10-3 A Summary of Project Cost

Costs of various alternative road construction plans have been translated into economic values and listed in Table 10-9. The values presented in the table reflect designing cost, construction cost, maintenance and administration costs for the trunk routes and also the feeder roads. For phased road construction, a useful life of 20 years has been assumed for both initial as well as additional capital investments and residual value has been accounted for in the last year of the calculation period. Detailed cashflow of the project cost for each alternative is shown in Appendix Table A-10-3.

Table 10-9 Summary of Project Cost
Alternative Development Plans A-1 to C-3

	Alternative Case											
Year	A-1	A-2	A-3	B-1	B-2	B-3	B-4	B-5	B-6	C-1	C-2	C-3
1980	1,564	1,651	1,766	548	591	648	862	894	936	591	548	648
1981	2,372	2,503	2,677	836	901	987	1,310	1,357	1,421	901	836	987
1982	61	61	61	22	22	22	37	37	37	22	22	22
1983	39,753	41,969	44,902	13,922	15,016	16,465	21,922	22,718	23,801	15,016	13,922	16,465
1984	79,504	83,938	89,802	27,843	30,034	32,932	43,844	45,436	47,600	30,034	27,843	32,932
1985	39,753	41,969	44,902	14,938	16,076	17,583	22,624	23,475	24,631	15,643	14,528	17,121
1986	747	722	547	1,903	1,957	1,958	1,414	1,489	1,535	1,302	1,282	1,259
1987	747	722	547	388	376	289	376	367	303	380	392	293
1988	747	722	547	26,189	27,299	28,695	18,183	19,594	21,380	16,290	15,767	16,952
1989	747	722	547	52,019	54,250	57,131	36,012	38,845	42,481	32,243	31,173	33,644
1990	747	722	547	26,189	27,299	28,695	18,183	19,594	21,380	16,728	16,177	17,414
1991	1,213	1,188	1,013	1,213	1,188	1,013	1,213	1,188	1,013	1,678	1,662	1,591
1992	764	739	564	764	739	564	764	739	564	580	598	450
1993	764	739	564	764	739	564	764	739	564	11,583	11,020	12,192
1994	764	739	564	764	739	564	764	739	564	22,585	21,441	23,936
1995	764	739	564	764	739	564	764	739	564	11,583	11,020	12,192
1996	764	739	564	764	739	564	764	739	564	739	764	564
1997	1,958	1,935	564	1,958	1,935	564	764	739	564	1,935	1,958	564
1998	2,818	2,798	597	2,818	2,798	597	764	739	564	2,798	2,818	597
1999	4,863	4,950	652	4,863	4,850	652	2,464	2,442	518	4,850	4,863	652
2000	863	850	762	863	850	762	787	765	610	850	863	762
2001	863	850	762	863	850	762	787	765	610	850	863	762
2002	8,323	8,323	762	863	850	762	5,582	5,568	480	850	863	762
2003	964	964	964	863	850	762	2,890	2,879	686	850	863	762
2004	-7,504	-7,504	964	-28,001	-29,136	-27,674	-23,908	-25,335	-20,369	-40,248	-38,526	-39,553
Total	184,923	193,650	196,705	154,920	162,551	166,425	159,930	167,251	173,001	150,634	143,560	153,970

10.4 Project Evaluation

10-4-1 Economic Analysis Findings

The costs and benefits of each alternative road construction plan as presented in Tables 10-8 and 10-9 have been discounted by the rate of 8% and expressed in current value as of 1985 for comparison in Table 10-11. A discount rate of 10% was used for Table 10-11. These comparisons support the following observations.

1) While one-step construction plans show an internal rate of return of under 8%, such rate of two-stage construction plans is about 9% to 9.5% and that of three-stage construction plans, about 10%. Therefore, staged construction is more economical than one-step construction, and three-stage construction more than two-stage. However, the advantage of three-stage construction over two-stage is smaller than the advantage of two-stage construction over one-stage.

2) Among the two-stage construction plans, economic difference is almost non-existent between alternatives B-1, B-2, and B-3, and alternatives B-4, B-5, and B-6.

3) It has been indicated that the economy of surface-treated roads and paved roads is higher than the economy of gravel roads, regardless of the alternative, but the difference is very small for the following two reasons: (1) Cost difference is small between various types of pavement, because the gravel roads discussed here are not of the existing type, but are what will remain after the removal of asphalt concrete layer from the pavement structure shown in Fig. 7-4 under Paragraph 7.5, Chapter 7, and the same is true with surface-treated roads; (2) the benefit for normal traffic is the only benefit which varies by the type of pavement, but it represents only a small portion of the total benefits and, therefore, difference in the total benefits is small between the alternative pavement types. Traffic benefits other than the normal traffic benefit vary little by pavement type, because difference between river transportation cost and road transportation cost is far greater

than differences in road transportation cost between various pavement types.

Therefore, it is believed that the selection of appropriate pavement type should not be made only by the basis of economic evaluation.

Table 10-10 Results of Economic Analysis for Alternative Construction Plans (Discount Rate: 8%)

Present Value (at 1985: M$000)

Analysis Case	Cost	Benefit					IRR (%)	B/C Ratio	NPV (B-C)
		Normal	Diverted	Development	Induced	Total			
A-1	188,002	10,381	74,849	24,041	69,510	178,781	7.45	0.95	-9,220
A-2	197,690	16,960	77,225	24,805	73,373	192,363	7.69	0.97	-5,327
A-3	205,616	23,556	79,205	25,443	77,233	205,437	7.92	0.99	-1,179
B-1	142,802	10,381	69,537	15,077	60,967	155,962	9.07	1.09	13,160
B-2	150,673	17,185	71,624	15,529	64,380	168,719	9.39	1.12	18,046
B-3	158,209	23,558	73,488	15,935	67,792	180,772	9.62	1.14	22,564
B-4	154,831	10,381	69,626	24,041	64,899	168,947	9.03	1.09	14,116
B-5	162,210	15,001	71,835	24,805	68,512	180,153	9.24	1.11	17,943
B-6	170,202	19,715	73,671	25,443	72,110	190,940	9.34	1.12	20,738
C-1	129,793	10,381	69,537	15,077	54,848	149,843	9.83	1.15	20,050
C-2	136,979	17,185	71,624	15,529	57,920	162,259	10.17	1.18	25,280
C-3	143,745	23,358	73,488	15,935	60,988	173,969	10.41	1.21	30,224

Table 10-11 Results of Economic Analysis for Alternative Construction Plans (Discount Rate: 10%)

Present Value (at 1985: M$000)

Analysis Case	Cost	Benefit					IRR (%)	B/C Ratio	NPV (B-C)
		Normal	Diverted	Development	Induced	Total			
A-1	190,241	8,843	63,880	19,950	58,341	151,014	7.45	0.79	-39,227
A-2	200,163	14,485	65,908	20,583	61,582	162,559	7.69	0.81	-37,603
A-3	210,067	20,119	67,598	21,113	64,822	173,652	7.92	0.83	-36,415
B-1	139,247	8,843	58,695	11,930	50,331	129,798	9.07	0.93	-9,449
B-2	147,089	14,653	60,456	12,287	53,148	140,545	9.39	0.96	-6,544
B-3	155,079	20,121	62,029	12,608	55,965	150,723	9.62	0.97	-4,356
B-4	153,386	8,843	58,785	19,950	53,939	141,517	9.03	0.92	-11,869
B-5	160,666	12,594	60,651	20,583	56,942	150,771	9.24	0.94	-9,895
B-6	168,852	16,412	62,202	21,113	59,933	159,660	9.34	0.95	-9,192
C-1	125,946	8,843	58,695	11,930	45,106	124,573	9.83	0.99	-1,373
C-2	133,080	14,653	60,456	12,287	47,632	135,029	10.17	1.01	1,948
C-3	140,261	20,121	62,029	12,608	59,155	144,914	10.41	1.03	4,653

The results of economic analysis made for the introduction of ferry or bridge over Bg. Baram at Long Lama indicate that a bridge is economically more advantageous than ferry as is presented in Appendix Note A.10.2 in detail.

10-4-2 Sensitivity Analysis

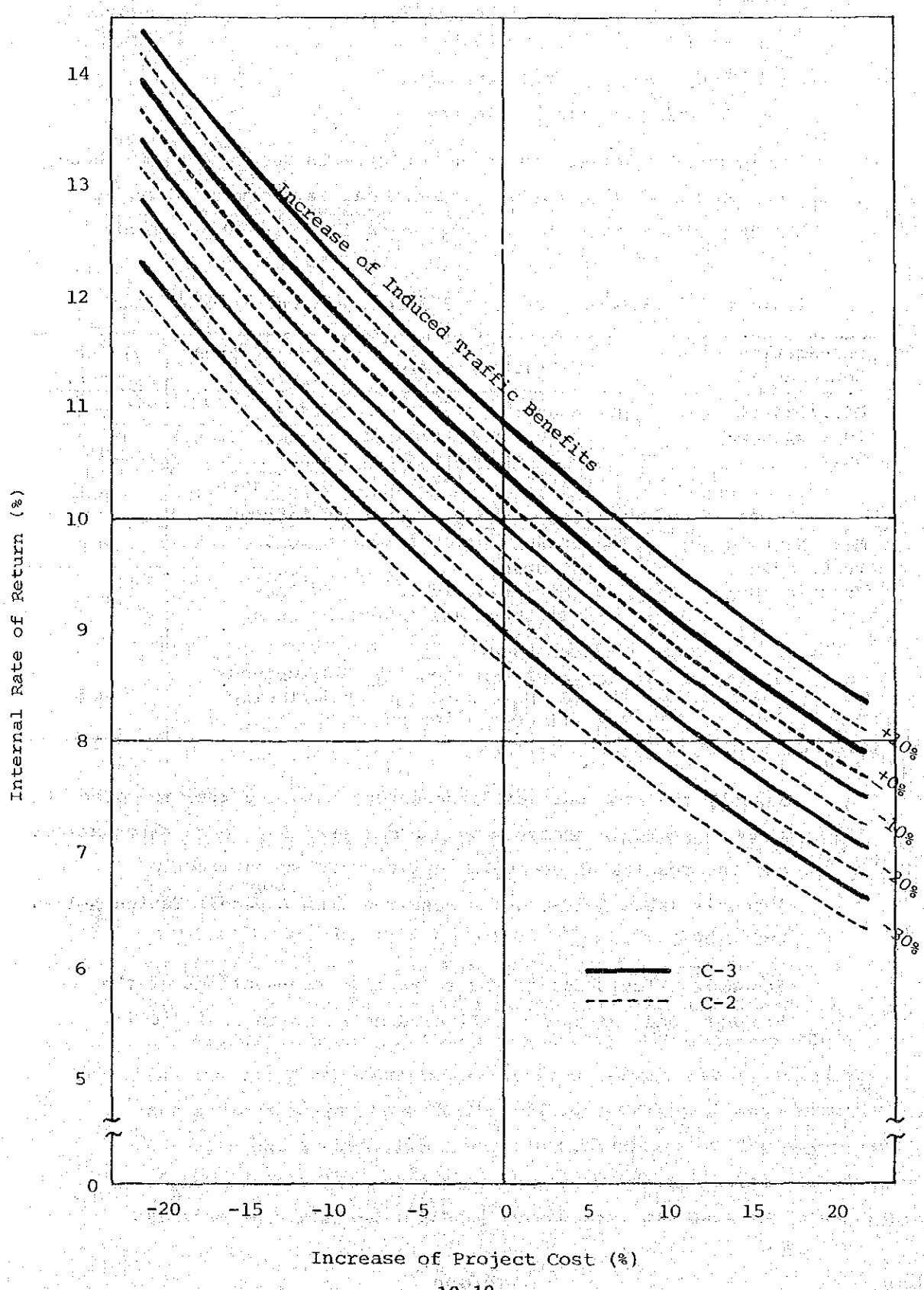
In order to ascertain the economic feasibility and the stability of project implementation, the sensitivity analysis of the construction plans of alternatives C-3 and C-2 for the following cases have been accomplished:

(1) Cost fluctuation : ±0% to ±20%

(2) Benefit to induced traffic : +10% to -30%

Fig. 10-1 is a diagram based on the analysis results. The plan C-3 will have an internal rate of return of 8% even under the project cost increase of approximately 20% or the cost increase of 10% plus 20% decrease of induced traffic benefit. The plan C-2 shows similar results.

Fig. 10-1 RESULTS OF SENSITIVITY ANALYSIS FOR THE SELECTED ALTERNATIVE CONSTRUCTION PLAN OF C-2 AND C-3 CASE



10-4-3 Priority Ranking for Project Road Sub-sections

This section deals with estimation of economic effects of the implementation of the Project Road sub-sections which include:

(1) Miri/Bintulu Road - Long Lama

(2) Long Lama - G. Mulu Junction

(3) G. Mulu Junction - Limbang

In order to estimate the economic effects due to each of these sub-sections, alternative project road development plans D-1 to D-6 were established as presented in Table 10-12 below.

Table 10-12 Alternatives for Project Road Development Plans

Sub-Section to be Constructed	Construction Stage	Type of Road Surface	Code of Alternative
Miri/Bintulu Rd. to Long Lama Only	One Stage: Whole sub-section is to be opened for traffic in 1985	Gravel	D-1
		Surface Dressing	D-2
		Bituminous Surfacing	D-3
Miri/Bintulu Rd. to G. Mulu Junction Only	Two Stages: 1st stage: Miri/Bintulu Rd. to Long Lama (1985)	Gravel	D-4
		Surface Dressing	D-5
	2nd stage: Long Lama to G. Mulu Junction (1990)	Bituminous Surfacing	D-6

Exactly the same analysis procedures including traffic forecast through economic analysis were undertaken for these alternatives and the results of economic analysis are summarized in Appendix Table A-10-6 which resulted from Appendix Tables A-10-4 and A-10-5.

Economic effects due to the respective sub-sections of the Project Road were then estimated as shown in Table 10-13.

Table 10-13 Economic Effects due to Major Project Road Sub-Sections for Alternative Construction Plan of C-3 Case

Project Road Sub-Section	8% of Discount Rate Present Value (M$000) Cost	Benefit	B/C Ratio
Miri-Bintulu Rd. - Long Lama	47,662	88,160	1.85
Long Lama - 1/ G. Mulu Junction	47,885	44,072	0.92
G. Mulu Junc. 2/ - Limbang	104,898	55,511	0.53

Project Road Sub-Section	10% of Discount Rate Present Value (M$000) Cost	Benefit	B/C Ratio
Miri-Bintulu Rd. - Long Lama	47,975	74,650	1.56
Long Lama - 1/ G. Mulu Junction	45,386	35,693	0.79
G. Mulu Junc. 2/ - Limbang	110,027	48,295	0.44

1/ economic effects due to the construction of this sub-section can be estimated by deducting costs and benefits of the alternative case D-3 from those of D-6.

2/ similarly A-3 minus D-6.

These tables indicate that the entire project is to be supported by Miri/Bintulu Road - Long Lama section, whose construction will result in high economic effects, followed by Long Lama - G. Mulu Junction section. Economic effects will be very small in sections beyond G. Mulu Junction.

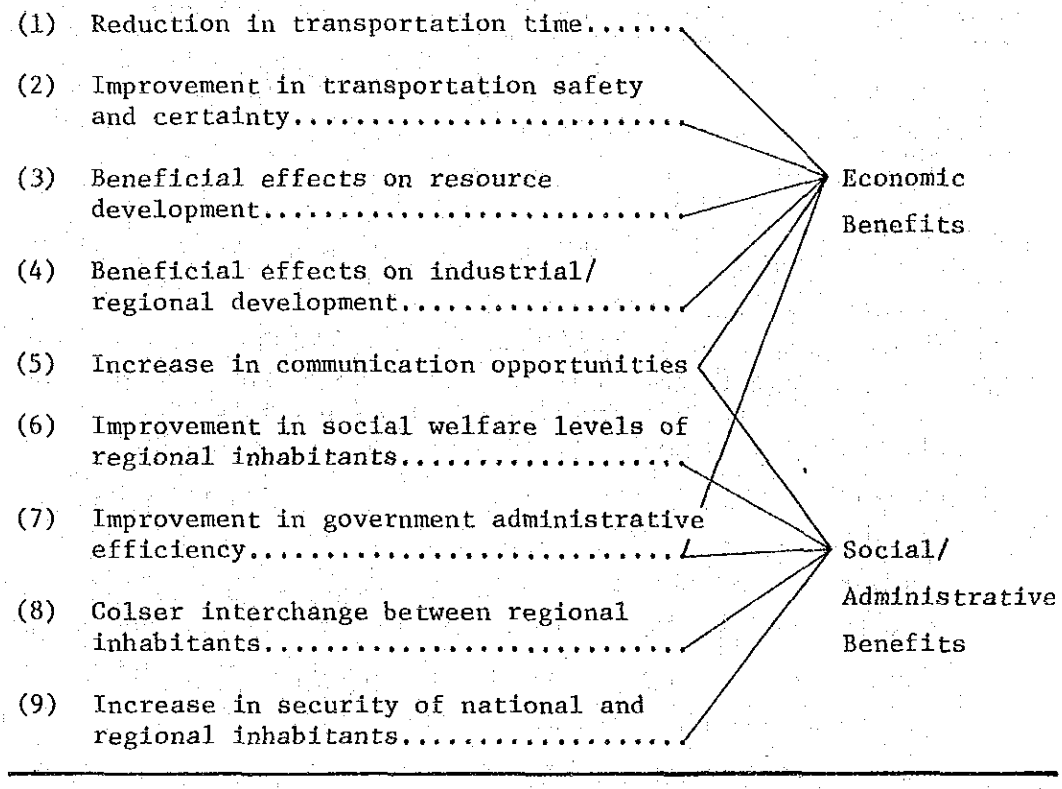
10-4-4 Miscellaneous Benefits Resulting from Project Implementation

1) Introduction

In addition to the benefits examined before, the Project implementation will have many social and economic impacts on the region. The benefits accruing from road construction range widely, depending upon the standard and characteristics of roads: and the major benefits resulting from the project implementation are summarized as those in the following Table 10-14. Previously, not only has accessibility between communities in the major part of the Project Area been poor, but also implementation of administrative services and regional development has been impeded because

there were only water links and limited air routes in the area as a result of the lack of road transportation. Thus, in addition to economic benefits, Project implementation will have considerable social and administrative benefits. Benefits of this nature overlap one another and in the main cannot be quantified; the following is a more detailed description of each.

