its amenities and good functioning as a modern urban centre.

FIGURE 5.3


DEVELOPMENT POTENTIALS OF THE MIRI PLANNING UNIT
Sub Planning Unit Boundary
Block Boundary & Number A2
Land Possibly Suitable for Agriculture:
State Land
Encumbered Land
Timber Complex
Existing Road
Proposed Road
K.BARAM
Peat Swamp Forest
LUTONG
MIRI
MIRI NORTH
A1
BEKENU SIBUTI
SIBUTI
A2
Kuala Sibuti
S. Sibuti
S. Niah
S. Bakas
NIAH
LAMBIR – SUBIS
SUAI
BATU NIAH
Btg. Suai
A4
NIAH – SUAI
TEMEDAK
A5
F A O UNIT 6
UNIT 2
TO BINTULU
5 0 5 10 15
STATUTE MILES

5.4.2 Sibuti Sub-Unit

Certain increases in the basic employment outside the urban Miri will take place within the Lambir-Subis Development Area, within the SLDB and CDC schemes on State Land and as extensions of these activities into the adjoining areas of legally occupied land. The agricultural population connected with the CDC and SLDB schemes will be mostly wage earners. This implies that their way of living and their demand for goods will be different from the traditional agricultural population. Their incomes will be mostly in cash and not in kind and, similar to an urban population, they will buy goods and services from other people. However, this situation could be changed, and most likely to the better for the wage earners, if each family on an estate is allocated a small plot of land for their own cultivation.

The preliminary proposal for settlements in the Lambir-Subis Development Area is to locate the population in about 8 to 10 villages of about 2 000 to 3 000 persons each as well as having one urban centre. Each village would have facilities to supply day to day needs.

The development of the CDC and SLDB schemes with a future population of from 20 to 25 thousand people would require a local service centre, which could be of about 7 000 people. The existing service centres of Bekenu and Batu Niah are located too far from the Lambir Subis Development Area to be of use to this development, thus a new centre is planned at the junction of the Bekenu and Miri-Bintulu roads. The need to support the growth of this centre is important and the policy of spreading the agricultural population in as many as 8 to 10 villages should be reconsidered.

5.4.3 Niah-Suai Sub-Unit

This sub unit contains in the northern part of Block A5 some promising land for large scale agricultural development. Development here of 30 000 to 40 000 gross acres could take place during the first years of the planning period and could cater for about five to seven thousand people with a livelihood in agriculture. An additional population of nearly the same size would be required to fulfill the employment opportunities derived from the primary and secondary processing industries as well as the demand for services of the total population. This could give a total new population in the area of about 10 000 by 1980/85, which would require a service centre in the

area. A possible site for such a future centre is where the Miri-Bintulu road crosses the Batang Suai (Temedak). This location is within 10 miles of most of the State Land possibly suitable for agricultural development in Block A5 and is a suitable junction for a road to the large areas of possible agricultural development within Similajau Forest Reserve. The orientation of the population in this area for a service centre of higher order would probably be towards Bintulu.

Temedak is proposed by the FAO team as the site for one of the first timber complexes to be established. This complex would rely on the FAO Units 2 and 6 for its supply of timber.

The large scale agricultural development, a wood processing complex coupled with small scale manufacturing industries would support an urban population in Temedak of 10 000 to 15 000 by 1990. The size of this town would depend to some extent on the chosen cropping pattern in the area, the type of farming organisation, that is smallholdings or estates, and the policy for agricultural settlements, namely it is found opportune to concentrate most of the agricultural population in the town or disperse it over the area.

CHAPTER 6

HOUSING AND PUBLIC SERVICES

6.1 INTRODUCTION

The provision of adequate housing, education, health, transport facilities as well as other public services are necessary requirements for a large scale development. This would imply that an important part of the Region's development budget would be taken up by such social overhead costs. These facilities would be needed in the early stage of the growth period thus they could impose a real constraint on development in the form of inadequate supply of finances, lack of appropriate planning and design or scarcity of physical and human resources for their construction and operation.

In this Chapter the investment costs of housing and public services for the Perspective Plan period have been estimated for each planning unit. These calculations are based mainly on physical requirement standards per capita or per family, which have been multiplied by their corresponding investment costs. The more important assumptions and standards used in the computations are included here; others are presented in special papers the references of which are given. The numbers of facilities mentioned in this Chapter do not correspond to the Government programmes for each sector because in both Situations I and II a much higher number of people are envisaged in the Study Area than are assumed in the official calculations.

The investment costs for the various sectors are summarised in Table 6.1 which, however, contains only the main items, and allowances should therefore be made for miscellaneous services like garbage collection, social institutions and public halls.

The total costs of urban housing, public services and transport, excluding a port in Bintulu, would amount to $554 mn and $667 mn in Situations I and II respectively. The costs of a deep sea port in Bintulu would increase these figures by a roughly $70-100 mn.

TABLE 6.1: INVESTMENT COSTS OF HOUSING AND PUBLIC SERVICES

Type of facility	Situation I		Situation II	
	Million dollars	Percentage	Million dollars	Percentage
Housing	210.0	37.9	268.0	40.1
Education	49.1	8.9	60.5	9.1
Health	17.0	3.1	18.5	2.8
Public Services	7.0	1.3	7.2	1.1
Public Utilities	52.5	9.5	64.0	9.6
Recreation	3.2	0.5	4.3	0.6
Transport	215.0	38.8	245.0	36.7
Total	553.8	100.0	667.5	100.0

Housing construction in urban areas at the rates foreseen would be a major effort in future because the building rate would be 1 100 to 1 400 dwellings per year compared to a present rate in the urban areas of the Fourth Division of less than 250. When housing for rural development is added, the building rate would amount to 1 600 to 1 900 dwellings per year. The unit costs per dwelling used in the calculations presuppose that a major proportion of the houses are built from wood and other local materials, preferably from wood made into components for prefabricated houses in a plant located within the Study Area. If, however, the present preference for individually built brick houses is sustained also in the future, the cost estimates used would have to be increased considerably.

The other items in the Table amounting to a total of $344 mn in Situation I and $399 mn in Situation II, are public expenditures, which would either have to be covered by the budgets of the pertinent departments or by foreign loans. The major single item of the public investments is transport, of which about $120 mn are designated for roads in the lower alternative.

The overall demand for urban land is estimated at 9 000 acres in Situation I and 12 000 acres in Situation II.

6.2 HOUSING

The estimated housing requirements and costs in Table 6.2 refer to urban housing. Housing for the rural population is included in the calculated investment costs for agricultural development. The number of dwellings necessary to provide for rural housing is estimated at 9 500, of which 2 000 are needed in connection with small holder development and another 7 500 for the SLDB type of development. The total costs of new rural dwellings are estimated at about $38 mn.

The calculation of the urban housing requirements up to 1990 is based on the following assumptions:-

- an estimated income distribution for the urban population for 1980 which indicates the average net income level during the 20 year period;
- a minimum of 15 per cent of the annual family income spent on housing; this amount is assumed to equal about 10 per cent of the building costs;
- an average of 5.2 persons per household and one dwelling per household;
- 50 per cent of the existing urban housing stock to be replaced by 1990.

The above assumptions give, for the urban areas, the following building costs per unit:-

Income group	dollars
Lower (20 per cent)	4 500
Lower middle (30 per cent)	7 000
Higher middle (40 per cent)	11 000
Higher (10 per cent)	20 000

The total number of urban dwellings in 1990 is estimated at above 25 000 in Situation I and nearly 32 000 in Situation II. The number of dwellings of the existing stock still in use in 1990 is estimated at 3 300. Hence, in order to meet the housing requirements in Situation I more than 22 000 new dwellings, equal to 1 100 per annum, should be built. In Situation II a total of 28 000 houses or a building rate of more than 1 400 dwellings a year would be needed.

The corresponding total building costs for the two Situations are $210 and $268 mn respectively. These requirements could be expected to impose both a technical and a financial strain on the building trade; technical because the rate at which living quarters are built in the urban areas of the Fourth Division at present only amounts to roughly 250 per year; and financial because in 1980, for example, the total building costs for urban housing would correspond to about four per cent of the calculated Gross Regional Product for that year.

The number of new urban dwellings forecast to be needed in each planning unit and the corresponding costs are shown in the Table 6.2.

TABLE 6.2: ESTIMATED BUILDING OF NEW URBAN DWELLINGS 1970-1990 (AND CORRESPONDING COSTS) BY PLANNING UNITS - SITUATIONS I AND II

Planning Unit	Situation I		Situation II	
	New dwellings 1970-1990	Costs $mn	New dwellings 1970-1990	Costs $mn
Baram	2 875	27.2	3 635	34.7
Bintulu	6 255	59.1	9 545	90.2
Miri	13 100	123.7	15 180	143.1
Study Area	22 230	210.0	28 360	268.0

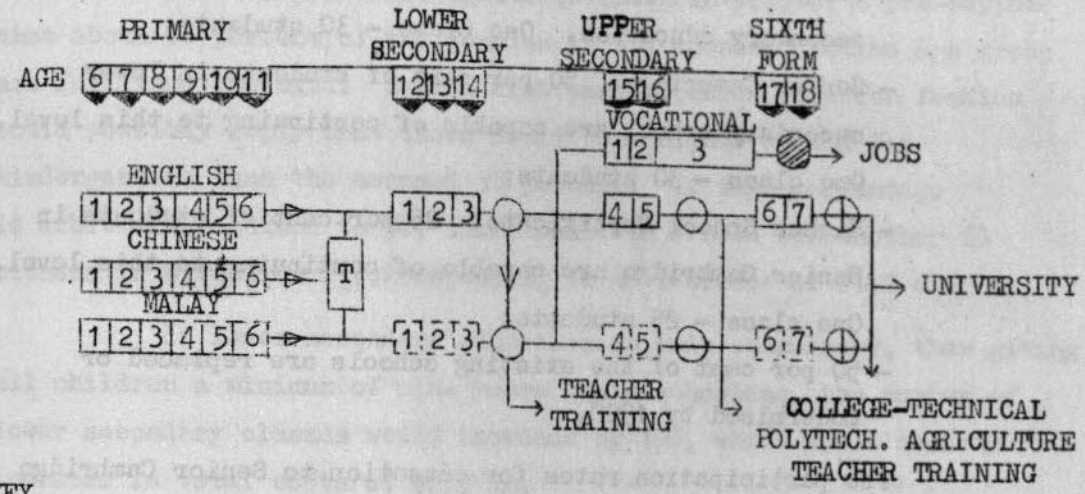
6.3 EDUCATION

Education can be divided into formal education and what can be called education for work. Between these two forms of education there is, however, no sharp distinction as both can have a practical and a cultural effect:

- practical meaning forming and improving productive skill;
- cultural, giving a general understanding of oneself and one's society.

The present public educational system of Sarawak is shown in Figure 6.1 which gives the different types and levels of education corresponding to specific age groups.

FIGURE 6.1: PUBLIC EDUCATIONAL PATTERN, SARAWAK 1970



KEY

⊳ SECONDARY ENTRANCE EXAMINATION

T = TRANSITION CLASS

○ LOWER CERTIFICATE OF EDUCATION (S.R.P./L.C.E.)
SABAH/SARAWAK: JUNIOR CERTIFICATE

⊖ MALAYSIAN CERTIFICATE OF EDUCATION/
SCHOOL CERTIFICATE (S.P.M./M.C.E./S.C.)

⊕ HIGHER SCHOOL CERTIFICATE (S.T.P./H.S.C.)

● MALAYSIAN VOCATIONAL CERTIFICATE (S.V.M./M.V.C.)
CITY & GUILDS AND STATE TRADE EXAMINATION

[3] CLASSES

Calculations of the demand for educational facilities are based on the distribution of the population for specific age groups. This is shown in Appendix III 1.1, which gives the distribution of the population by age groups relevant to different levels of primary and secondary education.

The need for classrooms has been calculated on basis of the following assumptions:

- Kindergartens: take in 30 per cent of children of five years. One class - 25 children;
- Primary school: all children; one primary stream will have six classes, and primary education is compulsory. One class - 25 pupils;

- Lower secondary school: this level of education covers forms one to three. The entrance examination to primary six is abolished and about 80 per cent of pupils originally entering primary one continue to lower secondary education. One class - 30 students;
- Senior Cambridge: 50 per cent of students in lower secondary school are capable of continuing to this level. One class - 30 students;
- Higher School Certificate: 25 per cent of students in Senior Cambridge are capable of continuing to this level. One class - 25 students;
- 50 per cent of the existing schools are replaced or modernised by 1990.

The participation rates for education to Senior Cambridge and Higher School Certificates are expected to be higher than the present rates which imply that about 40 per cent of lower secondary pupils and about 20 per cent of the Senior Cambridge pupils move on to the next stage. These percentages have been raised to 50 and 25 respectively.

Applying the assumptions, the number of new classes to be built by 1990 has been calculated and shown in Table 6.3 which also gives the corresponding building costs based on an average cost per classroom of $20 000 to $23 000.

TABLE 6.3: NUMBER AND COST OF NEW CLASSROOMS 1970-1990 BY EDUCATION LEVEL. SITUATION I

Planning Unit	Level of Education											
	Kinder-garten		Primary School		Lower Secondary		Senior Cambridge		Higher School Cert.		Total	
	No. of classes	costs in 1 000 dollars	No. of classes	costs in 1 000 dollars	No. of classes	costs in 1 000 dollars	No. of classes	costs in 1 000 dollars	No. of classes	costs in 1 000 dollars	No. of classes	costs in 1 000
Baram	23	460	321	6 420	82	1 804	22	506	8	184	456	9 374
Bintulu	29	580	425	8 500	107	2 354	34	782	10	230	605	12 446
Miri	56	1 120	715	14 300	196	4 312	50	1 150	17	391	1 034	21 273
Study Area	108	2 160	1 461	29 220	385	8 470	106	2 438	35	805	2 095	43 093

The Table indicates a total number of new classrooms in the Study Area of more than 2 000 with an equivalent cost of $43.1 mn. These numbers would be 20 percent higher in Situation II.

The employment alternatives shown in Chapter 4 pre-suppose that about 60 percent of the females in the economic active age group are full time employed. Such a high participation rate for females could possibly imply that there could be a higher demand for kindergartens than the assumed 30 percent. If this percentage is arbitrarily raised to 50, there would be a need for another 60 classes in Situation I corresponding to an increase of $1.2 mn.

If lower secondary education is made compulsory, thus giving all children a minimum of nine years basic schooling, the number of lower secondary classes would increase by 100, which would mean an increase in total costs of $2.2 mn.

The education for work is usually more directly geared at importing practical skill and the institutions giving this education must be suitably equipped for this. Such education and institutions have several specific lines, which can be summarised as follows:-

- vocational training for those employment lines needing some special knowledge and/or proficiency;
- technical and commercial schooling for more complex operations and for certain management functions;
- university education for work requiring a professional and academic background.

Rather complex problems are encountered in planning these types of education. They are expensive and therefore should be limited to what is necessary for the economic development of the country. On the other hand with growing personal incomes and with an increasing number of scholarships, there would be an increasing pressure to join this education with the expectation of getting a valid entrance card to a well paid job.

An over-production of skilled people, however, is socially costly and humanly frustrating. Unfortunately experience from other parts of the world on this problem is not appropriate because everywhere this whole aspect is continually under review. Clearly there is need for flexibility in types of education, curricula, length of courses and for adult education, so that seekers of employment can improve their qualifications when they consider it worthwhile. Furthermore a close cooperation is needed between the educational institutions and those trades and industries which are expected to absorb the trained labour force. A combination of on-the-job training and institutional education may be a promising line of approach.

A preliminary attempt to estimate and calculate the physical requirements for education for work has been made in Chapter 1. The total number of education years amounted to 5 300 in Situation I and 6 300 in Situation II, demanding 265 and 315 teachers. If two thirds of this demand is to be met in the Region, and if the investment cost is $35 000 per class (one teacher per class) the total expenditure will amount to approximately $6 mn in Situation I and $7.5 mn in Situation II.

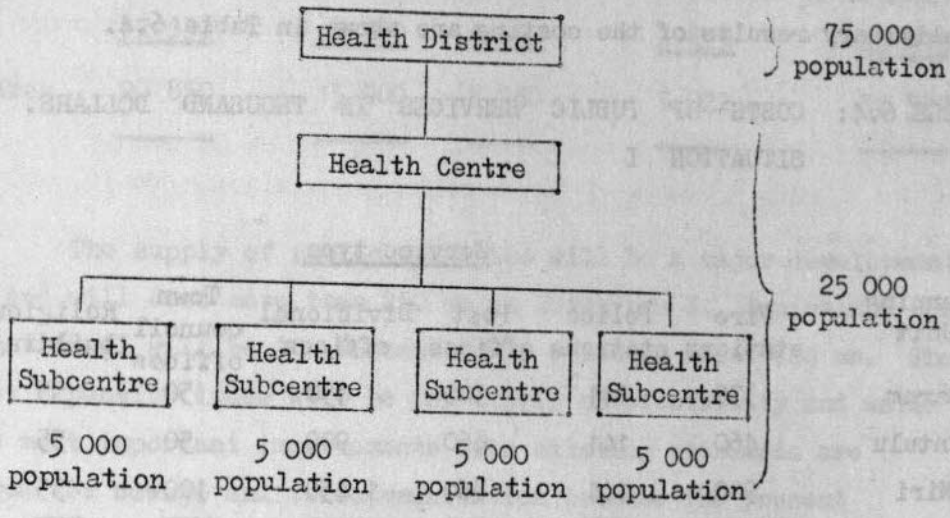
Education for work is an important prerequisite for the development described in this Report whether industrial, agricultural, commercial or administrative. The result is not only dependent on well equipped and well staffed educational institutions but also on the recognition and reputation given to the various types of work to be performed in a modern society.

The location of institutions for this type of education should be close to the industries for which they are preparing people. In this way the productive activity, such as industry and agriculture and the training of their future labour forces could support each other in the development process. Hence, a vocational school for forestry and timber industries should be located in Bintulu, while a school for training of office staff could be in Miri.

6.4 HEALTH

The standards applied for estimating the future supply of medical services are based on the New Economic Policy in the Second Malaysia Plan in which Sarawak is divided into fifteen health districts each with an approximate population of 75 000. One health district is subdivided into health centres and sub-centres as shown in Figure 6.2.

FIGURE 6.2: ADMINISTRATIVE ORGANISATION OF THE HEALTH SERVICE



In each health district it is planned to build one district hospital attached to which are three health centres each with four subcentres comprising one health unit which covers a population of about 25 000, i.e. the health centre itself covers 5 000 people and 5 000 are covered by each sub centre. These standards have been adjusted a little to suit the envisaged settlement pattern of the Study Area. Hence, in Situations I and II there will be three district hospitals and ten health centres in the Region. The number of sub-centres would be 42 in Situation I and 50 in II. A district hospital should be located in each planning unit and each planning sub unit should have one health centre, except for the Miri North and the Bintulu-Similajau sub units which would have two each.

The average unit costs for medical facilities are estimated at $3 mn for district hospitals ($1.5 mn only for the Baram unit), $200 000 for a health centre and $180 000 for a subcentre. If it is assumed that all the present facilities in the Study Area would be replaced by 1990 at the level envisaged, the costs would amount to $17 mn and $18.5 mn in Situations I and II respectively.

6.5 OTHER PUBLIC SERVICES

This group of services consists of Government offices, police and fire stations postal offices and religious buildings. The standards used for the requirements and costs of such services are derived from the Johor (Hunting Technical Services Ltd., 1971) and Pahang Tenggara (Simonsen O.C., 1971) reports and currently applied standards in Sarawak. The adopted standards are summarised in a draft working paper: Temedak New Town (S. Jorgensen et alia, 1973) while more detailed calculations of the number of services and their costs will be presented later in a separate working paper. Hence, only preliminary results of the costing are shown in Table 6.4.

TABLE 6.4: COSTS OF PUBLIC SERVICES IN THOUSAND DOLLARS. SITUATION I

Planning Unit	Service type						
	Fire stations	Police stations	Post offices	Divisional offices	Town council offices	Religious buildings	Total
Baram	370	141	300	450	50	55	1 366
Bintulu	460	141	460	900	50	55	2 066
Miri	900	144	860	1 450	100	55	3 509
Study Area	1 730	426	1 620	2 800	200	165	6 941

The most costly items are the Divisional offices which would amount to nearly $3 mn. To establish these new offices is in line with the ideas presented in the report (Planning Division, Land and Survey, 1973) where it is suggested that the last stage of divisional development would result in the present Fourth Division being divided into four.

The total costs of public services would increase by only $300 000 above the total shown in Table 6.4 because there would be the same number of Divisional offices, town council offices and religious buildings in both alternatives.

6.6 PUBLIC UTILITIES

This section covers supply of water, sewage, electricity and telephones, and again the standards applied are those given in the above mentioned paper (S. Jorgensen et alia, 1973). In general the calculations are based on per capita standards and costs applied only

for the urban areas because the costs of these utilities for rural development are included in the investment costs for agriculture. The results of the calculations for Situation I are shown in Table 6.5.

TABLE 6.5 COSTS OF PUBLIC UTILITIES IN THOUSAND DOLLARS SITUATION I

Planning Unit	Public Utility				
	Electricity	Water	Sewage	Tele-Communication	Total
Baram	3 030	3 450	1 200	1 346	9 026
Bintulu	5 490	4 550	3 200	1 781	15 021
Miri	12 330	7 900	4 350	3 895	28 475
Study Area	20 850	15 900	8 750	7 022	52 522

The supply of public utilities will be a major development effort and will cost more than $50 mn in Situation I. Equivalent costs in Situation II will be 25 percent higher reaching about $64 mn. The two most expensive items will be the supply of electricity and water but the most important improvements over existing standards are envisaged for sewage and telecommunication because the present provision of these facilities, especially sewage, is at a relatively low level.

6.7 RECREATIONAL FACILITIES

It is assumed that the demand for recreational facilities such as parks, sportsgrounds and playgrounds will increase as the living standards rise. Sarawak standards for major facilities (parks and sportsgrounds) are three acres per thousand people in urban areas, while for minor facilities (playgrounds) it is one acre per thousand population in urban areas. The costs of developing such areas are estimated at $10 000 and $5 000 per acre for major and minor facilities respectively. These standards give the costs shown in Table 6.6 for the increase in the urban population.

TABLE 6.6: ACREAGE AND COSTS OF RECREATIONAL FACILITIES. SITUATION I

Planning Units	Acres	Costs Thousand Dollars
Baram	50	437
Bintulu	102	983
Miri	205	1 795
Study Area	357	3 215

The areas and costs in Situation II would be 500 acres and $4.3 mn respectively.

6.8 URBAN LAND REQUIREMENTS

The increase in the urban population, from about 41 000 to 133 000 in Situation I and 165 000 in Situation II, will demand new land for urban expansion. The requirements for new land are based on a relatively compact layout of new towns, estimated at 0.1 acre per urban dweller, of which 0.04 is reserve land for future expansion of institutions public buildings, parks, etc. Most of these facilities require a central location; thus a considerable part of the reserve land should be close to the city centres.

The total or gross demand for new urban land is then estimated at 9 000 acres in Situation I and 12 000 acres in Situation II, while the net demand will amount to 5 500 and 7 500 respectively.

CHAPTER 7

TRANSPORT

7.1 INTRODUCTION

The transport in the Study Area is characterised by the collection and export of agricultural and forestry products, and the import and distribution of manufactured goods. The main transport infrastructure for most of the area is still the river systems, which are rigid, have a limited influence area and a low service standard. Imports and exports are burdened with extremely high shipping costs due to lack of proper port facilities.

An efficient transport system providing accessibility to all development areas is the back-bone of any modern society.

The main features of a future transport system designed to meet the requirements of the development should include:-

- an extensive road network;
- convenient and efficient port facilities;
- sufficient airport facilities; and
- an efficient transport industry.

The future transport system includes the following infrastructural investments up to 1990:

- construction of 500 miles of new main roads, surfacing and improvement of the existing road system together costing $120 to $140 mn;
- construction of new urban roads and improvement of the existing roads together costing $30 to $40 mn;
- improvement of Miri airport and the building of a new airport at Bintulu together costing about $50 mn;
- possible construction of a deep sea port at Bintulu at a cost of some $70 to $100 mn;
- improvement of the coastal ports at Miri and Marudi at a total cost of some $15 mn.

The total bill for public investments in the transport sector in the period up to 1990 is thus estimated at $285 to $345 mn. If a deep sea port at Bintulu is regarded as being more of a State affair and excluded from the sum the amount will be reduced to between $215 and $245 mn.

Of equal importance to the construction of transport infrastructure is the development of efficient and socially desirable transport services by all modes of transport. This requires a coordination of all Government actions to guide and effectively enforce regulations so as to ensure that the objectives of the transport policy are met.

The following sections present a perspective of the future development of transport demands, transport infrastructure and transport services. The transport of oil, oil products and gas has been omitted because this transport will probably be completely handled by the oil companies and will require little direct Government involvement. Air-service for the interior of the Fourth Division has also been omitted as being a highly specialised problem which ought to be the subject of a special study.

7.2 TRANSPORT DEMAND

7.2.1 Introduction

In most countries it has been observed that the development of transport demand is closely related to:-

a) the economic growth and the growth in population;

b) improvements in the transport system.

Transport demands are in general growing at a little faster rate than the overall economic growth. With a projected growth of the GRP of 6.9 and 8.2 per cent per annum in the two Situations goods transport demand could be expected to grow at annual rates of about 8 and 10 per cent respectively.

The development of an extensive road network as envisaged in Section 7.3.2 is estimated to be accompanied by an annual growth in car transport of 10 to 12 per cent and in bus transport of 16 to 18 per cent. The passenger transport by river and coastal crafts on the other hand is expected to diminish to insignificance. Passenger transport by air into and out of the Study Area is estimated to increase at an average rate of 13 to 15 per cent per annum.

Lorry transport is estimated to grow at a high average annual rate of 9 to 11 per cent because it is expected to take care of the increase in internal goods transport demand and to take over most of the services now provided by river and coastal crafts. The internal river and coastal transport is however, likely to remain of importance for transport of low value bulk commodities.

The volume in tons of exports and imports is expected to increase by 60 to 100 per cent up to 1990. This modest growth is due to an expected low increase in volume of export timber and timber products. But the composition of the timber exports is expected to change considerably as more and more timber will be exported as sawn planks and manufactured products instead of as logs. In spite of the modest general increase, the volumes requiring proper port facilities in 1990 are expected to be 10 to 11 times the 1970 volumes.

The estimated future transport demands for 1990 are presented in the following subsections. The average growth rates presented are meant to give only an indication of the growth, in fact the actual growth could follow other geometrical patterns.

7.2.2 Internal Goods Transport

Lorry Transport

It has been estimated (Wetteland, 1973) that lorries carried out some 35 mn ton-miles in 1972. A portion of the transport by river and coastal craft amounting to about 10 mn ton-miles in 1972 will be taken over by lorries. With the assumed average internal goods transport growth rates of 8 and 10 per cent per annum, the lorry transport in 1990 should, in Situations I and II, amount to about 180 and 250 mn ton-miles respectively. Calculations of the estimates are presented in Table 7.1

River and Coastal Transport

Most of the internal river and coastal transport is expected to be diverted to lorry transport by 1990. The only significant water transport will be bulk transport of stone and other low-value bulk commodities. Any estimates of the volume and patterns of this transport will not be useful or required before more details on the demand for this specialised transport are worked out.

7.2.3 External Goods Transport

Transport between the Study Area and other parts of Sarawak, other states in Malaysia and foreign countries, is primarily carried by coastal and ocean-going vessels. Some cargo and mail is carried by air, the total volume of which in 1970 accounted for less than 0.1 per cent of the total external transport demand.

TABLE 7.1 ESTIMATED DEVELOPMENT OF LORRY TRANSPORT

A. ESTIMATED LORRY TRANSPORT 1972

	Type of Traffic	Transport volumes	Average transport distance	Total
Estimates Based on Traffic considerations		mn tons	miles	mn ton miles
	Long distance	1	30	30
	Local	0.8	5	4
	Total	1.8	19	34

Estimates Based on Vehicle fleet considerations	(1) No. of Lorries	Average annual mileage	Average load capacity	Average load factor	Total
		thousand miles	tons		mn ton miles
	750	20	5	50%	37.5

B. DIVERTED WATER TRANSPORT, 1972 VOLUMES

Estimated river and coastal transport that will eventually divert to lorry transport:

200 000 tons x 50 miles average transport distance = 10 mn ton miles

C. ESTIMATED LORRY TRANSPORT 1990

Development Situation	Estimated growth rates		Mn ton miles
	Economic	Internal goods transport	
Basis 1972	-	-	45
1990, Sit. I	6.9%	8%	180
1990, Sit. II	8.2%	10%	250

Notes: (1) Based on statistics supplied by Miri District Council, PWD Miri and the Land Transport Department.

In the future it is expected that coastal and ocean-going vessels will continue to carry the bulk of the external goods transport but air transport will grow in importance and some of the coastal transport will be diverted to lorry transport.

Coastal and Ocean Shipping

About 30 000 tons of stone and sand and 73 000 tons of other cargo were brought by ships into the Study Area in 1970. Roughly 75 per cent of the goods were landed in Miri, the rest mainly at Bintulu and Marudi. About half of the goods were supplied by dealers in First, Second and Third Divisions of Sarawak, the rest came mainly from Singapore, West Malaysia and Thailand. The estimated total import of general cargo amounted to about 0.53 tons per capita which appears reasonable in relation to the comparable foreign import to the whole of Sarawak of 0.37 tons per capita.

The export of an estimated one million tons of timber products was mainly cleared through the Miri Customs and went as logs to Japan. Another 50 000 tons of export cargo was mainly shipped from Miri and Bintulu to the other Divisions of Sarawak. Details of the estimated total volumes of imports and exports are shown in Table 7.2.

The estimates of the future volumes of imports and exports of the Study Area have been made for four commodity groups for imports and four groups for export. The estimated 1990 volumes and some average growth rates are presented in Table 7.3. The import of agricultural inputs (fertilisers, animal feed stuff etc.) is estimated to have increased by more than ten fold by 1990 and the import of cereals to have doubled. The export of agricultural products which are handled as dry cargo, is forecast to reach about 140 000 tons and the export of palm oil by tankers to more than 300 000 tons by 1990.

The import of stone from the First and Second Divisions of Sarawak is estimated to follow the general economic growth, the present and possibly new quarries in the Study Area can probably supply the lower quality stones.

The forestry output could according to preliminary estimates, (FAO,1972), reach about 70 to 80 mn cubic feet by 1990, which however, is not more than 40 to 60 per cent above the 1970 volume. With an increased local processing of the timber,by 1990 about 50 per cent could

TABLE 7.2

EXPORT AND IMPORT OF THE STUDY AREA BY SHIPPING 1970 - TONS

(EXCLUDING OIL AND OIL PRODUCTS)

District (capital)	Origin/(4) Destination	Import		Export		
		General cargo	Stone sand	General cargo(1)	Sawn timber	Round timber
Miri	A	21 000		9 500		
	B	29 100		1 600		
	C	1 400		200	6 500	
	D	4 900		500	7 200	800 000(2)
	Total	56 400		11 800	13 700	800 000(2)
Marudi	A	5 000		1 600		
	B	1 900		800		
	C	-		2 600	900	2 650
	D	150		5 250		9 100
	Total	7 050		10 250	900	11 750
Bintulu	A	10 000		17 000		
	B					
	C				3 600	
	D					183 700
	Total	10 000		17 000	3 600	183 700
Study Area	A	36 000	30 000(3)	28 100		
	B	31 000		2 400		
	C	1 400		2 800	11 000	2 650
	D	5 050		5 750	7 200	992 800
	Total	73 450	30 000(3)	39 050	18 200	995 450

Note

(1) Includes also agricultural products

(2) Estimated on basis of export value and average f.o.b. unit value for Sarawak

(3) Rough estimate as actual figures are scarce.

(4) A = First, Second, Third Divisions of Sarawak;

B = Singapore, West Malaysia, Thailand;

C = Sabah, Brunei;

D = Other foreign countries.

TABLE 7.3 ESTIMATED FUTURE (1990) IMPORT AND EXPORT OF THE STUDY AREA BY SHIPPING (EXCLUDING OIL)(1)

	Commodity group	Present 1970 volumes	Estimated 1990 volumes	
			Situation I	Situation II
		Thousand tons		
Import	Input to agriculture (fertiliser etc.)	7.4	85	85
	Cereals (rice, wheat, oats etc.)	5	10	12
	Stone, sand	30	120	150
	Other cargo (consumers & producers goods)	61	240	330
	Total	103.4	455	577
Export	Agricultural products, dry cargo	8	140	140
	Agricultural products, liquid cargo	-	316	316
	Forestry products: logs	996	280	320
	sawn timber	18	400	450
	industrial products	-	150	200
	Other cargo	30	120	170
	Total	1 052	1 406	1 596
Grand total	Volumes	1 155.4	1 861	2 173
	Average growth rates per cent p.a.	-	2.5	3.5
Total, excluding logs (port requiring volumes)	Volumes	159.4	1 581	1 853
	Average growth rates per cent p.a.	-	12	13

Note (1) Some of the coastal transport to Sibu and Brunei will probably be taken over by lorry transport.

be exported as sawn timber, 20 per cent as manufactured products and only 30 per cent as logs. The volume of import cargo, such as consumer goods and producer goods, together with general export cargo is expected to increase at an average rate of 7 to 9 per cent per annum which is slightly faster than the general economic development.

The total import and export by 1990 will according to the estimates made above, be about 60 to 100 per cent higher than the 1970 volumes. The general port requiring volumes will, however, increase by 10 to 11 times because the manufactured timber products will be handled by the ports in 1990 whereas at present the logs are floated to ships waiting out at sea.

Air Transport

Airlines throughout the world are now finding that transport of cargo and mail are showing higher growth rates than passenger transport. It has, therefore, been assumed that air transport of cargo and mail to and from the Study Area will grow at an average annual rate of 15 to 17 per cent.

Lorry Transport

It is estimated that some of the future coastal transport between the Study Area and other parts of Sarawak and Brunei, will be diverted to lorry transport when the road connections are established with a reasonable standard. It is, however, necessary to carry out some more detailed studies before estimates of the volumes can be made up.

7.2.4 Internal Passenger Transport

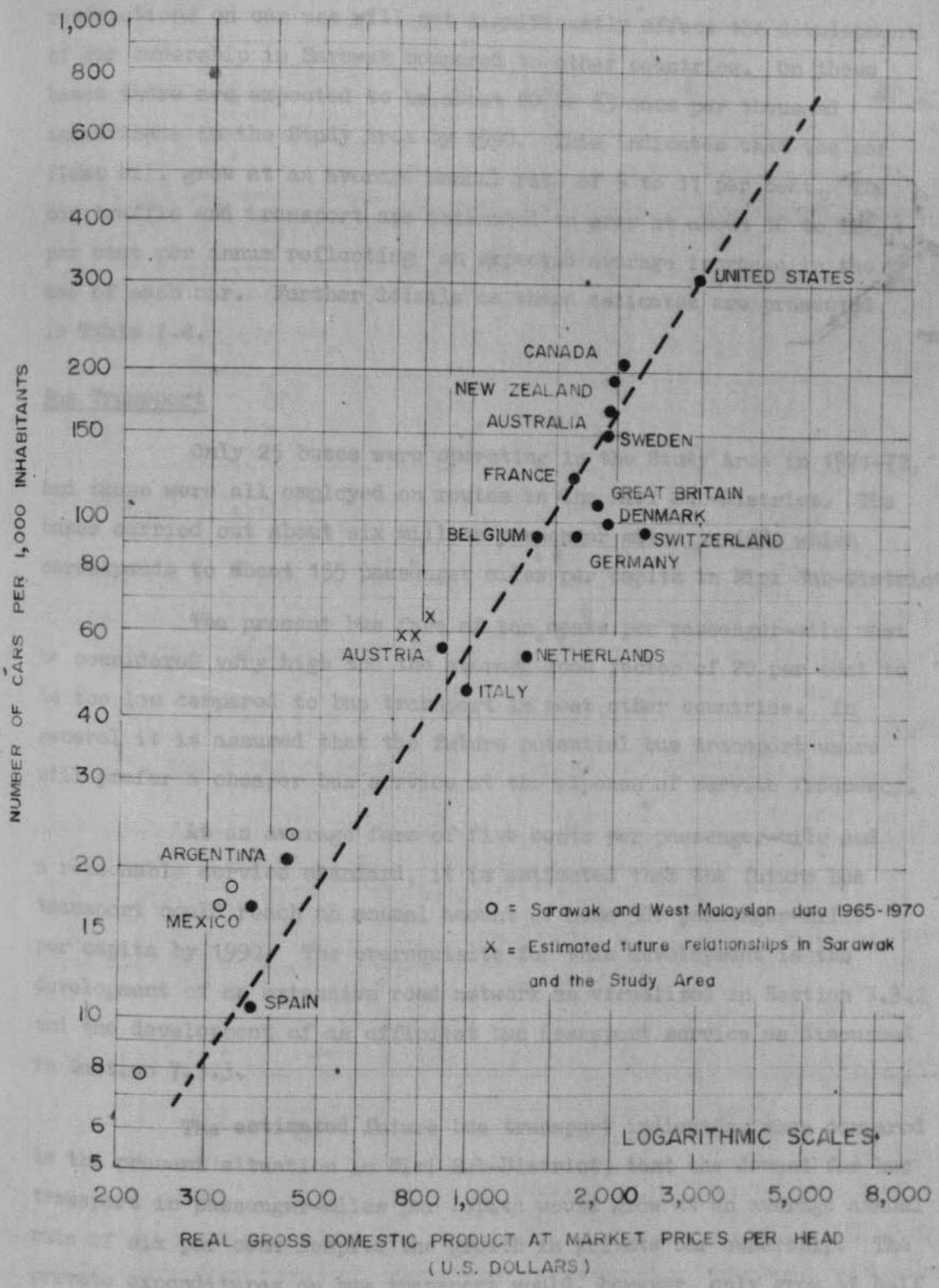
Car Transport

Experience from other countries indicates a strong relationship between car ownership and GRP per capita. This relationship for a number of countries in 1962 is illustrated in Figure 7.1 which also shows the same relationship for Malaysia and Sarawak 1965-70. It has also been observed that the demand for individual car ownership increases over the years as people become more and more car-minded.

In the projections of future car ownership in the Study Area it has been assumed that the problem of cars being a major polluter of the environment will have been improved by 1990, so that at least in

FIGURE 7.1

AUTOMOBILE OWNERSHIP AND LEVEL OF ECONOMIC DEVELOPMENT, (1962)



Notes : 1) After Nowicki A.G. 1968.

2) The following exchange rate has been used : 1 U.S. $ = 2.8 M. $.

sparsely populated Sarawak there will be no need to seriously curb the "motorization". It has been further assumed that taxes and other restrictions on car use will not significantly affect the development of car ownership in Sarawak compared to other countries. On these bases there are expected to be about 60 to 65 cars per thousand inhabitants in the Study Area by 1990. This indicates that the car fleet will grow at an average annual rate of 9 to 11 per cent. The car traffic and transport are estimated to grow at about 10 to 12 per cent per annum reflecting an expected average increase in the use of each car. Further details on these estimates are presented in Table 7.4.

Bus Transport

Only 25 buses were operating in the Study Area in 1971-72, and these were all employed on routes in the Miri Sub-District. The buses carried out about six million passenger miles in 1971 which corresponds to about 155 passenger miles per capita in Miri Sub-District.

The present bus fare of ten cents per passenger-mile must be considered very high and the average load factor of 20 per cent to be too low compared to bus transport in most other countries. In general it is assumed that the future potential bus transport users will prefer a cheaper bus service at the expense of service frequency.

At an average fare of five cents per passenger-mile and a reasonable service standard, it is estimated that the future bus transport could reach an annual amount of some 500 passenger-miles per capita by 1990. The prerequisite for this development is the development of an extensive road network as visualized in Section 7.3.2 and the development of an efficient bus transport service as discussed in Section 7.3.3.

The estimated future bus transport indicates, when compared to the present situation in Miri Sub-District, that the demand for bus transport in passenger-miles per capita would grow at an average annual rate of six per cent despite the growth in private car ownership. The private expenditures on bus transport would, however, only grow at half that rate due to the expected decrease in bus fares.

Further details on the considerations and estimates are presented in Table 7.5.

TABLE 7.4. ESTIMATED DEVELOPMENT OF CAR TRANSPORT

A. DEVELOPMENT OF CAR OWNERSHIP

Year	Area	GRP per capita[1] dollars	Cars per thousand population	Population thousand	No. of Cars
1965	Sarawak	620	7.8	840	6 552
1966	W. Malaysia	920	17.4	8 720	151 776
1970	Sarawak	907	16.4	975	16 000
	Study Area	1 235	22.3	115	2 560
1990	Sarawak	2 185[2]	60	1 700	100 000
	Study Area				
	Sit. I	2 095	60	250	15 000
	Sit. II	2 265	65	300	20 000

B. DEVELOPMENT OF CAR TRAFFIC AND TRANSPORT IN THE STUDY AREA

Year	Car traffic development				Car transport development		
	Car fleet thousand	Average annual mileage thousand	Total mn vehicle miles	Average growth per cent p.a.	Average No. of persons per car	Total mn passenger miles	Average growth per cent p.a.
1970	2.56	5	12.8	-	4	51	
1990							
Sit. I	15	6	90	10	4	36.0	10
Sit. II	20	6	120	12	4	48.0	12

Notes: (1) GRP in dollars per capita = Gross Regional Product in Malaysian dollars per capita.

(2) Assumed GRP in dollars per capita.

TABLE 7.5 ESTIMATED DEVELOPMENT OF BUS TRANSPORT IN THE STUDY AREA

A. RELATION BETWEEN BUS FLEET AND POPULATION

Year	Area	Population thousand	No. of buses	No. of buses per thousand population
1966	West Malaysia	8 720	3 491	0.4
	(Sarawak	1 000	342	0.34
1971	(Fourth Division	140	25	0.18
	(Miri Sub-District	37	25	0.68
1990	(Study Area, Sit. I	250	200	0.8
	(Study Area, Sit. II	300	250	0.8

B. DEVELOPMENT OF BUS TRANSPORT IN THE STUDY AREA

Year	Growth in GRP[1] per capita in per cent p.a.	Passenger miles per capita		Total passenger miles	
		Passenger miles	Average growth per cent p.a.	Passenger miles	Average growth per cent p.a.
1971		(155)[2]		5.75	
1990, Sit. I	2.8	500	6[3]	125	16
1990, Sit. II	3.2	500	6[3]	150	18

C. ESTIMATED REQUIRED BUS FLEET 1990

Year	Total passenger miles mn	Average passenger miles per bus mile	Average annual mileage of buses	Total no. of buses required
1971	5.75	7.5	30 600	25
1990, Sit. I	125	15	40 000	200
1990, Sit. II	150	15	40 000	250

Notes: (1) GRP - Gross Regional Product

(2) In Miri Sub-District

(3) Compared to Miri Sub-District.

TABLE 7.6 ESTIMATED AIR TRANSPORT DEVELOPMENT IN AND TO/FROM THE STUDY AREA(1)

A. PASSENGER TRANSPORT

Year	Airport	Estimated population basis	Traffic inside Study Area	Traffic to/from Study Area		
				Average number of passengers per capita	Total	Average growth
		Thousand	Thousand passengers		Thousand passengers	Per cent p.a.
1970	Marudi	21	4.3		-	-
	Miri	65 + 21	14.2	0.7	59.4	-
	Bintulu	30	9.9	0.5	14.3	-
1990 Sit. I	Marudi	-	-	-	-	-
	Miri	180	15	4	750	13.5
	Bintulu	70	15	4	300	16.0
1990 Sit. II	Marudi	(40)	-	-	-	-
	Miri	200	20	5	1 000	15
	Bintulu	100	20	5	500	20

B. MAIL AND CARGO

Year	Airport	Estimated population basis	Transport inside Study Area	Transport to/from Study Area		
				Tons per thousand people	Total	Average growth
		Thousand	Tons		Tons	Per cent p.a.
1970	Marudi	21	11.8		-	-
	Miri	65 + 21	22.3	3.9	332	-
	Bintulu	30	10.5	2.4	70.8	-
1990 Sit. I	Marudi	(35)	-	-	-	-
	Miri	180	insignif.	25	4 500	14
	Bintulu	70	insignif.	25	1 800	17
1990 Sit. II	Marudi	(40)	-	-	-	-
	Miri	200	insignif.	30	6 000	16
	Bintulu	100	insignif.	30	3 000	20

Note (1) Excluding traffic to/from the interior of the Third, Fourth and Fifth Divisions.

Air Transport

The internal passenger transport by air between the airports of Miri, Bintulu and Marudi, amounted to about 14 000 trips in 1970. This is seen to remain practically static up to 1990 because the construction of a direct road between Miri and Marudi together with some improvement and asphaltic sealing of the Miri-Bintulu road are likely to remove the basis for any significant development of this traffic.

7.2.5 External Passenger Transport

Air Transport

The passenger transport by air between the Study Area and the rest of Sarawak, West Malaysia and other countries amounted to about 74 000 passengers in 1970. The increase over the last ten years has been exceptional with average annual growth rates of 22 per cent at Bintulu and 36 per cent at Miri. This decade has, however, also been the period for the establishment of modern aviation in the Study Area and the years of the timber boom.

The Malaysia Airport Study (ACRES/SWR Consortium, 1972) estimated that the annual traffic on Bintulu and Miri airports would reach 170 000 and one million passengers respectively by 1990. That volume of the report which has been available does not give any specific details on the forecast methodology, but it seems as if trend extrapolations have played a major role. The forecasts of the Airport Study must therefore be modified in the light of the development which is envisaged in the present Study.

Both Bintulu and Miri are expected to develop into major urban centres with an extensive road network providing good connections between the cities and their influence areas. On this basis and on the basis of the estimated population and economic growth it is estimated that the external air traffic in 1990 will be around 300 000 to 500 000 passengers on Bintulu airport and about 750 000 to one million passengers on Miri airport (see Table 7.6). These volumes correspond to average annual growth rates in external traffic of 16 to 20 per cent for Bintulu airport and 13 to 15 per cent for Miri.

Shipping

Some of the external passenger transport is at present carried by coastal vessels and vessels plying the South China Sea. This transport is foreseen to decrease to insignificance in the future because shipping will probably be too slow, inconvenient and too costly compared to air and land transport.

Land Transport

Some of the future passenger transport to the rest of Sarawak and Brunei will go by cars and buses. The volume of this transport is in general included in the estimates of future car and bus transport presented in Section 7.2.4.

7.3 FUTURE TRANSPORT SYSTEM

7.3.1 Introduction

The backbone of the future transport system will be an extensive road network consisting of some 750 miles of public main roads. The roads are estimated to have a standard that allows public transport to be carried out at average rates of some 15 cents per ton-mile and 5 cents per passenger-mile by an efficient road transport industry.

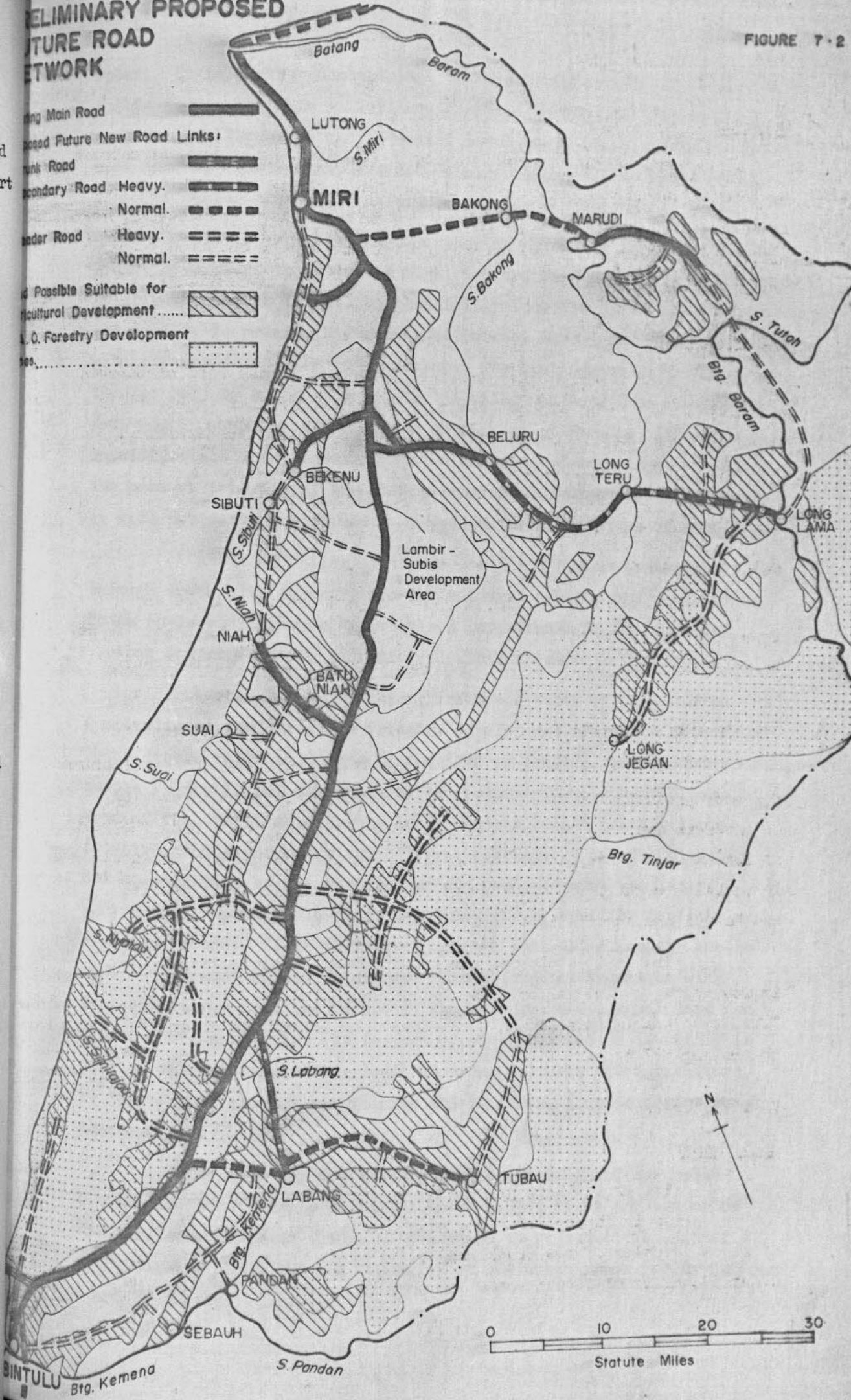
It is expected that the volume of agricultural and manufactured forestry products for export would probably warrant the construction of a modern deep sea port at Bintulu. The volume of trade with the rest of Sarawak and other states and countries in the South China Sea would in addition require the development of modern coastal ports at Miri and Marudi and an efficient regional shipping.

The fast developing air transport will require major improvements to Miri airport and the building of a new airport at Bintulu to enable these towns to be served by modern jet aircraft of the Boeing 737 type.

7.3.2 Future Road Network

Road Network

The preliminary proposals for the future main road network are presented in Figure 7.2. The proposals assume the construction of about 16 miles of new trunk roads, 110 miles of secondary roads and about 374 miles of feeder roads and some improvement of the existing


ELIMINARY PROPOSED
TURE ROAD
ETWORK
FIGURE 7·2
ing Main Road
posed Future New Road Links:
unk Road
econdary Road Heavy.
Normal.
eder Road Heavy.
Normal.
d Possible Suitable for
ricultural Development.....
A. C. Forestry Development
ves.....
Batang Baram
LUTONG
S.Miri
MIRI
BAKONG
MARUDI
S.Bakong
S. Tutoh
Btg. Baram
BELURU
LONG TERU
LONG LAMA
BEKENU
SIBUTI
S.Sibuti
Lambir - Subis Development Area
S.Niah
NIAH
BATU NIAH
SUAI
S.Suai
LONG JEGAN
Btg. Tinjar
S.Nyalau
S.Sebuyau
S.Labang
TUBAU
LABANG
Btg. Kemena
PANDAN
SEBAUH
BINTULU
S. Pandan
N
0 10 20 30
Statute Miles

roads. It is further assumed that the Bintulu-Sibu road is completed before 1990. The main policy consideration behind the proposals is to provide all centres and potential development areas with suitable road access. Further studies and considerations are required before a proper master plan for the future road development can be given.

It is generally assumed that an agreement is made with the Brunei Government to provide a high standard link between Miri and Kuala Belait. Also that it will be technically feasible, although difficult and costly, to provide a direct road between Marudi and Miri via Bakong with a ferry across the Batang Baram. The distance to Miri would then be only 40 miles compared to 150 miles via Long Lama and the direct road would obviate the need for an airport at Marudi. If detailed investigations show, however, that a direct road link is not feasible, the present priority of the Bakong road should be reconsidered because it will not serve any forestry or agricultural potential of significance.

About 150 miles of the proposed new public feeder roads run through areas with forestry and agricultural development potentials. These roads would lessen the required investments in the forestry section compared to the standard calculations made in Chapter 8.

A road has an efficient influence width of only 0.3 to 2 miles in agricultural and forestry development areas. A network of local access roads will thus be required to provide the necessary road access in the larger agricultural and forestry development blocks. Some of the chosen development areas contain both a primary forest potential and a secondary agricultural potential. Careful planning and coordination of the forestry access roads to suit the later agricultural needs could yield high benefits by avoiding duplication of access roads. It is therefore proposed that all plans for access road development should be cleared through a joint committee with representatives from the forestry, agricultural and general land use planning organisations. It is further proposed that an inventory is made of the existing timber roads in areas suitable for agriculture, to assess the value of maintaining and improving them as agricultural access roads.

The need for new urban roads in existing and new urban centres has been roughly estimated to be 0.0016 miles per new urban dweller. The proposed future urbanisation as presented in Chapter 4 would require about 150 and 200 miles of new urban roads for Situations I and II respectively.

Road Standards

Generally the road standards presently employed by the Public Works Departments (PWD) are considered suitable as a basis for the future road network. But the design of roads and bridges ought to be linked to specific design vehicles which then can be used as a norm for the generally permitted vehicle dimensions.

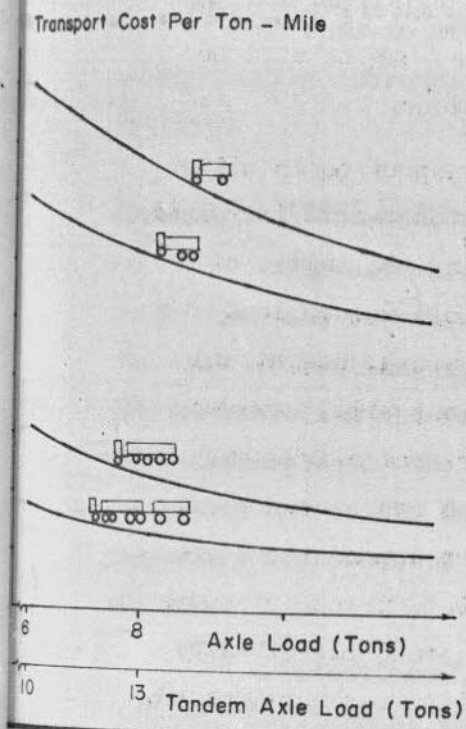
Because of economics of scale road transport costs will decrease with increasing vehicle load capacity which can be increased by raising the vehicle axle loads and by augmenting the number of axles (for example by use of trailers). The vehicle volume load capacity can be raised by increasing the vehicle width, height and length. Increased vehicle axle loads and dimensions will, however, require stronger pavements and bridges and better road alignment, and thus increase the road costs. Experience from other countries, however, has shown that at each level of transport demand there are standards which bring to a minimum the combined road transport costs and road building costs. In general the optimum standards of axle loads and dimensions are increasing with increasing transport demand. The principles of these basic relationships are presented in Figure 7.3.

It is assumed that in general it would be feasible to construct and improve the roads in the Study Area to accommodate a five-axled tractor-semitrailer with an overall length of 50 feet, and having the internationally recognised width standard of eight feet three inches (2.5 m) with maximum axle loads of 8/13 tons on single/tandem axles. The present road structural standards can possibly accommodate the proposed vehicle axle loads and weights; but it is recommended that standards be amended to include a widening of the road pavement, especially in sharp curves and a stipulation of the pavement widths at 24, 20 and 14 feet on trunk, secondary and feeder roads respectively.

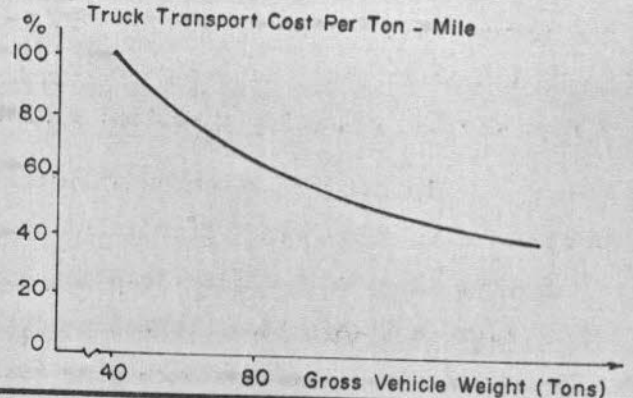
It is further suggested to consider the feasibility of increasing the design (and permitted) vehicle axle loads to 10/16 tons on single/tandem axles on those main roads which will be heavily trafficed by timber truoks and palm oil tankers.

PRINCIPAL RELATIONS BETWEEN VEHICLE WEIGHTS AND DIMENSIONS, TRUCK TRANSPORT COSTS - AND ROAD CONSTRUCTION & MAINTENANCE COSTS

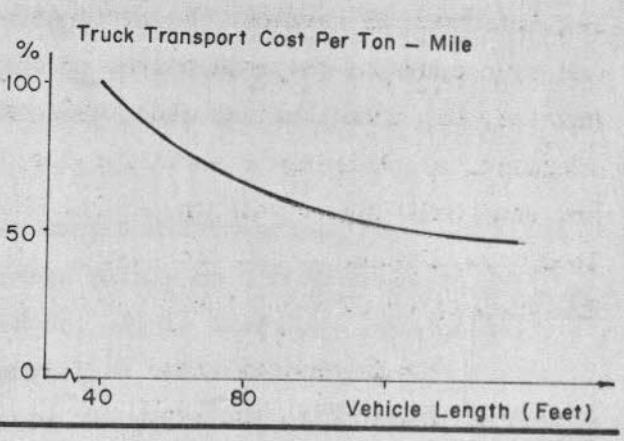
(a) TRANSPORT COST PER TON-MILE FOR DIFFERENT TYPES OF VEHICLES AND AXLE LOADS



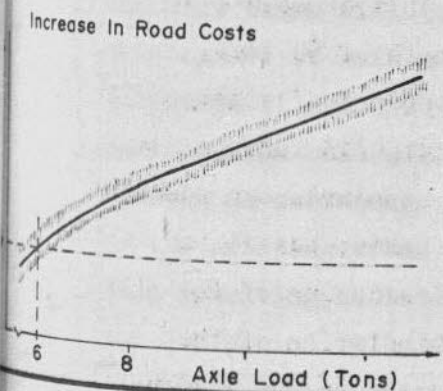
(b) RELATION BETWEEN GROSS VEHICLE WEIGHT AND TRANSPORT COST



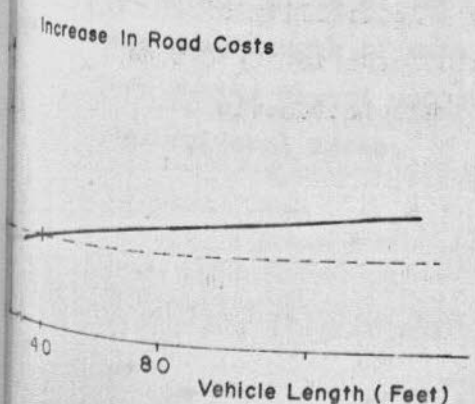
(c) RELATION BETWEEN VEHICLE LENGTHS AND TRANSPORT COST



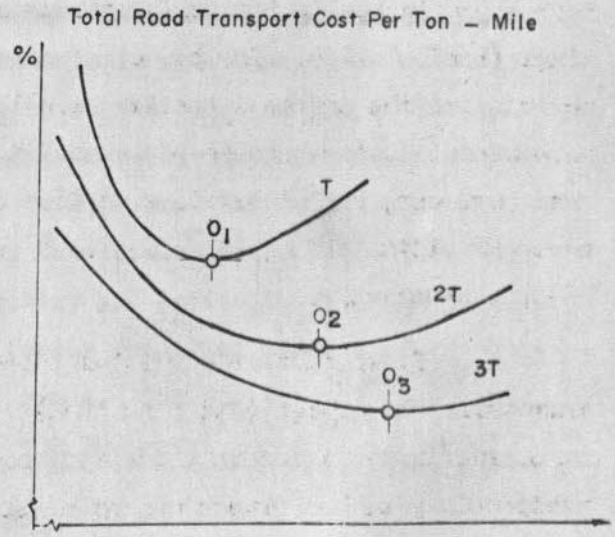
(d) RELATION BETWEEN ROAD COSTS AND MAXIMUM PERMITTED AXLE LOAD



(e) RELATION BETWEEN ROAD COSTS AND MAXIMUM PERMITTED VEHICLE LENGTH



(f) PRINCIPAL RELATION BETWEEN OPTIMUM VEHICLE WEIGHTS AND DIMENSIONS AND TRUCK-TRAFFIC VOLUME



KEY

Total Road Transport Costs = Road Costs + Truck Transport Costs

T = Traffic Volume in no. of Trucks or Goods Volume in tons

O = Optimum Vehicle Axle Load, Gross Vehicle Weight or Vehicle Length i.e when the Sum of Road Cost and Truck Transport Costs is a Minimum

A main source of accidents is the mixing of slow moving and motorised traffic. It is therefore suggested that roads in urban areas, and perhaps some other places, where traffic makes it desirable, are provided with separate lanes or paths for pedestrians and cyclists. These sidelanes or paths, which ought to have the same surface type as the main road to attract the pedestrians and cyclists will significantly increase the capacity of the main road for the motorised traffic.

Road Development Costs

The estimated detailed costs of building the proposed new road links and improving the existing roads, is presented in Table 7.7. The cost of building the new roads as gravel roads is estimated at $80 mn including the required bridges. Asphalt surfacing of the Miri-Bintulu road, the branch roads to Marudi, Bekenu, Batu Niah, Long Lama and to the Brunei border is estimated at some $36 mn. Other necessary improvements of the existing roads are assumed to cost about $20 mn.

Situations I and II envisage a difference in population and economic development which are based mainly on a difference in the development of the industrial sector. It is therefore assumed that the future road network in miles will be the same for the two Situations but that there will be a difference in road standards. The bill for development of main public roads is calculated at about $140 mn for Situation II and $120 mn for Situation I. The completion of the Bintulu-Sibu road will require some additional $30 mn including bituminous surfacing. The investments in new urban roads and improvement of the existing urban roads will be in the range of $30 to $40 mn, thus resulting in total investments in public main and urban roads for the period 1973-1990 of $150 to $180 mn. The public access roads through forestry and agricultural development areas will, however, lessen the need for separate forestry and agricultural access roads. About 150 miles of the proposed feeder roads are virtually replacing the same length of main forestry roads. The 500 miles of new roads are giving direct access to some 100 000 gross acres of potential agricultural areas.

TABLE 7.7 ESTIMATED FUTURE ROAD DEVELOPMENT IN THE STUDY AREA (1973 - 1990)

A. PRESENT AND FUTURE MAIN ROAD NETWORK (BASIC ESTIMATE)

Year	Area		Mileage by surface type			Total mileage
			Bitumen	Gravel	Earth	
1972	Sarawak (maintained by PWD		260	895	57	1 212
	Fourth Division (maintained by PWD)		29	217	21	267
1990	Study Area	New roads	87	413	-	500
		Surface existing	165			
		Total network	281	465	5	751

B. COST OF DEVELOPMENT MAIN ROAD NETWORK IN THE STUDY AREA (BASIC ESTIMATE)

Items		Roads		Major Bridges $mn(2)	Total $mn
		Miles	$mn(2)		
New constructions as gravel roads	Trunk roads	16	5	0.2	5.2
	Secondary roads	110	25	2.1	27.1
	Feeder roads	374	45	2.3	47.3
	Sub total	500	75	4.6	79.6
Bituminous surfacing	Trunk roads	150	22.5	-	22.5
	Secondary roads	102	13.5	-	13.5
	Sub total	252	36.0	-	36.0
Improvement of existing roads (widening etc.)					20
Ferries for crossing Batang Baram of Marudi and Kuala Baram					1
Total					136.6

C. DEVELOPMENT OF URBAN ROADS

Items	New urban dwellers in thousands		Units		Total cost dollars mn	
	Sit. I	Sit. II	Miles per dweller	Cost per mile $'000	Sit. I	Sit. II
New urban roads	92	124	0.0016	130	20	25
Improvement of existing					10	15
Total					30	40

Notes (1) Based on information from PWD records and Sarawak Annual Bulletin of Statistics.

(2) Based on PWD unit cost estimates. Cost of minor bridges is included in roads cost.

(3) Includes reconstruction of some earth roads and tracks.

The proposed coordination of forestry and agricultural access roads and the benefits to agriculture and forestry of the proposed public roads as outlined above, are estimated to reduce the forestry and agricultural investments in access roads by at least some $15 mn compared to the total calculations made in Chapter 8.

Road Construction Capacities

At present the PWD in Sarawak has fourteen road construction units (MRCUs), of which four are allocated to the Fourth Division: three for road construction and one for road improvement and surfacing. If the capacity of one unit is assumed to be about $1.5 mn of road works per year, the envisaged public road development in the period 1973-1990 would require the full time employment of an average of six to seven construction units. An important aspect of the road construction programme is the need for major portions of the network to be ready before specific forestry or agricultural projects can start. To attain the optimal timing of road construction might put too great a strain on the capacities of the PWD and the State budgets. It is therefore suggested that foreign financing (e.g. through IBRD, IDA, or ADB) and contractors' assistance are considered for financing and constructing part of the necessary road development.

7.3.3 Road Transport

Goods Transport

The goods transport is at present mainly carried out by four to five ton lorries of which 30 per cent are in public service. The transport is carried out on a per-hire basis, the shipper has to hire the lorry and driver for a certain time or distance. There is only one known example of a goods route (between Miri and Kuala Baram). The transport rates quoted are generally in the range of 25 to 35 cents per ton-mile on distances exceeding 15 miles.

The introduction of heavier lorries and tractor-semitrailers with maximum axle loads of 8/13 tons on single/tandem axles, increased utilisation of the equipment and better transport organisation with routes and simple terminals, could bring the average transport costs down to some 15 cents per ton-mile, thus reducing the present transport costs by 40 to 50 per cent.

Bus Transport

It is generally assumed that an efficient future bus transport in the Study Area can provide adequate service of both urban and rural demands for an average fare of some five cents per passenger mile. This would imply that buses run at least 40 000 miles a year with an average load factor of 30 to 40 per cent. On rural routes with rather limited demand, the passenger and goods services can be combined and served by buses with a special load compartment.

Development of Efficient Services

To obtain efficient bus and lorry transport services generally requires that the industry is dominated by relatively large companies or corporations which can attract and develop the necessary managerial and technical skills. These companies should have access to credit for financing purchase of the most suitable equipment and the opening up of new routes and services. An overall basic requirement however, is that the Government, through regulations and other actions, promotes the establishment of an efficient transport industry. Some further considerations on the Government role in transport development is presented in Section 7.4.

7.3.4 Shipping

The main factors to be considered in estimating the future shipping to/and from the Study Area are:-

- the volume and main patterns of the transport demand;
- the shipping characteristics of the commodities; that is whether they are liquid or solid, handled as bulk or general cargo suitable for containerisation or other forms of unitised loads, and the size of shipments;
- the characteristics of future shipping services by major links; that is the size and type of vessels to be used, minimum size of shipments to warrant direct calls and the general development of containerisation and other forms of unitised loads;
- the probable port facilities in the Study Area, other ports in Sarawak and the general shipping services of the South China Sea.

Some preliminary considerations on these factors are presented in the following subsections.

Import/Export Patterns

Estimates of the future import/export of the Study Area were presented in Section 7.2.3; further detailing by origin/destination of the goods, will be pure 'guestimates'. Which, however, will be useful for the discussion of future shipping and port requirements.