Table 10-14 Miscellaneous Benefits of Project Implementation



2) Transportation Improvements

Direct benefits to travellers resulting from the Project Road construction include reduction of running costs and in transportation time, improvements in transportation safety and frequency, upgrade in travelling comfort, decreases in load damage, economization of packaging, and mitigation of driver fatigue. Excluding reduction of running costs which has already been examined, the two factors of particular importance are reduction in transportation time and improvements in transportation safety and certainty.

(1) Reduction in Transportation Time:

As pointed out in Section 4-3-2 of Chapter 4, completion of the Project Road will greatly reduce travelling time between the main regions of the Project Area. The following table (Table 10-15) summarizes travelling times between main regions "with and without" the Project Road. For example, between Long Lama, one of the main regional center in the Project Area, and Miri, the region's central city, the transportation distance will be reduced by 46% (from 245km to 132km) and transportation time by 58% (from 9.9 hrs to 4.1 hrs). As time in the case of river transport is unpredictable, the reduction due to construction of the Project Road should have even greater importance.

Table 10-15 Comparison of Travel Time Between Major Zones of the Project Area for "With" and "Without"

Traffic Zone Pair		"Without" Project					"With" Project					Estimated Reduction			
		Distance (km)				Travel Time (Hrs.)	Distance (km)				Travel Time (Hrs.)	Distance		Travel Time	
		Road	Express Boat	Long Boat	Total		Road	Express Boat	Long Boat	Total		(km)	(%)	(Hrs.)	(%)
1. Miri	- 5. Sg. Dakong	25	75	52	25+127	6.8	69	-	-	69	2.2	83	54.6	4.6	68.0
	- 6. Sg. Tinjar	25	148	66	25+224	10.7	107	-	-	107	3.3	132	55.2	7.4	68.8
	- 7. Lower Baram (Marudi)	25	112	-	25+112	4.5	69	37	52	158	6.7	Δ21	Δ15.3	2.4	Δ52.1
	- 8. Baram Middle (L/Lama)	25	220	-	25+220	9.9	132	-	-	132	4.1	113	46.1	5.8	58.3
	- 9. Upper Baram	25	220	123	25+343	18.1	132	-	132	255	12.3	113	30.7	5.8	31.9
	-10. Sg. Tutoh/Apoh	25	168	86	25+254	13.0	187	-	-	187	5.8	92	33.0	7.2	55.2
5. Sg. Bakong	- 6. Sg. Tinjar	-	73	118	191	10.9	38	-	-	38	1.2	153	80.1	9.7	89.1
	- 7. Marudi	-	37	52	89	4.7	63	108	-	171	7.4	Δ82	Δ92.1	2.7	Δ56.8
	- 8. Long Lama	-	145	52	197	10.1	63	-	-	63	2.0	134	68.0	8.1	80.5
	- 9. Upper Baram	-	145	175	320	18.3	63	-	123	186	10.2	134	41.9	8.1	44.4
	-10. Sg. Tutoh/Apoh	-	93	138	231	13.2	118	-	-	118	3.7	113	48.9	9.5	72.1
6. Sg. Tinjar	- 7. Marudi	-	36	66	102	6.2	25	108	-	133	6.2	Δ31	Δ30.4	0	0.3
	- 8. Long Lama	-	72	66	138	8.0	25	-	-	25	0.8	113	81.9	7.2	90.3
	- 9. Upper Baram	-	72	189	261	16.2	25	-	123	148	9.0	113	43.3	7.2	44.6
	-10. Sg. Tutho/Apoh	-	20	152	172	11.1	80	-	-	80	2.5	92	53.5	8.6	77.5
7. Marudi	- 8. Long Lama	-	108	-	108	5.4									
	- 9. Upper Baram	-	108	123	231	13.5									
	-10. Sg. Tutho/Apoh	-	56	86	142	8.5	55	108	-	163	7.1	Δ21	Δ14.8	1.4	16.5
8. Long Lama	- 9. Upper Baram	-	-	123	123	8.2									
	-10. Sg. Tutho/Apoh	-	52	86	138	8.3	55	-	-	55	1.7	83	60.1	6.6	79.4
9. Upper Baram	-10. Sg. Tutho/Apoh	-	52	209	265	16.5	55	-	123	178	9.9	83	31.8	6.6	40.0

Source: Based on the Table 4.10.

(2) Improvements in Transportation Safety and Frequency: Construction of the Project Road will considerably increase the safety and certainty of transportation within the Project Area. For example, the Limbang harbour in particular becomes difficult and often impossible to navigate during the Landas (monsoon) season, due to sandbanks at the mouth. There have even been cases of vessels capsizing or running aground. While Project Road construction will not, as pointed out in Chapter 4, reduce transportation costs or distance between Miri and Limbang, it will provide a reliable alternative route between these two main towns and this is of both economic and social significance. While the river network in the Project Area is well developed, the only river actually navigable as a main waterway and capable of supporting relatively large vessels throughout the whole year is the Baram, and even in the main tributaries of the Apoh and Tutoh prevention of the passage of barges and longboats occurs during the dry season.

(3) Rationalization of Production and Transportation Schemes: The external economic benefits accruing from economization of running costs and reductions in transportation time as a result of road construction are based on the ability of producers to rationalize production schemes and of transporters to employ larger vehicles; this permits the rationalization of transportation schemes. If the distribution system is rationalized, reductions in inventory investments and warehouse facilities also become feasible.

3) Beneficial Effects on Resource and Industrial Development

Development of Project Area resources is one of the main aims of Project implementation. As elaborated in Chapters 2 and 4, development of agriculture, forestry and tourist resources within the Project Area will be facilitated by Project Road construction. To summarize, taking into consideration the characteristics of the region in question (small population, natural conditions, present agricultural techniques, distributive mechanism etc.), agriculture cannot be expected to undergo immediate progress simply as a result of the construction of roads. However,

① The introduction of Government initiated schemes for various developments and diffusions can be implemented far more effectively and economically than previously, and considerable actualization of agricultural development potential can be expected.

② Development of the Limbang Valley will also not be directly affected by the planned road implementation, but as there are at present only the unreliable harbours and the overland route through Brunei (incorporating a ferry section), the reliable substitute transportation route guaranteed by completion of the planned road, will mean large savings in the transportation of products and raw materials.

③ As a result of new distribution patterns by the road, the agricultural markets of the regional population should expand and in particular, the production volume of rubber, pepper and other cash crops can be expected to increase.

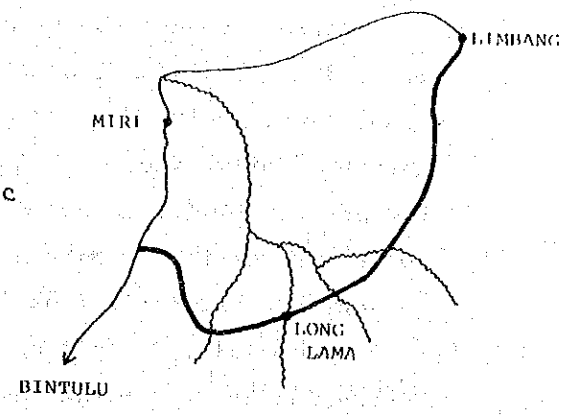
As far as forestry is concerned, even with completion of the planned road, it can be expected that the majority of timber will be transported by raft on the strong Baram River. However, if the forestry development around Baram River moves further upstream, or along the tributaries, or, as in the case of one region from where the timber must be carried a considerable distance to the main stream and often cannot be transported smoothly due to low level water, then there are places where new development will become feasible upon completion of the planned road.

The natural conditions characteristic of the Project Area have meant that it is inaccessible to the ordinary tourist, but on the other hand, ecosystems, natural spectacles and natural resources have been preserved in their original state. Completion of the Project Road will, as has already been elaborated, make approach to and use of the G. Mulu National Park, the Loagun Bunut Lake region, the Baram River basin and many other potential tourist spots, possible. Resources such as these are not only potential recreation areas for the regional population, but are also of first class international standard and could become the seat of a wide international tourist market.

There are numerous reports regarding the possible existence of mineral resources, but in every case surveys have been inadequate due to the inaccessibility of the areas under examination. With completion of the Project Road, more detailed surveys for the development of resources other than those already mentioned will become possible, and opportunities for new development may come to light.

4) Regional Social Development

As infrastructure development is inadequate in the Project Area besides the natural conditions characteristics, the level of education, medical care, communication and other public services and social welfare services is extremely low. The backwardness of the Baram region through which the planned road will pass is particularly conspicuous. Even if schools and medical facilities were established for the small communities scattered along the river, not only would the cost be exorbitant, but also a great deal of expense and time would be required for their maintenance, and recruiting of personnel for these areas would be difficult. These existing problems, mainly due to the lack of roads, has meant that plans for maintaining Long Lama as a sub-regional center in the region have not progressed. As the communities in the Project Area are located along the rivers, communication along one river is relatively easy, but otherwise it is extremely difficult between communities. As the planned road will tie together the river system, its completion will strengthen the interdependence of it as a trunk line and the rivers as distributors, and an effective traffic system will be established.



Further, at the junctions of the previous main traffic routes and the planned road, the creation of development base/service centres for influencial spheres in each river basin will become possible.

As the before-mentioned Long Lama is situated on the junction of the road and the largest river in the Project Area, and is expected to be developed as the core of development of the Baram basin upon completion of the Project Road. The construction of a road which links the river basins, will provide opportunities for new communication between regions which previously had none, will increase opportunities for commercial dealings and the mutual use of public facilities, and will in turn help facilitate interchange between regional inhabitants.

5) The Sabah/Sarawak Road

At present, there is no road link between the two states of Sabah and Sarawak although it is a political aim in the long term to join the two with a trunk road. The present planned road will connect Miri to Limbang and cease there on the way to Lawas (about 145 km between Limbang and Lawas). The economic effects of a road directly linking Sabah and Sarawak cannot be expected to be of great import, but a great deal of consideration must be given to the social and political significance of such a link.

10-4-5 Conclusion and Recommendation

The conclusion of this Study, based on the foregoing analysis, is as follows:

(1) The entire Project covering from Miri/Bintulu Road to Limbang will not only be fully feasible from economic standpoint, but, due to its uniqueness, it will also result in very substantial social and administrative benefits.

(2) The overall economic effects of the Project, however, will not be particularly large. Investment efficiency can be improved by implementing the Project in the following three stages (in the descending order of economic effect):

First Stage: The economic effects of the Miri/Bintulu Road - Long Lama Section is extremely high. The work, including the improvement of existing road sections, is to be completed and the road opened for service within 1985. As regards the Limbang - N. Medamit Road, it is desirable that the Limbang - Kubong Junction

Section be improved expeditiously in view of its high traffic volume; other sections are to be also opened for service within 1985.

Second Stage: Long Lama - G. Mulu Junction Section is to be constructed by 1990.

Third Stage: G. Mulu Junction - N. Medamit Section is to be constructed by 1995.

The second stage and subsequent construction work schedule should be determined taking into full consideration the progress of the Project, the various other development projects in the Project Area and with the necessary program adjustments.

(3) Because most of the potential traffic will occur after the Project Road has been constructed up to G. Mulu Junction, the Bg. Baram bridge should be constructed in the second stage.

(4) From technical and financial standpoints, it will be desirable that the Project Road be constructed initially as a surface dressed road and that its sections be subsequently bituminous-paved as traffic volume increases in each section. Each section is to be bituminous-paved when the number of passing axles (8.2-ton equivalent) exceeds 500,000 in accordance with the Road Note 31 Standard. The year in which traffic in each section will reach this level has been estimated in Table 10-16.

Table 10-16 Estimated Year for Bituminous Surfacing of the Project Road

Road Section	Estimated Year of Bituminous Surfacing	ADT in the Respective Year
Miri/Bintulu Rd. - Beluru	1998	1,330
Beluru - Sg. Tinjar	2000	920
Sg. Tinjar - Bg. Baram	2000	1,010
Bg. Baram - Sg. Tutoh	2003	510
Sg. Tutoh - N. Medamit	2003	410
N. Medamit - Kubong Junc.	1999	1,130
Kubong Junc. - Limbang	1985	1,804

(5) The construction of relevant feeder roads should be accomplished in coordination with the main road construction schedule. The schedule for construction of each feeder road has been estimated in Table 10-17.

Table 10-17 Construction Schedule of Project Road

Feeder Roads	Length (Km)	Relevant Project Road Section	Proposed Construction Timing
Long Laput Road	5.7	Sg. Tinjar - Bg. Baram	1983 - 85
Long Bedian Road	23.4	Bg. Baram - Sg. Tutoh	1988 - 90
Long Panai Road	11.4	- do -	1988 - 90
Long Terawan Road	4.7	- do -	1988 - 90
G. Mulu Access Road	4.6	- do -	1988 - 90
Total	49.8		

(6) Based on the above project implementation program, the required amount of investment capital has been estimated as follows:

Table 10-18 Cash Flow Schedule of Project Cost 1/

Year	Trunk Road			Feeder Road			Total (M$000)		
	Foreign Component	Local Component	Total	Foreign Component	Local Component	Total	Foreign Component	Local Component	Total
1980	346	278	624	14	12	26	360	290	650
81	518	429	947	21	18	39	539	447	986
82	-	26	26	-	-	-	-	26	26
83	8,782	7,081	15,863	358	308	666	9,140	7,389	16,529
84	17,562	14,160	31,722	716	616	1,332	18,278	14,776	33,054
85	9,038	7,327	16,365	461	397	858	9,449	7,724	17,223
86	383	384	767	154	133	287	537	517	1,054
87	-	34	34	-	-	-	-	34	34
88	6,494	6,262	12,756	2,618	2,253	4,871	9,112	8,515	17,627
89	12,988	12,523	25,511	5,235	4,506	9,741	18,223	17,029	35,252
90	6,758	6,463	13,211	2,618	2,253	4,871	9,376	8,716	18,092
91	397	302	699	-	-	-	397	302	699
92	-	1	1	-	-	-	-	1	1
93	6,722	5,106	11,828	-	-	-	6,722	5,106	11,828
94	13,445	10,213	23,658	-	-	-	13,445	10,213	23,658
95	6,722	5,106	11,828	-	-	-	6,722	5,106	11,828
96	-	-	-	-	-	-	-	-	-
97	770	752	1,522	-	-	-	770	752	1,522
98	1,314	1,284	2,598	-	-	-	1,314	1,284	2,598
99	2,616	2,555	5,171	-	-	-	2,616	2,555	5,171
Total	94,855	80,286	175,141	12,195	10,496	22,691	107,050	90,782	197,832

1/ Maintenance costs are excluded

(7) To facilitate road utilization, the following roadside area development programs should be actively carried out concurrently with the Project Road construction:

a) Development of Long Lama as a sub-regional centre:
Batang Baram will continue, even after the completion

of the Project Road, to offer important traffic routes in its basin, which covers the majority of the Study Area. Development of Long Lama, which will be located at the intersection of the River and the Project Road, as a sub-regional centre to function as a base in following ways will be an important strategy for inland regional development.

- Service base for the development of land with agricultural or forestry potentials,
- Administrative service base to include education, medical, and communication,
- Distribution center for consumer goods and agricultural/forestry products

b) G. Mulu Park Utilization Program:
Detailed and careful programs for the utilization and preservation of tourism resources of G. Mulu must be carried out in pace with the progress of the Project Road construction in order not only to serve the fairly large number of tourists expected after the Road completion, but also to preserve the very valuable international-level tourism resources including its highly sensitive ecological system.

c) Programmed Development of Roadside Agriculture-Potential Areas:

Programmed development, under the Government leadership, of the fairly large number of spots suitable for agricultural development which are found in the areas along the Project Road and the feeder roads is desirable because, if left alone, they will undoubtedly be eventually taken for shifting cultivation. Because few of them are suited for a large scale development, feasibility studies should be done in the future to determine the appropriate type or patterns for their development.

d) Major Community Development in Roadside Areas:
In addition to Long Lama, major communities connected with

each other by the feeder roads should be expanded, modernized, and developed.

e) Tourism Development in the Entire Study Area:
Tourism resources of Miri, Niah Cave, Loagun Bunut, and those in the Baram River basin, as well as Limbang and Brunei, will be united together with G. Mulu National Park upon the completion of the Project Road. Many of these resources will be able to satisfy the demand of not only domestic tourists but also visitors from abroad. Along with the said development program of G. Mulu National Park, a comprehensive tourism development program should be undertaken for the entire Study Area.

APPENDIX

Appendix Table A-1-1 Sarawak Gross Domestic Product and per Capita GDP, 1967-1975

Sector	1970 Prices									Average Annual Growth Rate (%)			
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-1975	67-70	67-73	70-75
Agriculture, Forestry and Fishery	267	305	343	319	292	282	327	–	355	2.0	6.7	1.0	3.1
a) agriculture/livestock				168									
b) forestry/logging				133									
c) fishery				18									
Manufacturing	69	73	77	77	66	62	50	–	92	-0.1	3.9	-5.0	2.6
Building and Construction	43	44	41	45	49	51	55	–	68	5.9	0.7	4.4	8.4
Commerce	191	210	233	222	256	279	294	–	270	5.2	5.7	7.2	3.8
a) transport/communication	37	42	50	31	63	72	78	–	57	7.3	-3.5	13.5	10.1
b) whole sale/retail trade	90	103	117	125	126	135	143	–	138	5.6	11.5	7.5	2.5
c) banking/insurance	11	12	13	13	14	17	18	–	17	6.5	6.0	8.4	6.0
d) ownership of dwellings	53	53	53	53	53	55	55	–	58	1.1	0.0	0.7	1.9
Services	140	141	145	127	150	170	176	–	210	5.3	-2.6	4.0	10.0
a) public administration/ defence	44	45	45	45	46	62	62	–	63	5.7	0.7	6.2	7.8
b) electricity/water	9	9	10	12	12	14	15	–	22	11.6	10.2	9.7	13.3
c) services	87	87	90	70	92	94	99	–	125	4.3	-6.0	2.0	10.8
Sub-total	710	773	839	790	813	844	902	–	995	3.6	4.1	3.1	4.9
Mining and Quarrying	2	7	16	30	114	155	152	–	157	77.1	144.8	112.8	31.0
Grand Total	712	780	855	820	927	999	1,054	1,177	1,152	6.5	5.3	6.5	7.3
Population (Mid-year Estimates)	901,663	923,592	944,029	967,274	994,535	1,022,382	1,063,300	–	1,102,956	2.6			
Per. Capita GDP (M$)	790	845	906	889	932	977	991	–	1,044	3.3			
Annual Rate of Growth													
a) GDP (%)		9.6	9.6	0.6	7.8	7.8	5.5	–	4.5				
b) Per Capita GDP (%)		7.0	7.2	-1.9	4.8	4.8	1.4	–	2.6				

Source: State Planning Unit, Sarawak

Appendix Table A-1-2 Exports of Major Commodities, Sarawak

Commodity Section	Unit of Measurement	1975 Quantity	1975 Value (M$000)	1977 Quantity	1977 Value (M$000)
0. Food		53,234	111,323	58,145	155,255
(1) White Pepper	(ton)	9,644	39,041	7,363	42,494
(2) Black Pepper	(ton)	20,229	61,854	19,432	90,208
(3) Sago Flour	(ton)	22,506	5,305	29,717	8,312
(4) Prawns, Fresh and Frozen	(ton)	855	5,123	1,633	14,241
2. Crude Materials Inedible		-	161,779	-	405,816
(1) Sawlogs	(H.ton)	696,989	63,729	3,470,109	254,200
(2) Sawn Timber	(H.ton)	170,823	62,184	231,589	88,755
(3) Rubber	(ton)	28,579	35,866	37,665	62,861
3. Mineral Fuels		4,398,306	1,025,319	5,387,587	1,423,247
(1) Petroleum, Crude and Partly Refined	(ton)	3,963,204	917,292	4,995,242	1,310,089
(2) Petroleum Products	(ton)	435,102	108,027	392,345	113,158
4. Animal/Vegetable Oils and Fats		8,007	8,293	16,538	24,645
(1) Coconut Oils, Crude and Refined	(ton)	3,717	4,128	2,198	3,976
(2) Palm Oil	(ton)	3,592	3,887	12,497	19,620
(3) Palm Kernel	(ton)	698	278	1,843	1,049
6. Manufactured Goods			33,157		60,867
(1) Wooden Mouldings and Moulded Board	-	-	8,764	-	16,182
(2) Wooden Dowels	-	-	13,286	-	27,870
(3) Chipwood	-	-	8,588	-	9,327
(4) Veneer Sheets: max 1/5"thick	(000 sq.ft.)	544	37	n.a.	n.a.
(5) Plywood Plain; 5mm	(000 sq.ft.)	16,211	2,482	2,901	7,488
Total of Major Exports	-	-	1,339,871	-	2,070,912
Other Exports	-	-	47,524		82,336
TOTAL			1,387,395		2,153,248

Source: Preliminary Figures of External Trade, Dept. of Statistics

Appendix Table A-1-3 Import Commodity Division and Section

(M$ million)

	Commodity Section/Division	1975	1977
0	Live animals, other pets and animals for zoos	1.71	1.43
1	Meat, edible offal and meat preparations	7.16	10.13
2	Daily produce and birds' eggs	19.71	23.41
3	Fish and other marine animals, except mammals and preparations thereof	9.61	11.81
4	Cereals and cereal preparations	67.14	89.91
5	Fruits and vegetables	13.27	15.96
6	Sugar, sugar preparations and honey	31.36	33.35
7	Coffee, tea, cocoa, spices and manufactures thereof	4.91	7.12
8	Feeding stuffs for animals, excluding unmilled cereals	21.60	32.32
9	Miscellaneous food preparations	6.18	8.70
0*	FOOD AND LIVE ANIMALS	182.65	234.15
11	Beverages	11.29	16.18
12	Tobacco and tobacco manufactures	27.25	35.51
1*	BEVERAGES AND TOBACCO	38.54	51.69
21	Hides, skins and furskins, undressed	-	-
22	Oil-seeds, oil-nuts and oil kernels	3.81	3.98
23	Crude rubber and similar natural gums and synthetic rubber	0.04	0.09
24	Wood	11.12	23.04
25	Paper-making material	0.36	0.27
26	Textile fibres and waste	0.45	0.68
27	Crude fertilizers and minerals other than fuels and precious stones	4.99	5.50
28	Matallic ores and concentrates	0.17	0.06
29	Crude animal and vegetable materials, inedible	1.44	1.55
2*	CRUDE MATERIALS, INEDIBLE, EXCEPT FUELS	22.38	35.17
32	Coal, coke and related fuels	0.05	0.02
33	Petroleum and petroleum products	140.69	123.72
34	Gas	1.62	1.40
3*	MINERAL FUELS, LUBRICANTS AND RELATED MATERIALS	142.41	125.14
41	Animal oils and fats, unprocessed	0.48	0.40
42	Vegetable oils and fats, unprocessed	1.89	2.08
43	Animal and vegetable oils and fats, processed and waxes of animal or vegetable origin	0.03	0.04
4*	ANIMAL AND VEGETABLE OILS AND FATS	2.40	2.52
51	Chemical elements and compounds	8.33	9.12
52	Mineral tar and crude chemicals obtained from coal, petroleum and natural gas	0.08	4.68
53	Dyeing, tanning and colouring materials	6.20	8.79
54	Medicinal and pharmaceutical products	8.62	13.26
55	Essential oils and perfume materials, toilet, polishing and cleaning preparations	12.48	20.22
56	Fertilizers, manufactured	15.87	15.64

Appendix Table A-1-3 (continued) (M$ million)

	Commodity Section/Division	1975	1977
57	Explosives	1.54	0.94
58	Artificial plastic materials, regenerated cellulose, artificial resins and related materials	6.15	8.15
59	Miscellaneous chemical materials and products	9.23	11.89
5*	CHEMICALS AND PRODUCTS OF CHEMICALS INDUSTRIES	68.50	92.69
61	Leather, leather manufactures not elsewhere specified, dressed furs and parts of footwear and saddlery of any material	0.04	0.05
62	Rubber manufactures not elsewhere specified	8.32	11.25
63	Wood or cork manufactures, not elsewhere specified or included	2.01	2.91
64	Paper, paperboard and manufactures thereof	9.25	12.47
65	Textile yarn, fabrics and made-up articles related products, except clothing	21.64	23.50
66	Non-metallic mineral manufactures, not elsewhere specified or included	28.12	28.94
67	Iron and steel and alloys of iron except cerium alloys	47.04	48.02
68	Non-ferrous metals	2.73	3.43
69	Manufactures of metals	22.62	31.67
6*	MANUFACTURED GOODS CLASSIFIED CHIEFLY BY MATERIALS	141.77	162.24
71	Machinery other than electric but not excluding machinery driven by electric motors	74.84	176.20
72	Electric machinery, apparatus and appliances	60.77	71.04
73	Transport equipment	41.48	85.39
7*	MACHINERY AND TRANSPORT EQUIPMENT	177.09	332.63
81	Sanitary, plumbing, heating and lighting fixtures and fittings and blinds	2.42	2.74
82	Furniture	2.53	2.82
83	Travel goods, handbags and similar articles	1.16	1.80
84	Clothing	12.16	15.84
85	Footwear	7.54	8.67
86	Professional, scientific and controlling instruments, optical and photographic goods, watches and clocks	5.73	8.00
89	Miscellaneous manufactured articles	14.81	20.64
8*	MISCELLANEOUS MANUFACTURED ARTICLES	49.95	60.51
91	Postal packages	15.23	14.64
93	Special transactions	9.01	3.48
94	Live animals not commonly used for food	0.02	0.01
95	Weapons except military	0.02	0.02
96	Unissued coins	0.94	1.69
97	Gold	-	0.99
9*	TRANSACTIONS AND COMMODITIES NOT ELSEWHERE SPECIFIED	25.22	20.83
**	TOTAL OF IMPORT	850.91	1,117.56

Appendix Table A-1-4 Distribution of Population by Age-group, 1970, Sarawak

Age-group	Urban		Rural		Total	
	Number	(%)	Number	(%)	Number	(%)
0 - 4	21,890	(14.5)	141,976	(17.2)	163,866	(16.8)
5 - 9	21,172	(14.0)	143,733	(17.4)	164,905	(16.9)
10 - 14	20,190	(13.3)	101,124	(12.3)	121,314	(12.4)
15 - 19	19,896	(13.2)	79,849	(9.7)	99,745	(10.2)
20 - 24	14,851	(9.8)	61,253	(7.4)	76,104	(7.8)
25 - 29	11,172	(7.4)	52,966	(6.4)	64,138	(6.6)
30 - 34	9,023	(6.0)	44,937	(5.4)	53,960	(5.5)
35 - 39	7,170	(4.7)	41,440	(5.0)	48,610	(5.0)
40 - 44	6,001	(4.0)	36,286	(4.4)	42,287	(4.3)
45 - 49	4,680	(3.1)	30,987	(3.8)	35,667	(3.6)
50 - 54	4,248	(2.8)	29,500	(3.6)	33,748	(3.5)
55 and Over	10,844	(7.2)	61,081	(7.4)	71,925	(7.4)
Total	151,137	(100.0)	825,132	(100.0)	976,265	(100.0)

Appendix Table A-1-5 Labour Force Distribution by Industrial Sector, 1970 Sarawak

(%)

	Malay	Melanau	Iban	Land Dayak	Other Indigenous	Chinese	Others	Total
Agriculture, Forestry and Fishery	21.9	26.4	61.0	48.6	55.7	11.2	10.2	34.4
Mining and Quarrying	0.3	0.1	0.03	0.4	0.4	0.2	0.2	0.2
Manufacturing	6.6	10.2	6.1	5.2	3.6	8.7	8.8	7.1
- agricultural products requiring substantial processing	3.0	4.2	5.4	4.9	2.8	3.7	6.9	4.2
- others	3.6	6.0	0.7	0.3	0.8	5.0	1.9	2.9
Building and Construction	0.8	0.6	0.2	0.4	0.2	1.9	1.5	0.9
Commerce	2.9	1.9	0.4	0.6	0.7	9.3	6.8	3.8
- transport/storage/communication	1.5	0.5	0.1	0.2	0.2	2.1	2.2	1.0
- others	1.4	1.4	0.3	0.4	0.5	7.2	4.7	2.8
Services	11.9	4.0	2.4	4.6	3.0	8.2	21.9	6.4
- electricity/gas/water/sanitary services	0.5	0.2	0.1	0.1	0.1	0.2	0.8	0.2
- others	11.4	3.8	2.3	4.5	2.9	8.0	21.1	6.2
Industry not adequately described	3.5	2.5	3.0	7.5	3.8	4.5	4.2	4.0
Total Experienced Labour Force	47.9	45.7	73.1	67.3	67.4	44.0	53.6	56.8
Not working but looking for first job	1.4	1.0	0.8	0.6	0.5	1.7	1.5	1.2
Total Labour Force	49.3	46.7	73.9	67.9	67.9	45.7	55.1	58.0
Not in Labour Force	50.7	53.3	26.1	32.1	32.1	54.3	44.9	42.0
Grand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix Table A-1-6 Labour Force Distribution by Occupational Sector, 1970 Sarawak

	Malay	Melanau	Iban	Land Dayak	Other Indigenous	Chinese	Others	Total
Professional, Technical & Related Workers	1.5	1.3	0.7	1.2	1.0	2.8	10.8	1.7
Administrative & Managerial Workers	0.2	0.1	0.1	0.03	0.1	0.7	1.1	0.3
Clerical & Related Workers	2.2	0.9	0.4	0.6	0.5	3.4	3.1	1.7
Sales Workers	0.9	0.8	0.2	0.4	0.3	6.0	3.7	2.2
Service Workers	6.3	1.3	1.1	2.4	1.0	3.0	6.8	2.8
Agricultural, Animal Husbandry & Forestry Workers, Fishermen & Hunters	25.0	31.6	66.4	53.2	58.2	14.3	16.5	38.5
Production & Related Workers, Transport Equipment Operators & Labourers	8.3	7.2	1.2	1.9	2.4	9.3	7.4	5.6
Occupation not adequately Described	3.5	2.5	3.0	7.5	3.9	4.5	4.2	4.0
Total Experienced Labour Force	47.9	45.7	73.1	67.2	67.4	44.0	53.6	56.8
Not Working but looking for first job	1.3	1.0	0.8	0.7	0.5	1.7	1.5	1.2
Total Labour Force	49.2	46.7	73.9	67.9	67.9	45.7	55.1	58.0
Not In Labour Force	50.8	53.3	26.1	32.1	32.1	54.3	44.9	42.0
Grand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix Table A-1-7 Production of Sawlogs, 1976

Timbers	Section				: Tons/CF	
	Kuching	Sibu	Bintulu	Miri	Total	(%)
Belian	330	1,103	4,511	2,258	8,202	(0.3)
Others, Class A	4	106	20	14	144	(0.0)
Ramin	162,170	75,655	51,497	90,694	380,016	(15.5)
Class C	14,456	73,969	89,290	318,996	496,711	(20.2)
Class D	107,801	74,000	131,808	220,740	534,349	(21.7)
Alan	113,924	102,600	16,295	353,371	586,190	(23.9)
Others, Class E	94,757	175,777	107,216	74,256	452,006	(18.4)
Total	493,442	503,210	400,637	1,060,329	2,457,618	(100.0)
(%)	(20.1)	(20.5)	(16.3)	(43.1)	(100.0)	

Appendix Table A-1-8 Sawmill Operation in Sarawak, 1976[1/]

Section	Number of mills				Average Monthly Labour Employment					Timber Conversion		Recovery Rate
	Vertical Bandmill	Horizontal Bandmill	Circular Saw	Total	Chinese	Iban	Malay	Others	Total	Input (Hoppus Tons)	Output (Cubic Tons)	%
Kuching	3	17	14	34	583	509	602	72	1,766	207,455.77	98,519.47	47.49
Sibu	14	15	5	34	733	336	486	277	1,832	158,693.00	86,058.48	54.23
Bintulu	11[2/]	1	11[3/]	21	81	43	89	6	219	62,466.67	24,621.18	39.41
Miri	13	2	16	31	333	288	259	68	948	112,920.68	46,491.22	41.17
Total	39	35	46	120	1,730	1,176	1,436	423	4,765	541,536.12	255,690.35	47.22

Source: Annual Report of the Forest Department, 1976

1/ The input-output statistics of Sarawak Woodchip Co. Sdn. Bhd. (Factory) is not included in the above Table. The input was 228,449.5 metric tons and its output was 159,515.0 metric tons. The recovery rate was 70%.