The major part of agricultural export products can be assumed to be destined for countries outside the South China Sea. The same would probably also be true for logs and about 90 per cent of the sawn timber and manufactured timber products. The external supply of agricultural inputs and cereals will probably be about equally split between the rest of Sarawak, West Malaysia, countries in the South China Sea and other more distant countries. Of the general cargo imported by Sarawak in 1970 about half the volume came from West Malaysia and countries within the South China Sea, and half from more distant countries. It is assumed that this is valid for the Study Area and will be also for the Situation in 1990. Export of general cargo would most probably be shipped to Kuching, Sibu and West Malaysia. A summary of the assumed export/import patterns by 1990 is presented in Table 7.8.

Shipping Patterns

The main export products such as palm oil and forestry products will probably be picked up directly by liners and chartered vessels at the most convenient deep sea port, for shipment to distant destinations. The same will probably also be true for most other bulk export commodities such as rubber and palm kernels. But other exports to and imports from distant countries will probably be of volumes too small on each link and too separated in time to warrant direct shipping to a deep sea port in the Study Area. Direct shipping may account for around 30 per cent of the volumes, the rest will probably be transhipped at major ports in West Malaysia and at Singapore.

The trade between the Study Area and West Malaysia and other countries in the South China Sea will probably be shipped directly for most of the volumes when reasonable port facilities are available in the Study Area.

TABLE 7.8 ASSUMED MAIN SHIPPING PATTERNS TO AND FROM THE STUDY AREA 1990 (Excuding transport of oil and gas)

A. ASSUMED IMPORT/EXPORT PATTERNS

Commodities	Assumed Distribution by countries in %				Total volumes in thousand tons	
	Sarawak	West Malaysia and countries in South China Sea	Other countries	Total	Sit.I	Sit.II
Import a)Agric.input, cereals	40	30	30	100	95	97
b)Stone, sand	100	-	-	100	120	150
c)Other cargo	30	35	35	100	240	330
Export d)Agric. dry cargo	negl.	5	95	100	140	140
e)Palm oil	-	-	100	100	316	316
f)Logs	negl.	5	95	100	280	320
g)Sawn timber	negl.	10	90	100	400	450
h)Manf. timber prod.	negl.	10	90	100	150	200
k)Other cargo	50	50	negl.	100	120	170

B. ASSUMED SHIPPING PATTERNS. VOLUMES IN '000 TONS (SITUATION II)

Commodities	Origin/Destination and Shipping Pattern				Total
	Sarawak	Others within S. China Sea	Other countries		
	Direct	Direct	Via transhipment	Direct	
b)Stone, sand	150	-	-	-	150
e)Palm oil	-	-	-		316
g)Sawn timber	-	50	negl.	400	450
h)Manf. timber	-	20	negl.	180	200
Other commodities a+c+d+k	237	220	150	130	737
Sub total	387	290	150	1026	1853
f)Logs	-	10	-	310	320
Total	387	300	150	1336	2173

Shipping

The present trend within international shipping is towards the use of larger and faster vessels as well as specialised vessels for containers, other unitised loads and bulk cargo when the volume can support this. This development is linked to the rationalisation of cargo handling where containerisation, unitised loads, mechanical handling and faster handling are of great importance.

The long distance general cargo trade is more and more diverted from conventional ships to container-liners carrying some 2 000 to 3 000 containers, and other specialised unit load carrying vessels. These huge, fast and expensive vessels will only call at major ports where they can discharge and load thousands of tons each time. Containers and loads to and from minor ports will have to be transhipped and carried by small vessel feeder-services. The current SLDB plans for handling palm oil are that it should be bulk loaded into specialised tankers of 20 000 to 30 000 tons.

The economies of scale in ship size depends heavily on the transport distances involved (Kendall, 1972). Therefore, also in the future shipping within the South China Sea will mostly be carried out by vessels of a tonnage less than 5 000. Efficiency in shipping and cargo handling is, however, just as important in short distance travel as for the inter-continental runs. Efficient shipping and extensive use of pallets, containers and other forms of unitised loads can lead to a lowering of transport costs. More attention should be given to a blue print for a multi-purpose vessel with ability to handle containers, pallets and roll-on-roll-off vehicles presented by (Little, 1972) after a thorough study of the regional shipping in South East Asia.

Shipping to and from the Study Area

The greatest volume of the future export products will originate in the Bintulu planning unit. It will thus from a transportation point of view be of advantage, to establish deep sea port facilities in the Bintulu area and haul the products for long distance shipping by road and water to this port. It is, however, considered that inter-regional shipping to and from, Miri and Marudi planning sub-units, could be more economically made directly by shallow draft vessels of some

1 000 to 1 500 tons dwt than by transhipment at a deep sea port near Bintulu. This would, of course, depend on the possibility of providing suitable port facilities near Miri and Marudi.

Development of Coastal and Regional Shipping

The emergence of an efficient regional shipping service will depend on the mood and incentives within the shipping industry as well as the provision of efficient ports and port operations. It is therefore recommended that the Government should review its policies on shipping with the aim to achieve a better control of the industry and that coastal and regional shipping are developing in line with the general economic and social priorities. Some further considerations on the future role of Government participation in shipping development is presented in Section 7.4.

7.3.5 Ports

Deep Sea Port

The estimated future transport demand and shipping patterns indicate that there is a need for a deep sea port facility in the Study Area and that the best location, from a transportation view, would be somewhere near Bintulu. It is estimated that a deep sea port near Bintulu would have a through-put of about one million tons in 1990 from the Study Area alone. Log exports are excluded because rafting of logs to an open anchorage will probably be cheaper even in the future than wharfside handling.

The whole of the coastal waters of Sarawak are extremely shallow. The point at which the six fathom line (36 feet) comes closest to the shore in the Bintulu area is at Tanjong Kidurong, some 10 miles north of Bintulu. A deep sea port there would have to be built 1 to 1.5 nautical miles off the shore and be connected to dry land by a correspondingly long combined road and breakwater against the northeast monsoon. An additional breakwater would probably be required outside the port to protect it against the southeast monsoon. The sandstone ridge forming the point of Tanjong Kidurong probably extended several miles further out to sea in prehistoric times and remnants of this in the seabed can possibly support a port of the type indicated above.

However, at present there is only little information available on the physical and environmental conditions at Tanjong Kidurong. Alternative locations could be considered. First sandstone formations similar to those at Tanjong Kidurong are found off Similajau and at Tanjong Lobang near Miri. Hydrological studies (Hydraulic Research Unit, 1970) have shown that a semi-deep (18 feet) port at Kuala Baram seems possible but will probably be extremely expensive and to consider facilities to accommodate vessels of 30 feet draft is probably out of the question.

A deep sea port at Tanjong Mani on the Rajang River, will in the same way as with a port located near Miri, mean that a majority of the goods requiring these facilities would have to be hauled or barged some 100 miles or more. In that case it might be more feasible simply to barge the goods to an off-shore anchorage and only develop a barge-port at Bintulu.

If the soil and environmental conditions at Tanjong Kidurong are not too difficult, a deep sea port might be constructed there for around $70 to $100 mn. If the advantage of a deep sea port at Tanjong Kidurong compared to the next best alternative measured by saved road or lighter transport costs amounts to an average of $10 per ton for all cargo except logs and palm oil, the annual benefit of the port in 1990 would be about $7 mn which could cover the annual interest payment at a 10 per cent interest rate of $70 mn. This exemplified calculation indicates thus that if the basic assumptions are not too improbable, a deep sea port at Tanjong Kidurong might be economically feasible.

The unit advantage of a port at Tanjong Kidurong could be less than $10 a ton. The port would be of advantage in other ways, for example it would greatly benefit ocean transport to other parts of Sarawak, the palm oil transport, regional transport, and the development efforts in general. It is therefore recommended that a feasibility study of a deep sea port at Tanjong Kidurong or elsewhere in or near the Study Area, is made as soon as possible. It is, however, suggested that this study is linked to the development envisaged by the Sarawak Port Authority and that studies of coastal port developments at Miri and Marudi are included.

Coastal Ports

The estimated future volume of direct regional and coastal shipping indicates that significant improvement of the ports of Miri and Marudi are necessary. These ports would have influence areas covering respectively about 27 and 5 per cent of the population in the Study Area in 1990.

It is believed that Marudi port can be easily developed to take shallow-draft vessels of 1 000 to 1 500 dwt which should have no great difficulty in negotiating the Baram bar at high tides. Development of Miri port might be more difficult because the Miri bar is extremely shallow and dangerous. If improvement of the port here proves to be too difficult and costly, a move of the main coastal wharfs to Kuala Baram might be an alternative.

The necessary improvement of Miri and Marudi ports is assumed to require investments in the range of $15 mn.

7.3.6 Airports and Aviation

Miri and Bintulu Airports

The airports at Miri and Bintulu are at present serving scheduled domestic flights with the Fokker Friendship. Both airports were opened for this service in 1968. Miri also serves scheduled flights to Marudi with the small aircraft BN2.

The volume of traffic in East Malaysia and the projected traffic growth warrants that more airports, including Miri and Bintulu, should be improved to accommodate jet aircraft such as the Boeing 737. The Miri airport has a good location some 6 miles from the town and can be readily improved. The airport at Bintulu, however, is poorly located with respect to community development and flight safety, and should preferably be moved to a new site.

The recently completed Malaysia Airport Study covering the prospective aviation development and airport needs up to 1991 has made the following recommendations:-

- that Miri airport should initially be developed to handle aircraft of the Boeing 737 size, but should be capable of further improvement to a full ICAO class A airport which can accommodate even the big 747 Jumbo jet. As such it should not only be

developed to serve the needs of the community but also serve as a strategic alternative to Kuching and Kota Kinabalu;

- that Bintulu airport should be moved to a new site and built to ICAO class B standard capable of serving aircraft of the Boeing 737 size.

It appears reasonable under existing circumstances that both Miri and Bintulu should be developed as recommended and thus allow for a convenient and efficient service of the Study Area. Aviation is, however, a highly international business. The recently signed air traffic agreement between Malaysia and Brunei should, therefore, allow for the new international airport at Bandar Seri Begawan to serve as an emergency alternative for Kuching and Kota Kinabalu at times when these airports are suddenly closed to air traffic; development of Miri airport to a full ICAO class A airport would thus be unnecessary.

The improvement of Miri airport with widening and extension of the present runway is due to start in 1973. The Malaysia Airport Study estimated that this alternative of improvement including the moving of the air terminal a bit further from the runway, would cost some $6 mn. The Study has further estimated that the long term requirements for terminal buildings, apron, roads, navigational equipment etc., would require additional investments amounting to some $7 mn.

At Bintulu the Study correctly recommends that investments in the existing airport should be kept to a minimum. The cost of constructing a new airport is estimated at about $50 mn. This cost is considered to be somewhat on the high side; it might be possible to keep total investments for Miri and Bintulu airports below the $50 mn level. A feasibility study of a new airport at Bintulu is recommended in line with the Malaysia Airport Study.

Other Airports

If the extensive future road network as envisaged in Section 7.3.2, is implemented it will obviate any need for other schedule-served airports in the Study Area. If, however, the direct road from Miri to Marudi via Bakong proves not to be feasible, an air services to Marudi of about the present standard would be necessary also in the future.

7.4 TRANSPORT POLICY

7.4.1 Introduction

A transport system is highly complex as it encompasses several modes of transport which serve a large variety of transport needs. Transport affects almost all social and economic activities; the total transport bill of a society may easily account for 5 to 10 per cent of the GRP.

Directly or indirectly nearly all transport activities are controlled or affected by Government decisions. The very essence of a transport policy must, therefore, be to coordinate Government activities to ensure that decisions are consistent with the general development policies and aims.

Transport Policy was, among other things, the subject of the comprehensive study, (Nathan Consulting Group, 1968) to which reference is generally made. Only aspects of special importance for the development of an efficient transport system in the Study Area are discussed in this Section. The discussions are based on the assumption that the following aims are important elements in the Government Transport Policy:

- the transport system should achieve an efficiency in service and costs compatible with the transport demand and social priorities;
- the transport price should be based on the cost of providing the service.

The conclusion reached is that Government should increase its involvement in the transport sector and consequently to strengthen the Government agencies concerned.

7.4.2 Regulation of Entry and Operation

Regulation of entry into the transport business is usually considered a practical means of ensuring that only sufficiently skilled, responsible and financially sound operators are allowed to provide a transport service. Entry regulations also make it possible to restrict the number of companies involved so that each company is able to have a sufficiently large share of the market to permit efficient operation of suitable equipment. This is especially important where the transport demand is rather small as it is, and will be for a long time in the Study Area.

With a restricted number of licenced operators there ought to be a progressive lessening of restrictions on the number and capacity of equipment as time proceeds to allow the most efficient operators to expand their service and thus benefit the society. Inbalanced restrictions on equipment and on entry can lead to a protected and inefficient business which are a burden on the society and an obstacle to social and economic development. The establishment and development of route services ought to be carefully planned to ensure that the service levels are in balance with the transport demand so the service can be offered at a reasonable price.

It is considered that regulation of entry and operation are both feasible and desirable for coastal and river transport as well as for land transport and terminal operations. The system of regulations ought, however, to be flexible and dynamic to take advantage of technical innovations and developments within the transport sector.

7.4.3 Transport Pricing

In a modern efficient transport system, the fares and rates ought to be based on the cost of providing the service on a long term basis, for example two to five years. The practice of ad valorem pricing in shipping is a remnant from the past where the assumed ability to pay and not only the cost of providing the services were the basic price-determinants. Ad valorem pricing is being more and more abandoned all over the world as it leads to distortions in the economic and social development.

In a changing and fast developing transport system there ought to be some basic regulations and guidance on pricing to ensure that the transport industry develops and maintains a fair pricing policy and that the benefits of improvements are fairly shared between the industry and the society. Systems of price regulations are especially important on protected transport routes and where monopoly situations exist.

7.4.4 Taxes and Fees

Taxes and fees are levied on transport modes and operations, some as a price for public services rendered (roads, airfields etc.), others for fiscal reasons. The taxes and fees and their effect on the transport system ought to be carefully considered to ensure that the effect is in line with the aims of the transport policy and does not have any undesirable side effects. An often favoured policy is to evaluate service fees on the basis of cost-responsibility. The fees (or taxes) are levied on traffic and transport which corresponds to the cost to the society of providing the services.

The public transport offers services to the whole society and the service obligations are often putting the public transport in a less favourable competitive position versus private and individual transport. It is, therefore, often found desirable to favour public transport at the expense of individual and private transport.

The annual licence fees on private cars are today generally less per seat than the licence fees on buses. The annual licence fee on a private car with an engine of 1 500 cc is $150 or about $30 per seat. The annual licence fee on buses is $60 per seat. It is recommended that these fees are reviewed and possibly changed in the favour of buses.

Transport in the inner parts of Sarawak is mostly by longboats with gasoline powered outboard engines. This mode of transport will probably be the only one available in these areas for a long time. Transporting goods by longboats is extremely expensive and adds considerably to the cost of imported goods as well as to the production costs of goods people bring down river for sale. It would make a significant difference if the outboard engines in the upper river systems could be supplied with tax-free gasoline. The gasoline bill would be halved and the total longboat transport costs could be cut by 30 to 40 per cent. One argument to support such a move could be that the current gasoline tax (or most of it) is levied as a means of letting motor vehicles pay for the public road services.

On distances of 100 to 250 miles there is and will in the future certainly be keen competition between air and road for the passenger transport demand. The comfort and speed of air transport is weighted against the additional costs compared to the use of buses or private cars. It will, in promoting an optimal distribution of traffic by transport modes, be an advantage if the competition is based on the total cost of providing the services. Both airport taxes and road user taxes should, therefore, reflect the cost to the society of providing airports and roads.

7.4.5 Management of Transport Development

Control and guidance of transport development in accordance with the aims of the overall regional development policy is a difficult but highly rewarding task. It is, therefore, recommended that the relevant Sections within the Ministry of Communications and Works are strengthened and allocated the necessary power to facilitate an efficient coordination of Government activities within the transport sector. The Sections should be capable of giving expert advice on operational as well as infrastructural matters, also to help and guide the traditional small holder industries (land transport) as well as large scale enterprises such as ports and shipping lines. The Sections ought to be well staffed with highly skilled transportation economists and engineers who have sufficient position to enable easy cooperation with the future Sarawak Port Authority, the Public Works Department etc.

ESTIMATES OF POPULATION BY SPECIFIC AGE GROUPS FOR PLANNING UNITS AND SUB-UNITS 1990 SITUATION I

Planning Unit/ Sub-unit	Population 1990	Number of persons in each age group by years								
		0 - 4	5	6 - 11	12 - 14	15 - 16	17 - 18	19 - 22	23 - 65	66^{+}
Bakong	17 000	2 924	612	2 958	1 037	629	629	1 122	6 647	442
Marudi	15 000	2 580	540	2 610	915	555	555	990	5 865	390
Long Lama	21 000	3 612	756	3 654	1 281	777	777	1 386	8 211	546
BARAM	53 000	9 116	1 908	9 222	3 233	1 961	1 961	3 498	20 723	1 378
Bintulu/Similajau	43 000	7 396	1 548	7 482	2 623	1 591	1 591	2 838	16 813	1 118
Kemena	25 000	4 300	900	4 350	1 525	925	925	1 650	9 775	650
BINTULU	68 000	11 696	2 448	11 832	4 148	2 516	2 516	4 488	26 588	1 768
Miri-North	73 000	12 556	2 628	12 702	4 453	2 701	2 701	4 818	28 543	1 898
Sibuti	24 000	4 128	864	4 176	1 464	888	888	1 584	9 384	624
Niah-Suai	32 000	5 504	1 152	5 568	1 952	1 184	1 184	2 112	12 512	832
MIRI	129 000	22 188	4 644	22 446	7 869	4 773	4 773	8 514	50 439	3 354
STUDY AREA	250 000	43 000	9 000	43 500	15 250	9 250	9 250	16 500	97 750	6 500

Note

The 1970 Census data which are presently available do not have a breakdown of age into single years, therefore, the percentage age distribution of the specific age groups used for the calculation of Appendices III.1.1 and III.1.2 is based on the 1960 Census for Sarawak as a whole. Consequently, it is assumed that the age structure of Sarawak or the Planning Units will not alter much in the period up to 1990. The error included in this assumption would not affect the calculation of, for instance, the number of classes by level of education to any significant extent.

ESTIMATES OF POPULATION BY SPECIFIC AGE GROUPS FOR PLANNING UNITS AND SUB-UNITS 1990 SITUATION II

Planning Unit/ Sub-unit	Population 1990	Number of persons in each age group by years								
		0 - 4	5	6 - 11	12 - 14	15 - 16	17 - 18	19 - 22	23 - 65	66+
Bakong	19 000	3 268	684	3 306	1 159	703	703	1 254	7 429	494
Marudi	15 000	2 580	540	2 610	915	555	555	990	5 865	390
Long Lama	28 000	4 816	1 008	4 872	1 708	1 036	1 036	1 848	10 948	728
BARAM	62 000	10 664	2 232	10 788	3 782	2 294	2 294	4 092	24 242	1 612
Bintulu/Similajau	61 000	10 492	2 196	10 614	3 721	2 257	2 257	4 026	23 851	1 586
Kemena	30 000	5 160	1 080	5 200	1 830	1 110	1 110	1 980	11 730	780
BINTULU	91 000	15 652	3 276	15 834	5 551	3 367	3 367	6 006	35 581	2 366
Miri-North	77 000	13 244	2 772	13 398	4 697	2 849	2 849	5 082	30 107	2 002
Sibuti	24 000	4 128	864	4 176	1 464	888	888	1 584	9 384	624
Niah-Suai	46 000	7 912	1 656	8 004	2 806	1 702	1 702	3 036	17 986	1 196
MIRI	147 000	25 284	5 292	25 578	8 967	5 439	5 439	9 702	57 477	3 822
STUDY AREA	300 000	51 600	10 800	52 200	18 300	11 100	11 100	19 800	117 300	7 800

APPENDIX III.2

REFERENCES

ACRES/SWR Consortium	1972	Malaysia Airport Study Study Vol:I National Airport Plan. (Draft Final Edition)	Toronto Canada
Food Agriculture Organisation	1971	Development Strategy for the Hill Dipterocarp Forests of Sarawak	Forest Industries Development Project, Kuala Lumpur, Malaysia
Government of Malaysia	1971	Second Malaysia Plan 1971 - 1975	Government Printer, Kuala Lumpur
Harris F. R., Inc. Nathan R. R. Associates, Inc.	1968	Transport Development in Malaysia. (Draft Edition)	Kuala Lumpur
Hunting Technical Services Limited.	1971	Johor Tengah and Tanjong Penggerang Regional Master Plan. Supporting Volume 8: Settlement, Communications and Services	Government Printer, Kuala Lumpur
Hydraulics Research Unit	1970	Kuala Baram, Sarawak. Studies of Bar Deepening	H. R. U. Wallingford, England
Jorgensen S.	1973	- Employment and Population Multipliers - Population and Labour Key Figures - Population Growth and Urbanization	M-B Study, Internal Papers
Joregensen S. Chia Pit Chung Arthur Goh	1973	Temedak New Town. A Preliminary Assessment of the Approximate Space, Service and Housing Requirements Including Costs of Building a New Town of 7 000 People	M-B Study, Internal Paper
Kendall P. M. H.	1972	A Theory of Optimum Ship Size	Journal of Transport Economics and Policy
Land and Survey Department, Sarawak	1968	Planning Branch Manual	Land and Survey Department, Kuching

Land and Survey Department, Sarawak	1967	Development Control Standards	Land and Survey Department, Kuching
Little A. D. Inc. and Associate Consultants	1972	South-east Asian Regional Transport Survey. Book One	Singapore
Mathiesen C. J. Jorgensen S.	1972	Development Strategies	M-B Study Association Paper
Norwicki A. G.	1968	Automobile Demand in Developing Countries	Internal Working Paper of the IBRD
Planning Division, Land and Survey Headquarters	1973	Preliminary Delineation of a Service Centre Network in Sarawak	Land and Survey Department, Kuching
Simonsen O. C.	1971	Settlement size - An Evaluation of Service Thresholds	Pahang Tenggara Regional Master Planning Study Working Paper No. 52
Skule L.	1972	Physical Planner's Phase I Report	M-B Study, Internal Report
Wetteland T. E.	1973	The Present Transport System in the Study Area	M-B Study, Internal Paper

PART IV

ECONOMIC STRUCTURE

PART IV

ECONOMIC STRUCTURE

INTRODUCTION

Part IV describes in economic terms the consequences of the development envisaged in the Perspective Plan. Economic forecasts have been worked out for the period 1970 to 1990. The forecasts are based on estimated employment and productivity within the different sectors of production. The forecasts show the overall Gross Regional Product (GRP), its origin, which means the contribution from the main sectors of production to the GRP, and its application for investments, and consumption.

The future development of wages, personal incomes and savings is described. The financial aspects of a concentrated development effort are illustrated by the requirements for local and outside capital inputs. The collective result of the forecasts is an economic model describing the future economic structure of the Study Area.

CHAPTER 8
REGIONAL ECONOMICS

8.1 INTRODUCTION

The description of the economic structure of the region is an attempt to draw up a comprehensive picture covering the whole of production, consumption, investment, savings, import and export. The structure is expressed in money-terms which is the common denominator of all these economic activities. The description must necessarily include the use of a number of technical terms, which we try to explain currently in the text. A summary of findings is given in Chapter 12.

The analytical work can be either:

- macro-analyses, which deal with economic quantities in the large, such as investments, consumption, manufacturing industries and total employment; these are all aggregate quantities of a number of smaller and more specified quantities, - or
- micro-analyses which deal with the individual enterprises, households etc. and seeks to describe the total situation by summing up the details.

The micro-approach is used in collection of statistical data, for instance, censuses of population and of manufacturing industries. In planning and forecasting of general economic development, however, it is necessary to use the aggregated figures, that is figures for whole groups of populations, industries etc.

The economic consequences of the future possible development have been estimated according to the strategies laid down for the perspective planning work. Attempts have been made to describe and forecast the economic development in the Study Area. In order to do this and to analyse the impact of specific measures, economic models have been worked out. A model is a simplified description of real conditions; its purpose is to make it possible to calculate and study the consequences of different assumptions. Two different models have been worked out; a present time one and a future or 1990 one. The present time model is based on 1970 figures (presented in the Interim Report "Present State - Characteristics of the Study Area"); this model is thus a tool for analyses of the

present flow of resources. The forecast work has been carried out by means of the future model, which is a modified edition of the first model, taking the expected effects of technical innovations into consideration.

The present time model, which is a schematic description of the economic life in the Study Area, illustrates the flows of materials, labour and capital within the society. The model appears as an input-output matrix (presented in Appendix IV 1.1 to IV 1.3), where the 1970 economy is described in money terms and by the technical coefficients, that is, the relations between the various sectors of production. Furthermore, the estimated technical coefficients from the 1990 model are shown in a tentative input-output matrix describing the relations in the future economic society. By tracing possible changes through the input-output matrix, the effect of these changes on all sectors can, in principle, be measured. Actually, however, the complexity of economic mechanisms in the society does not permit accurate measurements.

The economic development in the Study Area is determined by primary and secondary growth rates. The primary growth rates are concerned with the growth of employment within the main sectors of the economy. The secondary growth rates are concerned with the changes in the productivity per occupied person in the main production groups and the distribution of the Gross Regional Product (GRP) on uses in the society when the employment level has been decided. The uses of GRP refer to: consumption, investment and export.

8.2 GROWTH RATES

To comply with the concept and purpose of the Perspective Plan the forecast model incorporates four major production sectors instead of the 21 subsectors in the more detailed input-output matrix. The detailed technical coefficients have been weighted, aggregated and afterwards applied to the selected growth criteria.

The forecasting has been carried out on the macro economic level and the growth rates have been established in accordance with local conditions, national aims and international trends. However, to a certain extent it has been possible to combine the macro-forecasts with aggregated micro-projections, based on studies and considerations of future products, jobs, resource requirements etc.

For practical reasons the Study Area has been treated as a separate economy, considering all services and products going into and out of the Region as external products irrespective of whether they come from or go to foreign countries, other parts of Sarawak or other parts of Malaysia. It might later be considered how priorities in distribution of imports and exports between Malaysia and foreign countries should be settled.

8.2.1 Primary Growth Rates - Employment

The employment assumptions described in Chapter 4 have been the basis for the economic computations. According to those assumptions, which imply certain growth rates for each main sector, the two 1990 Situations will be as shown in Table 8.1.

TABLE 8.1 EMPLOYMENT BY SECTORS IN 1990 (PRIMARY GROWTH RATES)

Employed in	Agriculture	Forestry	Manufacturing	Services
1990 Situation I :	45 000	4 000	19 000	20 000
1990 Situation II :	45 000	5 000	27 000	28 000

Altogether there will be 88 000 employed in Situation I and 105 000 in Situation II.

8.2.2 Secondary Growth Rates - Other Factors

These include growth in productivity per person employed in the various sectors; furthermore the quotas for import, export and investments have been introduced in the model. Quota, in this context, means the proportion of the Gross Regional Product (GRP) employed for a certain purpose; e.g. import quota = $\frac{\text{import}}{\text{GRP}}$.

The secondary growth rates, which are identical in the two 1990 Situations are shown in Table 8.2.

TABLE 8.2 SECONDARY GROWTH RATES BY SECTORS

	Agriculture		Forestry	Manufacturing	Services
	Traditional farming 0.025	New schemes 0.07			
Annual growth in value added per employed	0.06		0.02	0.03	0.025
GRP/product value	0.70		0.75	0.40	0.45
Prices	const.		const.	const.	const.
Import quota	0.20		0.10	0.20	0.60
Export quota	0.40		0.30	0.65	0.01
Investment quota	0.22		0.09	0.10	0.25

The assumptions in Table 8.2 exclude the petro-chemical industry including extraction and treatment, because development within this industry is more dependant than in other industries on local and international policy, and the outcome of future explorations is uncertain. The total regional economy forecast (excluding petro-chemical industry) is shown in Table 8.3.

8.3 THE SECTORS

The estimates of total future employment and production by sectors are treated below. It is, however, difficult to project development on the micro level up to 1990. The imagination is usually too limited to cover all possibilities for industries and activities over a 20 year period, furthermore to attempt planning in such detail would generally be valueless because uncertainties would far outweigh probabilities. Nevertheless within these limitations certain indications as to the product mix within each sector are possible to create thereby making provisions for future investment, employment, and production possibilities.

TABLE 8.3 ECONOMIC SECTOR DEVELOPMENT 1970-90 (EXCLUDING PETRO-CHEMICAL INDUSTRY)

Production Sectors by Year	Total product value	Production value (Value-added)	Number of employed	Production (Value-added) per employed	Employed by Sector	Value-added by Sector	Invest-ment	Import	Export	Domestic consumption and materials
	Thousand dollars			Dollars	Per cent		Thousand dollars			
1970										
AGRICULTURE	22 200	17 500	21 000	800	58	12	200	2 300	4 900	17 100
FORESTRY	92 500	64 500	3 500	18 400	10	45	4 500	6 900	84 000	4 000
MANUFACTURE	21 100	9 500	2 400	4 000	6	8	700	3 500	5 100	15 300
SERVICES	101 200	50 500	9 500	5 300	26	35	11 000	36 800	-	90 200
	237 000	142 000	36 400	3 900	100	100	16 400	49 000	94 000	126 200
1990 - I										
AGRICULTURE	162 000	113 400	45 000	2 500	51	21	24 800	22 700	45 400	91 800
FORESTRY	145 600	109 200	4 000	27 300	4	20	9 800	10 900	32 800	103 000
MANUFACTURE	343 800	137 500	19 000	7 200	22	26	13 800	27 500	89 400	240 600
SERVICES	386 700	174 000	20 000	8 700	23	33	43 500	104 400	1 700	341 500
	1 038 100	534 400	88 000	6 100	100	100	91 900	165 500	169 300	776 900
1990 - II										
AGRICULTURE	162 000	113 400	45 000	2 500	43	17	24 800	22 700	45 400	91 800
FORESTRY	182 000	136 500	5 000	27 300	5	20	12 300	13 700	41 000	128 700
MANUFACTURE	488 800	195 500	27 000	7 200	26	28	19 600	39 100	127 100	342 100
SERVICES	541 300	243 600	28 000	8 700	26	35	60 900	146 200	2 400	478 000
	1 374 100	689 000	105 000	6 600	100	100	117 600	221 700	215 900	1 040 600

8.3.1 Agriculture

The future development within the agricultural sector depends largely on the selection of future crops. Different cropping patterns can be devised depending upon various assumptions and conclusions concerning, for example, markets and the aims of development. The following is only an exemplification of how the agricultural development might reach the targets assumed in the macro forecast.

The assumed overall growth of production by six per cent annually per employed is a rather high growth rate, but the agricultural sector must expect an even higher growth than other sectors because the present level of productivity per employed is very low. Growth in agricultural productivity is considered technically possible and it is also socially necessary because a considerable increase of individual incomes is needed if future employment in the agricultural sector is to be considered an attractive alternative to other employment.

In Chapter 13 it is assumed that 270 000 net acres of land will be developed over 20 years and one production pattern for this acreage is tentatively designed as shown in Table 8.4.

TABLE 8.4 PRODUCTION PATTERN ASSUMING FULL DEVELOPMENT OF 270 000 ACRES OF LAND BY 1990

Product	Acreage	Employed	Product Value $000	Net Investment $000
Oil palm	135 000	10 500	60 000	121 000
Rubber	94 500	12 200	40 000	168 000
Pepper	6 750	3 400	25 000	6 800
Diverse crops	6 750	600	2 000	8 400
Beef	13 500	400	2 000	10 800
Rice	13 500	3 400	6 000	8 500
Total	270 000	30 500	135 000	323 500

In addition the traditional agricultural areas outside the 270 000 developed acres will provide employment for about 14 500 people who will produce about $27 mn worth of agricultural products. Thus the total product value in agriculture will amount to $162 mn which corresponds to a sector value-added of $113.4 mn as shown in Table 8.3.

The investments in the agricultural sector have been calculated on an average investment cost per work place in different product lines. This investment cost has been applied to all jobs in the new agricultural areas.

8.3.2 Forestry

The assumed development of the forest industry is based on the recommendations by the FAO, Forest Industries Development Project which at present are still provisional. To create a reliable and economic foundation for the wood based industries a new concept of logging utilisation should be introduced. It is proposed in the following section to establish a number of major timber complexes to which the logging operation is closely tied.

The forest exploitation is being planned by the FAO-team, which will carry out specific studies for each industrial complex. A broad outline of the economic implications of the in- and output is, however, given below.

The Situations I and II are estimated to require respectively five and six timber complexes. It is assumed that each complex will need an annual log throughput of approximately 8 to 12.5 mn cubic feet equivalent to 200 to 250 000 tons (hoppus).

The logging operations per complex (including internal transport) would employ approximately 500 workers and require a net investment of $23 mn. The annual production would at world market prices amount to a value of about $25 mn.

It is assumed that 70 to 85 per cent of all production in the forestry sector will be allocated to the planned integrated wood industry complexes.

The key figures for the forest sector would be as shown in Table 8.5.

TABLE 8.5 FORESTRY SECTOR UNDER SITUATIONS I AND II 1990

	Situation I	Situation II
	- Hoppus tons -	
Total annual production (1990)	1 450 000	1 825 000
- in integrated complexes (logging section)	1 240 000	1 550 000
	- Dollars -	
Total investment (1970/1990)	120 000 000	145 000 000
- in integrated complexes (logging section)	115 000 000	138 000 000
	- Persons -	
Total employment (1990)	4 000	5 000
- in integrated complexes (logging section)	2 500	3 000
- other units	500	600
- other forest activities, reforestation, administration etc.	1 000	1 400

8.3.3 Manufacturing

The composition of the specific industries within the future manufacturing sector can, at this stage of the Study, only be described in general terms. Development is expected to take place along two lines. The first, a continued development of existing industries, mainly small scale. The second, the establishment of new comparatively large industrial units partly based on existing resources and partly as footloose enterprises.

Although the petro-chemical industry is expected to account for an overwhelming part of investment and production within the next decade, only a few new jobs will be created in this industry - probably less than 1 500 will be employed by 1990. This is a very limited expansion in jobs considering that at present 1 200 persons are employed and considering the extraordinary future investment and production figures.

The wood-based industry will represent a considerable contribution to the regional development. The timber complexes will each create 300 to 400 jobs at an investment of approximately $12 mn (excluding the logging operation). Around three quarters of the quantity of logs will be processed locally, the resultant product being sawn timber, plywood or remanufactured goods. Also other related industries are expected to emerge, for example, furniture making and the prefabrication of houses. Special opportunity is seen in the possibility of starting a standardised module based housing industry because a considerable renewal of present housing is envisaged within the next decades, and future urban and agricultural schemes will accentuate the requirements for more houses and new ways in construction. The Asian market, in this context, seems relatively unexplored and an early start might give the Sarawak industries an advantage which they might be able to maintain. The natural wood resources in Sarawak and the market potentials in the neighbouring countries should make this possible.

The total wood-based industry is expected to constitute about 15 per cent of total employment, 35 per cent of total investment and 30 per cent of total product value in the manufacturing sector (excluding the petro-chemical industries).

Food industries will presumably develop along the present pattern with a possible few new major enterprises established. Although at present it is difficult to establish the actual resources of crustacea and fish along the coast line of the Study Area it seems possible that these might be the basis for a fish industry, aiming at both fish for human consumption and fish protein production for animal feed. The size of such plants would depend on the outcome of research on sea fish resources and guidance of future fishing activity.

Factories for extracting palm oil and processing rubber latex will be set up according to the relevant acreages established in the agricultural sector. Slaughter houses orientated towards both domestic and export markets will be considered in accordance with the developments in livestock production. Increases in agricultural activities could possibly justify the establishment of a feed mix plant and a fertiliser factory. The latter plant could be merely a mixing unit, but it might be worthwhile to consider nitrogen fertiliser production based on natural gas production. However, fertiliser production plants are not labour intensive and require very high investments. A factory with a production capacity of approximately 50 000 tons of nitrogen fertiliser per annum would probably require investments of between $75 mn and $100 mn and only provide jobs for about 300 workers.

The resources in the Bintulu area of silica sand might justify the establishment of a glass factory. Although the glass sand is reputed to be of high quality any future glass factory would probably concentrate on glass containers and pane glass. A factory with basic tools for bottle manufacture, for example, would if established with a 4 mn units capacity probably require a net investment of $1.5 mn, and provide jobs for about 200 workers.

The availability of limestone and clays for cement production could justify the establishment of a cement industry in the Study Area. However, the domestic market will be completely satisfied by the planned cement factory in Kuching, which by 1974 is scheduled to produce about 200 000 tons. Also the export market is most unattractive because huge capacity reserves are available in neighbouring countries, thus an attempted entry into an already congested market is inadvisable.

Most other industries that could be developed in the Study Area are footloose industries. This means that the enterprises in question do not establish themselves because of availability of raw materials or an isolated local market; they base their production entirely on competitiveness (or protection) on domestic and foreign markets. The main requirements to attract footloose industries are a reliable labour force with sufficient skill, competitive wage levels, effective production and reliable transport at non excessive costs.

The clothing industry is an example of a footloose industry and there might be possibilities for the establishment here of one or two medium sized enterprises for ready made wearing apparels.

Manufacturing of plastic goods could be provided by a couple of medium size industries. The demand for containers and disposable wrappings will increase and local manufacturing of these goods only requires limited capital and skill. If for example, two plastic goods factories of an average size of 40 to 50 workers were established, the local market and export potentials could be covered by a net investments of less than $1.5 mn, yet jobs for about 100 unskilled workers would be created.

Future, more specialised industries could only be based in the Study Area when the present and future labour force has been educated to meet the demand for labour of a diversified industrial community. At the latest this should be possible in the second decade of the perspective planning period.

The provision of good transport facilities could make the Region as attractive for electronic and other component based industries as are Perak and Selangor.

As an indicator for the future distribution of major groups within the manufacturing sector the following example has been calculated. This is a rather theoretical exercice because projections for a developing industrial sector includes employment and production figures 10 times the present level.

TABLE 8.6 PRODUCTION PATTERNS FOR MANUFACTURING INDUSTRIES UNDER SITUATIONS I AND II 1990

	Situation I			Situation II		
	Employed number	Annual production $ mn	Investment $ mn	Employed number	Annual production $ mn	Investment $ mn
Wood based	3 500	125	75	4 000	145	90
Food	3 000	150	60	3 000	150	60
Local mineral based:	500	10	5	500	10	5
Footloose	8 500	40	75	15 000	100	140
Construction	2 000	25	20	3 000	45	30
Total	17 500	350	235	25 500	450	325

As is shown in the Table 8.6 the construction industry is assumed to expand considerably - a consequence of the projected development.

The difference between the employment figures applied in this Chapter and the occupation figures in Chapter 4 is partly due to the fact that the oil industry is not included, neither is a possible fertiliser factory. The petro-chemical industrial sector is expected to employ about 1 500 **persons** in 1990.

8.3.4 Services

The service sector consists of a number of heterogeneous activities which make the application of a common growth factor rather problematic, as changes in emphasis between the different subsectors automatically will lead to different rates in growth and quotas.

The service sector includes transport services, commerce, banking, private services, ownership and hiring out of dwellings, public administration and utilities. Table 8.7 shows estimates of the economic contribution to the GRP by these subsectors and their expected growth rates.

TABLE 8.7 SERVICE SECTOR'S CONTRIBUTION TO GRP BY SUB-SECTORS

	GRP 1970		GRP 1990/I			GRP 1990/II		
	$mn	%	$mn	pct of total %	annual growth %	$mn	pct of total %	annual growth %
Public utilities	7 235	8	17 400	10	7.3	24 400	10	9.1
Transport	7 165	14	19 140	11	4.8	26 840	11	6.8
Trade	14 560	29	50 460	29	6.4	70 760	29	8.2
Banking	2 790	6	10 440	6	6.8	14 640	6	8.6
Ownership of dw.	8 100	16	20 880	12	4.6	29 280	12	6.6
Administration	3 570	7	15 660	9	7.7	21 960	9	9.5
Other Services	10 095	20	40 020	23	7.1	56 120	23	9.0
Total	50 500	100	174 000	100		244 000	100	
Average	-	-	-	-	6.4	-	-	8.2

The considerable overall growth in the turn-out of the service sector is due to the expectation that higher service levels will be offered to the population when the general income level in the community is increased. The public services especially are assumed to grow at a rate above average. Better education and health standards are the main reasons for the increase in other services. Also administration will, according to the forecast organisational development, account for an increased part of the GRP.

Public utilities will be supplied either by public authorities or by special bodies. With rising demands for higher standards in power, water, sewerage and possibly also public transport this sector will necessarily make up an increased part of the total GRP.

The other sub sectors: commerce and banking are expected to increase at the average growth rate because at present there is no indication of under-supply of these services.

Transport as a separate industry is expected to expand at the same rate as the other service sub-sectors because its present relatively high contribution to the regional product is due to the imperfect transport network. By improved roads and port facilities the relative importance of this sector should be reduced somewhat.

"Ownership of dwellings" which also includes hiring out of houses and apartments has been projected at a lower rate of growth than other sectors. This is not due to an expected, lower construction activity, on the contrary house construction is expected to accelerate. But the government is expected to control price developments in this service category because free price formation here is usually one of the sources of nominal price rises, which have only a speculative background, and which may contribute to inflation and rising cost level.

CHAPTER 9
PRICES AND WAGES

9.1 PRICES

The present and future level and structure of prices and wages are important elements in the economic state of the Study Area. Variations in these can be derived from both internal and external sources. The Study Area, however, is such a limited unit that only some of the internal circumstances in connection with price and wage variations are touched upon here. The economic influence of external factors can only be controlled to a limited degree depending on the possibility of substitution between supply of different foreign goods and services.

The price changes can be either nominal or relative. A nominal price increase, usually as a result of some inflationary forces, implies that the entire price level is rising without any changes in the relation between the individual prices. A change in relative prices means that the price on certain goods or services varies in relation to others.

In the past the price level has been rather stable in Malaysia, not least in Sarawak. Apparently the nominal prices increased by less than one per cent per year (1967-71) at a time when most OECD-countries (members of Organisation of Economic Cooperation and Development) recorded an annual rate of inflation of three to four per cent. As no actual price index exists in Sarawak, an intermediary cost-of-living index has been worked out during this Study. According to this prices were virtually constant from 1967 to 1971.

The general price level is higher in the Study Area than for instance in First Division in Sarawak due mainly to higher transport costs, but trends seem to be practically identical in Kuching and Miri.

In comparison West Malaysia's interim retail price index showed a five per cent increase in the period 1967-1971. Still, in an international context this development in the nominal prices seems insignificant. Future developments in nominal prices are usually difficult to forecast. Two opposite working effects might be considered in the Study Area. Improved transport facilities and a resulting decline in freight costs will tend to lower the general price level. Increased economic activity will tend to pull the other way. At present many resources in the Study Area have only been employed in a limited scale. Future demand for capital, labour and goods will fill out the gap of under-utilisation in the Region.

Thus the inflationary tendencies may be increased in the future. This trend might be controlled by financial and monetary policy, but still the rises in nominal prices should not necessarily be considered a general evil, especially not as long as the general price level in other countries is increasing at a higher rate.

The changes in relative prices are equally difficult to forecast. World market prices and currency relations can make upredictable variations in relative prices, which again can give a spin-off effect on nominal prices.

The above considerations make it unnecessary to introduce price changes into the computations of the economic implications of the Perspective Plan. Studies of past trends do not indicate any significant price changes and future development does not automatically imply strong changes from the present pattern. Only in a few specific cases has future market demand been considered. For instance, palm oil outputs have been calculated at prices different from the present level but this has resulted from a specific judgement of market potentials rather than a forecast of prices in nominal or relative sense.

9.2 WAGES

Wages can be considered from two angles, either as a cost of production or as the remuneration to the employee. In the latter case the wage is the source of personal income. For this Report the cost of the production factor, labour, has been assumed to be constant in relation to the production output. That is, the

labour cost per unit produced will not change over time. This constancy, however, cannot be applied to the wage when the remuneration of the employee is considered. In the estimates of the future GRP it is assumed that the productivity per labour unit will increase because of improved technology, skill etc. - and this increase will, with constant product prices, lead to higher incomes. The question is then, how will this higher income be distributed between labour and capital? The development in wages as a source of personal income is discussed below.

Assessment of the present wage level in Sarawak and in the Study Area is difficult as statistics on the subject are limited. Consequently the past changes in wages can only be roughly estimated.

Wage changes, like price changes, can be considered as either nominal or real. Nominal wage changes correspond to nominal price changes and because this type of price change has been disregarded in the consideration of prices, the nominal wages are likewise taken as constant. Real wages, that is the purchasing power of wages, can be affected in different ways. Some of the more important ones are; increase in labour productivity, changes in the distribution of income between labour and capital, and variations in wage relations, for example according to skill. The changes in the distribution of income can be due to various reasons. Both financial policy and labour market relations are important in this connection, and both are unpredictable.

A general productivity growth factor has been applied in Section 8.2, Growth Rates, as the consideration of isolated changes in labour productivity for specific industries is not possible. This factor includes growth in production value according to changes in labour productivity, technology, and in terms of trade.

The functional distribution of the production value, that is the distribution of income between labour and capital, will depend on the general economic development, particular labour market relations and political regulations. A proper prediction of these conditions is not possible, but a few comments can be given on the present pattern and expected general tendencies.

TABLE 9.1 PRESENT WAGE STRUCTURE

		Approximate annual income
unskilled	:	$ 1 500.-
semi-skilled	:	$ 2 700.-
skilled	:	$ 5 400.-

Wages have shown a rising trend over recent years with an average annual growth of approximately three per cent. Apparently there have been no major differences between the growth within the different wage-groups. The total value added per employed in 1970 has been calculated at $3 900, in 1990 this figure is predicted to be about $6 100 to $6 600. This reflects an annual growth rate in the GRP per employed of 2.3 and 2.7 per cent, but it is unlikely that the total wage sum will increase at only that rate. At present the total wage sum (outside agriculture and oil industries) is calculated at 25 per cent of the GRP, corresponding to $1 800 per employee. The ratio wages sum ÷ GRP in 1990 is, according to trends from more developed countries, expected to be about 55 per cent (weighted according to the employment in the different sectors), which corresponds to an average wage of $3 500, implying an annual growth rate of 3.4 per cent. This increase in average wages is a consequence of the factors mentioned above. The fact that the wage sum ÷ GRP-ratio is expected to change implies both new trends in the labour structure (less unskilled, more skilled labourers), and a certain redistribution between wages and other factor income.

CHAPTER 10

INCOME AND CONSUMPTION

There is an inter-relationship between income distribution and the consumption-saving pattern within the Region. However, the present lack of basic statistical information on these subjects makes it necessary to undertake a number of estimates based on general experience, supplemented by isolated local data when such data have been available.

The expediency of working on these rather hypothetical distributions and their interrelations might be questioned. But as it is the purpose of the Perspective Plan to analyse the consequences of economic development, the most important trends in macro-economic development have been studied and estimated. The results are shown in Table 10.1, where the frames for consumption and investment are indicated.

TABLE 10.1. PROJECTED MACRO-ECONOMIC STRUCTURE FOR SITUATIONS I AND II

	1970 GRP		1990/I GRP		1990/II GRP	
	$ mn	per cent	$ mn	per cent	$ mn	per cent
Private consumption (Cf)	110.0	77.5	370.1	69.3	477.6	69.3
Public consumption (Cg)	15.6	11.0	72.1	13.5	93.8	13.6
Total consumption (C)	125.6	88.5	442.2	82.8	571.4	82.9
Private investment (If)	6.4	4.5	47.5	8.9	59.5	8.7
Public investment (Ig)	10.0	7	44.4	8.3	58.1	8.4
Total investment (I)	16.4	11.5	91.9	17.2	117.6	17.1
Gross Regional Product (Y)	142.0	100	534.1	100	689.0	100

The concepts used above and in the following equations are:

Gross Regional Product (Y), consumption (C), savings (S), investment (I), public (g), private (f), export (X), imports (M).

The results in Table 10.1 are estimated on the basis of the fundamental macro-economic equation: $Y = C + S$ where $C = C_g + C_f$ and $S = I = I_g + I_f$ under the assumption that $X = M$. The computations have been worked out ignoring the petro-chemical industries. Information on these is, as mentioned, scarce and their future development rather uncertain. In addition they could, if introduced, disguise development in other industries. This distinction is the more relevant as the petro-chemical industries, in spite of expected mammoth-investment, will have only a limited direct spin-off effect on the regional economy.

On the other hand it means that an important heavy industry is not represented and that the trends in private investments would be reduced accordingly if compared with investment ratios in other countries.

The ratio between GRP and a target saving has been estimated in Section 8.2. It has been the purpose in the regional economic model to establish a balance between current savings and investment in the target year 1990. In the years up to 1990, however, a discrepancy between savings and investments can be expected, the need for investment capital exceeding the supply of savings capital and thus necessitating a net capital import.

Corresponding to the savings-investment balance in the target year 1990 there will also be a balance between total imports and exports of goods and services. The input-output model, however, has only taken into account the import and export of goods, not of services. Therefore this model will not necessarily display a balance between import and export of goods.

Calculations show that a minor trade surplus can be expected in 1990 under Situation I and a minor deficit in 1990 under Situation II. These differences are expected to be balanced by corresponding capital movements as described in Chapter 11.

The distribution of the consumption on different commodity groups will depend on the distribution of the personal income among the population. Possible changes over time in elasticities for the demand of different commodities have been ignored as the present data only illustrate the distribution according to income groups at a certain time. Still it seems as if marginal propensity to consume is only decreasing slightly. This means that for every extra dollar earned, spending will increase by almost the same relative amount. The present indications of the consumption-pattern in the high income groups do not indicate that future growth in average income will lead to significant changes in ways of spending. Moreover a successful policy of more evenly distributed incomes should justify the assumed linear tendency.

The above macro-economic analysis of the expected distribution of the GRP between the different uses should be related to the expected development in the personal income in the society. Unfortunately it has not been possible to calculate an income distribution for 1970, but based on computations of employment, GRP and private consumption surveys, a future income distribution for 1990 has been estimated. Detailed distinction between the two Situations has been considered irrelevant in this context; consequently the income distribution pattern has been calculated only for Situation II, as shown in Table 10.2.

TABLE 10.2 ESTIMATED INCOME DISTRIBUTION 1990 SITUATION II

Income group, $ per year	Average Income $ per year	Number of income earners		Total income	
		thousand	per cent	mn $	Per cent of total
——— 3 999	2 500	42	40	105	18
4 000 - 5 999	5 000	26	25	130	21
6 000 - 9 999	8 000	32	30	255	43
10 000 ———	22 000	5	5	110	18
	5 700	105	100	600	100

The distribution shown should reflect the declared policy of creating more equitable and higher incomes. Thus the distribution mentioned also serves as a guideline for considerations concerning changes in standards for housing, services, financing of public expenditures.etc.

It is recommended that income statistics be collected and analysed continuously in the future, so that an objective measurement of this important development goal can be undertaken.

CHAPTER 11

FINANCE

The model for the regional economy is based on a balanced economy in the year 1990 in the two Situations, whereby inward and outward movements of goods and capital were balanced. This, however, is only in the target year for the Perspective Plan. In the period up to 1990 a concentrated development is expected to take place in which both the increase in employment and the changes in the economic structure will require a considerable economic effort. It is hardly possible that, an excessive re-structuring of the society combined with the envisaged net immigration could be financed solely out of local resources.

A tentative budget for total GRP and savings during the period has been calculated and the investment requirements have been estimated. But the timing of the investments has not been forecast. Consequently a proper financial plan cannot be established but an estimate has been made (see Table 11.1) of total income, savings, investment and net capital import for five year periods from 1975 to 2000. Because no timing of costs and returns has been included it has not been possible to take account of interest costs on capital out-lay.

That part of the investment which is not covered by domestic (i.e. regional), private and public savings must be covered by imported capital. The sources for this could be the other parts of Sarawak and Malaysia, direct investment by foreign investors, or loans and grants from international or national development organisations. However, the surpluses provided by the oil and gas industries have not been taken into consideration. Part of this surplus will accrue to foreign capital; another part will accrue to Sarawak and Malaysia as royalties and would thus increase the regional rate of savings. There is no information on the value of the royalties but if, for example, they are fixed at eight per cent of the sales value and if oil and gas production is assumed to grow at a rate of 2 to 2.5 per cent annually, the accummulated royalties would be in the range of $400-450 mn over the 20 years. If this were to be used for development in the Study Area the whole development might be covered by domestic finances. But it is likely that a considerable

part of the royalties will serve as funds for development all over Malaysia.

The application of the royalty revenues for the future development in Malaysia is unknown as a perspective plan has only been worked out for the Study Area but not for Sarawak and Malaysia. Consequently any estimate of the needs for net foreign capital import and the possible availability of international funds for development in the Study Area is impossible.

The capital requirements for different purposes in five year periods are given in the Table 11.1 and illustrated in figure 11.1.

TABLE 11.1 ESTIMATES OF DEVELOPMENT FINANCING 1976 TO 2000

	1976 - 80 Situation		1981 - 85 Situation		1986 - 90 Situation		1991 - 2000 Situation	
	I	II	I	II	I	II	I	II
(Accumulated 5 year:)	mn $		mn $		mn $		mn $	
GRP	1 212	1 347	1 687	2 002	2 350	2 972	7 800	10 900
Available:								
Savings	208	230	290	342	404	508	1 300	1 750
Required:								
Private investment	150	160	230	255	275	365	700	950
Public investment	65	85	100	120	125	150	260	310
Housing investment	50	60	60	80	75	90	150	215
Difference:								
Available - Required =	-57	-75	-100	-113	-71	-97	+190	+275

The peak requirements for outside capital are expected in the period 1981-85. Later, the investments are expected to bring the regional economy into equilibrium by 1990 after which the repayment of outside capital could begin.

The period up to 1976 has not been considered here because in this period both savings and investments are expected to be at a low level. Information indicates that a considerable net saving is probably taking place in the Study Area at present. If these savings (cf. 'Present State') were to be invested locally instead of outside

the area the rate of investment could possibly be brought up to the assumed growth rates at an earlier stage. After the target year 1990 the growth rate of capital requirements is assumed to slow down. Also the relative growth in savings is assumed to stagnate because of assumed increases in private and public consumption.

CHAPTER 12

SUMMARY

The expected economic consequences of different development efforts have been calculated and estimated in the economic model which describes the main economic features of the Study Area. The reasons for the development described in this report are the wish to create a livelihood for Sarawak's growing population and to improve this livelihood by an increasing application of modern techniques and organisation. To this end it has been found desirable to accelerate the development of the Study Area in order to utilise in an optimal way the existing natural potentials, the infrastructure and the productive investments.

This has lead to an investigation of two model-situations, of which Situation I corresponds to an annual population growth of 4 per cent and Situation II to 4.9 per cent. The models are based on the assumptions of a slight increase in the percentage of people wanting to be gainfully occupied and of full employment of all job-seekers; therefore the number of employed will increase by higher percentages than the population, namely by 4.1 per cent and 5.1 per cent respectively. Labour productivity is expected to rise, due to better skills, technical innovations, investments, better resource allocation and organisation, thus the GRP will rise by a higher rate than the labour force, namely by 6.9 per cent and 8.2 per cent in Situations I and II respectively. The average annual increase in productivity per employed accounts for 2.3 per cent and 2.7 per cent respectively of the total growth. The GRP is thus expected to increase from $1.5 mn in 1970 to $534 mn in 1990 Situation I and to $689 mn in 1990 Situation II.

The distribution of the GRP between its different uses will change depending on the adopted policies for the development. These different applications of the GRP will result in different growth rates. For the two 1990-Situations the annual growth will be as shown in Table 12.1.

TABLE 12.1 ANNUAL GROWTH PER CAPITA IN GRP AND ITS USE 1970-90

per capita increase:	1990/I	1990/II
	per cent	per cent
Total GRP	2.8	3.2
Consumption:		
Private	1.8	2.2
Public	3.7	4.1
Total	2.4	2.8
Investment:		
Private	6.3	6.6
Public	3.6	4.1
Total	4.7	5.0

The impact of development on other economic factors such as external trade and finance has only been briefly mentioned. In the perspective planning computation the timing of investments and production is assumed to be such as to result in a smoothly growing curve determined by the estimated growth rates. During implementation of development over twenty years, discrepancies from a smooth development must be expected; especially in the case of investment needs which will manifest themselves relatively early. This will result in a subsequent need for financing from outside because regional savings during that period will be insufficient to meet the demand for investment funds.

The import-export consequences of a new production pattern have been estimated in the input-output matrix (Appendix IV 1.1 to IV 1.3), but a quantification over time is not possible. The 1990 Situations are forecast with almost a balance between imports and exports, but up to this year a probable need for investments will lead to an import surplus, and a need for outside capital. This need is expected to increase up to the mid-1980s and decrease again towards 1990.

The distribution of the trade deficit between different possible outside suppliers, and the possibility of establishing import substituting industries will be a matter of re-current decisions by Government and private enterprises. Thus no reasonable forecast could be made. The envisaged development over the Perspective Plan period is difficult to compare with other Malaysian and foreign examples because long term economic projections are not known and probably do not exist. It can, however, be useful to compare the annual growth figures in the Perspective Plan with the growth goals put forward in the Second Malaysia Plan for the whole of Malaysia. The annual growth rates are shown in Table 12.2. The adjusted figures have been introduced to compensate for the inmigration to the Study Area. Thus in these columns the average annual growth in population in Malaysia 1971-75 and the Study Area 1970-90 are assumed indentical.

TABLE 12.2 ANNUAL GROWTH IN GNP/GRP AND ITS USE IN MALAYSIA AND THE STUDY AREA

	Second Malaysia Plan 1971-75	Situation I 1970-90		Situation II 1970-90	
	actual per cent	actual per cent	adjusted for inmigration per cent	actual per cent	adjusted for inmigration per cent
GNP/GRP	6.5	6.9	5.8	8.2	6.5
Consumption:					
Private	6.4	6.4	5.3	7.6	5.9
Public	7.3	7.8	6.7	9.2	7.5
Total	6.6	6.4	5.3	7.8	6.1
Investment:					
Private	8.8	10.8	9.7	12.1	10.4
Public	5.9	7.7	6.6	9.2	7.5
Total	7.8	8.8	7.7	10.2	8.5

It is evident that although the goals taken as the basis for the Perspective Plan might seem conservative the overall efforts required for the development of the Study Area are higher than those demanded by the aims of the Second Malaysia Plan. The investment requirements shown in the Table are only provided by domestic savings, no investments financed from outside are included. But as the capital needs are strictly determined by relevant development purposes, financing of a net capital requirement from outside, not exceeding $250 mn to $300 mn over a 15 year period, could be expected and should be possible.

All computations of the future economic structure are based on the two model assumptions represented by Situation I and II. Consequently all production, consumption and capital requirements are related to these situations.

Other basic assumptions as to growth rates of population and production would naturally imply other inputs. For instance a higher growth in production could probably be reached if more investments were introduced. This would again imply increased demands for outside investors and/or capital which could lead to another balanced situation.

TO: / FROM:	AGRICULTURE	FORESTRY	FISHING	MINING	OIL INDUSTRY	MANUFACTURING	food	clothing	wood	furniture	rubber	non-metal	metal	transport	other	CONSTRUCTION	PUBLIC UTILITIES	TRANSPORT	TRADE	BANKING	OWNERSHIP OF DWELLINGS	ADMINISTRATION	SERVICES TRADE	TOTAL	INVESTMENT	CONSUMPTION	EXPORTS	PRODUCTION THIS PERIOD
AGRICULTURE	50	–	110	–	–	1660	1650	–	–	–	–	–	–	–	10	–	–	–	10	–	–	–	1275	3055	150	14140	4875	22220
FORESTRY	–	–	–	–	–	3715	–	–	3670	5	20	10	–	–	10	–	–	–	–	–	–	–	–	3765	4250	435	84000	92450
FISHING	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5	–	–	–	520	525	200	2910	70	3705
MINING	–	200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	200	10	–	–	210
OIL INDUSTRY	60	2800	370	25	–	55	–	–	25	–	–	10	5	10	5	75	160	4090	–	–	–	–	–	7635	27000	1800	174845	211280
MANUFACTURING	95	390	85	15	290	445	5	10	90	240	–	25	10	20	45	495	15	340	230	10	20	–	145	2575	665	8135	5110	16485
food	5	–	35	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	185	–	–	–	120	345	15	1605	750	2715
clothing	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	70	630	10	710
wood	30	–	–	–	100	285	–	–	–	230	–	15	–	10	30	400	–	–	–	–	–	–	–	815	420	3385	3600	8220
furniture	–	–	–	–	–	40	–	10	30	–	–	–	–	–	–	–	–	–	–	10	20	–	15	85	5	400	50	540
rubber	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	70	–	70
non-metal	20	–	15	5	20	–	–	–	–	–	–	–	–	–	–	10	–	–	20	–	–	–	–	90	10	65	5	170
metal	20	40	–	–	70	60	–	–	45	–	–	–	–	5	10	45	15	–	–	–	–	–	–	250	15	5	5	275
transport	–	350	35	10	100	25	–	–	10	–	–	5	5	–	5	25	–	300	25	–	–	–	–	870	30	300	680	1880
other	20	–	–	–	–	35	5	–	5	10	–	5	5	5	–	15	–	40	–	–	–	–	10	120	100	1675	10	1905
CONSTRUCTION	–	300	60	–	300	210	–	–	35	10	–	5	15	95	–	–	–	–	–	10	20	–	–	900	25	3330	–	4255
PUBLIC UTILITIES	–	–	–	–	–	420	105	20	200	20		10	10	20	35	20	–	50	910	50	240	–	650	2340	150	2120	–	4610
TRANSPORT	110	5875	15	–	100	170	10	–	80	5	–	10	5	35	25	75	–	–	3495	–	–	–	–	9840	920	2245	–	13005
TRADE	1765	8885	405	–	1200	70	55	–	–	–	–	5	–	–	10	–	–	–	–	–	–	–	–	12325	–	47650	–	59975
BANKING	45	240	–	–	50	240	10	5	130	–	5	–	5	25	60	215	–	100	1050	–	100	–	90	2130	–	835	–	2965
OWN. of D.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8480	–	8480
ADMINISTRATION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3570	–	3570
SERVICE TRADES	70	420	40		1420	425	10	45	245	5	5	5	5	35	70	95		10	200	55	20	–	–	2755	–	10910	–	13665
IMPORTS	2285	6890	215	5	150930	2120	55	250	65	15	15	15	120	805	780	1355	200	1250	34485	–	–	–	890	200625	–	–	–	–
GOODS & SERVICES	4480	26000	1300	45	154290	9530	1900	330	4540	300	45	95	175	1045	1100	2330	375	5840	40385	125	400	–	3570	(48045) 248670	33370	106560	268900	456875
WAGES	9000	7500	1195	45	5550	3690	325	85	2130	145	10	40	60	580	315	1125	450	2365	2835	490	100	2925	5390	42660	–	–	–	–
OTHER GRP	8370	54500	1210	395	50340	3265	485	295	1550	95	15	35	45	255	490	800	3785	4800	11725	2300	8000	645	4705	154840	–	–	–	–
GRP	17370	62000	2405	440	55890	6955	810	380	3680	240	25	75	105	835	805	1925	4235	7165	14560	2790	8100	3570	10095	197500	–	–	–	–
PRODUCT VALUE	22220	92450	3705	485	211280	16485	2710	710	8220	540	70	170	280	1880	1905	4255	4610	13005	54945	2915	8500	3570	13665	452090	–	–	–	–
+ Duty etc.) 370		4450			1100																			5920				
– Subsidies)																												

FROM: \ TO:	AGRICULTURE	FORESTRY	FISHING	MINING	OIL INDUSTRY	MANUFACTURING	food	clothing	wood	furniture	rubber	non-metal	metal	transport	other	CONSTRUCTION	PUBLIC UTILITIES	TRANSPORT	TRADE	BANKING	OWNERSHIP OF DWELLINGS	ADMINISTRATION	SERVICE TRADES	TOTAL	INVESTMENT	CONSUMPTION	EXPORTS	PRODUCTION PLUS IMPORTS
AGRICULTURE	–	–	2.97	–	–	10.07	60.89	–	–	–	–	–	–	–	0.53	–	–	–	0.02	–	–	–	9.33	0.68	0.45	13.27	1.81	4.86
FORESTRY	0.23	–	–	–	–	22.54	–	–	44.65	0.93	28.57	5.88	–	–	0.53	–	–	–	–	–	–	–	–	0.83	12.74	0.40	31.24	20.24
FISHING	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.01	–	–	–	3.81	0.12	0.60	2.73	0.03	0.80
MINING	–	0.22	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.04	0.03	–	–	0.05
OIL INDUSTRY	0.27	3.03	9.99	5.16	–	0.33	–	–	0.30	–	–	5.88	1.79	0.53	0.26	1.76	3.47	31.45	–	–	–	–	–	1.69	80.91	1.69	65.01	46.24
MANUFACTURING	0.43	0.42	2.28	3.09	0.14	2.70	0.18	1.41	1.09	44.44	–	14.72	3.58	1.07	2.36	11.64	0.33	2.62	0.42	0.34	0.24	–	1.06	0.57	1.99	7.63	1.90	3.61
food	0.02	–	0.94	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.33	–	–	–	0.88	0.07	0.04	1.50	0.28	0.59
clothing	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.21	0.59	0.005	0.16
wood	0.14	–	–	–	0.05	1.73	–	–	–	42.59	–	8.82	–	0.53	1.57	9.40	–	–	–	–	–	–	–	0.18	1.26	3.18	1.34	1.80
furniture	–	–	–	–	–	0.24	–	1.41	0.36	–	–	–	–	–	–	–	–	–	–	0.34	0.24	–	0.11	0.02	0.01	0.38	0.02	0.12
rubber	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.07	–	0.02
non-metal	0.09	–	0.40	1.03	0.01	–	–	–	–	–	–	–	–	–	–	0.24	–	–	0.04	–	–	–	–	0.02	0.04	0.06	0.005	0.04
metal	0.09	0.04	–	–	0.03	0.36	–	–	0.55	–	–	–	–	0.27	0.53	1.06	0.33	–	–	–	–	–	–	0.06	0.04	0.005	0.005	0.06
transport	–	0.38	0.94	2.06	0.05	0.15	–	–	0.12	–	–	2.94	1.79	–	0.26	0.59	–	2.31	0.05	–	–	–	–	0.19	0.09	0.28	0.25	0.40
other	0.09	–	–	–	–	0.22	0.18	–	0.06	1.85	–	2.94	1.79	0.27	–	0.35	–	0.31	–	–	–	–	0.07	0.03	0.30	1.57	0.005	0.42
CONSTRUCTION	–	0.32	1.62	–	0.14	1.27	–	–	0.43	1.85	–	2.94	5.35	5.05	2.62	–	–	–	–	0.34	0.24	–	–	0.20	0.07	3.13	–	0.93
PUBLIC UTILITIES	–	–	–	–	–	2.55	3.87	2.82	2.42	3.70	–	5.88	3.56	1.06	1.84	0.47	–	0.38	1.66	1.72	2.82	–	4.76	0.52	0.45	1.99	–	1.01
TRANSPORT	0.50	6.35	0.40	–	0.05	1.03	0.37	–	0.97	0.93	–	5.88	1.79	1.86	1.32	1.76	–	–	6.36	–	–	–	–	2.18	2.76	2.11	–	2.85
TRADE	7.94	9.61	1093	–	0.57	0.42	2.03	–	–	–	–	2.94	–	–	0.53	–	–	–	–	–	–	–	–	2.72	–	44.72	–	13.13
BANKING	0.20	0.26	–	–	0.02	1.46	0.37	0.70	1.58	–	7.14	–	1.79	1.34	3.14	5.05	–	0.77	1.91	–	1.18	–	0.66	0.47	–	0.78	–	0.66
OWN. of D.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7.96	–	1.86
ADMINISTRATION	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.35	–	0.78
SERVICE TRADES	0.32	0.45	1.08	–	0.67	2.58	0.37	6.34	2.08	0.93	7.14	2.94	1.79	1.86	3.67	2.24	–	0.08	0.36	1.89	0.24	–	–	0.60	–	10.24	–	2.98
IMPORTS	10.28	7.45	5.82	1.03	71.44	12.86	2.03	35.21	0.79	2.78	21.42	8.83	42.85	4382	40.94	3184	4.33	9.61	62.76	–	–	–	6.51	44.38	–	–	–	–
GOODS & SERVICES	20.17	2811	3509	9.28	73.03	57.81	70.11	46.48	5523	55.56	64.29	55.88	62.50	5559	57.74	5476	8.13	4491	73.50	4.29	4.72	–	26.13	55.00	100	100	100	100
WAGES	40.50	8.11	3825	9.28	2.63	22.38	11.99	11.97	2582	26.85	14.29	23.53	21.43	3085	16.54	2644	9.76	1819	5.16	16.81	1.18	81.93	39.44	9.44	–	–	–	–
OTHER GRP	37.67	5895	3266	8144	23.82	19.81	17.90	41.55	1885	17.59	21.43	20.59	16.07	1356	25.72	1880	82.10	3680	21.34	78.90	94.10	18.07	34.43	34.25	–	–	–	–
GRP	78.17	6706	6491	9072	26.45	42.19	29.89	53.52	4477	44.44	35.72	44.12	37.50	4441	42.26	4524	91.87	5509	26.50	95.71	95.28	100	73.87	43.69	–	–	–	–
PRODUCT VALUE	100	100	100	100	100	100	100	100	100	100	1000	100	100	100	100	100	100	100	100	100	100	100	100	100	–	–	–	–
+ Duty etc.	1.67	4.83			0.52																							
– Subsidies																								1.31				