2/ Includes 3 Belian Sawmills

3/ Includes 8 Belian Sawmills

Appendix Table A-1-9 Export of Timber by Port of Clearance

Tons/CF

Port of Clearance	Sawn Timber		Round Timber		Total	
	1975	1976	1975	1976	1975	1976
Kuching	274	357	34,821	71,860	35,095	72,217
Sibu	6,166	1,268	3,351	20,629	9,517	21,897
Tg. Mani	148,899	191,774	187,840	423,718	336,739	615,492
Bintulu	1,263	1,002	99,871	237,828	101,134	238,830
Miri	10,621	6,392	299,598	800,266	310,219	806,658
Marudi	2,548	2,207	-	-	2,548	2,207
Limbang	344	414	39,784	47,854	40,128	48,268
Lawas	569	72	10,612	15,575	11,181	15,647
Sundar	139	0	21,112	20,862	21,251	20,862
Total	170,823	203,486	696,989	1,638,592	867,812	1,842,078

Appendix Table A-1-10 Exports of Timber

Year	Round Timber						Sawn Timber					
	Ramin	Meranti	Other Non-Conifer Wood	Conifer Wood	Total (000 Tons/CF)	Export Value (M$ million)	Ramin	Meranti	Other Non-Conifer Wood	Conifer Wood	Total (000 Tons/CF)	Export Value (M$ million)
1965	62.5	131.6	476.3	4.2	672.6	47.3	170.3	10.3	10.7	0.5	191.8	35.2
1966	100.3	303.6	667.0	0.3	1,071.2	82.5	142.3	3.4	10.9	0.0	156.6	26.3
1967	89.0	480.2	673.2	0.7	1,243.1	99.8	176.3	4.9	13.1	0.0	194.3	36.2
1968	87.5	563.2	1,004.5	0.7	1,655.9	138.7	198.7	4.6	16.3	0.0	219.6	42.4
1969	41.0	743.9	911.2	1.2	1,697.3	143.4	199.6	4.1	11.4	0.1	215.2	43.2
1970	18.4	661.0	1,053.2	0.3	1,732.9	148.4	207.1	4.0	11.0	0.0	222.1	49.8
1971	1.3	573.6	836.9	0.2	1,412.0	120.8	184.0	4.1	11.0	-	199.1	47.1
1972	-	333.3	769.3	4.8	1,107.4	83.5	186.9	5.1	22.7	0.0	214.7	50.9
1973	0.9	242.2	800.4	6.4	1,049.9	123.9	161.7	6.9	13.0	0.0	181.6	87.0
1974	-	197.2	733.9	3.4	934.5	108.2	128.2	5.2	18.0	0.5	151.9	57.7
1975	0.3	210.1	485.9	0.7	697.0	63.7	147.3	3.9	19.4	0.3	170.9	62.2
1976	-	450.6	1,181.7	6.3	1,638.6	242.1	187.8	3.6	11.6	0.5	203.5	117.0

Appendix Table A-2-1 Population Distribution by Race, 1970

Race	Sarawak		4th Div.		5th Div.	
	Number	(%)	Number	(%)	Number	(%)
Malay	182,709	(18.7)	17,371	(12.8)	12,713	(34.6)
Melanau	53,234	(5.5)	7,837	(5.8)	66	(0.2)
Sea Dayak (Iban)	302,984	(31.1)	47,544	(35.0)	4,734	(12.9)
Land Dayak (Bidayuh)	83,276	(8.5)	645	(0.5)	90	(0.2)
Other Indigenous 1/	49,960	(5.1)	27,144	(20.0)	13,747	(37.4)
Chinese	294,020	(30.1)	34,230	(25.1)	5,131	(14.0)
Others	9,735	(1.0)	1,147	(0.8)	250	(0.7)
TOTAL	975,918	(100.0)	135,918	(100.0)	36,731	(100.0)

Source; Sarawak Annual Statistical Bulletin, 1976

1/ Including Bisayas, Kedayans, Kayans, Kelabits, Dusun etc.

Race	Miri Sub-dist.		Niah-Suai-Siburi Sub-dist.		Baram Dist.		Limbang Dist.	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Malay	9,311	(26.1)	3,334	(15.2)	2,255	(5.7)	5,941	(30.0)
Melanau	1,561	(4.4)	606	(2.7)	135	(0.3)	47	(0.2)
Sea Dayak(Iban)	2,722	(7.6)	10,554	(48.0)	11,940	(30.2)	4,551	(23.0)
Land Dayak(Bidayuh)	264	(0.7)	34	(0.2)	43	(0.1)	55	(0.3)
Other Indigenous	1,039	(2.9)	4,219	(19.2)	19,628 2/	(49.7)	5,982 1/	(30.2)
Chinese	20,059	(56.2)	3,178	(14.4)	5,361	(13.6)	3,167	(16.0)
Others	746	(2.1)	61	(0.3)	146	(0.4)	64	(0.3)
TOTAL	35,702	(100.0)	21,986	(100.0)	39,508	(100.0)	19,807	(100.0)

Source; 1970 Census of Population and Housing, Dept. of Statistics

1/ Including Bisayas (2,827), Kedayans (2,267), Murut (482) and Kelabit/Tabun (453).

2/ Including Kayan (6,936), Kenyah (6,587), Kelabit (2,003), Penan (2,221), etc.

Appendix Table A-2-2 Kampongs with the Population of 500 and more in Baram District, 1977/1978

Name of Kampong	Population 1977	Population 1978	Race 1/
Lubok Nibong	n.a.	1,290	Ma/CH
Sg. Selipin	533	600	I/mixed
Lg. Pilah	702	702	KN
Lg. Miri	539	539	KN
Lg. Laput	713	713	KN
Lg. Bemang	944	1,044	KN
Lg. Terawan	614	614	Ky
Lg. Atip	624	624	KN
Lg. Bedian	578	578	Ky
Lg. Jee	587	587	Ky
Lg. Moh	651	651	Ky

1/ Ma; Malay, CH; Chinese, KN; Keniah, Ky; Kayan, I; Iban

Appendix Table A-2-3 Estimated Future Population by Division

Division	Population 1977	1985	1995	2005	Annual Growth Rate (%) 77-85	85-95	95-95
First Div.	430,670 (37.1)	548,376 (38.9)	732,314 (41.1)	967,359 (43.3)	3.07	2.94	2.82
Second Div.	157,758 (13.6)	183,955 (13.1)	220,002 (12.4)	260,253 (11.7)	1.94	1.81	1.70
Third Sixth Seventh Div.	359,713 (31.0)	410,460 (29.1)	478,036 (26.8)	550,685 (24.6)	1.67	1.54	1.43
Fourth Div.	169,276 (14.6)	216,377 (15.4)	290,362 (16.3)	385,422 (17.2)	3.12	2.99	2.87
Fifth Div.	42,507 (3.7)	49,955 (3.5)	60,333 (3.4)	72,074 (3.2)	2.04	1.91	1.80
Total	1,159.924 (100.0)	1.409,123 (100.0)	1,781,047 (100.0)	2,235,793 (100.0)	2.47	2.37	2.30

Appendix Table A-2-4 Exports of Agricultural Products by Port in the Study Area

Tons

	Miri		Marudi		Limbang	
Commodity	1976	1977	1976	1977	1976	1977
Rubber	664	1,023	718	531	552	659
White Pepper	999	1,122	102	53	3	5
Black Pepper	112	214	54	61	11	53
Sago Flour	2	2	-	-	-	-
Coconut Oils	1,042	767	18	1	-	-
Total	2,819	3,128	892	646	566	717

Appendix Table A-2-5 Description of Agricultural Potential Area

Block	1. LINEI PUTER	2. KUALA TINJAR
Area (Acre)	5,400. The area could possibly be extended east into the Buang River system. Acreage under primary forest: 4,300 Acreage under title: nil.	9,700. The area could be extended down the Baram River slightly. Acreage under primary forest: 5,000. Some is possible old secondary forest. Acreage under title: 315
Dominant Topography	Low to moderately high and steep ridges and hills of Terrain Classes 4 and 6. Slope facets of Terrain Class 8 are common and small areas of Terrain Class 1 probably occur in places.	Flat to gently sloping alluvial basins of Terrain Class 1.
Main Soils	The Nyalau Family of soils is dominant in hill areas, with subordinate Merit Family soils in places. River levees contain Semilajau s ils and river basins Malang soils.	The Bijat Family of soils is dominant except on the levees of main rivers and ox-bow lakes where Malang soils occur. Patches of Anderson family peat, both at the surface and beneath the clay soils may be present in the Tasong area.
Present Cultivation	Mainly hill rice, some swamp rice and seedling rubber close to rivers.	Mainly swamp and hill rice; scattered fruit and vegetable gardens near villages; small patches of seedling rubber close to rivers.
Main Hazards	Low soil fertility and strong risk of gully erosion with Nyalau soils on slopes exceeding 15-20, areas which should be avoided where possible.	Periodic flooding and the presence of deep peat.
Land Suitability	Many small hill areas are too steep for agriculture, large areas are marginal: alluvial valleys and low hills are the most suitable for agriculture. A semi-detailed soil survey would be necessary to delimit the small areas of steep land with shallow soils.	Most is suitable for the cultivation of mainly irrigated crops; the patches of deep peat, are unsuitable for cultivation and are probably most common in the Tasong area. A thorough appereciation of the flooding, drainage and irrigation problems is required before development.

Block	3. KUALA TUTOH	4. KUALA PEKING	5. IKANG
Area (Acre)	6,300. The area could be extended considerably up the Tutoh River. Acreage under primary forest: 300. Some is possible old secondary forest. Acreage under title: 279.	5,700. There is little scope for extension Acreage under primary forest: 2,000. Small areas are possibly old secondary forest. Acreage under title: nil.	7,500. The area could be extended up the Baram River considerably. Acreage under primary forest: 200. Small areas are possibly old secondary forest. Acreage under title: nil.
Dominant Topography	Flat to gently sloping alluvial land of Terrain Class 1.	Flat to gently sloping alluvial land of Terrain Class 1.	Flat to undulating alluvial land of Terrain Class 1.
Main Soils	Bijat and Malang family soils are dominant with possibly small patches of surface peat, and sandy levee soils of the Semilajau Family.	Bijat family soils are dominant with the possibility of shallow surface peat and deep peat beneath shallow clay south of the Peking River.	Bijat and Malang family soils are dominant, the latter on river banks and close to streams. Patches of Anderson family peat soils may occur, particularly close to swamp margins.
Present Cultivation	Mainly swamp and hill rice; scattered fruit and vegetable gardens near villages; a few small seedling rubber gardens close to rivers.	Mainly swamp rice and small scattered seedling rubber gardens close to rivers.	Mainly swamp rice with vegetable, fruit and rubber gardens adjacent to rivers.
Main Hazards	Periodic flooding.	Periodic flooding.	Periodic flooding.
Land Suitability	Most is suitable for cultivation, partly of irrigated crops, partly for dry land crops. A through appreciation of the flooding, drainage and irrigation problems is required before development.	Most land is suitable for the cultivation of irrigated crops. Areas south of the Peking River may be marginal or unsuitable due to the pregence of peat. A through appreciation of the flooding, drainage and irrigation problems is required before development.	Most land is suitable of cultivation, partly of irrigated crops, partly of dry land crops. There are possibly patches of peat unsuitable for cultivation. A through appreciation of the flooding, drainage and irrigation problems is required before development.

Appendix Table A-2-5 Description of Agricultural Potential Area

Block	6. TERU	7. PEKING	8. BAIN-LAMA
Area (Acre)	3,000. The area could be extended west considerably into the upper Karap River. Acreage under primary forest: 600. Some is possibly old secondary forest. Acreage under title: nil.	10,000. There is a little scope for extension of the block onto low hills on all margins. Acreage under primary forest: 5,000. Acreage under title: nil.	21,700. The area could be extended onto rather high hill land mainly in the south. Acreage under primary forest: 11,500. Acreage under title: nil.
Dominant Topography	Flat to gently sloping alluvial land of Terrain Class 1.	Low to moderately high, gentle to steeply sloping hills. Small slope facets of Terrain Class 8 are probably common.	Low to moderately high hills and ridges with gentle to steep slopes of Terrain Classes 4 and 6: Many small slope facets occur of Terrain Class 8.
Main Soils	Bijat soils are dominant with subordinate Mukah, and probably Anderson family peat, in places.	Merit Family soils are dominant with subordinate Malang, Bijat and Anderson soils in small valleys.	Merit family clayey soils are dominant, with locally Nyalau soils and Merit soils with sandy upper subsoils. Small valleys contain Malang and Bijat family soils with a few patches of Anderson Family peat.
Present Cultivation	Mainly swamp rice and a few seedling rubber gardens close to rivers.	Mainly hill rice, and seedling rubber gardens close to villages.	Largely hill rice with a few small seedling rubber gardens close to villages.
Main Hazards	Periodic flooding and the presence of deep peat close to swamp margins.	Low to moderately high, gently to steeply sloping hills. Small slope facets of Terrain Class 8 are probably common.	Low soil fertility and sheet and gully erosion on unprotected steep slopes. Shallow soils in places.
Land Suitability	Much land is suitable for the cultivation of irrigate crops mainly; patches of unsuitable deep peat may be present. A through appreciation of the flooding, drainage and irrigation problems is required before development.	Most of this block is thought to be suitable, or in places marginal for the cultivation of dry land, annual or perennial crops.	Most of this block is thought to be suitable for the cultivation of dry land, annual and perennial crops, although many small patches may be marginal or unsuitable due to steep slopes and shallow soils.

Appendix Table A-2-5 DESCRIPTION OF AGRICULTURAL POTENTIAL AREA

Block	9. SELEMEN-ARDH	10. MALOI-TABIR
Area (Acre)	8,600. There is little extra hill land available but much alluvial land adjacent to the Baram River. Acreage under primary forest: 2,400. Acreage under title: nil.	7,500. The area could be extended slightly on to higher hill land mainly to the south. Acreage under primary forest: 6,800. Acreage under title: nil.
Dominant Topography	Low to moderately high, gentle to steep hills and ridges of Terrain Class 4 and 6. Many small slope facets of Terrain Class 8 occur.	Low to moderately high, gentle to steep hills and ridges of Terrain Classes 4 and 6. Many small slope facets of Terrain Class 8 occur and patches of Terrain Class 7 may be common.
Main Soils	Merit Family soils are dominant with subordinate Nyalau soils mainly on the crests of high ridges. Malany and Bijat soils have been noted in small valleys.	Merit Family soils are probably dominant with Nyalau soils being confined largely to the higher ridges. Valleys contain both Semilajau and Malany soils and on the northern margin Anderson Family peat occupies some valleys.
Present Cultivation	Mainly hill rice with seedling rubber gardens close to villages.	Mainly hill rice and rubber. In the Tabih (Bemang) area R.P.S.'A' rubber has been planted successfully.
Main Hazards	Low soil fertility and sheet and gully erosion in unprotected steep slopes. Shallow soils in places.	Low soil fertility and sheet and gully erosion on steep slopes. Shallow soils in places.
Land Suitability	Most of the block is thought to be suitable for the cultivation of dry land, annual and perennial crops, although many small patches may be marginal of unsuitable due to steep slopes and shallow soils.	Much of the block is thought to be suitable or marginal for the cultivation of dry land, perennial and annual crops; small areas are likely to be unsuitable due to steep slopes and shallow soils. A semi-detailed survey may be necessary to delimit the worst areas.

Appendix Table A-2-5 DESCRIPTION OF AGRICULTURAL POTENTIAL AREA

Block	11. TERAWAN-WEST	12. TERAWAN-EAST
Area (Acre)	3,300. There is a little scope for extension on the northern margins onto hill land, possibly containing poor terrace soils and alluvial land. Acreage under primary forest: 2,900. Timber is being extracted in the north. Acreage under title: nil.	2,500. It may be possible to extend the area eastwards onto higher hills and westwards onto alluvial land. Acreage under primary forest: 2,400. Acreage under title: nil.
Dominant Topography	Moderately high to high, moderately steep to steep ridges of Terrain Class 6 occur in the north; dissected, rather lower hills of Terrain Classes 4 and 6 occupy the southern parts. Slope facets of Terrain Class 8 are probably most common in the ridges to the north.	Low to moderately high hills and ridges with gentle to steep slopes of Terrain Classes 4 and 6. Slope facets of Terrain Class 8 may be common.
Main Soils	Mixed Merit and Nyalau family soils occur and possibly gravelly Sabangan soils in the north. The Nyalau members are confined mainly to high ridges. Minor patches of deep peat occur in marginal valleys.	Mixed Merit-Nyalau family soils are dominant with long narrow belts of Malany and Semilajau soils in few valleys.
Present Cultivation	Mainly hill rice in the north.	A small patch of land is cultivated for hill rice in the north.
Main Hazards	Low soil fertility, sheet and gully erosion on higher steep hills and ridges and shallow soils.	Low soil fertility, sheet and gully erosion on high steep hills and shallow soils.
Land Suitability	Much of the land is marginal to suitable for the cultivation of dry land, perennial and annual crops. There are probably many small areas of unsuitable land on steep slopes. A semi-detailed soil survey may be necessary to delimit the worst areas.	Much of the land is marginal or suitable for the cultivation of dry land annual and perennial crops. A semidetailed soil survey may be necessary to delimit the worst areas.