TECHNICAL COEFFICIENTS STUDY AREA 1990

FROM: \ TO:	AGRICULTURE	FORESTRY	FISHING	MINING	OIL INDUSTRY	MANUFACTURING	food	clothing	wood	furniture	rubber	non-metal	metal	transport	other	CONSTRUCTION	PUBLIC UTILITIES	TRANSPORT	TRADE	BANKING	OWNERSHIP OF DWELLINGS	ADMINISTRATION	SERVICE TRADES	TOTAL	INVESTMENT	CONSUMPTION	EXPORTS	PRODUCTION PLUS IMPORTS
AGRICULTURE	—	–	4.3	–	–	–	28.8	0.9	–	–	28.0	2.0	–	–	2.5	–	–	–	0.1	–	–	–	5.0	–	–	–	–	–
FORESTRY	0.2	–	–	–	–	–	–	–	25.0	0.9	28.57	5.9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FISHING	0.1	–	–	–	–	–	22.0	0.9	–	–	–	1.0	–	–	–	–	–	–	0.1	–	–	–	2.5	–	–	–	–	–
MINING	–	0.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
OIL INDUSTRY	0.5	4.0	15.0	5.2	–	–	–	–	2.5	–	–	6.0	1.8	0.6	0.5	1.8	4.0	32.4	–	–	–	–	–	–	–	–	–	–
MANUFACTURING	1.1	0.8	5.1	3.1	0.4	–	0.6	1.6	4.5	44.5	–	10.0	3.6	1.1	2.5	16.2	0.5	2.9	0.6	0.3	0.5	–	3.2	–	–	–	–	–
food	0.7	0.3	0.9	–	–	–	–	–	–	–	–	0.2	–	–	–	–	–	–	0.4	–	–	–	0.9	–	–	–	–	–
clothing																												
wood	0.2	–	2.0	–	0.1	–	0.2	–	–	42.6	–	4.8	–	0.5	1.6	12.0	–	–	–	–	–	–	–	–	–	–	–	–
furniture	–	–	–	–	–	–	–	1.4	0.4	–	–	–	–	–	–	–	–	–	–	0.3	0.5	–	2.1	–	–	–	–	–
rubber																												
non-metal	0.1	–	0.5	1.0	0.1	–	0.1	0.1	–	–	–	–	–	–	–	–	0.1	–	0.1	–	–	–	0.2	–	–	–	–	–
metal	0.1	–	0.1	–	0.1	–	0.1	0.1	2.0	–	–	–	–	0.3	0.6	3.00	0.4	–	–	–	–	–	–	–	–	–	–	–
transport	–	0.4	1.7	2.1	0.1	–	–	–	2.0	–	–	2.5	1.8	–	0.3	0.8	–	2.5	0.1	–	–	–	–	–	–	–	–	–
other	0.1	–	–	–	–	–	0.2	–	0.1	1.9	–	2.5	1.8	0.3	–	0.4	–	0.4	–	–	–	–	2.0	–	–	–	–	–
CONSTRUCTION	–	0.4	1.8	–	0.2	–	–	–	0.6	1.9	–	2.5	5.4	5.1	2.5	–	–	–	–	0.2	0.5	–	–	–	–	–	–	–
PUBLIC UTILITIES	1.0	–	0.5	–	–	–	4.8	2.8	3.5	3.7	–	4.0	3.6	1.1	2.0	0.6	–	0.5	1.9	2.0	2.9	–	4.8	–	–	–	–	–
TRANSPORT	0.5	5.0	0.6	–	0.1	–	0.5	–	4.2	1.0	–	4.0	1.8	1.9	1.4	2.4	–	–	6.4	–	–	–	1.0	–	–	–	–	–
TRADE	5.00	4.0	10.9	–	0.6	–	2.0	–	–	–	–	3.0	–	–	0.6	–	–	–	–	–	–	–	–	–	–	–	–	–
BANKING	0.5	0.9	1.5	–	0.1	–	0.4	0.4	1.8	–	6.0	–	1.9	1.4	3.0	5.1	–	0.8	1.9	–	1.5	–	0.8	–	–	–	–	–
OWN. of D.																												
ADMINISTRATION																												
SERVICE TRADES	0.4	1.0	3.8	–	0.7	–	0.4	5.3	3.9	1.0	7.1	3.8	1.7	1.9	3.8	2.2	–	0.2	0.8	2.0	0.5	–	–	–	–	–	–	–
IMPORT	18.00	10.0	15.00	1.0	70.0	–	9.2	41.2	6.7	2.8	21.4	25.8	42.0	42.8	40.9	28.8	4.3	10.0	60.0	–	–	–	6.0	–	–	–	–	–
GOODS & SERVICES	27.4	26.5	58.5	9.3	72.1	–	68.9	52.2	52.8	57.7	62.5	68.0	63.6	55.9	59.7	57.1	9.8	43.9	71.8	4.5	5.4	–	25.3	–	–	–	–	–
WAGES	30.00	8.1	25.9	9.3	3.5	–	12.3	12.9	25.8	23.8	14.9	15.0	18.2	25.8	16.6	22.6	9.7	20.0	8.0	18.5	1.6	85.0	35.9	–	–	–	–	–
OTHER GRP	42.6	65.4	32.6	81.4	24.4		18.8	34.9	21.4	18.5	22.6	17.0	18.0	18.3	23.7	20.3	80.5	36.1	20.2	77.0	93.0	15.0	38.8	–	–	–	–	–
GRP	72.6	73.5	41.5	90.7	27.9	–	31.1	47.8	47.2	42.3	37.5	32.0	36.4	44.1	40.3	42.9	90.2	56.1	28.2	95.5	94.6	100	74.7	–	–	–	–	–
PRODUCT VALUE	100	100	100	100	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	–	–	–	–	–

◆ Duty etc.
– Subsidies

APPENDIX IV.2

GLOSSARY OF ECONOMIC TERMS

Macro-Analysis	Economic analysis operating with aggregated economic quantities, such as all investment, all consumption and main sectors of industries.
Micro-Analysis	Economic analysis operating with individual economic units, such as the economics of a particular industry or the income in a particular household.
Model	An economic model is a simplified description of the real conditions in society.
Input-Output Matrix	A table complex showing all transactions between relevant economic sectors, input being what the sectors buy, output what they sell. At the same time the distribution of the uses of the production is specified. The input-output matrix is an extension of the national accounting system.
Gross National Product (GNP)	The total value at market prices of all final goods and services produced by a nation's economy. The GNP is calculated through the national accounting system.
Gross Regional Product (GRP)	The calculation techniques for obtaining the GNP applied to regions and regional economics.

Value Added (Total)	The money value of goods and services completed less the cost of materials and services paid and included in the production. Total value added is an approximation of the Gross National/Regional Product.
Footloose Industry	Industries not tied to immediate availability of natural resources or local markets.

APPENDIX IV.3

REFERENCES

Department of Statistics Sarawak, Malaysia	-	Monthly External Trade Statistics of Sarawak up to September, 1972	Department of Statistics, Kuching.
Department of Statistics State of Sarawak	1966-71	Annual Bulletin of Statistics State of Sarawak 1966-1971	Department of Statistics, Kuching.
Department of Statistics State of Sarawak	-	Quarterly Bulletin of Statistics State of Sarawak up to Second Quarter 1972	Department of Statistics, Kuching.
Department of Statistics Sarawak	1970	1970 Population and Housing Census, District Returns	Department of Statistics, Kuching.
Department of Statistics	1970	Construction Survey, 1970 Preliminary Tabulation for Fourth Division	Department of Statistics, Kuching.
Department of Statistics	1967-68	Provisional Data on Employment and Unemployment (Based on Sample Totals)	Department of Statistics, Kuching.
Department of Statistics	1969	Manufacturing Survey Preliminary Tabulation for Fourth Division	Department of Statistics, Kuching.
Department of Statistics Sarawak	1970	Crop Estimation Survey on Padi in Sarawak 1969-70	Department of Statistics, Kuching.
Department of Statistics	1967-68	Intermediary Reports on a Survey of Household Expenditures	Department of Statistics, Kuching.
FAO	1971-73	A series of draft reports on forest industries in Malaysia by the Forestry and Forest Industries Development Project	
FIDA	1969	A Study of Industrial Potentialities of Sabah. Vol. I-IV.	Kuala Lumpur

FIDA	1971	Industrial Survey of Sarawak	
Forest Department, Sarawak	1971	Silvicultural Research Programme 1971-75	Kuching 1971
Geological Department Sarawak	1964	Geological Survey Annual Report 1964	Government Printer, Kuching.
Government of Sarawak	1963	Sarawak Development Plan 1964-1968	Government of Sarawak, Kuching.
Government of Malaysia	1970	Second Malaysia Plan	Government Printer, Kuala Lumpur.
Hunting Technical Services and Hoff Overgaard	1972	The Zonation Plan	Miri-Bintulu Regional Planning Study
IBRD	1972	Current Economic Position and Prospect of Malaysia	Washington 1972.
Iuul, M Chia P. C. Hamzah Hj.Drahman	1973	Present State Characteristics of the Study Area	Miri-Bintulu Regional Planning Study
Kho	1968	Geological Survey Memoir, Bintulu Area	Government Printer, Kuching.
OECD	1961	Regional Economic Planning - Problems of Regional Accounting	Paris, 1961
Regional Planning Study, Kuching.	1971		Regional Planning Study of the First Division of Sarawak, Kuching.
UNIDO	1971	Industrial Development Survey Vols. I - III	New York, 1971
United Nations	1967	Profile of manufacturing establishment	New York, 1967

Specific information from Federal and State authorities in Sarawak concerning public finances in Fourth Division

All annual Reports from Federal and State Department up to 1970/71

Intermediary Surveys and working papers prepared by the consultants (1972-73)

APPENDIX IV.3

REFERENCES

Department of Statistics Sarawak, Malaysia	-	Monthly External Trade Statistics of Sarawak up to September, 1972	Department of Statistics, Kuching.
Department of Statistics State of Sarawak	1966-71	Annual Bulletin of Statistics State of Sarawak 1966-1971	Department of Statistics, Kuching.
Department of Statistics State of Sarawak	-	Quarterly Bulletin of Statistics State of Sarawak up to Second Quarter 1972	Department of Statistics, Kuching.
Department of Statistics Sarawak	1970	1970 Population and Housing Census, District Returns	Department of Statistics, Kuching.
Department of Statistics	1970	Construction Survey, 1970 Preliminary Tabulation for Fourth Division	Department of Statistics, Kuching.
Department of Statistics	1967-68	Provisional Data on Employment and Unemployment (Based on Sample Totals)	Department of Statistics, Kuching.
Department of Statistics	1969	Manufacturing Survey Preliminary Tabulation for Fourth Division	Department of Statistics, Kuching.
Department of Statistics Sarawak	1970	Crop Estimation Survey on Padi in Sarawak 1969-70	Department of Statistics, Kuching.
Department of Statistics	1967-68	Intermediary Reports on a Survey of Household Expenditures	Department of Statistics, Kuching.
FAO	1971-73	A series of draft reports on forest industries in Malaysia by the Forestry and Forest Industries Development Project	
FIDA	1969	A Study of Industrial Potentialities of Sabah. Vol. I-IV.	Kuala Lumpur

FIDA	1971	Industrial Survey of Sarawak	
Forest Department, Sarawak	1971	Silvicultural Research Programme 1971-75	Kuching 1971
Geological Department Sarawak	1964	Geological Survey Annual Report 1964	Government Printer, Kuching.
Government of Sarawak	1963	Sarawak Development Plan 1964-1968	Government of Sarawak, Kuching.
Government of Malaysia	1970	Second Malaysia Plan	Government Printer, Kuala Lumpur.
Hunting Technical Services and Hoff Overgaard	1972	The Zonation Plan	Miri-Bintulu Regional Planning Study
IBRD	1972	Current Economic Position and Prospect of Malaysia	Washington 1972.
Iuul, M Chia P. C. Hamzah Hj.Drahman	1973	Present State Characteristics of the Study Area	Miri-Bintulu Regional Planning Study
Kho	1968	Geological Survey Memoir, Bintulu Area	Government Printer, Kuching.
OECD	1961	Regional Economic Planning - Problems of Regional Accounting	Paris, 1961
Regional Planning Study, Kuching.	1971		Regional Planning Study of the First Division of Sarawak, Kuching.
UNIDO	1971	Industrial Development Survey Vols. I - III	New York, 1971
United Nations	1967	Profile of manufacturing establishment	New York, 1967

Specific information from Federal and State authorities in Sarawak concerning public finances in Fourth Division

All annual Reports from Federal and State Department up to 1970/71

Intermediary Surveys and working papers prepared by the consultants (1972-73)

PART V

DEVELOPMENT OF NATURAL RESOURCES AND INDUSTRIES

PART V

DEVELOPMENT OF NATURAL RESOURCES AND INDUSTRIES

INTRODUCTION

Great importance is attached to a balanced use of the natural resources such that they contribute fully to the development of the Region but, at the same time, the methods of use ensure that the contribution is continued, possibly even increased. This ideal is embodied in the methods and strategies for development suggested in this Part of the Report. Major sections of the resources are discussed separately and both primary and secondary uses are considered.

CHAPTER 13

ALTERNATIVE METHODS AND STRATEGIES FOR DEVELOPMENT OF AGRICULTURE

13.1 INTRODUCTION

Two stages of screening possible agricultural activities prior to their inclusion in a development pattern are outlined. The first involves a simple grouping of activities on the basis of proven commercial potential and location, and the second is based on agronomic factors, production economics and market potential criteria. The overall conclusion is reached that the choice of crops for immediate large scale development is limited to oil palm and rubber with fair prospects for a wider range of activities on a restricted scale.

The area of land possibly suitable and available for development in the next 20 years has been taken as 270 000 acres. This is largely State Land but includes some Native Customary Land and Titled Land. Three alternative development patterns have been worked out for this area with differing cropping patterns, based on the most promising activities indicated by the screening studies, and different development organisation mixes. In addition the development of the remainder of the Study Area has been projected on the basis of known plans and possible future patterns of commercial and subsistence activities.

Overall contributions to development made by the new agricultural area and the remainder of the Study Area are summarised in Figure 13.1. The 270 000 net acres of development are estimated to create between 26 000 and 31 000 additional jobs and to raise agricultural output by 166 per cent compared to the output from the remaining agricultural areas. Expenditure on production inputs would be about $76 mn while the value added to the GRP would range from $96 mn to $115 mn according to the development pattern. These give value added averages of $356 to $427 per acre or $3 600 to $3 900 per job created. A significant impact on income distribution patterns is indicated by a 95 per cent increase in the average value added per job for the development area compared to the remainder of the Study Area.

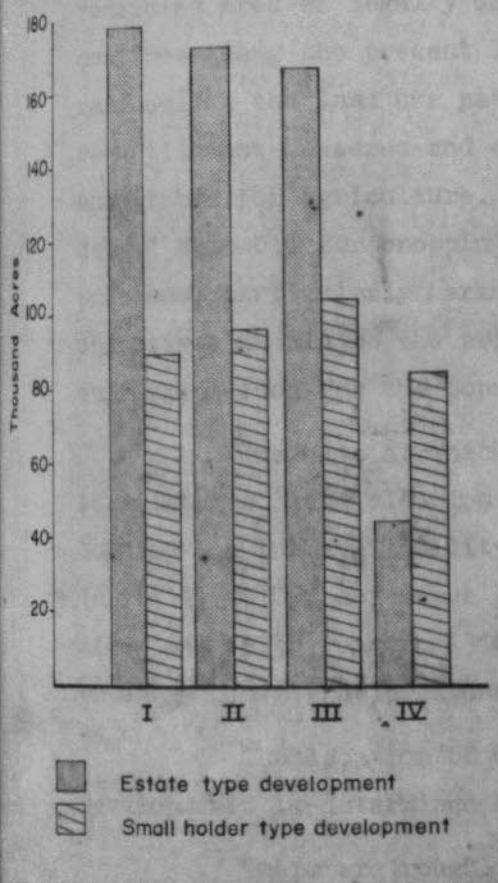
Further analysis of various aspects of the three alternatives indicates the relative merits of development pattern III in terms of its flexibility and more extensive small holder content. But it has somewhat lower employment and income achievements compared to patterns I and II; and its rate of development is foreseen to be lower due to the need for commercial trials in connection with diversification crops and problems associated with laying out small holdings.

In order to achieve the 250 000 acres of new development mainly on State Land, in accordance with the Terms of Reference, it will be necessary to incorporate considerable areas of Forest Reserve and Protected Forests in the agricultural development plans.

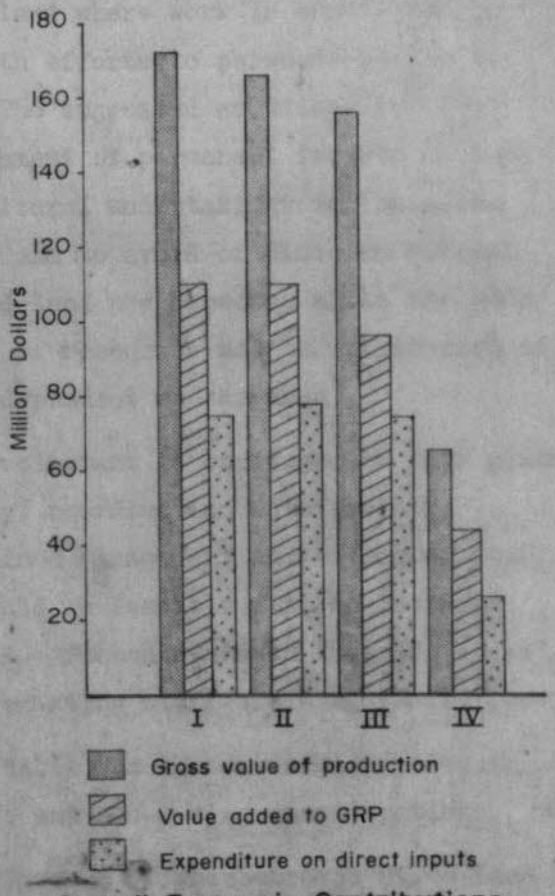
Development is envisaged to follow three basic patterns related to tenure and development organisation. The first involves improvement of selected areas of legally occupied lands aimed principally at the elimination of shifting cultivation and adoption of settled, economically viable farming systems. Concentration of effort under an Integrated Development Organisation, as described in "Alternative Strategies for Rural Development", into selected areas bordering existing and future roads is recommended as the most effective method of achieving the aim. While an early start could be made on this type of development the eventual area tackled is seen to depend on the creation of nucleus estates on nearby State Land.

The second type of development is that of State Land and is envisaged to involve a combination of public and private sector estates and small holder settlements based largely on in-migration from other areas. The eventual ratio between estate type and small holder based farms, including improvement, is projected to be 3:1. The pattern of development for the estates should follow the present system of undertakings by the SLDB and CDC but associated with private holdings of various sizes ranging from typical family based farms to larger sized holdings operated with hired labour. It is considered appropriate that the pattern of development in any one area should incorporate a mix of private holdings and estate type operations.

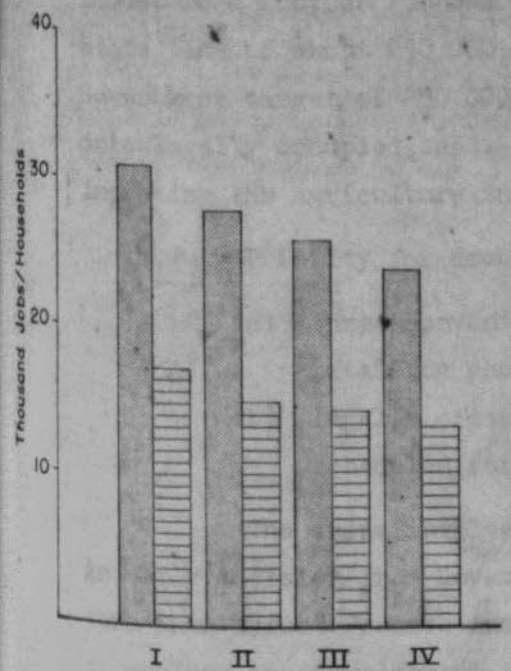
SUMMARY OF ACHIEVEMENTS UNDER ALTERNATIVE AGRICULTURAL DEVELOPMENT PATTERNS FOR THE STUDY AREA



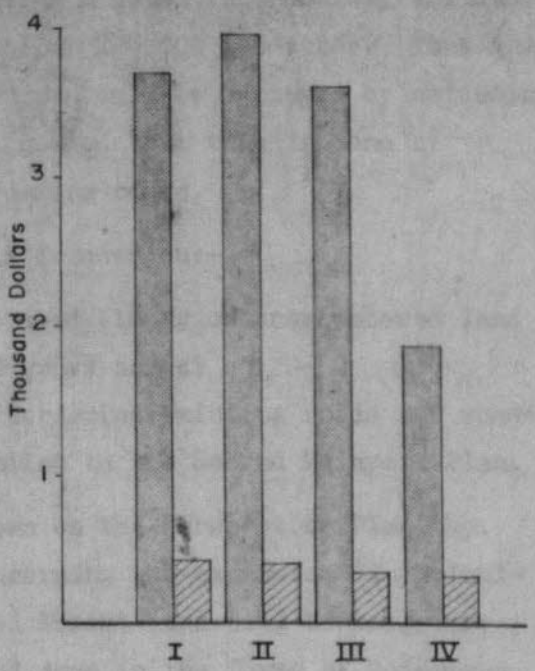
Areas Developed & Organisation Pattern



Overall Economic Contributions



Employment Created



Economic Indicators

Note: Figures derived from Table 13·4

I, II & III — Type of Development Pattern (290,000 Gross Acres)
IV — Remainder of the Study Area

The third type of development is that involving the remaining area of legally occupied land where work is considered to continue along the present lines with efforts to persuade people to rationalise the land use pattern. The suggested solutions involve re-settlement measures and establishment of permanent forests on land unsuitable for agriculture. Agricultural undertakings in the areas deemed suitable for cropping should aim to avoid or diminish current problems, particularly marketing and land use aspects, while the main objectives should be the protection of resources and the production of sufficient food for the population dependent on the area.

The rate at which new development is envisaged to take place is related to land clearing capacity, coordination with forestry logging and the availability of trained management and extension staff. Initially 10 000 acres per annum would be feasible with an increase after the fifth year to 13 000 acres. To achieve even these rates will entail a considerable expansion of existing staff training facilities.

The location of land suitable for the envisaged agricultural developments is determined by tenure and block size considerations.

There are roughly 140 000 acres of unencumbered State Land assessed as possibly suitable for agriculture and in reasonably sized blocks. Other large blocks in Forest Reserves and Protected Forests amount to a further 150 000 acres; giving a total for possibly suitable State Land of about 290 000 gross acres or 220 000 net acres. Thus the Government target of 250 000 net acres can only be achieved by extending into legally occupied land. It is suggested that this is done by improving the agriculture in land bordering roads.

Priority for development is focused on:-

a) three conveniently situated blocks of unencumbered land totalling about 90 000 gross acres;

b) legally occupied land bordering existing roads and roads scheduled for construction in the Second Malaysia Plan.

The areas involved are shown on the Perspective Plan Map. An early decision from Government concerning the expansion of agriculture into Forest Reserve and Protected Forest land will be necessary to achieve the development target laid down in the Terms of Reference.

Large-scale agro-based processing and manufacturing activities in the foreseeable future are likely to centre around palm oil and rubber production. Smaller scale operations based on essential oils, tea, cocoa, tapioca, sago and rice production could also develop. These developments are estimated to involve investments of between $60 and $70 mn and to create up to 1 800 additional jobs.

Secondary manufacturing possibilities based on agricultural sector products or input requirements are seen to include palm oil hydrogenation and fractionation, chocolate and soap manufacture, livestock feed mixing, fertiliser compounding and an abattoir-cum-meat processing plant.

13.2 DEVELOPMENT OPPORTUNITIES AND SELECTION OF AGRICULTURAL ACTIVITIES

13.2.1 Method of Screening and Selecting Activities

For the present planning exercise potential agricultural activities are analysed on the basis of existing knowledge of crops, farming techniques and market trends. However, over a twenty year period, technical innovations and changed market conditions may come up, as they have in the past, which may alter the agricultural aspects. The first approach to the problem has been to examine the list of potential activities derived from environmental criteria and to screen these on the basis of further selection criteria. To facilitate the screening process preliminary groupings, reflecting commercial production potential and location requirements, were developed in which each activity was given a rating on the basis of currently available data.

The preliminary grouping has been followed by a more rigorous evaluation of the more likely enterprises concentrating on agronomic factors, production economics and market potential.

13.2.2 Preliminary Crop Screening and Grouping

The object of this first screening is to determine commercial prospects on the basis of the following factors or constraints:-

- availability of proven technical knowledge on the basis of which husbandry requirements might be established;
- availability of market outlets either internally or overseas.

This grouping indicated primarily those enterprises for which there were prospects for commercial development and on this basis possible opportunities have been further examined within the overall development objectives.

Four production groups have been defined as follows:-

Group 1: activities known to be commercially viable for immediate development on a large scale.

Group 2: activities known to be commercially viable and suitable for immediate development but on a restricted scale or only for internal or local consumption.

Group 3: activities with promising commercial prospects but requiring an initial period of trial or limited research prior to recommendation for development on any scale.

Group 4: activities possibly suited to the local environment but requiring intensive research and field trial before they might be considered for commercial exploitation.

A second grouping has been developed in order to deal with the particular problems of access and transportation encountered in the Study Area, and to define the role of transport as a constraint to development planning. This grouping is therefore based on the location requirements of each activity for which three alternatives

are derived, thus:-

Group A: activities whose inputs and end-products are easily transported and for which no special processing facilities are envisaged. These activities may be regarded as suitable for development in remote areas served by minor waterways or tracks.

Group B: activities whose end-products are bulky but reasonably durable or may be processed on the farm, requiring simple means of transport on larger rivers or rural roads. These activities would be suitable for semi-remote areas.

Group C: activities which due to the bulkyness, perishability or need for specialised large scale processing of their inputs or products require good roads or waterways. These activities would be considered only where proximity to an all weather road network, navigable waterway, processing plant or urban market was satisfied.

On the basis of the above criteria a classification of potential agricultural activities has been drawn up as shown in Table 13.1. The table shows that any short term development programme will have to rely heavily on oil palm and rubber if anything approaching the 250 000 acres target mentioned in the Terms of Reference is to be developed. In fact, it is unlikely that any new agricultural enterprises would be sufficiently proven until some four to five years from now and this further under-scores the need to rapidly mount a programme of research and commercial trials in the Study Area aimed at establishing the commercial viability of several new enterprises, in particular beef, cocoa, tapioca, tea and a range of spice crops.

TABLE 13.1 CLASSIFICATION OF AGRICULTURAL ACTIVITIES BY COMMERCIAL VIABILITY (PRODUCTION) AND LOCATION GROUPINGS

Activity	Production group	Location group
Annual crops		
Chillies (spice)	3	A
Legumes - beans, groundnuts, cowpea, soyabeans and pulses	4	B
Maize and sorghum for grain	4	B
Maize for green cobs	2	B-C
Rice - wet padi, single crop per annum (landas season)	2	A-C
- wet padi, double crop	3	C
Tapioca for chips or feed	3	C
Vegetables for fresh markets	2	B-C
Semi-perennial crops		
Anatto	3	A-B
Bananas (for export)	4	C
Essential oils - lemon grass, patchouli	2	C
Essential oils - citronella grass, vetiver grass	3	C
Grasses and legumes for grazing (beef production)	3	C
Grasses and legumes for cut fodder (beef production)	3	C
Papaya for fruit or papain	4	C
Pepper	2	B-C
Spices - turmeric, cardamon	3	B-C
Spices - vanilla, ginger	4	B-C
Sugar cane	4	B-C
Perennial crops		
Cashew nuts	4	B
Coffee	3	A-B
Cocoa	3	B-C
Coconuts	2	B-C
Fruit trees including durian, guava, rambutan and citrus for local markets	2	
Fruits for processing	4	C
Oil palm	1	C
Rubber	1	B-C
Sago	2	C
Sago, cultivated plantation	4	C
Spices - cassia, cinnamon	4	B
Spices - cloves, nutmeg, mace	3	B
Tea - lowland	3	C
Livestock (commercial)		
Beef, breeding and fattening for freshmeat	3	C
Pigs for fresh meat	2	C
Poultry - eggs, broilers and hatching eggs	2	C

13.2.3 Preliminary Evaluation of Agricultural Development Opportunities

The criteria which have been employed as a basis for the preliminary evaluation of agricultural enterprises centre on three main elements, namely:-

- agronomic aspects;
- production economics; and
- market potential.

The results of these evaluations, summarised in Table 13.2 and detailed in Appendix V.1.1 to V.1.5, confirm those mentioned in the previous Section; that the choice of possible activities for immediate large scale development is limited to palm oil and rubber. This reliance emphasises the uncertainty attached to the future markets for these products and the degree to which future trends are likely to be influenced by the actions of other world producers.

This conclusion gives further weight to the need for diversifying agricultural production both at the State and the farm level. On the basis of market potential and production economics the best prospects for large scale development in the near future appear to lie in the direction of beef cattle and cocoa; both, however, would require a period of commercial field trial before large scale exploitation could begin. The possibility of integrating the field testing and expansion phases of both enterprises requires further investigation during Phase II of the Study.

On the other hand there are a number of enterprises which offer prospects for immediate exploitation on a restricted scale; these include various spices, essential oil crops, pepper, pigs, poultry, fresh vegetables and pond culture of freshwater fish. Expansion of the latter four activities will depend almost solely on the rate at which new settlements and urban complexes emerge since they are food producing enterprises which at present generally have limited export prospects.

TABLE 13.2 SUMMARY EVALUATION OF AGRICULTURAL ACTIVITIES

Production Group	Activity	Production organisation evaluated	Production Economics			Employment acres/units per full time job created	Market Potential	
			Gross value of production	Gross margin including labour	Capital cost		Maximum area permitted	Market Supplied
			$ per acre/unit				Acres	
I	Oil palm	Estate	613	281	1 810	12.5	155 000	Export
	Rubber	Estate	487	262	1 850	8.3	95 000	Export
II	Essential oils	Small holder	800	196	605	5.3	2 500	Export
	Pepper	Small holder	3 730	2 417	3 535	2.0	3 500	Export
	Pigs (10 sow unit)	Small holder	34 000	3 080	17 400	2.0	-	Internal
	Poultry (1 000 birds)	Small holder	14 000	1 950	7 300	2.0	-	Internal
	Rice - wet padi	Small holder	295	31	550	4.3	12 000	Internal
	Vegetables	Small holder	1 700	495	1 500	2.2	1 350	Internal
III	Beef, breeding	Commercial ranch	227	106	880	67.0	33 000	Small holder fatteners
	Beef, fattening	Small holder	356	85	550	27.8	33 000	Internal/ Export
	Cocoa	Small holder	550	220	800	7.1	6 000	Export
	Spices, annual	Small holder	1 090	585	740	3.6	3 100	Export/ Internal
	Spices, perennial	Small holder	700	190	1 365	2.4	1 800	Export
	Tapioca	Small holder	300	50	450	12.5	6 000	Internal/ Export
	Tea, lowland	Estate	1 120	195	3 400	1.7	1 000	Internal/ Export

Several crops, which might offer useful opportunities for diversification on a more restricted scale, require a period of trial before they can be firmly recommended for commercial exploitation. In this category are anatto, essential oils, and spices (for extraction of colouring, scented or flavouring material) together with tapioca and lowland tea.

In the category of crops which cannot be recommended for large scale development at present (Group 4) are a range of annual crops such as maize, groundnuts and vegetables for processing, in addition to fruits for processing, bananas for export, plantation grown sago and highly valued spices such as vanilla. One problem associated with the annual crops is that they tend to require specific soils and terrain conditions, particularly relatively flat, well-drained land, which appears not to exist on any scale in the Study Area. Another production problem, particularly of grain crops, is the risk due to unpredictable weather which, in a bad year, might cause complete failure resulting in severe financial losses although in a favourable year they might be comparatively profitable. As explained earlier erosion hazards generally rule out mechanised cultivation. Thus strip cropping techniques or zero cultivation methods using herbicides and covercrops would need to be developed if large scale arable cropping is found to be particularly desirable.

13.3 POSSIBLE AGRICULTURAL DEVELOPMENT PATTERNS

Consideration of the agricultural constraints has resulted in guidelines within which to formulate possible development patterns but it is not possible, at this stage of planning, to make concrete proposals for a cropping pattern for the future development of the Study Area. The aim has been to explore the consequences of possible alternative development patterns, which might be regarded as models, and to evaluate them in terms of their achievements and their policy implications.

For this purpose activity groups rather than individual enterprises have been dealt with each group being composed or represented by one, two or more activities. The grouping adopted has been as follows:-

Activity group	Crops included for preliminary development planning purposes
Oil palm	Oil palm
Rubber	Rubber
Spices and essential oils	Pepper, turmeric, lemon grass and patchouli
Diversification crops	Cocoa, tea and tapioca
Beef	Breeding on ranch basis, fattening on small holdings; grazed pastures
Food crops	Wet padi rice, vegetables for local markets

The main factors determining the nature of possible agricultural development patterns have been taken to be the following:-

a) the type of organisations responsible for directing development and controlling implementation; in particular the level of public sector compared to private entrepreneur participation. For this purpose a distinction has been made broadly on the basis of whether activities were likely to be developed on a public sector estate or small-holder basis. (Development under these organisations is considered in Section 13.4);

b) the degree of diversification away from the basic commercially proven crops, mainly oil palm and rubber, by giving greater emphasis to possible alternatives, primarily beef and activities in the diversification crop group.

In effect the acreage developed by each organisation has thus been fixed for each particular crop group within any given overall development pattern, but the overall mix varied according to the cropping pattern. Three alternative crop combinations have been considered and on this basis three alternative agricultural development patterns emerged as shown in Table 13.3.

TABLE 13.3 SUMMARY OF ALTERNATIVE AGRICULTURAL DEVELOPMENT PATTERNS

Crop group	Cropping pattern assumed for alternative development patterns in new areas						Cropping pattern assumed in remainder of Study Area (including Lambir-Subis Development Area)
	Proportion of area			Area developed			
	I	II	III	I	II	III	
	Per cent			Acres (net)			
Oil palm	50.0	55.0	42.5	135 000	148 500	114 750	36 000
Rubber	35.0	20.0	20.0	94 000	54 000	54 000	17 500
Spices and essential oils	2.5	2.5	2.5	6 750	6 750	6 750	800
Diversification crops	2.5	5.0	5.0	6 750	13 500	13 500	5 000
Beef	5.0	12.5	25.0	13 500	33 750	67 500	2 500
Food crops	5.0	5.0	5.0	13 500	13 500	13 500	71 000
Total	100	100	100	270 000	270 000	270 000	132 800

? Suitable land of < 15° will not be available.

The basic assumptions and facts employed for purposes of this exercise are as follows:-

a) The areas of each activity group developed by the two basic organisation systems would be at the following ratios:-

Activity group	Ratio of estate to small holder development on an area basis	Remarks
Oil palm	3 : 1	Based on need for close control of daily throughput of factories and fruit quality.
Rubber	2 : 1	Assumes replanting/new planting on estate type settlements mainly as a second crop
Spices and essential oils	0 : 1	All operations carried out on a small holder basis
Diversification crops	1 : 4	Allows for inclusion on schemes operated on estate lines or operated as estates per se (tea)
Beef	1 : 1	Assumes all breeding on commercial ranch (estate type) and all fattening on small holder basis
Food crops	1 : 1	Assumes area related to population and grown on estate type holdings as well as on private holdings

b) The market constraints for export crops have been based on those indicated in the previous Section. Food crops grown for internal consumption would occupy about 5 per cent of the net cropped area; this limit would be imposed by land capability aspects. The combination of rice and vegetables has been taken on an area ratio of 9:1;

c) the area of State Land suitable for agricultural development in reasonably large sized and conveniently located blocks is about 290 000 acres. This represents a net developable acreage of 220 000 acres on the basis of 25 per cent of the gross area being occupied by enclaves of unsuitable land, roads, settlements and the like. The areas of legally occupied land, mostly Native Customary Land, in which agriculture could be improved are extensive, but for reasons explained in Section 13.5, it has been assumed that only between 30 000 and 50 000 net acres would be tackled. This gives an assumed maximum of 270 000 net acres developed or improved;

d) development in the remainder of the Study Area outside of the basic 270 000 acres would be limited to full development of the CDC estate and SLDB areas currently planned in Lambir-Subis Development Area, but the acreage of export crops would not exceed the limits set earlier. Replanting of rubber would take place on an organised basis resulting in re-location of about 50 per cent of the current area under the crop within the new areas developed by 1990. The area of wet padi would increase to occupy about five per cent of the area assessed as possibly suitable for agricultural development in Native Customary Land areas, that is about 45 000 acres.

The main features of the three development patterns derived from the above exercise are summarised as follows:-

Development Pattern I

For this first alternative the cropping pattern is assumed to rely on a maximum of rubber and near-to-maximum oil palm development and with the pepper and spices group reaching the estimated limit of the market constraint. The implications of this development pattern would be:-

a) public sector estates would account for 66 per cent of all of new development;

b) employment would be high due to the crop mix which contains a large proportion of enterprises with high labour requirements;

c) scope for flexibility or ease of changing to alternative crops once development has occured would be limited due to the large proportion of permanent tree crops in the cropping pattern;

d) scope for improving income distribution over-time would be limited by the inflexibility of the crop mix, and the limited degree of the under-employment offered in the small holder sector;

e) due to the emphasis given to large scale operations a relatively fast rate of development would be feasible.

Development Pattern II

The second alternative is basically similar to the first except that oil palm and beef and diversification crop activities are increased at the expense of rubber. The main implications of this pattern would be;;

a) public sector estates would account for about 64 per cent of new development;

b) employment would be slightly lower than in Pattern I due to the inclusion of a larger cattle area which has a low labour input;

c) income distribution and growth prospects would be constrained by the lower degree of under-employment in the small holder sector;

d) flexibility in the future development pattern would be increased somewhat due to the larger area of land under beef production which might easily be changed to alternative forms of development;

e) a relatively fast development rate would be feasible as for pattern I.

Development Pattern III

This is designed with maximum flexibility of cropping pattern and income distribution in mind and incoporating least dependence on oil palm and rubber. Greater emphasis is given to beef production and diversification crops. The features of this alternative summarise as follows:-

a) public sector development would account for about 50 per cent of all new development, the lowest proportion in the three alternatives;

b) employment creation would be the lowest of the three alternatives due to increased area under cattle;

c) flexibility of the development pattern would be maximised due to the inclusion of a large area of ranch land under pastures and relatively short term crops in the diversification group. The land occupied by those activities might easily be developed to alternative enterprises if they become more commercially attractive at a later date ;

d) a slower development rate might result from the greater emphasis on small holder type development and the inclusion of a greater proportion of unproven enterprises which would require a period of experimentation during the early years of implementation.

A summary of the overall achievements of the three patterns, in terms of areas developed, employment created and economic performance is given in Table 13.4.

13.4 METHODS AND STRATEGIES FOR DEVELOPMENT OF AGRICULTURE

The Terms of Reference for this Study state that development in the Study Area should be directed mainly towards new settlements in State Land. This strategy has been accepted as a general principle but it has become clear during the investigations that if this is followed then considerable land at present in existing Forest Reserves and Protected Forests will need to be developed for agriculture to achieve the target of 250 000 acres. An alternative offered in the Forestry Chapter is that of directing efforts more towards developing agriculturally suitable Native Customary Land than towards Reserved and Protected Forests Land. In previous reports the Consultants have already pointed out the need for some intensive schemes for

TABLE 13.4 SUMMARY OF ACHIEVEMENTS UNDER ALTERNATIVE ACRICULTURAL DEVELOPMENT PATTERNS FOR THE STUDY AREA

Item	Unit	Development pattern			Remainder of Study Area	Remarks
		I	II	III		
1. Acreage developed under public sector and private estates	Net acres	179 100	173 700	165 260	45 000	Net area calculated as 75 per cent of gross area possibly suitable for agriculture in new areas. Present cropped area is included in remainder (including Lambir-Subis development).
Small holders		90 900	96 300	104 740	85 000	
2. Employment created at maturity (full time jobs)	Full time jobs	31 100	28 100	26 400	24 000	Full time job = 250 man days per annum calculated on physical input required.
3. Number of households at maturity	House-holds	17 100	15 100	14 600	13 600	Calculated on basis of: estate sector, 2 workers per household, small holder sector based on income target of $2 300 per annum per family.
4. Gross value of production at maturity	Thousand dollars	173 245	166 599	156 042	65 548	F.o.b. value of output at mature yields and projected prices
5. Total direct input expenditure at maturity	"	75 370	77 967	73 790	26 461	At constant prices
6. Total value-added at maturity	"	115 417	109 674	96 114	44 624	Value of production less taxes, duties, commercialisation costs and margins and direct inputs from other sectors.
7. Average value-added per acre developed	dollars	427	406	356	343	(6) ÷ (1)
8. Average value-added per full time job created	"	3 711	3 903	3 640	1 859	(6) ÷ (2)

improvement of farming in land already legally occupied. In the remaining parts of the Study Area development and assistance to farmers should not cease but should be continued at least at the present level. Development work in each of these different categories of land requires different approaches and have slightly different objectives. These are outlined below.

13.4.1 Improvement in Selected Areas of Legally Occupied Land

For this, the majority of which will be Native Customary Land and will have been assessed as suitable for agricultural development, the main objectives of the development work would be:

a) gradual reduction and eventual elimination of hill rice cultivation;

b) adoption by the people of a viable form of settled agriculture and where possible concentrating it into part of the area over which the people presently have customary rights;

c) improvement of the amenities of rural life.

The need for special effort in already occupied areas arises from the observation that the present programs, though achieving success, are not able to meet, at their present level and orientation, the demands and needs of the rural people. This conclusion results from observing the continued widespread cultivation of hill rice and numerous examples of illegal occupation of State Land, particularly along newly constructed roads. It is evident that a peaceful coexistance of the existing population with people from other Divisions settled onto State Land in the Study Area would not occur without increased improvement efforts among the population in the legally occupied areas. The physical problems of vast areas, poor communications, long distances and the remoteness of some of the lands together with technical and social difficulties necessitate that intensified efforts should be concentrated initially into specific areas which have special advantages. Of particular importance will be accessibility and proximity to some adjacent nucleus development which can act as a catylist.

A number of principles which should influence the planning of improvement schemes in selected, legally occupied areas have been described in an interim report "Alternative Strategies for Rural Development". The principles are summarised as follows:-

a) schemes should, initially anyway, be aimed at providing improved farming and living condition for only those people having rights, customary or titled, to that land;

b) schemes should be based on the provision, or presence, of roads because these can provide the accessibility necessary for the supplying of services to the people and for the marketing of their produce. A major key to obtaining the cooperation of people presently living in remote areas is the provision of easy access to a service centre. This strategy could be used either as an expansion from existing or planned development in State Land, or as an independent development following a road into a currently remote area of Native Customary land;

c) road alignments should be chosen to pass close to existing longhouses or villages which are suitably located for future enlargement into rural service centres. Also the roads should pass through the land with high agricultural potential. Some relocation of longhouses and villages as well as redistribution of land must be anticipated;

d) to introduce simultaneously a complete range of development and amenity inputs under an Integrated Development Organisation in which personnel from the various institutions and Government Departments would be combined into a single management team. This would operate from a centre attached to an existing settlement in the area, or be so sited that it would form the nucleus of a coming new town;

e) farming should be encouraged and supported only in specified areas, generally reasonably close to the roads and the centres;

f) mixed cropping should be encouraged, but the range of crops in any one development area should be generally limited to a few selected ones which suit the particular conditions. Generally the main enterprises would be those undertaken on a nearby nucleus development where processing and/or marketing facilities would be provided;

g) wet padi production should be improved and encouraged on all suitable land. In areas without, or short of, such land guarantees of rice supplies, as food relief if necessary, should be given;

h) a credit system, as opposed to a subsidy system, should be the method of providing cash and kind assistance to farmers for agricultural undertakings.

13.4.2 Development of State Land

The Perspective Plan rests on the assumption that a considerable number of people will migrate from other parts of Sarawak into the Region. These people, together with smaller numbers from within the Region, will be the settlers involved in agricultural development of State Land.

The objectives of this development would be:-

a) to provide a reasonable standard of living to as wide a range of persons as possible;

b) to ease unemployment among the country's population of working age;

c) to expand Sarawak's agricultural production and to widen the variety of this production emphasising the development of other suitable agricultural products in addition to rubber.

Methods of development to obtain these objectives are discussed in the interim report "Alternative Strategies for Rural Development". Generally they follow those currently employed but with

some important suggested changes. The methods recommended are:

a) that public estate development, as is undertaken by SLDB in the Lambir Subis Development Area, and estate-type like that of the Sarawak Oil Palm Company operated by CDC, should continue. By these systems large areas of land are developed mainly on a mono-crop system and there is no sub-division of the land to individuals. Such developments in future are expected to cater for those people in the population who prefer to be employed and directed in their daily work or those who are not able to organise their own productive activities independently;

b) that development by small holder settlement schemes should be increased, but the criteria for selection of settlers should be designed to provide opportunities for that section of the population capable of individual initiative and hard work but at present are unable to take advantage of these qualities. The holdings, which would be under title or secure long term lease, should be of sufficient size to provide a reasonable living yet generally workable by family labour alone. Processing, storage, transporting and marketing of the produce would be provided as part of the overall development;

c) that farming of medium sized holdings should be started whereby people who have enough capital, or are sufficiently credit worthy, to enable them to finance the development of a holding themselves are encouraged to take up farming. The holdings would be considerably larger than the holdings envisaged in a small holder scheme and would be partly operated by hired labour.

d) that development types (b) and (c), which for convenience in this Report are collectively called private holder development, should be organised and supported by teams forming Integrated Development Organisations as previously described.

e) that development in any given area should include two or more of the above mentioned methods, and if there is suitable nearby Native Customary Land then the overall scheme should automatically be planned to extend into that land.

13.4.3 Development of the Remaining Areas of Legally Occupied Land

Present rural development promotion is generally undertaken by individual Government Departments most often operating separately. That considerable success has resulted is shown in the establishment of large numbers of rural schools and of health clinics, the planting of numerous plots of swamp rice, rubber, coconuts, coffee and fruit trees as well as the construction of fish ponds and the establishment of some farmers' cooperatives. Much of the agricultural development has resulted from the agricultural subsidy schemes. These and other equally important efforts will need to continue at least at the present level of effort.

The objectives of this development work would, in general, be similar to the aims of the intensive efforts in the selected occupied areas. But in addition attempts should be made to persuade those people at present occupying land assessed as unsuitable for agricultural development to resettle or to adopt a permanent form of forestry: possibilities associated with forestry are discussed in Chapter 15. The resettling would imply a reversion of their land to state ownership either by sale or by substitution for agriculturally suitable land elsewhere. This latter choice would in effect mean joining, possibly as a group, an organised settlement scheme. Another possibility, not yet thoroughly investigated in this Study, would be the settling of these local people on other, more agriculturally suitable Native Customary Land after agreement with the present holders of right of usage. Planned relocation of people in this manner would improve the farming practices and social amenities of both communities.

In continuing the work in the areas suitable for agriculture efforts should be made to diminish or avoid problems which have sometimes occured, such as;

a) creating market transport problems by starting production enterprises in too small and too isolated circumstances;

b) inappropriate land use planning resulting in the best land in an area being used for a low return crop;

c) the over expansion of individual crops in certain areas leading to the over supply of limited local markets which results in low prices and unprofitable production.

The least that could be expected from continued efforts in those remaining areas would be:-

a) a maintenance of the land in a condition suitable for a more substantial improvement in due time when development in the Region will have proceeded sufficiently to permit their selection for an intensive scheme;

b) the production of sufficient food (rice, fruit, vegetables, meat, eggs, fish, etc.) for the farmers themselves and other people living in those areas.

Other developments could take place. Of particular importance in this respect is the possibility of a collection, processing and marketing organisation to utilise the potential production of the numerous, small, scattered plantations of rubber. The construction of factories at carefully selected sites to process lump or poly-bag coagulum together with an organised collection and transport system is a concept which merits careful investigation. This will be undertaken in Phase II of the Study.

13.4.4 Rate of Development

The Government has indicated that about 250 000 acres of land should be developed within the Study Area during the next twenty years and 50 000 acres in the first five years. These are averages of 10 000 per year for the first five years increasing to 13 000 per year during the remaining fifteen years. These average overall rates are considered reasonable considering that the SLDB and CDC have developed about 10 000 acres in the Lambir-Subis Development Area during 1972, and the SLDB alone is planning to complete 12 000 acres during 1973. Although this latter acreage may be ambitious with the resources presently available, the SLDB is expected to expand in the future and be able to maintain at least this rate of development. No great increase in the total development rate is envisaged in the Study Area over time because not only does the above rate appear reasonable considering the land resources available, but also because even this rate will seriously tax the training facilities for agricultural extension staff. This problem is further discussed in Section 13.7 and Appendix V.3.

The rate of development by different methods (estate type and private holder-type) will be important as will the balance between the opening up of State Land and improvement on legally occupied land. History has proven that land tenure and land-ownership

problems have often given rise to political agitation. The exclusive implementation of estate-type development, whether by private companies or Government, could in time lead to political and social problems because many people who desire land but do not have the resources to acquire and develop it would be deprived of an opportunity to own land. Therefore, there must be a carefully controlled balance between the area developed by the estate methods, where no individual land ownership is intended, and the area developed by private holders. Public estates and private estate-type development will provide a means of creating employment for some of those people who do not have the desire or ability to farm land on their own inititative. These methods also offer a convenient way of initiating development in new areas and, by providing processing and marketing facilities, can act as a nucleus from which other, more socially desirable, methods of development can expand.

Considerations of a desirable ratio between areas developed by the estate method and by private holdings are at present relevant only on State Land because the strategy laid down in the Terms of Reference that new development should be on State Land has been generally accepted.

At present in Sarawak the immediate need appears greatest for the public estate-type of development followed in order by the small holder-type, the individual investor-type, and lastly the private estate-type. But in the future, as education in the country increases, it is suggested that these priorities be changed to meet expected demands for an increase in the private holder schemes. In practice this trend will be dictated to some extent by the fact that SLDB is already operating in the Study Area whereas private holder settlement, as envisaged in this report, has not started. Also at present a constraint is imposed on private holder development by the fact that the only enterprises considered really suitable for development are particularly suited to large-scale undertakings. Consequently during the early years there will be considerably more area developed along the estate-type systems than along the private holder systems, necessitating an increase of the latter system in later years.

The implications of this and the possible rates of change from the estate method to private holdings are the subject of detailed studies scheduled for Phase II of the Study. However, preliminary

studies based on the following have been carried out:-

a) the tentative overall cropping patterns;

b) the ratios presently considered desirable, for each enterprise, between the acreage under estate-type development and the acreage under private holders;

c) the assumed ratios between the area of State Land developed and the area of legally occupied land improved. (See section 13.5)

For the State Land the studies show that the eventual ratios of public and private estate-type development to private holders will vary from 2.3:1 to 3.5:1 giving an overall average of about 3:1. Thus if 220 000 net acres of State Land is developed as suggested in Section 13.5 then about 165 000 acres would be developed under estate-type systems and 55 000 under private holders.

A possibility which might well increase the proportion of the latter systems of development is that private holder production of central-mill-processed crops such as oil palm and rubber will prove more reliable than presently assumed, thus permitting an increase in the proportion of land allocated to private holders. Whatever the eventual ratio, it is clear that it will change over time; the proportion of private holders increasing as time proceeds. For calculation purposes in this Report the rates of development assumed are shown in Table 13.5.

Table 13.5 RATES OF LAND DEVELOPMENT

Land Category	Development method	Average development rate per year Years 0 - 5 (net acres)	Average development rate per year Years 0 - 20 (net acres)
State Land	Estate types	8 250	8 250
	Private holders	1 000	3 500
Legally occupied land	Road based	1 000	1 700

The figures for occupied land assumes that only 30 000 acres would be improved in the twenty year period. This rate represents an annual road-based improvement along only about six miles of road. If improvement of 50 000 net acres of occupied land were to be the target as is suggested in Section 13.5 the annual

average acreage during years six to twenty would need to be increased to about 3 000, representing about twelve miles of roadside improvement a year.

If it were found desirable and practical to increase the area of State Land allocated to development by private holders so that the ratio between this method of development and the estate-type would become, for example, 1:1 during years six to twenty then the average development rate per year for each method would become approximately 5 800 acres.

An aspect which may well affect the overall rate of State Land development is the rate at which the commercially usable timber can be economically exploited from the land suitable for agriculture. The FAO Forest Industries Development Team is drawing up plans for the exploitation, by large timber processing complexes, of the unlogged dipterocarp hill forests. Where these forests contain land suitable for agriculture and government decides to develop them for that purpose the exploitation plans will need to be dove-tailed with agricultural development. Also efforts should be made to utilise the one to two tons per acre of timber still remaining in the already logged areas when they are developed for agricultural purposes. This subject, which is further discussed in Chapter 15, will require early decisions concerning royalty rates and extraction conditions so that profitable exploitation can be organised.

13.5 LOCATION AND PRIORITIES OF AREAS FOR DEVELOPMENT AND IMPROVEMENT

The Government has stated that the majority of new development should be on State Land and in reasonably large blocks. The area of unencumbered State Land (see Glossary) assessed as possibly suitable for agriculture and in reasonably large blocks (over 1 000 acres) is about 123 000 acres. This includes about 27 000 acres in the proposed extension to the Labang Forest Reserve and roughly 13 000 acres in the Bakas proposed forest reserve. In addition there is a block of about 18 000 acres in the south-western part of the Lambir-Subis Development Area assessed as unsuitable for oil palm planting but possibly suitable for pasture for cattle. This gives a total of State Land outside the Forest Reserves and Protected Forests of about 140 000 gross acres or 100 000 net acres.

At the rate of development suggested in the previous Section this might represent between nine and ten years development if a rather scattered pattern of development is accepted. After that time the need would arise to move into areas suitable for agriculture in the Forest Reserves and Protected Forests, or to obtain the cooperation of the holders of Native Customary Land for large-scale development.

Measurements of the large blocks of land in the Forest Reserves and Protected Forests assessed as possibly suitable for agriculture reveal a total of roughly 150 000 acres. This together with the unencumbered land gives a total for State Land of about 290 000 acres in large blocks. The locations of these lands are shown in the Perspective Plan Map.

The 290 000 acres of land possibly suitable for agriculture represents roughly 220 000 net acres of usable agricultural State Land if a reduction factor of 25 per cent is accepted for unsuitability and for roads, towns and other infrastructural purposes. There is thus a shortfall of 30 000 acres from the Government's twenty year development target of about 250 000 acres which can be easily made up by improvement schemes in conveniently situated, legally occupied land. In fact it is the Consultants' opinion that a considerable effort in this direction is essential if harmonious relationships are to be maintained between the new in-migrants settlers and the local inhabitants.

Priority in the selection of State Land areas for development should, it is suggested, be given to those suitable areas outside the existing Forest Reserves and Protected Forests, in fact the unencumbered State Land. The Perspective Plan Map shows that in only three places, outside the Lambir-Subis Development Area is there sufficient conveniently accessible land of this category to warrant investigation and consideration as areas to be developed first. These are:-

a) the blocks of land northwest and east of the Lambir-Subis Development Area. These total about 20 000 gross acre and could be considered for development by private holders as an extension to,and in association with, the public and private estates being developed in the Lambir-Subis Development Area. The acreage of land ultimately available for development, however, could be considerably less than 20 000 because the legal tenancy is very confused in these particular parts. Field investigations have shown that the occupied areas are

now considerably larger than the areas of shifting cultivation shown on the Series T735, 1:50 000 scale maps. To determine the legality of this occupation will require the assistance of local Government Departments;

b) the double block of land on the Miri-Bintulu road lying north and south of the Sungai Suai. The northern block totals about 24 000 gross acres, but the net agricultural land will be considerably less because field investigations have revealed a ridge of agriculturally unsuitable land running north-east right through it. The southern block of roughly 34 000 acres contains about 27 000 acres in the proposed extension to the Labang Forest Reserve. The two blocks together offer nucleus areas where development of the public estate and private holder-types could start. Expansions could eventually take place into surrounding Forest Reserve land. The first expansion would best be north-westwards to connect up with blocks of unencumbered State Land located just south of Niah.

Close to the two nucleus blocks and the possible north-western expansion block are areas of Native Customary Land. It will be important to firmly establish the legal boundaries between the State Land and the Native Customary Land before detailed development planning takes place;

c) a block of land between Labang and Tubau lying just south of the alignment of a road scheduled to be built during the Second Malaysia Plan. After this road has been built agricultural development could follow and could be of the public estate and private holder-types, but because the block is of only about 14 000 gross acres and there is no nearby State Land into which later expansion could extend, it is unlikely that oil palm would be recommended for this area. Again determination of land tenure status in this area would be important.

Although these groups of land total about 90 000 gross acres of land their limited size and separated locations do not make them ideal, from the administrative aspect, for the first stage of development. However, their locations are favourable for achieving the aim of a balanced development in the Region. In this respect groups (b) and (c) could be considered nuclii developments from which future expansion could take place, while group (a) would represent actual expansion from an existing nucleus. The block of 16 000 gross acres in the Lambir-Subis Development Area should also be considered for early development, possibly to pasture for beef cattle. This Study could form part of the more detailed livestock work scheduled for Phase II.

Subsequent priorities for development on State Land will depend firstly on Government's decision concerning the ultimate use of agriculturally suitable land in the Forest Reserves and Protected Forests, and secondly on the integration of the forest development plans put up by the FAO Team with the chosen development strategy for the Study Area. These are aspects which will receive attention in Phase II, but if agricultural development is to extend into the Forest Reserves and Protected Forests then the planning will consist of coordinating agricultural development with forest exploitation into specific areas.

The Perspective Plan Map also shows suggested areas for road-based improvement schemes in occupied areas. Highest priority should be given to the lands bordering the existing roads in and around the Lambir-Subis Development Area. Next, in order of importance would be:-

a) areas along the remaining existing roads;

b) areas along the roads scheduled for construction in the Second Malaysia Plan;

c) areas along road extensions into occupied areas from development schemes on State Land;

d) areas along roads proposed for construction during the next twenty years.

Calculations and assumptions, given in Appendix V.2, indicate that if the road-based development approach is accepted for legally occupied land then only about 120 miles of road would be used to provide improvement to about 30 000 net acres of land. There are already a minimum of 60 miles of road maintained by the Public Works Department passing

through legally occupied land assessed as possibly suitable for agriculture. Another 40 miles of road which will pass through similar country are planned to be constructed during the Second Malaysia Plan and about 465 additional miles have been suggested, in Chapter 7 as necessary for regional development in the next twenty years. Clearly, improvement along only 120 miles of these roads could be considered as unreasonably low, therefore, a second possibility has been investigated, namely improvement along 200 miles of road giving a total of 50 000 net acres of occupied land. A target for improvement of 50 000 net acres would give a total acreage to be tackled of about 270 000.

The decision as to whether 250 000 or 270 000 acres, or any other figure, should be the twenty year target will rest with Government, but their choice will be influenced by consideration of social, economic, financial and agricultural aspects. Some implications of all these aspects are given in this Report.

13.6 THE NUMBER OF AGRICULTURAL JOB OPPORTUNITIES CREATED UNDER DIFFERENT DEVELOPMENT SITUATIONS

The job opportunities created under any of the development systems will depend on:-

a) the cropping pattern: this determines the area of land that a full time worker can handle and the net income per acre of fully developed land;

b) the target income for a rural family: this will determine the size of holding or the number of shareholders in public estate development.

Preliminary calculations have been made for the three tentative cropping patterns assuming:-

a) that totals of 250 000 and 270 000 net acres are developed;

b) that State Land will be divided between the estate-type of development and the private holder methods at the ratio of 3:1;

c) that the target income is $2 300 per small holder family per year;

d) that the acreages capable of being handled by each worker under the estate-type system, and the acreages

required to provide small holders with the target income are as given in Section 13.3.

The results presented in Table 13.6 show that cropping pattern I creates more jobs than either of the other two patterns mainly because it contains a lower percentage of pasture for beef which requires a low labour input. Assumings that by 1990 the number of employed in agriculture outside the development areas is around 20 000 then it appears reasonable to expect that the total of about 45 000 jobs, as estimated in Chapter 4, could be created in agriculture even if only 250 000 acres are developed provided development takes place under cropping patterns I and II.

If the eventual agricultural development pattern approaches that represented by cropping pattern III, which has considerable emphasis on beef, then a total net acreage greater than 250 000 will need to be developed to obtain the same number of job opportunities.

In any of the alternatives an increase in the total area of State Land developed under the small holder system will increase the number of job opportunities because the average family has available more labour than is required to work a holding of the size necessary to obtain the target income.

13.7 REQUIREMENTS FOR AGRICULTURAL EXTENSION STAFF

Any of the agricultural development situations envisaged will require a considerable increase in the number of agricultural extension staff, and a shortage of trained men could limit the rate of development. Calculations, given in Appendix V.3 and based on the assumption that the expansion of training envisaged by Government up to 1982 will continue to 1990, show that the requirements for graduate staff in the Study Area in 1990 will be roughly five times those estimated to be available, while the requirements of diplomate staff will be about twice those estimated to be available. For the lowest cadre there would appear to be a surplus available. The calculations have taken no account of the staff required in the Study Area for research, for planning or for survey work. If the supply of graduates and diplomates is not to constitute a constraint to development then either particular preference must be given to the Study Area for allocation of these cadres or the training and recruitment rates will have to be expanded considerably beyond that envisaged in the calculations.

TABLE 13.6 NUMBER OF JOB OPPORTUNITIES CREATED UNDER DIFFERENT SITUATIONS

A. ASSUMING DEVELOPMENT OF A TOTAL OF 270 000 NET ACRES

Method of development	Cropping Pattern I		Cropping Pattern II		Cropping Pattern III	
	Number of jobs created under					
	Estate type methods at 10.7 acres per employed	Other methods at 6.6 acres per employed	Estate type methods at 12.5 acres per employed	Other methods at 8.3 acres per employed	Estate type methods at 11.7 acres per employed	Other methods at 7.6 acres per employed
Public and private estate type	16 100	-	13 800	-	14 700	-
Private holder	-	8 700	-	6 900	-	7 600
Improvement in occupied land	-	6 000	-	4 800	-	5 300
Total	16 100	14 700	13 800	11 700	14 700	12 900
Grand totals	30 800		25 500		27 600	

B. ASSUMING DEVELOPMENT OF A TOTAL OF 250 000 NET ACRES

Public and private estate type	16 100	-	13 800	-	14 700	-
Private holder	-	8 700	-	6 900	-	7 600
Improvement in occupied land	-	3 000	-	2 400	-	2 600
Total	16 100	11 700	13 800	9 300	14 700	10 200
Grand totals	27 800		23 100		24 900	

The number and grade or cadre of staff needed as time proceeds will depend not only on the rate and eventual extent of development but also on the density at which the staff is applied; that is the number of farming families, or acreages, allocated to each extension worker or manager. This density will vary depending on whether the area is developed by the estate-type methods, or developed by private holdings or whether the land remains outside the development area.

The supply of trained extension staff will depend mainly on the training facilities within Malaysia as a whole. The existing facilities are currently being expanded. For example, the Serdang College of Agriculture in West Malaysia is expected to increase its output of agricultural diplomates from 160 per year to 320 by 1974; and the accommodation at the Natural Resources Training Centre at Semongok is being increased. These expansions and the out-turn of graduate staff have been assumed sufficient to fulfill the Sarawak Department of Agricultures' present planned overall staffing for 1982.

13.8 AGRICULTURAL PROCESSING AND MANUFACTURING DEVELOPMENT

13.8.1 Possible Primary Processing Activities

The future development of agricultural processing is naturally closely linked to the production and availability of raw materials. Extraction of palm oil and processing of rubber latex are likely to be the only large-scale processing developments in the primary agricultural sector during the next twenty years. Smaller-scale processing opportunities are foreseen to arise in connection with rice, cocoa, tea, tapioca, sago and essential oil crops but only if the crops in production Group 3 mentioned in Section 13.2.2 prove to be commercially viable. The development of an abattoir-cum-meat processing unit, together with a possible hide and skin industry and fruit canning facilities may prove to be feasible once sufficient development has occured to warrant decisions for their location being taken on commercial criteria. All would need to be export orientated but could supply local markets as well.

Possible development patterns for activities in production Groups 1, 2 and 3 over the twenty year period are summarised in Table 13.7.

TABLE 13.7 SUMMARY OF POSSIBLE AGRICULTURAL PROCESSING DEVELOPMENT PATTERNS

Area/development pattern	Net agricultural area served acres	Total investment required mn dollars	Employment created(1) No. jobs	Number of processing units			
				Total	Large scale	Medium scale	Small scale
New agricultural area							
Development pattern I	248 250	55.49	1 408	125	19	66	40
Development pattern II	227 500	59.90	1 313	143	18	85	40
Development pattern III	193 750	45.58	1 073	141	16	85	40
Remainder of Study Area	119 500	14.20	361	132	4	28	100

Note (1) Full time jobs for unskilled labour.

13.8.2 Secondary Manufacturing

Considered here are two groups of possible manufacturing industries; the first would be based on the utilisation of products from primary processing units, and the second developed to supply the inputs required by agriculture.

The first group might include palm oil hydrogenation and fractionation, cocoa grinding, chocolate and soap manufacutre.

The second group could aim at livestock feed and crop fertilizer requirements. The annual quantities of feed and fertiliser required to supply the needs of the projected crop and livestock developments envisaged are estimated at about 18 and 60 thousand tons respectively. It is possible that these quantities would justify setting up local feed mixing mills and fertiliser compounding plants. Since these two items represent large proportions of farm production costs any means of reducing their price to the farmer would have a significant effect on the production economics and profitability of virtually all agricultual activities. The availability of local ingredients or raw materials would provide some impetus to the development although scale of operation would be the major constraint to both activities. Further investigation will be carried out during Phase II of the Study.

CHAPTER 14

LIVESTOCK

14.1 INTRODUCTION

The generally favourable year-round growing conditions offer good opportunities for the establishment and use of grazing pastures for cattle and buffaloes. The market, both local and export, is favourable for beef and a considerable expansion in this commodity is envisaged. In addition other livestock enterprises, particularly pigs and poultry, are expected to increase.

Development could proceed in several different ways. The major alternatives are:-

a) gradual and piecemeal improvement of the existing, traditional industries;

b) the creation of new, commercially oriented, conventional livestock enterprises;

c) the integration of traditional and/or commercial livestock production with tree crop, fish pond or forest production.

The choice of one or more of these alternative development strategies depends upon:-

a) the availability of land and animals;

b) economic factors such as the availability of capital and labour, the relative prices of livestock products and the need to encourage import substitution; and

c) social factors such as the need to provide improved nutrition and work for the population.

In the following Sections the possibilities for each sector of the industry - buffaloes, cattle, sheep and goats, pigs and poultry are briefly examined.

14.2 BUFFALOES

Buffaloes are extremely well adapted to the ecological conditions in the Study Area and some consideration is being given to the development of this sector, particularly the use of buffaloes for work and for meat production. There could be an increasing demand

for working buffaloes following the envisaged increase in cultivation of swamp rice, and there is already such a demand for buffalo meat that the local off-take is insufficient, and meat is flown into Miri, for example, from Bario. The possibility of allowing domestic buffaloes to become feral in some Forest Reserves, particularly coastal swamp forests, will be considered.