Appendix Table A-2-5 DESCRIPTION OF AGRICULTURAL POTENTIAL AREA

Block	13. GAZ	14. BEREI SELAMAT-WEST	15. BEREI SELAMAT-EAST
Area (Acre)	3,600. It may be possible to extend the area north and south into higher hills. Acreage under primary forest: 3,400. Part of the area is being exploited for timber. Acreage under title: nil.	7,200. There is little scope for expansion of this area. Acreage under primary forest: 6,100. Acreage under title: nil.	1,500. There is little scope for extending this block. Acreage under primary forest: nil. Acreage under title: nil.
Dominant Topography	Low to moderately high hills and ridges with gentle to steep slopes of Terrain Classes 4 and 6. There are probably many slope facets of Terrain Class 8 and small areas of Terrain Class 7.	Low to moderately high hills and ridges with gentle to steep slopes in Terrain Classes 4 and 6. Many slope facets of Terrain Class 8 occur and there may be some hills of Terrain Class 7.	Low to moderately high, gentle to steep hills and ridges of Terrain Classes 4 and 6. Many slope facets of Terrain Class 8 occurs.
Main Soils	Mixed Merit and Nyalau family soils with Bijat and Malany soils in the valleys.	Merit family soils are dominant. Small valleys on margins contain Anderson Family peat.	Merit Family soils are thought to occur throughout the area with subordinate Kapit soils on steep slopes.
Present Cultivation	nil.	Part of the area is planted with hill rice in the west.	nil.
Main Hazards	Low soil fertility, sheet and gully erosion on steep slopes and shallow soils.	Low soil fertility, sheet erosion on unprotected steep slopes and shallow soils.	Low soil fertility, erosion on unprotected steep slopes and shallow soils.
Land Suitability	Much of the land is marginal or suitable for the cultivation of dry land perennial and annual crops. Many small areas consist of slopes too steep for cultivation. A semi-detailed soil survey may be required for the delimitation of the worst areas.	Most of this block is considered to be suitable for agriculture although many small areas of marginal and unsuitable land occurs, mainly on steep slopes.	Most of the land is marginal to suitable of the cultivation of dry land, perennial and annual crops. Further field investigations may prove that the steep land is extensive.

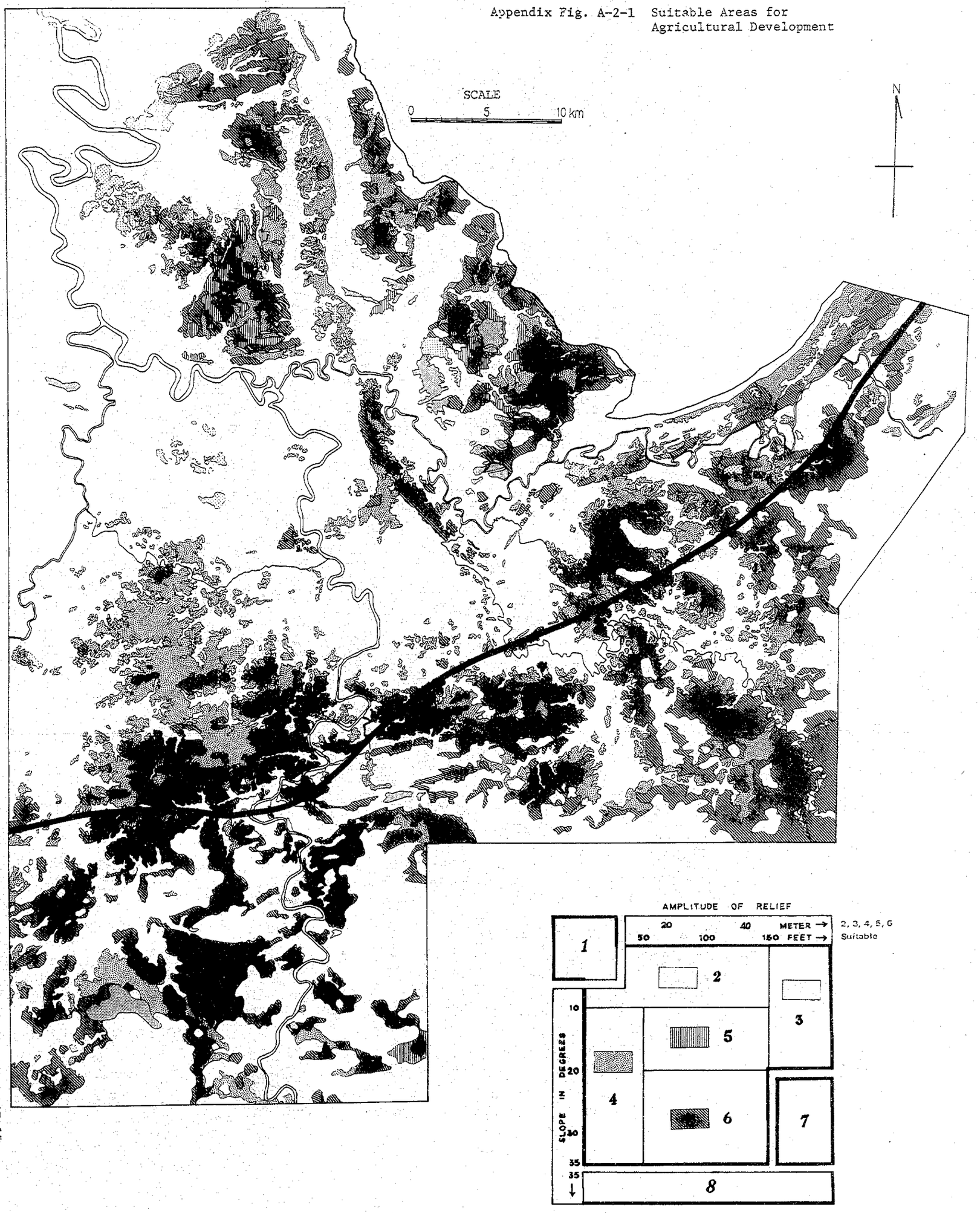
Appendix Table A-2-5 DESCRIPTION OF AGRICULTURAL POTENTIAL AREA

Block	16. ULU TERAWAN	17. DIAT-NORTH	18. DIAT-SOUTH
Area (Acre)	2,200. Extensions to this block might be made to the north on alluvial and/or peat land. Acreage under primary forest: nil. Acreage under title: nil.	1,200. It may be possible to extend this area north to higher hill land. Acreage under primary forest: nil. Acreage under title: nil.	2,000. It may be possible to extend this block north among higher hill land. Acreage under primary forest: 200. Acreage under title: nil.
Dominant Topography	Flat alluvial land.	Low to moderately high, gentle to steep hills and ridges of Terrain Classes 4 and 6. Many slope facets of Terrain Class 8 occur.	Low to moderately high hills and ridges with gentle to steep slopes in Terrain Classes 4 and 6. Many slope facets of Terrain Class 8 occur and there may be some hills of Terrain Class 7.
Main Soils	It is thought that Bijat and Malang family soils are dominant but it is possible that many parts contain deep surface peat or peat beneath shallow clay.	Merit Family soils are thought to be dominant probably with Malang and Bijat soils in the small valleys.	Merit Family soils are dominant. Small valleys on the margins contain Anderson Family peat.
Present Cultivation		nil.	nil.
Main Hazards	Periodic flooding and presence of deep peat.	Low soil fertility, sheet erosion on unprotected steep slopes and shallow soils.	Low soil fertility, sheet erosion on unprotected steep slopes and shallow soils.
Land Suitability	Land suitable for the cultivation of irrigated crops is probably dominant, although the possible presence of much peat unsuitable for cultivation must not be discounted. A semi-detailed survey would be required to delimit the unsuitable land, and a through appreciation of the flooding, drainage and irrigation problems is required before any development takes place.	Most of the land is marginal to suitable for the cultivation of dry land, perennial and annual crops. Further field investigations may prove that the steep land is extensive.	Most of this block is considered to be suitable for agriculture although many small areas of marginal and unsuitable land occur, mainly on steep slopes.

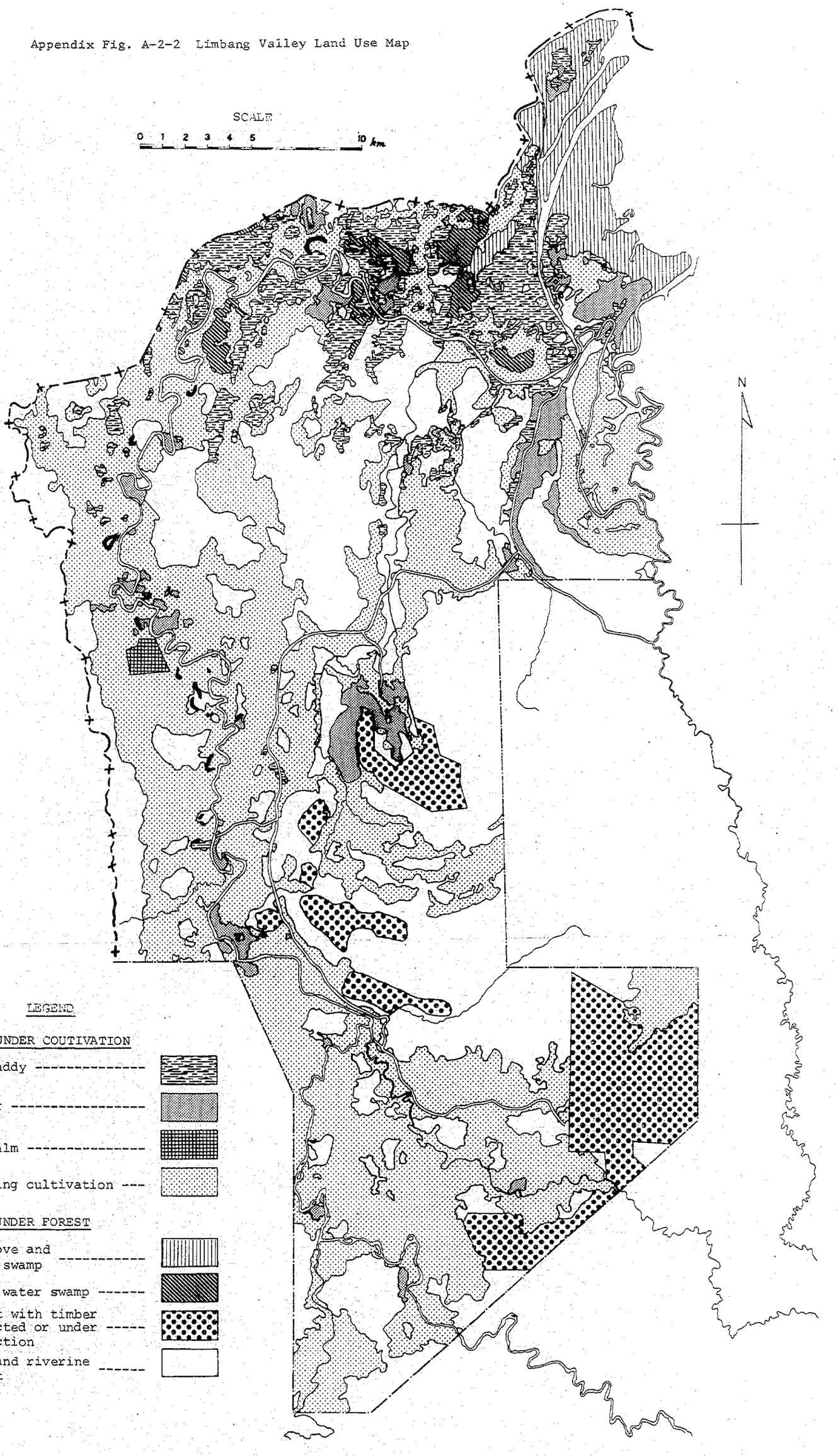
Block	19. SEMAND	20. LARAI
Area (Acre)	3,000. It may be possible to extend this block southwards among higher hill land. Acreage under primary forest: all. Acreage under title: nil.	4,000. This block could probably be extended to the east and south among higher hill land if necessary. Acreage under primary forest: all (?). Acreage under title: nil.
Dominant Topography	Low to moderately high, gentle to steep hills and ridges of Terrain Classes 4 and 6. Many small slope facets of Terrain Class 8 occur and patches of Terrain Class 7 may be present.	Low to moderately high, gentle to steep hills and ridges of Terrain Classes 4 and 6. Many small slope facets of Terrain Class 8 occur and patches of Terrain Class 7 may be present.
Main Soils	Merit Family soils are thought to be dominant with Anderson Family peat and Malang and Bijat soils in the valley on the margins.	Merit Family soils are dominant with subordinate Nyalau soils in a few places on the higher ridges.
Present Cultivation	Small areas in the north are in use for hill rice cultivation.	It is probable that small parts are used for hill rice cultivation (none in 1951 air photographs).
Main Hazards	Low soil fertility and sheet and gully erosion on steep slopes. Shallow soils in places.	Low soil fertility and sheet and gully erosion on steep slopes. Shallow soils in places.
Land Suitability	Much of the block is thought to be suitable or marginal for the cultivation of dry land, perennial and annual crops; small areas are likely to be unsuitable due to steep slopes and shallow soils. A semi-detailed survey may be necessary to delimit the worst areas.	Much of the block is thought to be suitable or marginal for the cultivation of dry land, perennial and annual crops; small areas are likely to be unsuitable due to steep slopes and shallow soils. A semi-detailed survey may be necessary to delimit the worst areas.

Block	21. NYALIN	22. ATIP	23. MELANA
Area (Acre)	14,500. Extensions to this block could probably be made to the south and possibly to the west among higher hills. Acreage under primary forest: 7,300. Acreage under title: nil.	1,460. Extensions to this block can only be made into alluvial land on the margins. Acreage under primary forest: 100. Acreage under title: nil.	2,500. Slight extensions to this block can be made to the east. Acreage under primary forest: 200. Acreage under title: nil.
Dominant Topography	Low to moderately high, gently to steep hills and ridges of Terrain Classes 4 and 6. Many small slope facets of Terrain Class 8 occur and patches of Terrain Class 7 may present.	Low to moderately high, gentle to moderately steep hills of Terrain Class 4. Slope facets of Terrain Class 8 are few.	Low to moderately high hills and ridges with gentle to steep slopes in Terrain Classes 4 and 6. Many slope facets of Terrain Class 8 occur and there may be some hills of Terrain Class 7.
Main Soils	Merit Family soils are dominant, and Nyalau Family soils are thought to occur also in the west, mainly in higher hills. Small valleys contain Malang and Bijat soils mainly.	Merit soils are dominant with subordinate Bijat and Mukah soils in the common minor valleys.	Merit family soils are dominant, in places Kapit Family soils occur.
Present Cultivation	Farms in the east are used for hill rice cultivation. Small fruit, coffee and rubber gardens, some R.P.S. 'A', are located near rivers.	Almost wholly hilly rice.	Mainly hill rice cultivation, with fruit, coffee and seedling rubber gardens close to rivers.
Main Hazards	Low soil fertility and sheet and gully erosion on steep slopes. Shallow soils in places.	Soil fertility, sheet erosion on unprotected steep slopes and shallow soils.	Low soil fertility, sheet erosion on unprotected steep slopes and shallow soils.
Land Suitability	Much of the block is thought to be suitable or marginal for the cultivation of dry land, perennial and annual crops; small areas are likely to be unsuitable due to steep slopes and shallow soils. A semi-detailed survey would be necessary to delimit the worst areas.	Most of this block is considered to be suitable for cultivation of dry land, perennial and annual crops. Small patches of marginal land may occur where there are steep slopes.	Much of this block is considered to be marginal to suitable for cultivation. Many small areas may be unsuitable due to steep slopes. A semi-detailed soil survey would be required to delimit the worst areas.

Appendix Fig. A-2-1 Suitable Areas for Agricultural Development



Appendix Fig. A-2-2 Limbang Valley Land Use Map



Appendix Table A-2-6 Hill Timber Production, 1977

000HT

Species	Fourth Div.			Fifth Div.		
	Export	Sawmill	Total	Export	Sawmill	Total
Meranti	366.9	1.9	368.8	61.0	1.8	62.8
Ranggu	4.9	neg.	4.9	neg.	-	neg.
Kapor	83.8	1.2	85.0	11.8	0.8	12.6
Keruing	44.9	1.5	46.4	7.9	0.4	8.3
S. Batu	35.5	1.2	36.7	1.0	0.6	1.6
Resak	0.5	0.1	0.6	neg.	-	neg.
Sepetir	8.4	0.1	8.5	neg.	-	neg.
Medang	1.4	0.1	1.5	neg.	-	neg.
Bindang	0.1	-	0.1	10.4	-	10.4
Kerukup	neg.	-	neg.	neg.	-	neg.
Others	76.3	1.1	77.4	2.0	neg.	2.0
Total	622.7	7.2	629.9	94.1	3.6	97.7

Source; Forest Department Annual Report, 1977, Miri Section

Appendix Table A-2-7 Swamp Timber Production

000HT

Species	Fourth Div.			Fifth Div.		
	Export	Sawmill	Total	Export	Sawmill	Total
Ramin	-	60.2	60.2	-	4.9	4.9
Jongkong	1.3	neg.	1.3	2.6	neg.	2.6
Sepetir	29.6	0.8	30.4	0.2	neg.	0.2
Medang	0.5	neg.	0.5	neg.	neg.	neg.
Semayur	0.4	neg.	0.4	-	-	-
Kerukup	4.0	1.5	5.5	neg.	-	neg.
Alan	312.8	38.2	351.0	-	-	-
Meranti	2.8	0.1	2.9	0.5	-	0.5
Kapor	7.1	0.7	7.8	0.2	-	0.2
Others	26.4	1.1	27.5	0.7	0.1	0.8
Total	384.9	102.6	487.5	4.2	5.0	9.2

Source; Forest Department Annual Report 1977, Miri Section

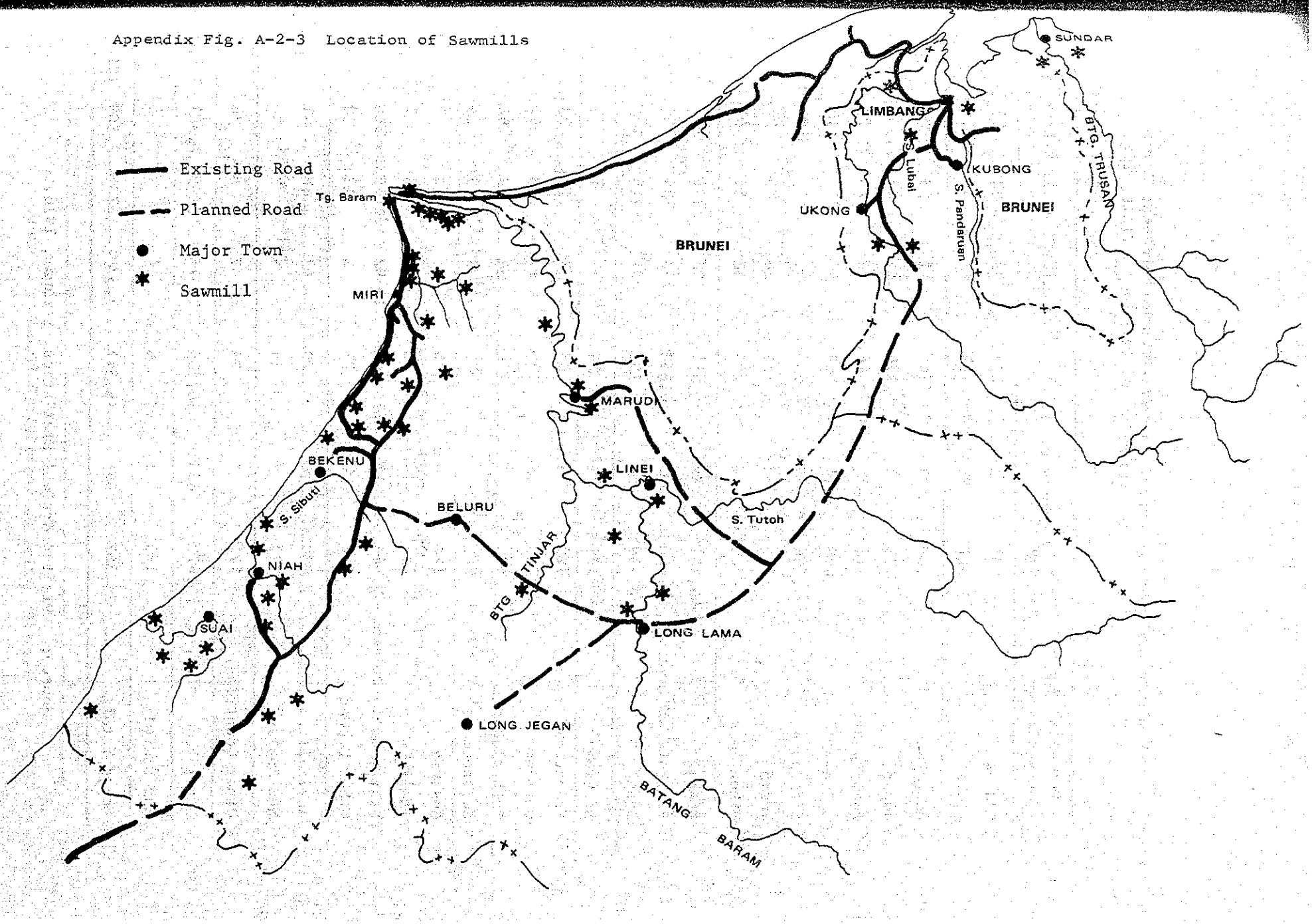
Appendix Table A-2-8 Sawmill Operation in Miri Section

Section	Number of Sawmills: Vertical Band	Number of Sawmills: Horizontal Band	Number of Sawmills: Circular	Total No. Sawmills	Average Labour Employed: Chinese	Iban	Malay	Melanau	Others	Total	Sawn Timber Conversion: In-put (hop. ton)	Out-put (Cu. ton)	Remarks
Miri	14	4	21	39*	268	292	252	18	38	868	90,399.77	42,298.54	*Including 3 domestic and belian mills, and 4 new licences issued during the year.
Section					(25)	(23)	(6)	-	(1)	(55)			
				TOTAL:	293	315	258	18	39	913			

NOTE: Figures in brackets denotes the No. of female employees.

Source; Forest Department Annual Report 1977, Miri Section

Appendix Fig. A-2-3 Location of Sawmills



Appendix Table A-2-9 Arrivals of Visitors by Permanent Place of Residence and Purpose of Visit, 1976

Permanent Place of Residence	Leisure/ Holiday	Education	Business	Official	Transit	Others	Total
Canada	487	3	135	39	32	82	778
U.S.A.	1,971	28	499	45	56	115	2,714
Hong Kong	406	1	245	11	13	26	702
Japan	733	5	1,136	35	24	36	1,969
Philippines	114	2	66	36	23	15	256
Indonesia	698	14	109	57	247	118	1,243
Singapore	5,169	13	4,558	45	145	107	10,037
India	646	2	125	20	16	29	838
Other Asia	266	2	183	38	31	62	582
Brunei	46,441	89	1,954	38	436	274	49,232
Peninsiar Malaysia	8,606	305	6,668	1,748	234	859	18,420
Sabah	3,889	164	1,191	227	215	144	5,830
Belgium	125	1	24	1	1	6	158
France	769	3	75	7	13	23	890
Germany	983	2	140	17	23	47	1,212
Netherlands	585	2	156	34	98	166	1,041
Switzerland	265	1	25	3	3	13	310
Austria	147	-	8	2	1	-	158
Italy	244	-	28	5	2	1	280
U.K.	1,546	13	791	92	75	218	2,735
Other Europe	144	-	77	3	12	10	246
Australia	939	10	279	62	48	93	1,431
New Zealand	222	3	34	3	2	36	300
Other Countries	277	2	33	7	5	24	348
Total	75,672	665	18,539	2,575	1,755	2,504	101,710
Not Stated	185	1	8	4	-	5	203
Grand Total	75,857	666	18,547	2,579	1,755	2,509	101,913

Source; Visitor Arrival Statistics, Sarawak, 1976.

Appendix Table A-2-10 Arrivals of Visitors by Nationality, Sarawak

Nationality	1972 Persons	1972 (%)	1973 Persons	1973 (%)	1975 Persons	1975 (%)	1976 Persons	1976 (%)	Annual Growth Rate(%)
U.S.A.	2,304	3.8	2,518	3.8	2,889	3.7	3,463	3.7	10.0
Canada	400	0.7	502	0.7	515	0.7	901	1.0	17.9
Japan	1,638	2.7	1,790	2.7	1,973	2.5	1,958	2.1	4.6
India	1,322	2.2	949	1.4	899	1.2	1,090	1.2	-4.3
Brunei	20,559	34.0	22,492	33.9	26,130	33.4	36,778	39.5	14.0
Indonesia	1,019	1.7	1,595	2.4	1,563	2.0	1,169	1.3	2.6
Singapore	6,338	10.5	6,240	9.4	7,814	10.0	8,573	9.2	8.6
Malaysia	16,918	28.0	19,517	29.4	21,664	27.7	24,498	26.3	8.8
Other Asia	1,421	2.3	1,260	1.9	1,184	1.5	1,430	1.5	-0.5
France	487	0.8	662	1.0	972	1.2	974	1.0	19.4
Germany	492	0.8	726	1.1	2,435	3.1	1,416	1.5	39.4
Netherlands	1,515	2.5	1,627	2.5	1,995	2.6	2,225	2.4	10.2
U.K.	3,547	5.9	3,641	5.5	4,428	5.7	4,794	5.1	8.3
Other Europe	1,009	1.7	1,145	1.7	1,406	1.8	1,393	1.5	8.9
Australia	986	1.6	1,156	1.7	1,552	2.0	1,698	1.8	14.8
New Zealand	242	0.4	317	0.5	320	0.4	365	0.4	8.7
Other Countries	246	0.4	250	0.4	410	0.5	434	0.5	17.7
Total	60,443	100.0	66,387	100.0	78,149	100.0	93,159	100.0	10.8
Not Stated	14		2		42		77		-
Stateless Persons	10,684		12,997		8,009		8,677		-
Grand Total	71,141		79,386		86,200		101,913		8.3

Source; Annual Statistical Bulletin, Sarawak

Appendix Table A-2-11 Arrivals of Visitors by Purpose of Visit, Sarawak

Purpose of Visit	1973	1974	1975	1976 (%)
Leisure/Holiday	71.7	71.3	71.0	74.4
Education	0.1	0.5	0.6	0.7
Business	18.3	19.2	20.3	18.2
Official	2.8	2.7	4.0	2.5
Transit	2.0	1.9	2.2	1.7
Others	5.1	4.4	1.9	2.5
Total	100.0	100.0	100.0	100.0

Source; Annual Statistical Bulletin, Sarawak

Appendix Table A-2-12 Arrivals of Visitors by Mode of Transport, Point of Entry and Purpose of Visit, 1976

Mode of Transport	Point of Entry	Purpose of Visit						
		Leisure/ Holiday	Education	Business	Official	Transit	Others	Total
AIR	Kuching	14,144	464	10,253	1,767	720	1,230	28,578
	Miri	3,224	56	4,162	439	209	368	8,458
	Others	128	2	100	7	12	33	282
	Sub-total	17,496	522	14,515	2,213	941	1,631	37,318
SEA	Kuching	473	5	40	199	65	128	910
	Limbang	19,502	5	802	31	214	60	20,614
	Lawas	790	7	100	4	4	33	938
	Sundar	1,395	1	26	3	112	10	1,547
	Others	101		-	22	249	17	408
	Sub-total	22,261	18	987	259	644	248	24,417
LAND	Sungei Tujoh	37,754	122	3,032	107	153	599	39,767
	Biawak	174	-	-	-	6	20	200
	Others	172	4	13	-	11	11	211
	Sub-total	36,100	126	3,045	107	170	630	40,178
TOTAL		75,857	666	18,547	2,579	1,755	2,509	101,913

Source; Annual Statistical Bulletin, Sarawak, 1976.

Appendix Table A-2-13 Arrivals of Visitors by Mode of Transport, Sarawak

Mode of Transport	1972	1973	1975	1976	Average Annual Growth Rate (%)
Air ; Number	24,704	29,460	35,527	37,318	10.7
(%)	(34.7)	(37.1)	(41.2)	(36.6)	
Sea ; Number	17,358	18,708	18,442	24,417	6.9
(%)	(24.4)	(23.6)	(21.4)	(24.0)	
Land ; Number	29,079	31,218	32,231	40,178	7.0
(%)	(40.9)	(39.3)	(37.4)	(39.4)	
Total ; Number	71,141	79,386	86,200	101,913	8.3
(%)	(100.0)	(100.0)	(100.0)	(100.0)	

Source; Annual Statistical Bulletin, Sarawak, 1973 and 1976.

Appendix Table A-2-14 Arrivals of Visitors by Intended Length of Stay, 1976

Intended Length of Stay	AIR		SEA		LAND		TOTAL	
	Persons	(%)	Persons	(%)	Persons	(%)	Persons	(%)
Less than 1 day	507	(1.4)	12,856	(53.2)	2,659	(6.6)	16,022	(15.9)
1 - 3 days	8,568	(23.3)	4,771	(19.7)	18,323	(45.8)	31,662	(31.4)
4 - 7 days	11,539	(31.4)	3,547	(14.7)	13,900	(34.7)	28,986	(28.7)
8 - 14 days	10,069	(27.4)	2,456	(10.2)	3,779	(9.4)	16,304	(16.2)
15 - 21 days	1,121	(3.1)	70	(0.3)	251	(0.6)	1,442	(1.4)
22 days to 1 month	587	(1.6)	54	(0.2)	84	(0.2)	725	(0.7)
1 - 3 months	2,406	(6.6)	150	(0.6)	517	(1.3)	3,073	(3.0)
3 - 6 months	660	(1.8)	41	(0.2)	156	(0.4)	857	(0.8)
6 months to 1 year	366	(1.0)	30	(0.1)	178	(0.5)	574	(0.6)
Over 1 year	899	(2.4)	186	(0.8)	210	(0.5)	1,295	(1.3)
Total	36,722	(100.0)	24,161		40,057		100,940	
Not Stated	596		256		121		973	

Source; Annual Statistical Bulletin, Sarawak.

Appendix Table A-2-15 Monthly Variation of Arrivals of Visitors, Sarawak

Month	1973	1974	1975	1976
January	6.7	7.1	7.2	6.1
February	7.2	6.8	7.0	7.1
March	6.5	8.0	8.5	7.3
April	9.6	9.3	9.6	8.8
May	8.6	8.0	8.5	9.0
June	8.2	7.9	7.0	7.9
July	9.5	8.6	8.5	8.4
August	10.5	10.2	10.1	8.7
September	7.7	7.9	7.5	9.8
October	8.8	8.7	8.8	7.8
November	7.6	7.2	7.7	8.3
December	9.1	10.3	9.6	10.8
TOTAL	100.0	100.0	100.0	100.0

Source; Annual Statistical Bulletin, Sarawak, 1973 and 1976.

Appendix Fig. A-3-1 Traffic Count Survey Sheet

Station No.	Date of Count	Weather	Direction	Name of Surveyor	Name of Supervisor	Sheet No.
			—			

Type of Vehicle	0 ~ 1	1 ~ 2	2 ~ 3	3 ~ 4	4 ~ 5	5 ~ 6	6 ~ 7	7 ~ 8	8 ~ 9	9 ~ 10	10 ~ 11	11 ~ 12	12 ~ 13	13 ~ 14	14 ~ 15	15 ~ 16	16 ~ 17	17 ~ 18	18 ~ 19	19 ~ 20	20 ~ 21	21 ~ 22	22 ~ 23	23 ~ 24	Total
1. Car 																									
2. Taxi 																									
3. Van, pick-up 																									
4. Medium truck 																									
5. Heavy truck 																									
6. Truck-trailer 																									
7. Bus 																									
8. Motor cycle																									
9. Bicycle																									
10. Others																									
Total																									

BELURU/LONG LAMA/LIMBANG ROAD PROJECT

Appendix Fig. A-3-2 Road-side Interview Questionnaire

Station No.		Name of interviewer	Sheet No.
Date of interview			
Weather		Name of supervisor	/
Direction			
–			

1. Time of interview (Enter actual time)

2. Type of vehicle

1	Car	6	Truck-trailer
2	Taxi	7	Bus
3	Van, Pick-up	8	Motor cycle
4	Medium truck	9	Bicycle
5	Heavy truck	10	Others

Model of the vehicle		5. Origin	6. Destination	7. Trip purpose	Passenger cars		Trucks			13. Average travel time	14. Major points en route
3. Model/ Make	4. Age	Name of the place where you start the trip	Name of the place where you finally finish the trip	1. Home-Workplace 2. Work 3. To Home 4. Social intercourse, recreation 5. Others	8. Capacity (No. of persons)	9. No. of Passengers aboard	10. Loading Capacity (tons)	11. Type of Commodities carried	12. Weight of the Commodities (tons)		Name of route or municipality en route

1. Time	2. Type of vehicle	3. Model/make of the vehicle	4. Age	5. Origin	6. Destination	7. Trip purpose	8. Capacity	9. No. of pass.	10. Loading capacity	11. Type of commodities carried	12. Weight	13. Average travel time	14. Major points en route

Appendix Fig. A-3-3 Interview Sheet for Passengers (Water Transpo

Station No.		Name of Interviewer	Sheet No.	1. Time of interview	2. Origin	3. Destination	4. Major places en route
Date of Interview				(Enter actual time)	Name of the place where you start the trip.	Name of the place where you finally finish the trip	Name of route or municipality en route
Weather		Name of Supervisor					
Direction							
–							

5. Trip purpose	
1.	Home-Work place
2.	Work
3.	To Home
4.	Social Intercourse, recreation
5.	Others

6. Transport means before/after	
1.	On foot
2.	Bus
3.	Car/taxi
4.	Boat
5.	Others

7. Average travel time (min.)

8. Sex	
1.	Male
2.	Female

9. Age

10. Occupation			
1.	Managerial staff	5.	Student
2.	Supervisor or craftman	6.	Housewife
3.	Shop or office clerk	7.	Unemployed
4.	Part-time workers	8.	Others (Specify)

1. Time	2. Origin	3. Destination	4. Major places en route		5. Trip purpose	6. Transport means before/after		7. Average Travel time	Passenger Characteristics			
									8. Sex	9. Age	10. Occupation	11. Race

BELURU/LONG RAMA/LIMBANG ROAD PROJECT

Appendix Fig. A-3-4 Interview Sheet for Boats (Water Transport)

Station No.		Name of interviewer	Sheet No.
Date of interview			
Weather		Name of supervisor	
Direction			
—			