14.3 CATTLE

14.3.1 Working Cattle

With the expected increase of swamp rice cultivation the use of either working cattle or buffaloes in these areas for cultivation purposes should also be stimulated. Cattle could be used for cultivation work on the lighter soils and buffaloes on the heavier soils. Any national cattle breeding plan should, therefore, include the production of some cattle that are suitable to use for cultivation work in small padi fields and as draught animals for on-the-farm and short distance transportation of goods.

14.3.2 Milk

Even if demand for milk was very high, which it is not, the overall lack of experience of the local people in cattle husbandry suggests that it would be prudent to first develop a beef rather than a dairy industry, because less sophisticated husbandry methods are required for beef cattle. Only limited attention will be given to the development and improvement of the dairy sector.

14.3.3 Beef

Internal and external market prospects and other factors appear to be favourable for the development of a beef cattle industry. At present per capita consumption in the Region is very low, being estimated at 1.33 pound/beef/per annum, but it is increasing. Possible external markets would be Singapore, Hong Kong, Japan and Brunei. There also appear to be areas of land, not particularly suitable for tree or other crops, that could be used for pasture.

Several alternate strategies that could be used for the development of a beef industry are:-

a) a conventional extensive ranch-type industry based on the utilisation of land not required, or which is

unsuitable, for other purposes;

b) an industry integrated with tree crop production, particularly coconuts and oil palm;

c) an intensive, small holder beef industry based on alternate husbandry or integration with tree crops;

d) a stratified beef industry incorporation;

- for breeding purposes, ranch-type husbandry with extensive pastures;
- for growing out purposes, estate and/or private holder-type undertakings in conjunction with coconut, oil palm and possibly forestry;
- for fattening purposes, a specialised farming group utilising fodder and by-product feeds.

Strategy (d) would appear to be the one most suited to local conditions, if it can be shown to be economically viable. The suggestions made in a Working Paper: "Preliminary Report of the Prospects for Beef Production in Sarawak" could, with some modifications, form the basis for the development of a national breeding ranch. This breeding ranch should be considered as a major base for the development of the country's future cattle population so that particular attention must be paid to the type of cattle that are imported because they are likely to constitute the majority of cattle in the country in the future.

In Phase II of the Study detailed considerations will be given to this and other possibilities for beef production. A policy of importing two or more breeds will not be excluded from consideration as crossbreds might be the most efficient type of beef cattle that can be produced in the Sarawak environment.

If the central breeding ranch were to be sited in the Lambir-Subis Development Area then it would be possible to instigate feasibility trials on integrating cattle with oil palm production. Also, reasonably close to this part of the Study Area there is sufficient suitable land available for the development of small holder type farming into which beef operations could be integrated.

The central breeding ranch should be primarily established as a commercial operation, but it could also be organised so as to further other desirable development objectives such as providing animals for development elsewhere, training of staff and farmers, conducting feasibility trials, provision of technical services and

organising the marketing of beef. But a real distinction will have to be made between the commercial and the social aspects of any beef cattle development project.

14.4 SHEEP AND GOATS

There are very few sheep and only a small number of goats within the Study Area. However, breeds of sheep and goats do exist that thrive quite well in other countries under somewhat similar ecological conditions to those existing here, and the possibility of introducing Indonesian methods of indoor feeding and management of both goats and sheep by small holder farmers will be considered. The possibility of integrating sheep with oil palm production will also be investigated.

14.5 PIGS

At present, pigs constitute the largest of the livestock population. They are reared as commercial enterprises mainly by the Chinese, and on a purely subsistence level by the longhouse people.

Apart from encouraging the use of the most suitable breeds and the local manufacture of rations, it is expected that the commercial sector will continue to develop without undue guidance. The subsistence sector will, however, need more assistance as will the introduction of pig rearing into the farming patterns on small holdings and individual investor holdings. In particular, attention will need to be given to the most suitable breed to use under small holder managerial conditions, the evaluation and organisation of the production of available carbohydrate and other feeds such as sago, tapioca and fish meal, suitable managerial methods, marketing services and the integration of pigs and fish pond production.

14.6 POULTRY

14.6.1 Chickens

Commercial chicken and egg production will undoubtedly develop and probably the most economic and useful assistance that could be provided would be the development of local feed resources to supply the local feed mills that produce concentrate feeds. No attempt should be made to breed local types but day-old chicks from recognised international lines could be distributed from a Sarawak base.

14.6.2 Ducks

The expected expansion of swamp rice will increase the feeding grounds for free range duck rearing, and the possibility is seen for the development of a minor duck industry. In addition, there will be considerable scope for the integration of duck rearing and fish farming.

14.7 WILD LIFE

Mention has already been made of the possible utilisation of feral buffalo in the forests. The introduction of feral Bali cattle (a domesticated banteng; Bos (bibos) banteng) is also a possibility as this animal is completely acclimatised and, in the not too distant past, was hunted in Sarawak forests.

CHAPTER 15
FORESTRY

15.1 INTRODUCTION

A statement of the forest resources potential in the Study Area is used as a background for a suggested broad development strategy.

It is recommended that forest land assessed as unsuitable for agricultural development should become or remain in the category of permanent forest. Also in principle forest land found suitable for agricultural development after detailed soil survey should be put in that category even if at present the land is within Forest Reserve or Protected Forest. The problems implicit in this principle are pointed out and the question raised whether agricultural development should be started here before making better use of land elsewhere.

The necessity for expansion of the Forest Department in management of forests and in silvicultural research, both for plantation and natural regeneration, is stressed.

15.2 CATEGORIES AND RESOURCES OF THE FORESTS

The gazetted acreages of the present Forest Reserves, Protected Forests and proposed Forest Reserves together with the approximate acreages of the non reserved forests are given in Table 2.1 (page 43).

The FAO Forest Industries Development Team has estimated the untapped commercial volume of the mixed dipterocarp forests within or immediately adjacent to the Study Area at about 1 400 mn cubic feet. The estimated volumes from the various forest blocks are shown below and their locations are shown in Figure 4.1.

DEVELOPMENT PRIORITY	AREA	On Figure 4.1	CUBIC FEET
Immediate	Similajau-Labang	2	470 mn
	Sawai, Niah-Jelalong Bok Tisam, Lemiting	6	330 mn
Reserved	Teland Usan	7	180 mn
Frozen	Tubau-Pandan	5	400 mn
			1 380 mn

The outlet of other vast resources from the mixed dipterocarp forests identified by the Team as the Tatau/Rajang Zone to the south of the Study Area is likely to be through Bintulu. Hence the volume available in or destined to pass through the Study Area could exceed 2 300 mn cubic feet. These estimates are primary-exploitation figures based on present standards of merchantability: they take no account of growth, for which no figures exist, and there are already signs that unforeseen increases in merchantability may be spectacular. Of the mixed swamp forests, worked under a sustained yield system, only an estimated logging potential of 3 mn cubic feet remains uncommitted.

The commercial volume remaining or likely to remain in the selectively logged, current licenced areas can be added to these resources. Licences outside reserves were opened for rapid release of land for agriculture before there were any detailed schemes to determine suitability. The acreage of these licenced areas now classified as possibly suitable for agriculture amounts to 172 000 acres representing a likely commercial log volume of 20 mn cubic feet. Changing markets and industrial expansion could transform standards of merchantability and soon affect the figures. Land clearance for development should be preceded by expert evaluation of the possibilities for processing and marketing the forest produce.

15.3 FORESTRY DEVELOPMENT

15.3.1 Existing Forest Reserve and Protected Forest Zones

The preliminary proposals of the FAO Team for immediate exploitation of the mixed dipterocarp forests involve the establishment of three medium sized timber complexes based on the logging of three Industry Units. These are forest areas selected by the Team within the Similajau-Labang Zone and parts of the Sawai, Niah-Jelalong area. The complexes are planned to be in Bintulu, near Bukit Temedak and near the junction where the future road to Labang meets the Miri Bintulu road. The steady, continuous but not large production from the swamp forests is also thought to be sufficient to support one manufacturing complex, although this aspect has only been provisionally assessed in this Study. The expected growing economic activity in the Study Area is partly based on a continued, sustained exploitation of the forest resources within and adjoining the Region.

By 1990 the amount of logs felled per year is estimated at a maximum of 70 to 80 mn cubic feet. This log intake could feed five to six complete timber complexes including those mentioned. They could be located, two at Bintulu and one at each of Labang, Temedak and Long Lama. All complexes would be based on the hill dipterocarp forests. The complex based on the forest resources near Long Lama could be split between Miri or Bintulu and Long Lama. This aspect is explained and discussed in Chapter 4.

Management of the Sarawak hill dipterocarp forests is at present restricted to control of productive logging. Nothing is known about the silvicultural requirements of individual species, the economics of regeneration, the effects of varying minimum felling diameters, the advantages (if any) of a short felling cycle, or even if the replacement will be an entirely different forest type. A programme of silvicultural research needs vigorous and urgent pursuit if there are to be any results useful to the management in the next 10 years. This state of affairs, serious though it is, we reluctantly agree must not delay development so necessary for the economic benefit of the country. In the meantime logging of all sizes down to the commercial minimum should be encouraged and the list of desirable species lengthened from time to time. Attempts to reduce pole damage are impractical and unnecessary in view of external evidence that the larger constituents of the understorey can never recover from repression.

If overall development is to be based on proper land use then forestry exploitation plans have to be integrated with those for agricultural development on land at present in Forest Reserve. The pattern of land use that would emerge would be broadly alternate zones of forestry and agriculture lying roughly parallel to the coast. This is illustrated in Figure 15.1 and assessed in Table 15.1. Fragmentation would be involved and would pose technical, administrative and protection problems which appear formidable under existing circumstances. Provision of employment in forestry ultimately could be an asset to the people living in the agricultural areas, but this would not be so in the early stages of development.

TABLE 15.1 ASSESSMENT OF LAND WITHIN FOREST RESERVES: PROTECTED FORESTS AND PROPOSED FOREST RESERVES

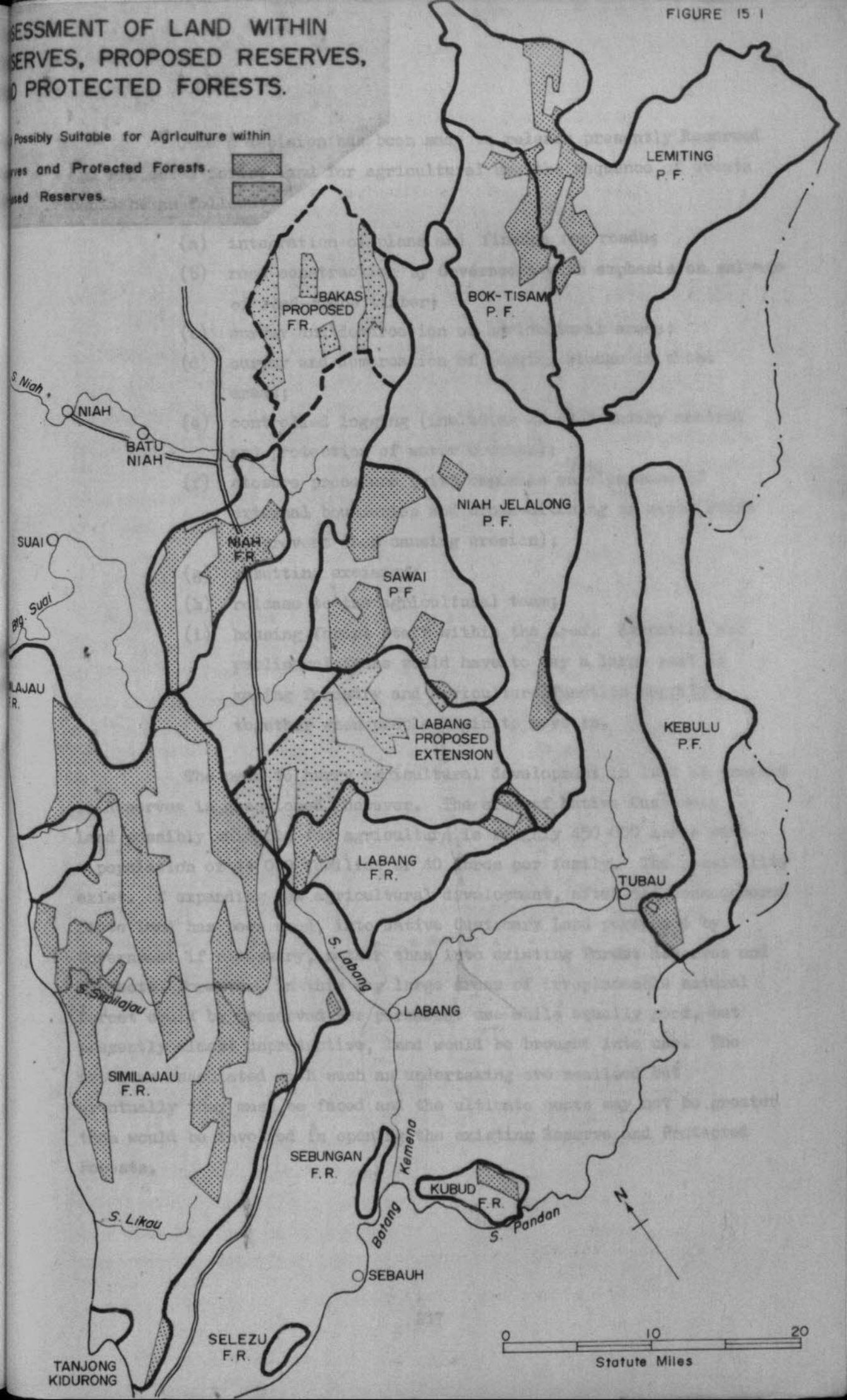
Name of forest area	Total gazetted area	Area assessed as probably suitable for agriculture	Area assessed as encumbered(1)
		Acres	
A. Mixed dipterocarp hill forest areas	1 000 136	164 500	56 900
Similajau	296 521	94 000	14 450
Niah Jelalong	141 700	3 000	NIL
Labang	38 848	12 000	1 100
Batu Belah	22 458	500	NIL
Lemiting	196 534	NIL	20 200
Sawai	74 240	30 000	1 250
Bok Tisam	73 310	NIL	11 000
Kubud	3 456	3 000	1 250
Kebulu	93 515	NIL	2 150
Marudi	5 660	NIL	NIL
Niah	42 500	19 000	13 100
Subis	8 194	3 000	2 450
B. Swamp forest reserves	327 743	NIL	NIL
Similajau	59 907		
Labang	8 000		
Bok Tisam	1 000		
Lemiting	15 286		
Kubud	8 128		
Lower Baram	150 610		
Marudi	11 579		
Beluru	36 587		
Sibuti	2 996		
Suai - Niah	28 500		
Selezu	5 150		
Sebungan	4 200		
proposed forest reserves	144 000	40 000	NIL
Bakas	62 000	13 000	
Labang extension	71 000	27 000	
Lower Baram extension	11 000	NIL	

Note (1) Shown as encumbered land on the Zonation Plan Map by glossary definition but illegal occupation is not in fact excluded.

FIGURE 15 I

SESSMENT OF LAND WITHIN SERVES, PROPOSED RESERVES, D PROTECTED FORESTS.

Possibly Suitable for Agriculture within
rves and Protected Forests.
osed Reserves.



Once a decision has been made to release presently Reserved and Protected forest land for agricultural use the sequence of events could be as follows:-

(a) integration of plans and finance for roads;

(b) road construction by Government with emphasis on salvage of road-trace timber;

(c) survey and demarcation of agricultural areas;

(d) survey and demarcation of logging blocks in those areas;

(e) controlled logging (including close boundary control and protection of water courses);

(f) closure procedure (with emphasis on clearance of external boundaries and cross-ditching of minor roads to prevent them causing erosion);

(g) gazetting excision;

(h) release to the agricultural team;

(i) housing forest staff within the area. Education and public relations would have to pay a large part in making forestry and agriculture function happily together when people begin to move in.

The need to hurry agricultural development in land at present in Reserves is questioned, however. The area of Native Customary Land possibly suitable for agriculture is roughly 450 000 acres with a population of 11 000 families or 40 acres per family. The possibility exists of expanding new agricultural development, after the unencumbered State Land has been used, into Native Customary Land purchased by Government if necessary, rather than into existing Forest Reserves and Protected Forests. In this way large areas of irreplaceable natural forest could be preserved for permanent use while equally good, but presently almost unproductive, land would be brought into use. The problems associated with such an undertaking are realised but eventually they must be faced and the ultimate costs may not be greater than would be involved in opening the existing Reserve and Protected Forests.

15.3.2 Currently Licenced Mixed Dipterocarp Forests

There are roughly 220 000 acres of forest in this category which is unsuitable for agriculture. The remnant commercial volume rarely exceeds 100 cubic feet per acre whereas estimates by the FAO Team for unexploited forest (the Similajau-Labang area for instance) frequently exceed 800 cubic feet per acre. There can be little financial incentive for salvage operations over selectively logged forest in general as a separate enterprise from re-logging by the licence holder when there are so many favourable investment opportunities in unexploited forest. Nevertheless, waste of commercial timber during clearance of remnant forest on land suitable for agriculture should be reduced by co-ordinated timber salvage and clearance operations. If some commercial use for the trees presently considered non-commercial can be found, such as chip board manufacture, timber for local houses, or for making boxes and crates in which goods for export are packed, these remnant forests could be of far greater value and their exploitation help towards the capital costs of developing the land for agriculture.

The selectively logged forests now classified as unsuitable for agriculture should, together with forest similarly classified but still under licence, take their proper place in the forestry potential. This potential not only includes the gain sector (growth of remaining trees, if saved, may well be sufficient for a second felling cycle within 20 years) but also one or all of seven factors:

- increasing merchantability;
- a source of domestic forest produce for local use;
- natural regeneration of desirable species;
- suitability for enrichment planting;
- suitability for plantations;
- a habitat for wild life as suggested in Chapter 14;
- the preservation of water supplies and the protection of farms below from erosion.

Logging of the forests in these areas was done with no thought to regeneration. The capacity to grow again naturally into productive forests is not known. Neither is it known what methods will be needed, nor the economics of naturally or artificially regenerating the forests. Silvicultural research on these problems has been started by the Forest Department, but as yet on a small scale. The economics of tending natural regeneration versus leaving all alone or replanting should be included in this research. In any event preservation of the forests in these areas is important regardless of what tree species may grow because research may well eventually show that basal area, and hence total volume, is more important than species composition.

Also for environment and soil conservation reasons the first need is to preserve what forest is left and prevent the areas from being cleared and illegally occupied for shifting cultivation or haphazard unorganised settlement. Speedy action is required if the forest is to be saved from loss to illegal cultivation by a process of attrition. Without going into detail we are convinced by arguments so far presented that the best method of immediate protection from illegal occupation would be demarcation and gazetting, of all the areas at this stage, as Proposed Forest Reserve. This would automatically freeze the position and would define the limits of the areas while the lengthy process of enquiry into rights and wishes of the public are undertaken. Considerably increased Forest Department budgets and additional forest staff will be required, and there will be criticism about expense with no immediate return but the need for clear and well defined boundaries before there can be sound land administration cannot be overstressed.

The intermingling of some of these areas with blocks of land suitable for agricultural development poses similar problems as for fragmentation of Forest Reserves, but in a lower key. The emphasis here would be on boundaries; their demarcation, upkeep and patrolling.

The smaller patches of logged forest, for example less than 1 000 acres, within blocks of land suitable for agriculture development will probably be found to be uneconomic or impractical as Forest Reserves under the Forest Department. In which case such areas must be taken into account in the detailed planning of the

agricultural development. They could become Government Reserves and be controlled by the administrative team of the particular development area.

15.3.3 Legally Occupied Land

Only the Native Customary Land and Titled Land which is assessed as unsuitable for agriculture is considered here. The vast majority of it, some 372 000 acres out of a total of about 440 000, is Native Customary Land most of which is under shifting agriculture. As a consequence of the overall stated aim to base future development on proper land use these areas should be developed to forestry. The particular conditions which permit shifting cultivation to continue without disastrous results are fast disappearing, as explained in Chapter 13. The problems to be faced to achieve the change are, however, far greater for this land than for the other categories, and any solutions must be considered as long term.

The problems are basically that:-

(a) the land is already occupied either by right of native law or by tile and natural resources protection legislation designed to prevent land destruction is lacking. An important recommendation is that a legislation for the protection and preservation of the natural resources should be drawn up and implemented;

(b) on most of the land the primary forest has been destroyed and the regenerated secondary forest appears to be of very little economic value though it is satisfactory on a 15 year rotation purely as a protective cover to the land;

(c) the methods and the costs of establishing an economic forest crop are not known: research work into these aspects has only recently started.

Research programmes into these problems were drawn up by Dawkins (1970) who, in his report, suggests detailed basic research, and by the Dutch University of Wageningen team who, in their Regional Planning Study of the First Division (1972), give ideas for large scale trials. We can support these approaches and suggest that efforts are made to enhance the research by adapting experiences and techniques of other climatically similar countries. Dawkins emphasised, however, that this activity does not come within the terms of the Forest Policy and cannot be justified unless that Policy is ignored or amended, and the Dutch team gives no weight to the disadvantages of customary right tenure of forest-plantations. In the meantime sociological investigations should be undertaken. Lines of approach seem to be:-

(a) that Government compensate the people for cancellation of legal rights (~~if proved legal~~) and establish plantations by using hired labour, recruited locally or from anywhere in Sarawak;

(b) similar to (a) but that attempts are made to employ the previous native-right-holders as the labourers. Possibly these people could be persuaded to remain living in the area on selected patches of land suitable for small scale subsistence agriculture but forestry employment would be their main source of income;

(c) similar to (b) but that the trees would be established on the Taungya system whereby tree planting follows hill rice planting. This is likely to be the most successful method if sociological investigations are favourable and for this reason should be given the highest priority.

In each of these systems the plantations or forests established would belong to the State. An alternative, not favoured by the Forest Department because of the many technical and administrative difficulties, could be one where the resultant plantation would be either individually owned by each participant or communally owned by the group. In fact the scheme would be similar to an agricultural development scheme except that forest trees would be planted instead

of oil palm or rubber. Whatever the system adopted the approach must be of the integrated institutional type with the administrative personnel living in the area.

15.3.4 Illegally Occupied Land

This subject is introduced here because it is the greatest single danger to the forests of the Country. The tree destruction involved begins in a hiatus between forest and land legislation because felling, burning or injuring trees is not illegal outside Reserves (with the exception of a very few specially protected species and burning which endangers nearby Forest Reserve). A firm tackling of this problem is vital if planned development is to be undertaken. Eviction should be mandatory and if genuine land shortage is proven than priority should be offered to the defaulters to participate in some development scheme.

15.4 NATIONAL PARKS

In the Zonation Plan the Consultants agreed with proposals previously submitted to Government to create five National Parks in the Study Area. There has been no further assessment of the subject during this Phase, but it has been revealed that the peat swamp forest near Logan Bunut lake has been exploited thus largely eliminating a major reason for creating a National Park in that area. The case of Sungai Dalam is equally unfortunate. The Forest Reserve protection has been withdrawn without substitution and the forest has recently been seriously damaged by fire. No Department holds protective responsibility for such areas because of a gap between the Forest Ordinance and the Land Code. Even Lambir, still under the protection of Forest Reservation but with proposed new boundaries, suffers trespass as a result of not having the limits clearly marked and patrolled pending the decision to constitute the National Park.

Studying the history of National Park proposals since 1954 reveals that only one park has been officially gazetted. If more rapid action is not taken there will soon be little left to protect.

Even if the Forestry Reservation and National Park proposals are implemented the need for special provision for wild life protection in the Study Area will still exist. For example, the growing scarcities of the sun bear and the crocodile warrent investigation into the need for their protection.

15.5 THE NUMBER OF JOB OPPORTUNITIES CREATED

In the FAO Units of mixed dipterocarp forests the total number of jobs in the logging of 70 to 80 million cubic feet of timber per year could be in the range of 4 000 to 5 000 by 1990. These estimates are founded on the type of logging operations proposed by the FAO team which assumes an increase in productivity per worker compared to the present situation. Only a minor effort in reforestation is included in the above figures. Thus, if it is found remumerative to increase this type of activity considerably the above figures would be higher. The same would be the case if large scale forest plantations are introduced in the area.

The expansion of forestry as seen in this Report would necessitate a large increase in staff for all sections of the Forest Department, administrative, research and field sections. These increases, which will be further studied in Phase II, have been accounted for in this Report by including them in the Public Service group. Employment creation connected with the final clearing of logged forest for agriculture has been included under the construction group.

15.6 DEVELOPMENT OF FOREST BASED INDUSTRIES

The present wood manufacturing industry in the Study Area is mainly sawmilling, usually located close to the source of log supply. The production is largely sawn planks; more specialised processing such as the production of mouldings is not carried out in the Area. In fact the main forestry activity is still the extraction of logs for export. Future policy is that local manufacturing should be emphasised and there would be a corresponding reduction in the exporting of logs. Thus an entirely new and massive forest industry will be developed in the Area.

The industry to be established initially must be made up of relatively large-scale, centrally administered units with capacity to handle most of the future manufactured wood output. When market and trade organisations have been established these large units will be able to stimulate small scale industries specializing in remanufacturing. These complexes would embrace both logging and manufacturing operations and the permanent forests would be worked on a carefully controlled cyclic yield programme aimed at securing adequate or augmented future production. The capacity of each complex

would amount to an annual log intake of about 8 - 10 mn cubic feet and would consist of sawmills, remanufacturing divisions, and plywood-manufacturing units.

Detailed studies for the specifications of capacity and product mix of the integrated industrial units will be carried out by the FAO Forest Industries Development Team. The new industries should be able to supply manufactured wood products of export quality and cover the entire home demand for all sophisticated wood products including prefabricated modular elements for housing.

The phasing of the industrial development is still not decided, but the extensive training programmes needed for executives and labour and the huge investments required necessitate that some years will pass before the industrial capacity can match the log production in the Area. Time is short (FAO 1972): not only is it predicted that most industrial countries will have changed from primary to processed product imports by the mid 1980's, but also that Kalimantan will dominate the log export markets within the next decade. There must therefore be no question of allowing logging profits to be absorbed without a very large proportion of direct investment in local processing.

CHAPTER 16

FISHERIES

16.1 INTRODUCTION

Considerable and immediately exploitable potential is seen to exist for pond culture of freshwater fish and turtles. Local and export markets exist for the products from these enterprises and the environment is particularly suited to their culture. Both human and animal food can be produced, thus the enterprise can fit in well with the diversification of production on small holdings.

Although the large rivers and numerous ox-bow lakes hold possibilities for large supplies of fish and freshwater prawns the present customs of the people for fishing these waters together with pollution from various sources eliminates any hope for realisation of this potential in the near future. Ultimately, however, these potentials will be developed and in the meantime the resources are expected to continue supplies of fish to the riverside population.

The sea resources appear promising but comprehensive long term exploratory fishing is required to provide a true picture of the potential.

16.2 THE POTENTIAL FOR FISHERIES DEVELOPMENT

16.2.1 Freshwater Fish Culture

Within the Region the abundance of suitable sites gives freshwater fish culture a high development potential. A big expansion in this activity is envisaged especially among the small holder farmers on development schemes and in improvement areas also among the market gardeners close to the large urban centres. Many fish species are already cultured using differing techniques. The advantage of all aqua-culture techniques is the greater control over the management and production of the stocks compared with fisheries exploiting wild populations. The techniques have consistently given high rates of economic return for relatively little capital outlay and are highly suitable for peasant farmers to adopt.

Although there is a good local market for some common pond species, and some export potential exists probably the most important

role of pond fish culture is in supplying rural householders with top quality fresh fish. In this role the ponds are supplementary to other undertakings by converting crop by-products such as spoilt grains, sweet potatoes and tapioca leaves into valuable protein. Also the ponds can be used complementarily to raise large quantities of small fish which can be used as a protein feed supplement for pigs, poultry and turtle raising.

To take advantage of this potential should be relatively easy because the Inland Fishery Division, which is administered by the Department of Agriculture, is advanced in methods of fish culture research as well as the promotion of fish culture techniques through a small but well developed extension service. Research is concentrated in the Kuching area but each Division has at least two fishery stations for the multiplication of fish fry for stocking natural inland waters and for distribution to farmers. The stations also act as centres for demonstration and advisory services. Two existing stations, at Kabuloh and Nyabau, are in the Study Area. The Department of Agriculture also administers a subsidy scheme to assist farmers to construct and stock fish ponds.

16.2.2 Lakes And Rivers

The Study Area is well supplied with large rivers and a number of small lakes, the latter are mainly ox-bow lakes in the Baram river system. These waters contain many species of native fish which are excellent for food and some species are considered a delicacy by the local people. However, the physical changes in the river environment due to erosion as well as the destructive use for fishing of poisons have resulted in these waters having, at present, a very limited potential for fishery development. The Fishery Department does practise stocking of the rivers and lakes throughout Sarawak, often with air-breathing fish species which are more resistant to fish poisons. The giant prawn can also be stocked to boost the local populations. But this re-stocking of natural waters has no lasting effect, proper management and conservation practices must first be introduced. At the present stage of development in Sarawak the administration of the necessary practices is considered to be too difficult to undertake. An educational and administrative campaign is needed to stop the poisoning of these waters before their large potential can be realised. Success of such a campaign can be expected within the

next twenty years and in the overall Plan it is assumed that increasing supplies of fish from these waters will at least provide the needs for protein of the people living along the rivers.

16.2.3 The Brackish Waters

Because these waters are of limited extent in the Study Area no large scale development is foreseen but a positive policy towards the prevention of destruction and pollution of these areas should be undertaken. They play a vital role in the aquatic environment by providing suitable spawning and nursery grounds for many species of marine and freshwater fish and crustacea. The waters are threatened in several ways:-

- by indirect pollution of the environment. Most important here is the increasing deposition on the mud flats of silt by the rivers. Other sources of pollution are saw dust and rice husks, often deliberately deposited directly into the rivers from the mills, and in the future effluent from oil palm processing mills;
- by direct destruction of the environment by exploitation of the mangrove trees for paper manufacture;
- by destructive fishing methods such as using very fine mesh nets to catch small prawns to manufacture fermented prawn paste. Some of these prawns are of a dwarf species but at certain times of the year are no doubt juvenile banana prawns.

16.2.4 The Sea

There is need to arrange for an organised investigation of the sea and coastal fishery potential, but the work in the sea off the coast of the Study Area should be considered as only part of a very necessary overall investigation of the whole of Sarawak's sea and coastal areas. Nevertheless, the systematic recording of catch-size and species together with studies into the possible conversion of trash fish into protein feed could be started in the Study Area.

Because the urban populations of Miri and Bintulu are expected to increase considerably in the future, thus increasing the market for fresh fish, some rise in prosperity can be foreseen for the fishermen

operating from these two towns. Improved cold storage and icing facilities together with better road connections to Brunei and inland settlements in the Study Area could enlarge the potential market significantly.

16.3 THE NUMBER OF JOB OPPORTUNITIES CREATED

The greatest expansion of fisheries is at the moment, seen in the pond culture of various species, an occupation which is often supplementary or complementary to other agricultural undertakings. Thus, although this activity will provide employment it will be more in the form of providing full employment to already employed people rather than **create** many new jobs. Consequently, in this report, future fisheries employment among the general population is assumed to have been included within the agricultural sector.

Similarly, the staff required for the Fishery Extension Service, which will need to increase considerably, have been considered in the calculations concerning the requirements for Agricultural Extension Staff (Section 13.7).

CHAPTER 17

DEVELOPMENT OF MINING

17.1 INTRODUCTION

Except for oil and natural gas exploitation the existing information indicates that other mineral resources in the Study Area do not constitute a basis for major mining industries. However, some development potentials of other minerals do exist and a brief account of these is given.

17.2 OIL AND GAS

In this Report only minor references have been made to the petro-chemical industry. This is because information concerning the industry is closely guarded and data on the expectations for future production are not available, but it is known that the off-shore continental shelf contains extensive oil and gas fields. For example; the present known gas fields contain sufficient resources to warrant the construction of a Liquified Natural Gas (LNG) plant that will have a capacity larger than any other planned plant in the world up to 1980. Also the present oil fields are now reaching a daily production of approximately 100 000 barrels which is considered the minimum production for the next decade. Whether in the future the already discovered or yet unexplored fields will increase these resources is not known.

At present the industry is controlled by a single foreign company and the extensive requirements for capital and technical know-how makes it difficult for the State to enter actively into the industry. In the next 20 years however, new possibilities for local intervention in the exploitation of domestic resources could occur.

17.3 OTHER MINERALS

The only other known mineral resources in the Study Area are lime-stone, silica sand, antimony and coal. Of these silica sand seems to present the best basis for a mining and a processing industry. The deposits north of Bintulu have been mined sporadically and it has been proved that the silica content of the sand and its purity are sufficient to produce high quality glass.

Up to the present the efforts to develop an industry have been on a limited scale and this together with difficulties of entering the market under sufficiently good conditions have not been successful. In the future at Bintulu with the expected increase in population, better export facilities, cheap power backed by a positive industrialization policy could make the establishment of a glass factory feasible.

The presence of limestone in several parts of the Study Area could provide the basis for cement factories but the market conditions are not considered suitable for more cement factories in Sarawak in addition to the one already planned near Kuching. Quarrying of the limestone is expected to become important; gravel will be required in large quantities for road surfacing and for construction work. The possibility of producing agricultural lime also exists.

Antimony is a mineral mainly used in the manufacturing of alloys, and the presence of this mineral in the upper Tinjar area represents a future source of income. But at present and in the near future the long and expensive transport lines restricts the importance of the resource as a major potential for a mining industry, although small scale mining might be carried out.

There are considerable coal deposits in the Kemena river catchment but exploitation under the present price structure in the market for power and fuel is not considered economic.

CHAPTER 18

URBAN TRADES

18.1 INTRODUCTION

The economic activities concentrated in and around the urban centres include manufacturing, trade and commerce, as well as private and public services.

An outline of the expected and possible development in the manufacturing industries and service trades has been given in Chapter 6. Phase II will include investigations of and more detailed plans for individual development projects. This will include pre-feasibility studies of particular industrial projects which will be selected by consulting relevant agencies in East and West Malaysia. The development of the service sector has been dealt with in Chapters 4 and 6, and the organisational restructuring of the public sector, mentioned in Chapter 3 will be assumed in accordance with guidelines communicated from the State authorities.