1. Time of Interview (Enter actual time)

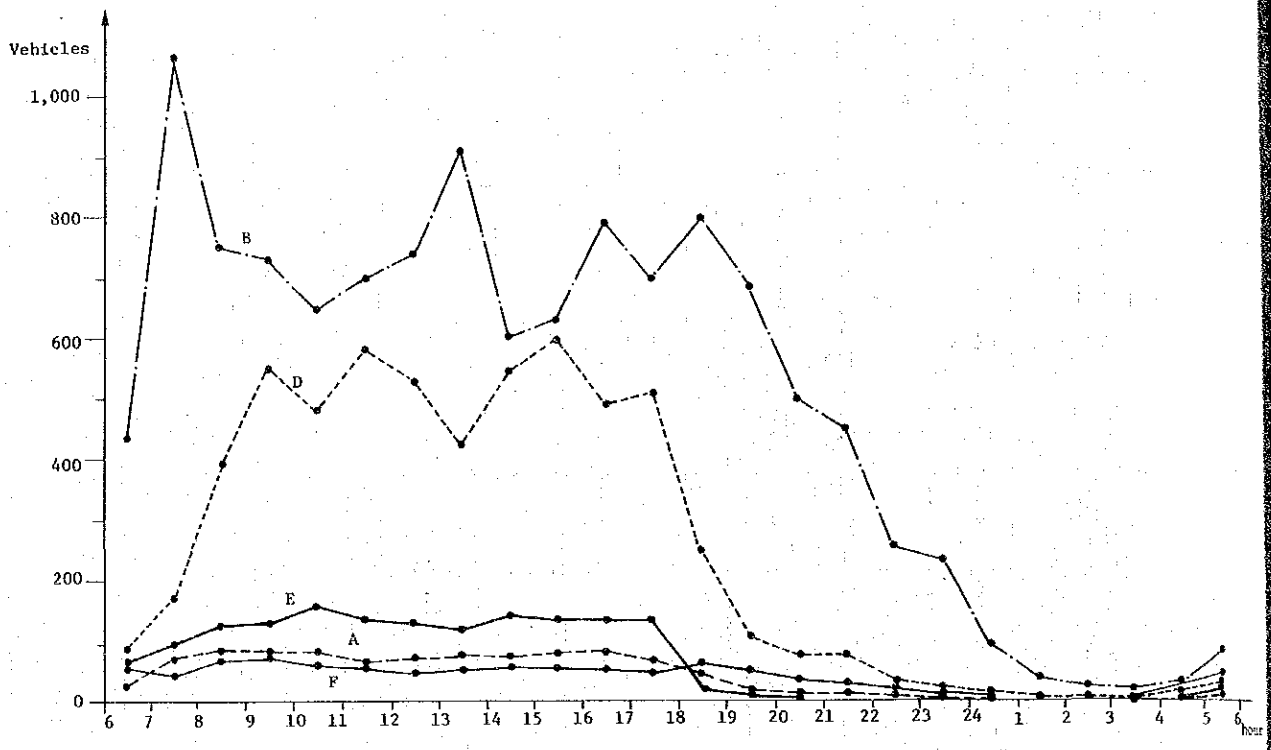
2. Type of vehicle

1	Long Boat	6	Barge
2	Pan Toon	7	Oil Tanker
3	Motor Launch	8	Others
4	Speed Boat		
5	Tug Boat		

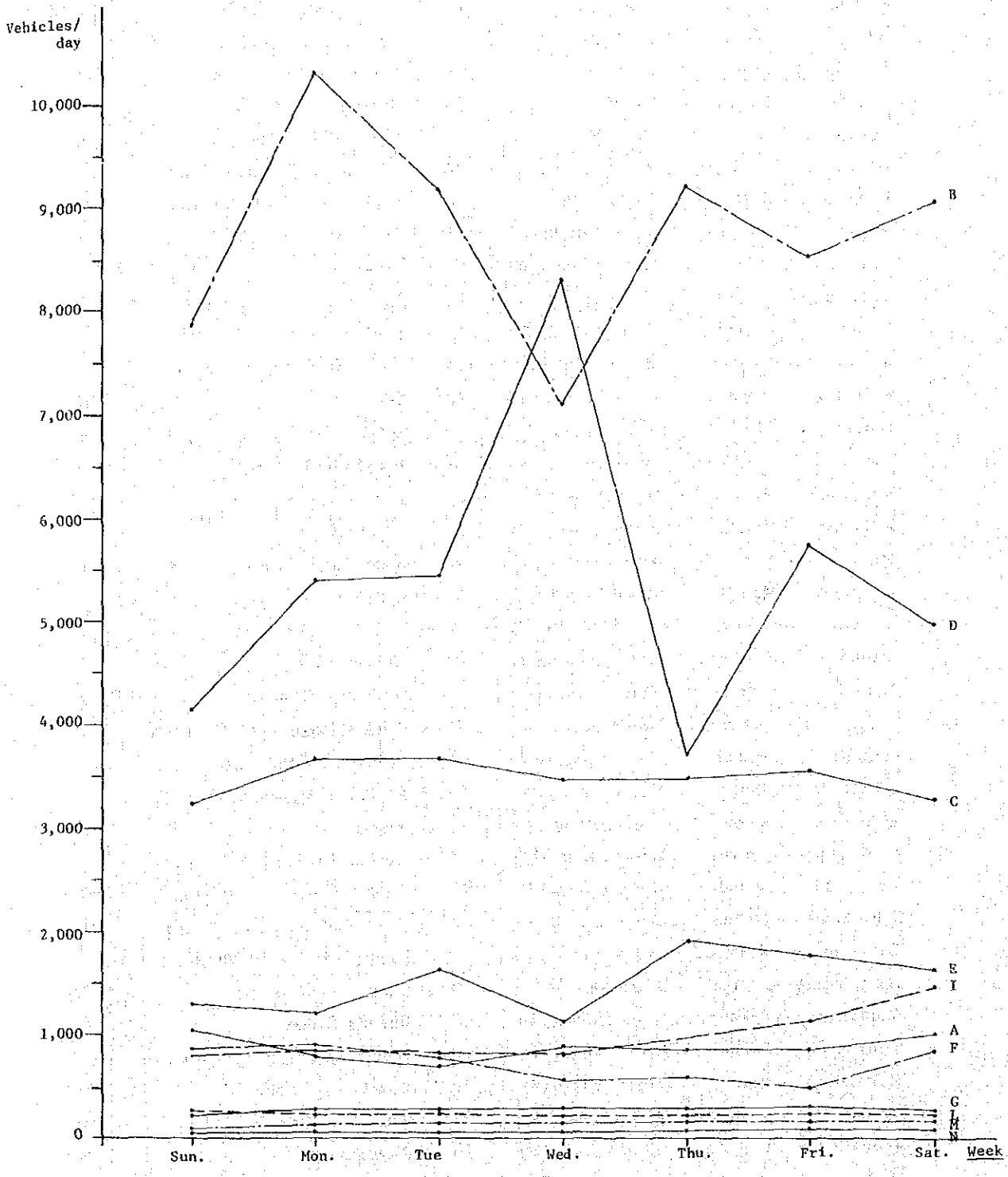
Model of the vessel		5. Origin	6. Destination	7. Trip purpose		Passenger		Goods			13. Average travel time	14. Major points en route
3. Model/ Make	4. Age	Name of the place where you start the trip	Name of the place where you finally finish the trip			8. Capacity (No. of persons)	9. No. of Passengers aboard	10. Loading Capacity (tons)	11. Type of Commodities carried	12. Weight of the Commodities (tons)		Name of route or municipality en route
				1	Home-Work place							
				2	Work							
				3	To Home							
				4	Social Intercourse, recreation							
				5	Others							

1. Time	2. Type of vessel	3. Model/make of the vehicle	4. Age	5. Origin	6. Destination	7. Trip purpose	8. Capacity	9. No. of pass.	10. Loading capacity	11. Type of commodities carried	12. Weight	13. Average travel time	14. Major points en route

Appendix Fig. A-3-5 Hourly Distribution of the Road Traffic



Appendix Fig. A-3-6 Weekly Variation of Road Traffic



Appendix Table A-3-1 Samples of River Cargo Traffic Characteristics

Origin	– Destination	Type of Vessel 1/	Loading Capacity (ton)	Commodities and Weight	Travel Time (hr.)
Kuching	– Marudi	Motor Launch (W)	100	General cargo – 80 ton	6 (days)
Sibu	– Marudi	Oil Tanker (S)	150	Fuel (Diesel) – 150 ton	2 (days)
Long Lama	– Miri	Barge (S)	450	Stone – 300 ton	13
Marudi	– Long Lama	Motor Launch (W)	60	Sugar, Salt, Kerosine	8
Long Lama	– K. Baram	Motor Launch (W)	60	Pigs, Rubber, Rice	20
Long Lama	– K. Baram	Motor Launch (W)	30	Rice, Wood, Rubber – 6 ton	10
Long Lama	– K. Baram	Tug Boat (S)	–	Pulling logs – 10,000 ton	30
Marudi	– Long Lama	Motor Launch (W)	30	Sugar, Fertilizer	11
K. Baram	– Marudi	Motor Launch (W)	30	Diesel – 30 ton	8
Long Lama	– Marudi	Motor Launch (W)	30	Rottan – 20 ton	10
K. Baram	– Marudi	Motor Launch (W)	60	Bricks, Wire	7
K. Baram	– Marudi	Motor Launch (S)	20	Sugar, Rice, Cement – 20 ton	7
K. Baram	– Tinjar	Motor Launch (W)	30	Diesel	14
Marudi	– Tutoh	Motor Launch (W)	2	Biscuits, Drink	8
Marudi	– Long Teru	Motor Launch (W)	15	Salt, Rubber, etc.	5
Long Ikang	– Marudi	Motor Launch (W)	30	Banana, Pigs	5
K. Baram	– Marudi	Motor Launch (W)	30	Car, Rice	7
Marudi	– Tinjar	Motor Launch (W)	30	Vegetable, Drinks, etc.	11
K. Baram	– Marudi	Motor Launch (W)	50	Oil, Plywood	9
Marudi	– K. Baram	Motor Launch (W)	50	Rubber, Pepper, Rice	9
Marudi	– Asampaya	Motor Launch (W)	5	Rubber, Drink	7
Marudi	– Long Tutoh	Motor Launch (W)	10	Oil, Drink, Cement	10
Tinjar	– Marudi	Motor Launch (W)	12	Rubber, Pepper, Paddy – 1 ton	7
Marudi	– Bemang	Motor Launch (W)	3	Paddy, Fertilizer – 1 ton	5
Long Teru	– Marudi	Motor Launch (W)	15	Rottan, Belian wood – 5 ton	7
Long Teru	– Marudi	Motor Launch (W)	30	Pepper – 1 ton	6
Long Ikang	– Marudi	Motor Launch (W)	8	Rubber, Banana	5
Long Teru	– Marudi	Motor Launch (W)	30	Rubber, Pepper – 0.5 ton	7
Long Lama	– Marudi	Motor Launch (W)	2	Food, Paddy, Rubber – 2 ton	8
Batu Gading	– K. Baram	Tug Boat (W)	–	Pulling logs – 10,000 ton	12
Batu Gading	– Marudi	Barge (S)	30	Stone – 12 ton	7
Marudi	– Bakong	Motor Launch (W)	3	Biscuits, Drinks	6
Long Ikang	– Marudi	Motor Launch (W)	10	Pepper, Banana, Rubber – 1.5 ton	7
K. Baram	– Marudi	Motor Launch (S)	40	Diesel – 15 ton	6
Marudi	– K. Apoh	Motor Launch (S)	25	Wire – 1 ton	8
Marudi	– Long Lama	Motor Launch (W)	20	Rice, Drink	8
K. Baram	– Marudi	Motor Launch (W)	30	Pigs, Fertilizer – 5ton	7

Source : Interview survey conducted by consultant.

1/ W : Made of wood
S : Made of steel

Appendix Table A-3-2 Air Traffic, Miri

Passenger (person), Cargo (ton) (per month)

Incoming (FROM)		K. L.	Singapore	Tawau	Sandakan	K/K	Labuan	Bander Serigawan	Bintulu	Sibu	Kuching	Long Semado	Lawas	Limbang	Bario	Long Seridan	Marudi	Mukah	Total
1973	Pass.	-	-	18	54	333	96	320	300	1,413	1,235	0	88	169	22	0	240	63	4,351
	Cargo	-	-	-	-	184	25	109	489	375	5,777	24	219	347	9	5	186	19	7,768
1974	Pass.	-	-	79	53	479	162	346	308	1,450	1,624	-	99	217	14	1	201	114	5,147
	Cargo	-	-	-	5	236	62	323	144	715	9,745	-	156	432	-	-	225	11	12,054
1975	Pass.	-	-	23	23	504	226	318	435	1,688	1,638	-	90	241	12	1	226	115	5,540
	Cargo	-	-	12	11	770	82	286	161	1,322	10,616	-	205	501	35	2	271	4	14,278
1976	Pass.	-	-	-	-	645	290	-	454	2,330	2,031	-	117	382	12	2	223	95	6,581
	Cargo	-	-	-	24	289	56	-	229	738	8,716	0	188	496	-	-	258	15	11.009
1977	Pass.	131	214	43	36	562	304	-	514	2,314	2,067	-	70	404	10	1	236	81	6,987
	Cargo	3,985	140	2	33	12,608	255	-	797	710	16,980	-	325	1,523	29	1	528	45	37,963
1978	Pass.	112	-	-	-	710	326	-	667	2,272	2,246	-	124	484	9	-	330	100	7,392
	Cargo	2,605	-	-	-	16,981	76	-	174	438	22,748	-	177	526	-	-	289	16	44,030

Outgoing (FOR)		K. L.	Singapore	Tawau	Sandakan	K/K	Labuan	Bander Serigawan	Bintulu	Sibu	Kuching	Long Semado	Lawas	Limbang	Bario	Long Seridan	Marudi	Mukah	Total
1973	Pass.	-	-	32	71	383	48	366	227	1,383	1,202	0	63	186	26	1	238	59	4,285
	Cargo	-	-	-	1	182	25	63	224	298	1,502	-	349	820	-	-	581	-	4,045
1974	Pass.	-	-	40	82	420	160	365	304	1,602	1,530	1	63	204	22	0	181	99	5,073
	Cargo	-	-	16	4	219	152	85	389	420	1,438	-	503	1,092	3	-	749	20	5,090
1975	Pass.	-	-	30	47	409	211	362	383	1,591	1,502	1	68	220	33	1	182	87	5,127
	Cargo	-	-	0	14	237	81	65	485	751	1,951	5	531	1,087	23	0	713	72	6,015
1976	Pass.	30	237	60	44	514	286	-	484	2,345	1,800	5	96	344	24	2	218	79	6,568
	Cargo	264	230	2	31	193	86	-	477	448	2,037	-	335	1,207	1	0	677	30	6.018
1977	Pass.	85	-	-	-	675	332	-	532	2,308	2,139	0	107	444	10	-	289	100	7,021
	Cargo	830	-	-	-	1,418	71	-	153	554	10,468	-	182	689	19	-	295	19	14,698
1978	Pass.	62	237	42	27	671	319	-	609	2,464	1,771	-	64	420	20	1	267	78	7,052
	Cargo	1,685	109	-	-	1,538	265	-	902	535	1,413	-	398	1,653	-	-	670	25	14,193

Source: Dept. of Civil Aviation

Appendix Table A-3-3 Air Traffic, Marudi

(per month)

Incoming (FROM)		Miri	Bario	Long Seridan	Total
1974	Pass.	189	51	16	256
	Cargo	1.14	1.79	1.30	4.23
1975	Pass.	211	48	15	274
	Cargo	1.93	2.12	0.96	5.01
1976	Pass.	227	52	19	298
	Cargo	3.12	3.16	1.50	7.78
1977	Pass.	263	40	15	318
	Cargo	2.98	2.69	0.96	6.63

Outgoing (FOR)		Miri	Bario	Long Seridan	Total
1974	Pass.	197	55	18	270
	Cargo	0.39	2.91	0.93	4.23
1975	Pass.	229	53	16	298
	Cargo	0.98	2.30	1.01	4.29
1976	Pass.	241	51	21	313
	Cargo	1.89	3.68	0.98	6.55
1977	Pass.	293	49	17	359
	Cargo	2.38	2.53	1.27	6.18

Source: Dept. of civil aviation

Appendix Table A-3-4 Air Traffic, Limbang

(per month)

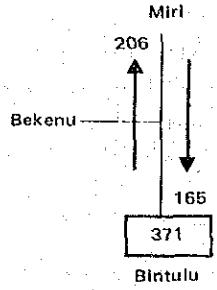
		Incoming Total	Outgoing Total
1974	Pass.	369	404
	Cargo	2,955	1,549
1975	Pass.	418	437
	Cargo	3,169	1,898
1976	Pass.	537	552
	Cargo	4,660	2,093
1977	Pass.	566	582
	Cargo	5,368	2,103
1978	Pass.	594	674
	Cargo	4,313	1,674