A short survey of the main characteristics of the trade sector is given here. The future development in other industries must be analysed before the trade sector's status can be revised. The estimates of development of the trade and commerce sector, given in Part IV, are therefore based on rather mechanical forecasts.

An outline of factors determining future development trends of this sector is given below; the close connection to both sociological and economic aspects of the whole Study is indicated.

18.2 TRADE AND COMMERCE

The present pattern of trade is heavily oriented towards external markets, and centres largely on the collection and export of a limited number of primary products, chiefly timber, petroleum, rubber and pepper as well as import and local distribution of foodstuffs, consumer goods and capital goods. Production for domestic markets is weakly developed and the Fourth Division, in common with the rest of Sarawak, trades more with the outside world than it does with neighbouring Divisions in the State.

Commerce is therefore heavily dependent on export/import

trade and is consequently particularly sensitive to fluctuations in the price of export commodities on world markets. In addition, most external trade, excluding timber and the re-export of petroleum, is channeled through commercial centres located outside the Study Area, mainly Sibu, Kuching, Singapore and West Malaysia. There is little direct consignment of goods to consumer countries or direct import from producer countries. This results in higher costs in transhipment and added trade connections. The trading position of Miri, in particular, is poorly developed. In contrast with other Sarawak urban centres, Miri lacks an established position as a focal supply point in a major river-based trade network and, despite expanded road links, continues to serve only a restricted hinterland relative to its size.

Four major factors are likely to alter this pattern in the future:-

a) an expansion of internal trade resulting from the growth of local manufacturing industries and increased agricultural production for domestic consumption in urban and estate areas;

b) increased Government involvement in agricultural marketing, credit and supply;

c) improved port facilities, possibly including a deep sea port in the Study Area, making it possible to lessen the present dependence on external ports and commercial centres;

d) road expansion linking Miri with other major urban centres and with an enlarged road-supplied regional market.

18.2.1 Trade Networks

Existing trade relations are structured hierarchically by ties that extend from major importation firms through retail and smaller wholesale dealers to a network of rural bazaars, isolated shops and itinerant hawkers. Credit and consumer goods are channeled downwards through these relations while primary products are channeled upward for eventual export. Horizontal relations, between firms engaged in trade at the same level, are characterised by competition between generally small, family-owned businesses that serve a limited clientele and provide more or less identical services. Restructuring this network

is likely to prove difficult because individual relations are not exclusively economic in nature. What is foreseen instead is a rationalisation of the network through a reduction of multiple links in the trade chain and the emergence of larger, more differentiated unit firms.

Current employment in trade is somewhat less than 2 000 persons, or under five per cent of the total number of employed in the Study Area. Over a third of this number consists of working proprietors which is indicative of the small size of existing firms. It is assumed that in the future the total number of persons engaged in trade will increase more slowly than the volume of trading activity, individual firms will handle a greater turnover and the proportion of employees to proprietors will increase as the firms grow larger.

18.2.2 Retail Trade

At present the operation of most retail firms combines retailing with credit supply and marketing functions and links these to other services including storage, grading, transport, knowledge of commercial contracts and market conditions. As a result, the shop-keeper plays an indispensable role; the activities of buying, selling and providing credit are joined into a single process. The system seems to work reasonably well and is well adjusted to present economic conditions.

As these conditions change in the future the system of trade will also change. Higher consumption levels, improved transport and an increased role of development institutions in marketing and supply are likely to result in larger and more specialised enterprises providing a greater variety of goods in specialised lines. These enterprises which will probably dominate retail trade will require re-organisation away from single-family businesses. The total number of persons engaged in retailing may be stagnant for a period and is likely to increase more slowly over the planning period than the volume of trade, with individual firms handling a greater turnover than at present.

Most existing retail enterprises are family concerns. The great majority are Chinese owned, although in recent years a growing number of Malay, Iban and other native people have opened shops, some as privately owned ventures, others run as cooperatives. Most operate

with little capital and are typically village shops characterised by small turnover that function as additional links in the trade chain rather than as competitors to the larger bazaar enterprises.

Within the Chinese trading community there continues to be a significant concentration of dialect groups in particular lines of business, and dialect associations are often important in promoting the interests of particular trades and as a source of business contacts and information.

18.2.3 Wholesale Trade

Wholesale trade is dominated by major importation firms that deal largely in branded consumer goods for which they act, often through a network of branch offices located in the larger urban centres, as exclusive local distributors. These firms are often European-owned or based outside Sarawak and conduct business either through local agents or secondary wholesalers. The latter supply retail traders or smaller wholesale firms located in the more remote bazaars.

A number of secondary wholesalers operate launches or lorries and thus absorb a transport function in their operations. Where they monopolise transport, this combination can severely limit competition. In addition, a limited amount of wholesale trade, at the secondary and tertiary level, is carried out by independent boat-owners who conduct business through major Kuching or Sibu importation firms. A large part of the current export commodity trade in the Study Area is handled by boat-owners who buy directly from bazaar traders or act as transport agents.

A combination of improved transport facilities and greater capital investment in trade is likely to reduce the existing replication of wholesale links and join the larger firms more directly to their retail outlets. The resulting improvement in efficiency and the development of more adequate trade outlets are likely to result in the emergence of a greater number of primary wholesalers or in externally-based firms transfering a larger part of their operations to the local area.

18.3 CREDIT

Each level of the existing trade network is characterised by special credit relationships; credit and trade are inextricably bound at all levels. At the lowest level, most families have a more or less permanent relationship with a shopkeeper who offers short-term credit primarily as a service to ensure this continued patronage. For rural families, the shopkeeper is often a source of productive capital supplying financial backing for opening new holdings or developing new crops. Usually the credit is in the form of goods or farm requisites and repayment is made later by the sale of agricultural products. Because of competition between shops and the danger of non-payment the credit, as a rule, is supplied on favourable terms and there is rarely a direct charge for the service, although indirect charges may be made in the form of price adjustments or lower grading of local products. Repayment schedules are generally flexible and most shopkeepers are interested in keeping a sum outstanding in order to maintain trading relations with their customers.

Existing credit ties tend to limit mobility in market relations. This applies not only to customers but equally to shopkeepers who must provide credit in order to do business and are themselves tied by similar relations to their wholesale suppliers. These credit relations also impose constraints on the growth of business enterprises, particularly in retail trade; credit is supplied on the basis of trust and personal knowledge and this restricts the number of credit customers a shopkeeper can, or will, carry. Consequently, there is a need for further development of financial institutions, particularly as suppliers of agricultural credit. Besides the shopkeeper, existing cooperative societies and the Cooperative Central Bank Limited engage in rural lending activity but only on a limited scale. More important as a source of productive capital are Government subsidy schemes, but these do not provide credit, as such, and narrowly restrict the use to which capital can be put.

The present Report recommends that rural credit be provided through an Integrated Development Organisation which would also provide all supporting services centralised in local development centres. In this way, repayment could be linked to market arrangements and close direction and follow-up assistance could be provided by local

personnel.

The present, more developed, credit service system is concentrated in the town areas where it mainly covers the requirements for short-term credit. The banks operate as savings institutions and only a part of the funds acquired from the Region is canalised back into the local economy. The nature of a modern banking service function is aimed at a more developed money economy thus the extent of the operation is both functionally and geographically centred around the developed industries in the major towns. This is shown by the fact that the agricultural sector only accounts for one per cent of total loans and advances from private financial institutions.

Mortgage institutions have as yet only limited importance as sources of credit. The basis for these institutions is the traditional real estate security, but their loans are usually on short-term conditions running only for 10 to 15 years.

Beside the banks and mortgage institutions a few companies operate as financing institutions. They usually offer a fraction higher interest on long-term deposits but in general their working field is largely covered by medium-term, ordinary banking business. Their main activity seems to be concentrated on loans for, and with security in, transport vehicles and machinery. These financial institutions are often corporatively connected to established banking firms.

Production group	Enterprise	Production organisation	Agronomic constraints	Production economics: Estimated average yield	Gross value of production at farm gate	Gross margin including labour at $4.50 per man day	Capital cost	Labour requirement
				Per acre	Dollars per acre			Man days per acre
	Oil palm	Estate including processing	1. Slopes less than 25 degrees 2. Fertility requirement on inland soil types 3. Inter-cropping on slopes less than 15 degrees 4. Proven on basis of experiments and existing development	8.5 tons f.f.b.	613	281	1 810	20
		Small holder excluding processing		8.0 tons f.f.b.	379	224	1 285	20
	Rubber	Estate including processing	1. Slopes less than 25 degrees 2. Availability of high yielding clones, planting material 3. Dispersion and neglect of existing plantings	1 500 pounds	487	262	1 850	30
		Small holder excluding processing		1 500 pounds	487	227	980	45

Enterprise	Market constraints	Market potential for Study Area products: Projected market limit over 20 years — Product	Internal	Export	Area required to meet market projection acres	Projected price dollars	Remarks
Oil palm	1. Demand for vegetable oils growing at 3.1 per cent per annum to 1990 2. Malaysia share of world market expanded to 50 per cent by 1990 3. Sarawak account for 10 per cent of Malaysia's production	Palm oil	Negligible	186 000 tons palm oil	155 000	Palm oil $330 per ton	Study Area share assumes 66 000 acres of potential already developed or located outside area, including Lambir-Subis Development.
		Palm kernels or kernel oil	Limited			Palm kernels $370 per ton	
Rubber	1. Demand for elastomers growing at 6 per cent per annum, diminishing share of increase captured by rubber 2. Demand for rubber growing at 3 per cent per annum, Sarawak share 2.9 per cent of world market	Smoked sheet or crumb rubber	-	32 000 tons	95 000	RSS1 or equivalent $1 050 per ton	Sarawak contribution to world market demand estimated at 151 000 tons. Split on basis of current high yielding rubber area, 20 per cent to Study Area = 75 000 to 95 000 acres at average yields of 800 to 1 000 pounds d.r.c. per acre.

EVALUATION OF AGRICULTURAL ACTIVITIES

Production group	Enterprise	Production organisation	Agronomic constraints	Production economics				
				Estimated average yield	Gross value of production at farm gate	Gross margin including labour at $4.50 per man day	Capital cost	Labour requirement
				Per acre	Dollars per acre			Man days per acre
II	Rice, wet padi	Small holder	1. Availability of suitable land 2. Development of cropping programmes to satisfy land usage constraints.	1.33 tons padi	295	-31	550	58
	Essential oils (lemon grass, patchouli)	Small holder	1. Availability of suitable land 2. Cropping patterns and husbandry techniques for maximum productivity, and persistence	1.3 tons raw material	800	196	605	47
	Pepper	Small holder	1. Introduction of improved varieties 2. Disease problems	25 piculs made pepper	3 730	2 417	3 535	124
	Vegetables	Small holder	1. Land suitability, slope less than 6 degrees 2. Varieties adapted to local environment 3. Crop rotations	10 tons fresh	1 700	495	1 500	115
	Poultry (layers, broilers)	Small holder (1 000 bird unit)	1. Feed costs and consumption rates relatively high 2. Diseases	-	14 000 per unit	1 950 per unit	7 300 per unit	125 per unit
	Pigs (porkers)	Small holder (10 sows unit)	1. Feed costs and consumption rates relatively high 2. Availability of breeding stock.	-	34 000 per unit	3 080 per unit	17 400 per unit	125

Production group	Enterprise	Market constraints	Market potential for Study Area products					Remarks
			Projected market limit over 20 years			Area required to meet market projection acres	Projected price dollars	
			Product	Internal	Export			
II	Rice, wet padi	1. Per capita consumption estimated at about 320 lb milled rice per annum 2. Production projected to keep pace with internal demand subject to availability of suitable land	Padi rice	According to population projections	-	1 acre per 6 persons in population	Padi $320 per ton	Present hill padi areas unlikely to decrease appreciably, wet padi area intensified, two crops in three years resulting in doubling of cropped area on existing areas.
	Essential oils (lemon grass, patchouli)	1. Market for oils related to demand for luxury goods, projected steady growth 2. Relatively small Sarawak production easily sold to buyers in Europe or Singapore	Crude oils	Limited	No data available	2 500	Various prices for products	Enquiries from Singapore buyers indicate future possibilities for quality products at competitive prices. Quality standards necessary for successful crude oil marketing.
	Pepper	1. Demand for pepper increasing at 2 per cent per annum 2. Sarawak share of market projected to remain at present 29 per cent or slowly increase 3. Quality and type of pepper produced improved	Black and white pepper	-	8 000 tons	3 500	White $2 100 Black $1 680 per ton	Possible competition from Indian hybrid production. Scope for producing more pungent type of black pepper. Essential to ensure quality of produce matches market requirements. Attention to marketing and grading organisations required.
	Vegetables	1. Demand for fresh vegetables increasing with population 2. Pattern of settlement determines degree of commercial production	Fresh vegetables	50 000 tons	Negligible	5 000 acres	Various	Production for urban population located in market gardens on periphery of town areas.
	Poultry (layers, broilers)	1. Consumption per capita increasing to 120 eggs and 9 lb meat per annum by 1990 2. Commercial production to supply urban areas.	Eggs Meat	42 mn eggs 1 280 tons	-	584 000 birds in commercial units, 656 000 birds in rural areas.	$12.00 per 100 $1.80 per kati	As for above. Feed costs are major elements of production costs and determinant of local prices.
	Pigs	1. Consumption increasing to 32 lb per capita by 1990 2. Commercial production to supply urban population 3. Production costs limit export prospects	Pork meat	4 300 tons	-	300 commercial 10 sow units	$3.50 per kati for lean meat	Long term prospects for some processing in conjunction with abattoir development. Feed costs are major determinant of local price structure.

Production group	Enterprise	Production organisation	Agronomic constraints	Estimated average yield	Gross value of production at farm gate	Gross margin including labour at $4.50 per man day	Capital cost	Labour requirement
				Per acre	Dollars per acre			Man days per acre
III	Cocoa	Small holder/estate	1. Land suitability and adaptation to Study Area soils below 1 000 feet 2. Rainfall and temperature conditions favourable. 3. Availability of seed of proven hybrids.	1 000 lb dried beans equivalent	550	220	800	35
	Tea	Estate	1. Land suitability and adaptation to soils of Study Area 2. Rainfall distribution and soil moisture relations favourable. 3. Provides good erosion protection	1 000 lb dried tea leaf	1 120	195	3 400	150
	Tapioca	Small holder/estate	1. Production techniques for local soils and slopes not yet established 2. Selection of varieties and availability planting material 3. Processing techniques require investigation	12 tons fresh roots	300	50	450	20
	Annual spices (turmeric, chillies)	Small holder	1. Production techniques and varieties for local conditions 2. Crop rotations not yet established	8 tons dried produce	1 090	585	740	70
	Perennial spices (cloves, nutmeg)	Small holder	1. Adaptation to local environment 2. Production techniques 3. Availability of planting material of proven high yielding strains	345 lb dried produce	700	190	1 365	104
	Beef, breeding weaners	Commercial ranch	1. Land suitability 2. Pasture production techniques not established 3. Availability of suitable breeding animals	NA	227	106	880	2.5 - 5.0
	Beef, fattening	Small holder	1. Land suitability 2. Pasture production 3. Availability of animals from breeders 4. Integration with crops	NA	356	85	550	9

Production group	Enterprise	Market constraints	Projected market limit over 20 years			Area required to meet market projection acres	Projected price dollars	Remarks
			Product	Internal	Export			
III	Cocoa	1. World supply and demand in balance to 1980's 2. Relatively small output from Sarawak unlikely to upset market balance 3. Attention to quality and type of bean essential	Dried beans	Negligible	2 700 tons	6 000 acres	$1 200 per ton	Expansion in other areas of Sarawak may extend to 20 000 acres. Estimated 6 000 acres in Study Area on basis of management requirements and related unit size.
	Tea	1. World market over supplied, declining price trend projected for future 2. Sarawak and West Malaysia import low quality tea, potential import substitution	Black tea	350 tons	100 tons	1 000 acres	$1.50 per lb	Export prospects limited to West Malaysian requirements for bulking or blending purposes at competitive prices. Estate type development essential for management and technical reasons.
	Tapioca	1. Good local and export demand prospects for animal feeds 2. Local market, based on feed mixing requirements, estimated at 5 000 tons increasing to 20 000 tons by 1990 3. Competitive price essential	Dried flakes	20 000 tons	Not assessed	6 000 acres	$200 per ton	Successful production basis must be established by commercial trials prior to expansion. Inter-cropping with oil palm possible.
	Annual spices (turmeric, chillies)	1. Steady increase in demand forecast but unstable production situation on year to year basis 2. Prices likely to fluctuate with changes in supply position 3. Grading and maintenance of quality standards essential	Dried spices	100 tons	2 500 tons	3 100 acres	$1 600 per ton	Sarawak projected to capture 5 per cent world export market. Further market studies are necessary. Development of any scale would require effective control of grading and quality for exported produce c.f. pepper. Oleoresin and flavouring market requires investigation.
	Perennial spices (cloves, nutmeg)	As above but relatively more stable market situation with stiffer competition	Dried spices	Negligible	300 tons	1 800 acres	$5 175 per ton	
	Beef, breeding weaners	1. Demand for fresh meat increasing with population and income growth 2. World market likely to be under supplied to 1980's 3. Freedom from diseases (foot & mouth) pre-requisite for export development	Weaners or fattening animals	6 000 to 20 000 weaners/ fatteners	-	33 000 acres	$180 to $195 for weaners	Major urban markets could be supplied from Fourth Division. Slaughtering and marketing facilities require attention. Commercial trial integrated with expansion phase.
	Beef, fattening	As above	Slaughter animals	6 000 to 12 000 slaughter animals	8 000 slaughter animals	33 000 acres	$3.30 to $3.50 for best cuts of meat	Based on breeding of weaners/ fatteners on commercial ranch, small holder fattening and finishing of animals.

APPENDIX V.2

ASSUMPTIONS AND CONCLUSIONS CONCERNING INITIAL ROAD-BASED DEVELOPMENT IN LEGALLY OCCUPIED LAND

Generally the distance on either side of the road that agricultural development would be actively encouraged is taken as 500 yards. This results from a consideration of the distance that it is reasonable to expect the products of various crops to be carried by humans, and the likely acreages of individual holdings. The gross acreage of land per mile of road is 364.

A reduction factor of 30 per cent has been applied for unsuitable land, for buildings, tracks etc. This factor is higher than that applied to unoccupied land because:

i) in some places the road will pass through areas known to be unsuitable for agriculture;

ii) much of the land will have already been used for hill rice cultivation and the resultant erosion could have rendered some of the land unsuitable for development.

The net acreage of usable agricultural land per mile of road is 255.

Oil palm would only be grown on suitable land within 200 yards of the road. The maximum slope on which oil palm would be planted is taken to be 20 degrees. It is assumed that 90 per cent of the net usable agricultural land would be suitable for oil palm. The acreage of oil palm per mile of road is approximately 90.

Wet padi would be planted on all suitable flat land, estimated at about 5 per cent of net usable agricultural land. The acreage per mile of road approximately 13.

Rubber would be grown on the steeper land (20 degrees to 25 degrees) in the first 200 yards. Assumed to be about 5 per cent. The area of rubber in the first 200 yards is about 5 acres per mile of road.

In the next 300 yards the more gentle slopes would be planted to pepper and other spices, diverse crops and to pasture for beef, each up to the required acreage for the particular cropping pattern. Rubber would then be planted on all the other suitable land.

In areas where oil palm would be grown this would be the crop which would determine the road frontage for each individual holding and this in turn would depend on the percentage of oil palm in the cropping pattern and the size of the holding.

TABLE V.2.1 HOLDING SIZE AND ROAD FRONTAGE

Holding Size	Cropping Pattern I	Cropping Pattern II	Cropping Pattern III
	Road frontage	Road frontage	Road frontage
	Yards		
10 acres	140(1)	160	115
15 acres	220	230(1)	170(1)
20 acres	290	315	225

Note (1) These are the holding sizes which, for each cropping pattern, will give the assumed target income of $2 300 per annum.

TABLE V.2.2 THE NUMBER OF HOLDINGS PER MILE

Holding size	Cropping Pattern I	Cropping Pattern II	Cropping Pattern III
10 acres	24	22	30
15 acres	16	15	20
20 acres	12	11	16

APPENDIX V.3

REQUIREMENTS FOR AGRICULTURAL EXTENSION STAFF

The Sarawak Department of Agriculture's own estimates for its staffing requirements have been used as a basis for estimates of the future availability of extension staff in the Study Area. The Department's 1982 overall staffing compared with the 1972 situation and with the Fourth Division 1972 staffing is shown in Table V.3.1. Also shown is a projection of staff availability in 1990 assuming the rate of increase to 1982 is continued to 1990.

TABLE V.3.1 POSSIBLE FUTURE COMPOSITION OF EXTENSION STAFF IN THE STATE AND FOURTH DIVISION DEPARTMENTS OF AGRICULTURE

Staff Category	Number of staff					
	State			Fourth Division		
	1972(1)	1982(1)	1990(3)	1972(2)	1982(4)	1990(3)
Degree						
S.A.O.	2	15		0		
A.O.	13	33		1		
	15	48	154	1	4	13
Diplomate						
S.A.A.O.	8	33		1		
A.A.O.	44	81		6		
	52	114	250	7	15	33
Local Certificate						
S.A.A.	15	115		0		
A.A.	259	983		20		
J.A.A.	186			51		
	460	1 098	2 620	71	170	406
Total	527	1 260	3 024	79	189	452

Note (1) Source - Department of Agriculture, Kuching.

(2) Source - Department of Agriculture, Miri.

(3) Assuming similar expansion continues.

(4) Assuming a similar proportional increase as for the State.

If the Study Area is taken as 83 per cent of the Fourth Division and staff is divided proportionally then the staff numbers which can be assumed to be available for development in the Study Area are shown in Table V.3.2.

TABLE V.3.2 FORECASTS OF EXTENSION STAFF AVAILABLE UP TO 1990

Staff cadre	1972	1982	1990
Degree staff	1	3	11
Diplomate staff	6	13	27
Certificate staff	59	141	337
Total	66	157	375

The 1972 density of staffing, about 66 staff serving between 10 000 and 13 000 farming families, is roughly one to 170. If this proportion is maintained in the rural parts of the Study Area outside the actual development areas, then about 100 staff would be required by 1990 for these areas and roughly 270 staff would be available to work in the development and improvement areas. These would be divided between estates and private holders on both State Land and legally occupied land.

The estate-type development as undertaken by SLDB at present requires a staffing density for degree and diplomate personnel of one each per 4 000 acres. Therefore estate-type development on about 165 000 net acres (assuming that the 220 000 net acres of State Land is developed on a ratio of 3:1 for estate-type and private holder-type methods) would require roughly 40 men of each of those two cadres. Lower cadre staff required would generally be trained by the SLDB and other estate organisations.

Private holder development would require the full range of staff cadres. The staffing density considered the optimum by the Federal Land Development Authority in West Malaysia on their development schemes is one to about sixty families. Using this figure the requirement for trained staff to serve about 3 650 private holder families (assuming 15 net acres per family over 55 000 net acres) on State Land together with the 3 300 or 2 000 families on legally occupied land (assuming 15 net acres per family over 50 000 and

30 000 net acres) would be respectively 116 or 194. Given below are these staff, divided into cadres in the same proportions as presently forecast for the 1982 State Department of Agriculture, added to the estimated estate development requirements. Also given are the numbers of staff estimated to be available.

TABLE V.3.3. COMPARISON OF AVAILABILITY AND REQUIREMENTS OF QUALIFIED STAFF

Staff cadres	Distribution 1982 per cent	Estimated number of staff		
		Available in 1990	Needed for 270 000 net acres developed 1990	Needed for 250 000 net acres developed 1990
Graduates	3	8	44	43
Diplomates	9	24	50	48
Certificates	88	240	102	83

APPENDIX V.4
GLOSSARY

The meaning given to land categories in the Miri-Bintulu Study reports

Forest Reserves	These are gazetted as such and are under the control of the Forest Department. They are productive forests, intended to be permanent forests and the principal permanent source of the country's supplies of timber and other forest produce. Distinction should be made between Proposed Forest Reserves which are so gazetted and proposed Forest Reserves not yet in that category.
Protected Forests	These are also gazetted forests under the control of the Forest Department but in which certain rights are admitted for the people of Sarawak to take forest produce for their own domestic use. They are also classed as permanent forests and subject to the same distinction in proposal as Forest Reserves; but a protective, rather than a productive function is more important in some localities.
Communal Forests	Permanent forests under the control of the local administration and set aside to provide the domestic needs of a settled community.
Currently Licenced Exploitable Forests	Forests, other than those included under Reserves, Protected and Communal Forests for which current exploitation licences have been issued.
Currently Licenced Remnant Forests	Forests, other than those included under Reserves, Protected and Communal Forests in which licenced exploitation has been completed.

Mixed Zone Land	Land within an area defined by Government in which people of all races in Sarawak can obtain land under title (unless the land is also included in Native Customary Land).
Native Area Land	Land within an area defined by Government in which only natives of Sarawak can hold land under title or native customary rights established legally.
Native Customary Land	Land on which, before the promulgation of the Land Code in 1954, rights of usage had been established under native law and custom. In fact there is no accurate record of the boundaries of such land. For planning purposes this category is taken to be represented by the areas shown as "area of Shifting Cultivation" in the Government of Sarawak map Series T 735 scale 1:50 000 and based on aerial photography of 1963-64.
Titled Land	Land held under registered title in either of the categories Mixed Zone or Native Area Land.
Interior Area Land	Land not falling within any of the definitions of Reserved Land, Native Customary Land, Native Area Land or Mixed Zone Land and which cannot be held under title.
State Land	Land over which a Ministry or Government Department exercises complete control. In effect it has been taken to mean all lands other than Native Customary Land and Titled Land. Because this definition differs from the legal definition of 'Crown Land', also for reasons presented in the 1962 Report of the Land Committee, the term should be used only in connection with the Miri-Bintulu Study Reports.

Unencumbered State Land	State Land which has not yet been committed to a permanent use. In effect this category consists of Interior Area Land and Currently Licenced or other forests outside Reserves. It excludes land under title and Native Customary Land.
Dipterocarp Hill or Hill Forests	Those forest areas technically classified as "Mixed Dipterocarp Forests" which are on mountainous, hilly, undulating or flat land which is not peat swamp, estuarine or alluvial swamp.
National Park	Land reserved and placed under the control of a Board of Trustees appointed by the Governor.
Swamp Forest or Peat Swamp Forest	Those forests which are growing on peat, estuarine or alluvial swamps and whose chief types are "Mixed Swamp Forest", "Alan Forest" and "Alan Bunga Forest".
Reserved Land	Land which includes Forest Reserves, National Parks, Native Reserves, Communal Reserves, Communal Forests, the margin of land along rivers and sea coasts and land used for Government purposes or precluded from grant of title and intended for future use by Government or the public.
Encumbered Land	Native Customary Land and Titled Land (subject to boundary generalisation in small scale maps).

APPENDIX V.5

REFERENCES

Cooper, M.	1972	Alternative Strategies for Rural Development	M-B Study, Association Paper
Commonwealth Secretariat	1972	United Kingdom Trade in Spices	Tropical Products Quarterly, No. 1, Vol. XIII, London
Dawkins	1970	Report on Silvicultural Research In Sarawak	Commonwealth Forestry Institute, Oxford
F.A.O.	1967	Agricultural Commodities - Projections for 1975 and 1985	Volume I, Rome
F.A.O.	1969	Provisional Indicative World Plan for Agricultural Development	Volumes I & II, Rome
F.A.O.	1970	FAO Commodity Review and Outlook 1969 - 1970	Rome
F.A.O	1971	Agricultural Commodity Projections 1970 - 1980	Monthly Bulletin of Agric. Economics and Statistics, 10, 20, Oct. 1971; Rome
F.A.O.	1971	The Marketing of Pepper	Monthly Bulletin of Agric. Econ and Statistics, 12, 20, December, 1971; Rome
F.A.O.	1971	First Session of Study Group	Monthly Bulletin of Agric. Econ and Statistics, 9, 20 September, 1971; Rome

F.A.O.	1972	Developments in the World Cocoa Economy	Cocoa and Coconuts in Malaysia, Inc. Soc. of Planters, K. Lumpur
F.I.D.A.	1971	A Study of Agro—based and Food Industries Potential of Sarawak	Industrial Survey of Sarawak Vol. II, K. Lumpur
I'ons, R.	1972	Preliminary Report on The Prospects for Beef Production in Sarawak	M-B Study, Internal Report
I'ons, R.	1972	Poultry Production Prospects and Feed Requirements in Sarawak	M-B Study, Internal Report
I'ons, R.	1972	Pork Consumption and Production	M-B Study, Internal Report
I'ons, R.	1973	Prospects for Processing Agricultural Products	M-B Study, Internal Report
Min. of Agric. and Forestry	1971	Annual Report of the Research Branch of the Department of Agriculture for the Year 1970	Kuching
Min of Agric. and Forestry	1970	Annual Report of the Research Branch of the Department of Agriculture for the Year 1969	Kuching
Ngui, C.K.K.	1972	Market Prospects for Essential Oil Crops	M-B Study, Internal Report
Phillips, P.	1970	Marketing of Cocoa	1970 Sabah Planters Cocoa Seminar Tawau
Sole, F.A.	1972	Demand for Rice in Sarawak	M-B Study, Internal Report

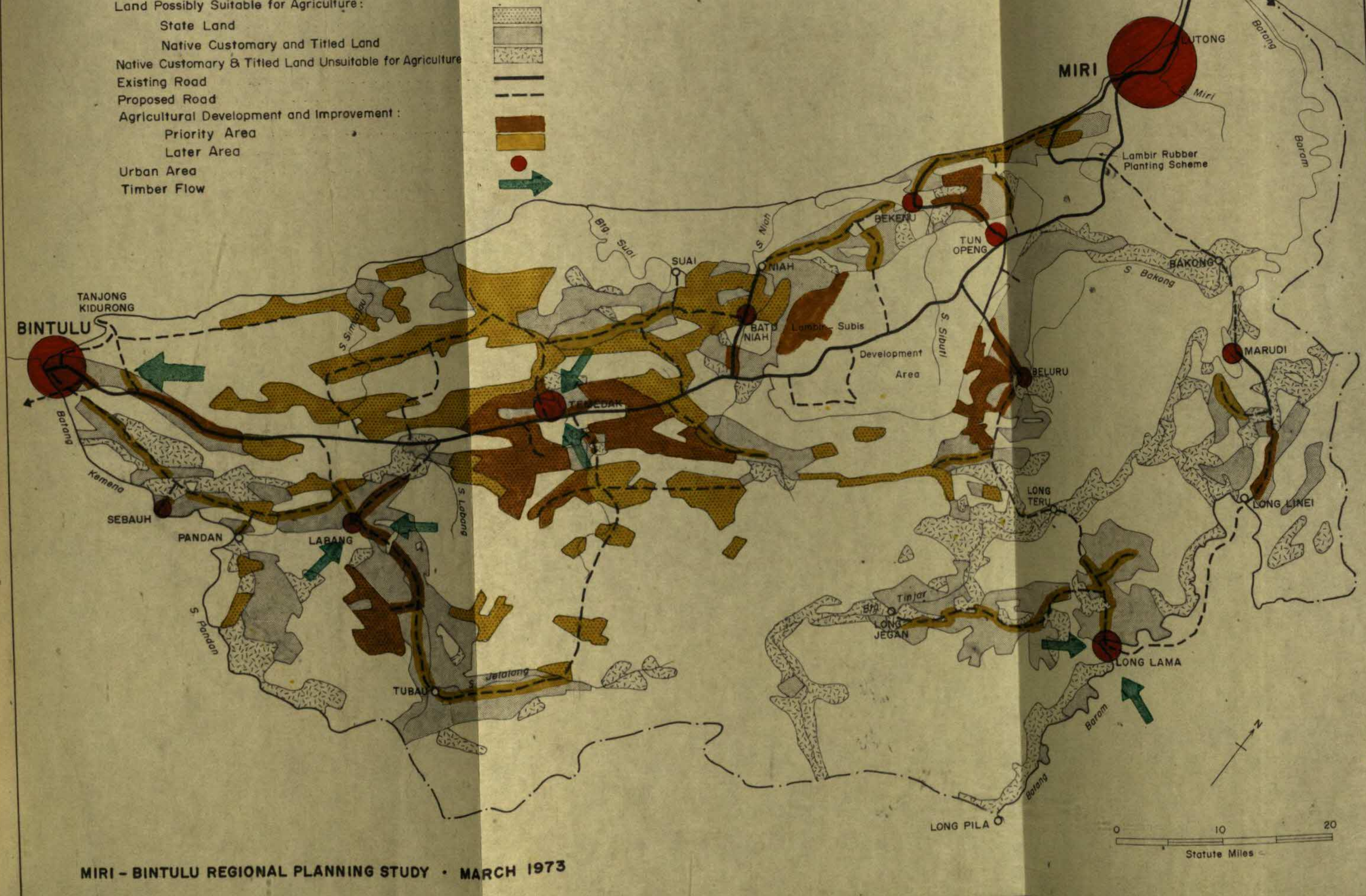
Sole, F.A.	1972	The Market for Oil Palm Products	M-B Study, Internal Report
Sole, F.A.	1972	Market Review for Rubber	M-B Study, Internal Report
Sole, F.A.	1972	The Market for Cocoa	M-B Study, Internal Report
Sole, F.A.	1972	Pepper	M-B Study, Internal Report
U.S. Agency for International Development	1968	Survey of India's Export Potential of Spices	Marketing Research Corporation of India, New Dehli
U.S. Dept. of Agriculture	1971	World Supply and Demand for Oilseeds and Oilseed Products in 1980	Foreign Agric. Econ Rep. No. 71, Washington D.C.
U.S. Dept. of Agriculture	1972	Record U.S. Spice Imports in 1971	Foreign Agri. Circular, March, 1972, Washington D.C.
University of Wageninen	1971	Regional Planning Study of the First Division, Sarawak Volume III, Natural Resources	

THE PERSPECTIVE PLAN

Land Possibly Suitable for Agriculture :
- State Land
- Native Customary and Titled Land

Native Customary & Titled Land Unsuitable for Agriculture
Existing Road
Proposed Road
Agricultural Development and Improvement :
- Priority Area
- Later Area

Urban Area
Timber Flow



MIRI - BINTULU REGIONAL PLANNING STUDY · MARCH 1973