Source: Dept. of civil aviation

Appendix Table A-3-5 (1) Result of Road Traffic Count at Major Junctions

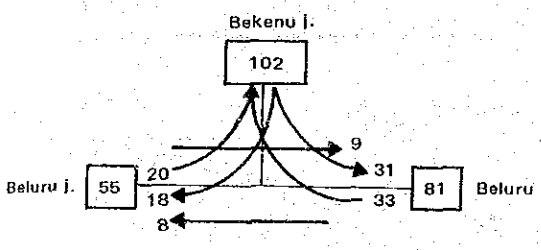
(Average of Two Days)

Miri-Bintulu road; Bekenu junction



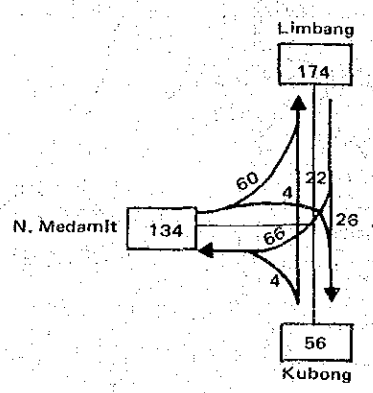
	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	179	60	122	10	371
Type of vehicle composition (%)	48.3	16.2	32.8	2.7	100

Beluru road; Peninjau junction



	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	38	22	57	2	119
Type of vehicle composition (%)	31.9	18.5	47.9	1.7	100

Limbang-N.Medamit road; Kubong junction



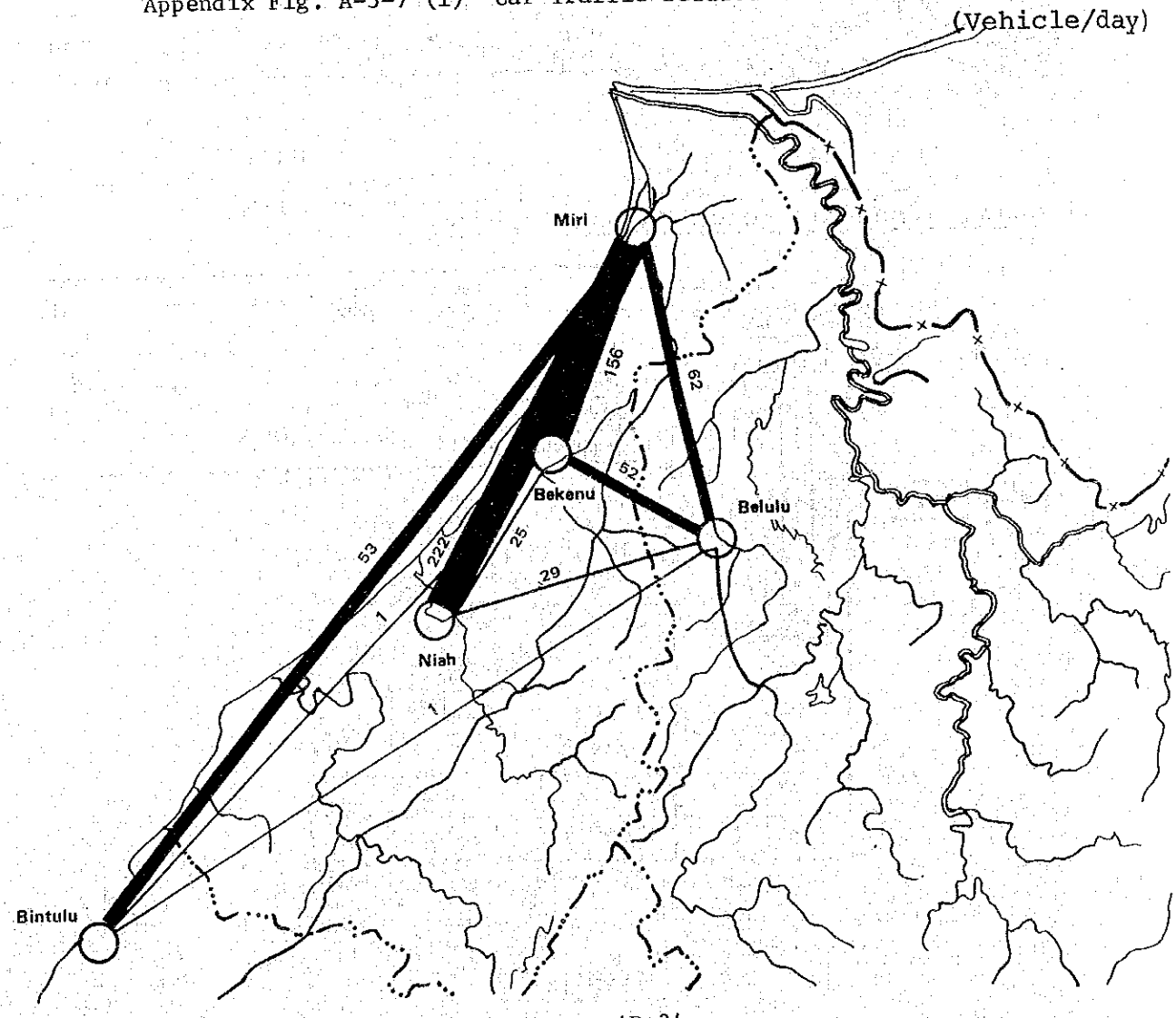
	Car Taxi	Van Pick-up	Truck	Bus	Total
No. of vehicle	80	42	36	24	182
Type of vehicle composition (%)	43.9	23.1	19.8	13.2	100

Appendix Table A-3-5 (2) Sample Rate of Road Side Interview Survey

(%)

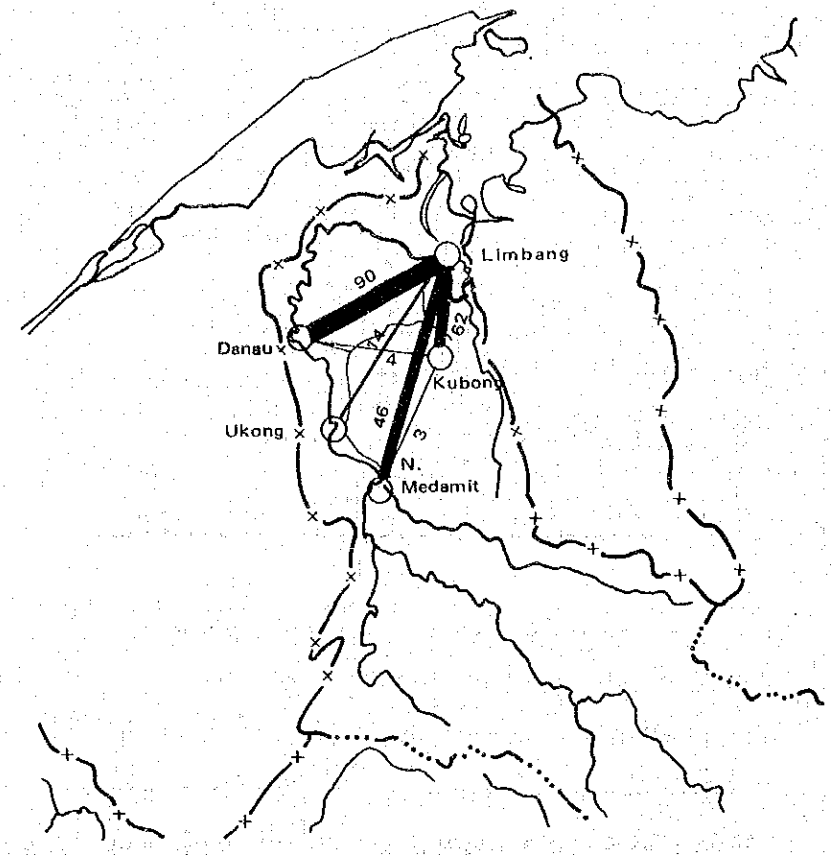
Survey post	Date	No. of vehicle	No. of Sample	Sample Rate
1 Miri-Bintulu road (Bekenu junction)	27 July	374	185	49.5
	28 July	368	219	59.5
2 Beluru road (Peninjau junction)	27 July	121	104	86.0
	28 July	115	112	97.4
Miri Total	-	978	620	63.4
3 Limbang-N.Medamit road (Kubong junction)	01 Aug.	182	163	89.6
	02 Aug.	180	165	91.7
Limbang Total	-	362	328	90.6

Appendix Fig. A-3-7 (1) Car Traffic Desired Line



Appendix Fig. A-3-7 (2) Car Traffic Desired Line

(vehicle/day)



Appendix Table A-3-5 (3) Trip Purpose Composition

( ) : %

	Home Work Place	Work	To Home	Social intercourse recreation	Others	Total
Miri	3 (1.0)	185 (59.9)	49 (15.9)	52 (16.8)	20 (6.4)	309 (100)
Limbang	14 (7.2)	143 (73.7)	24 (12.4)	11 (5.7)	2 (1.0)	194 (100)
Total	17 (3.4)	328 (65.2)	73 (14.5)	63 (12.5)	22 (4.4)	503 (100)

Appendix Table A-3-5 (4) Average No. of Passengers

	Car	Taxi	Van Pick-up	Truck	Truck Trailer	Bus 1/
Miri	3.6	3.5	3.1	3.9	2.0	22.6
Limbang	3.9	3.1	3.4	3.2	1.4	13.9

1/ Excluding driver and conductor

Appendix Table A-4-1 Main Import of Commodity Items/Group at the Ports of Marudi and Limbang, 1977

TONS

Commodity Group/Item	MARUDI EXTERNAL A)	MARUDI INTERNAL 1/B)	LIMBANG EXTERNAL A)	LIMBANG INTERNAL B)
Food	262	1,600	345	620
Milled Wheat	132	110	108	60
Sugar	340	400	49	350
Beverages	89	150	69	80
Animal Feed	-	n.a.	267	n.a.
Fertilizer	-	n.a.	15	n.a.
Cement	844	1,100	1,529	200
Iron & Steel	301	400	67	350
Tobacco	3		17	
Crude Materials Inedible except fuels	17		1,257	
Animal and Vegetable Oils	4	6,200	64	2,000
Chemicals and Products	30		58	
Other General Cargo	1,600		1,500	
Fuels	-	10,000	-	4,200
TOTAL	3,622	19,960	5,345	7,860

Source: A; Computer Output of external trade by port, Dept. of Statistics

b; Consultants' estimates based on the results of interview survey etc.

1/ *Includes Long Lama and Marudi*

Appendix Table A-4-2 Per Capita Consumption of Grouped Import Items

	Commodity Group	Whole State (Sarawak) Average 1971-73	1974	1975	1976	Average 1974-76	Study Area 1/ (1977) Miri	Marudi	Limbang
	Food	65.87	72.29	72.77	47.47	64.18	64.23	5.44	14.00
042	Rice	63.49	78.87	33.53	57.12	56.51	0	0	0
08/081	Animal Feed	56.33	59.39	58.81	69.09	62.43	115.82	0	11.03
041	Wheat Flour	13.31	11.02	12.22	14.48	12.57	16.59	2.74	4.46
06	Sugar	22.75	24.35	23.97	25.36	24.56	45.03	7.05	2.02
11	Beverages	7.35	10.51	9.68	9.76	9.98	12.08	1.85	2.85
	Cement	86.24	88.76	100.88	112.22	100.62	206.18	17.51	63.18
56/561	Fertilizer	31.69	37.12	31.10	29.15	32.46	126.59	0	0
67	Iron & Steel	37.06	44.11	44.23	53.25	47.20	120.78	6.24	2.77
	Mis. Gen. Cargo	157.37	289.55	167.30	n.a.	228.43	591.98	24.90	61.98
	Total	541.46	715.97	554.49	n.a.	638.94	1,299.28	65.73	162.29

1/ Imports from outside Sarawak only

Appendix Table A-4-3 Time Distance of Each Zone Pair via Road

hr.

	2 Bekenu	3 Niah	4 Bintulu	5 Bakong	6 Tinjar	7 Lower Baram	8 Baram Middle	9 Upper Middle	10 Tutoh/ Apoh	11 N. Medamit	12 Limbang
1 Miri	0.95	1.70	3.38	1.14	1.88	-	2.37	-	3.44	4.55	5.19
2		1.25	2.93	0.69	1.43	-	1.92	-	2.99	4.10	4.74
3			2.00	1.10	1.84	-	2.33	-	3.40	4.51	5.15
4				2.78	3.52	-	4.01	-	5.08	6.19	6.83
5					0.74	-	1.23	-	2.30	3.41	4.05
6						-	0.49	-	1.56	2.67	3.31
7							-	-	-	-	-
8								-	1.07	2.18	2.82
9									-	-	-
10										1.11	1.75
11											0.64

Appendix Table A-4-4 Distance of Each Zone Pair via Road

km.

	2 Bekenu	3 Niah	3 Bintulu	5 Bakong	6 Tinjar	7 Lower Baram	8 Baram Middle	9 Upper Middle	10 Tutoh/ Apoh	11 N. Medamit	12 Limbang	13 Brunei
1 Miri	58	102	202	69	107	-	132	-	187	244	285	153
2		76	176	43	81	-	106	-	161	218	259	211
3			120	67	105	-	130	-	185	242	283	255
4				167	205	-	230	-	285	342	283	355
5					38	-	63	-	118	175	216	222
6						-	25	-	80	137	178	-
7							-	-	-	-	-	-
8								-	55	112	153	-
9									-	-	-	-
10										57	98	-
11											41	-
12												-

Appendix Table A-4-5 Estimate of Vehicle Operating Costs

Appendix Table A-4-5 (1) Operating Characteristics of Vehicles

	Car			Van/Pick-up			Bus		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Life Years	3	4	5	4	5	6	5	6.5	8
Life Kilometrage (000)	28.8	64	96	57.6	96	144	240	416	640
Km/Year (000)	9.6	12.8	16	14.4	19.2	24	48	64	80
Operating Days/Year	-	-	-	-	-	-	300	320	340
Average Km/Day	-	-	-	-	-	-	160	200	260
Average Running Speed Km/Hour	40	56	80	40	55	70	30	37	48

	Medium Truck (6 Ton)			Heavy Truck I (10 Ton Truck)			Heavy Truck II (20 Ton Truck Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Life Years	5	6	7	5	6	7	5	6.5	8
Life Kilometrage (000)	240	384	560	200	320	490	280	520	896
Km/Year (000)	48	64	80	40	53.3	70	56	80	112
Operating Days/Year	260	280	300	260	280	300	280	300	320
Average Km/Day	185	230	270	155	190	235	200	270	350
Average Running Speed Km/Hour	35	43	55	25	32	45	32	40	52

Appendix Table A-4-5 (2) Vehicle Operating Cost (with Taxes)

M$/km

Cost Item	CAR			VAN/PICK-UP			BUS		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.5047	0.2271	0.1514	0.4405	0.2643	0.1762	0.3304	0.1906	0.1239
Fuel Consumption	0.0752	0.0627	0.0502	0.1568	0.1254	0.0941	0.1018	0.0853	0.0688
Oil Consumption	0.0038	0.0031	0.0026	0.0045	0.0038	0.0033	0.0055	0.0046	0.0041
Tyre Wear	0.0262	0.0157	0.0079	0.0568	0.0316	0.0149	0.0644	0.0337	0.0177
Maintenance; Parts	0.0262	0.0189	0.0160	0.0660	0.0431	0.0304	0.4758	0.2775	0.1586
; Labour	0.0045	0.0033	0.0026	0.0063	0.0040	0.0030	0.0226	0.0130	0.0080
Wages	–	–	–	–	–	–	0.2500	0.1875	0.1500
Insurance	0.0371	0.0278	0.0222	0.0571	0.0428	0.0343	0.0229	0.0172	0.0138
License/Fees	0.0155	0.0116	0.0093	0.0235	0.0177	0.0141	0.0094	0.0070	0.0056
Overhead	0.0693	0.0370	0.0262	0.0812	0.0533	0.0370	0.1283	0.0816	0.0551
Total	0.7625	0.4072	0.2884	0.8927	0.5860	0.4073	1.4111	0.8980	0.6056

Cost Item	Medium Truck (6 Ton)			Heavy Truck I (10 Ton)			Heavy Truck II (20 Ton T. Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.2253	0.1408	0.0966	0.3818	0.2386	0.1558	0.6130	0.3301	0.1916
Fuel Consumption	0.1018	0.0853	0.0688	0.1458	0.1100	0.0825	0.2200	0.1650	0.1238
Oil Consumption	0.0055	0.0046	0.0041	0.0117	0.0097	0.0085	0.0166	0.0138	0.0120
Tyre Wear	0.1745	0.0914	0.0480	0.3875	0.2022	0.1033	0.6975	0.3639	0.1860
Maintenance; Parts	0.1893	0.1352	0.1082	0.3436	0.2367	0.1909	0.5149	0.3261	0.2574
; Labour	0.0226	0.0130	0.0080	0.0250	0.0150	0.0100	0.0361	0.0208	0.0128
Wages	0.2000	0.1500	0.1200	0.3300	0.2477	0.1886	0.3429	0.2400	0.1714
Insurance	0.0258	0.0193	0.0155	0.0446	0.0334	0.0255	0.0707	0.0495	0.0354
License/Fees	0.0098	0.0073	0.0059	0.0155	0.0116	0.0089	0.0188	0.0131	0.0094
Overhead	0.0955	0.0647	0.0475	0.1686	0.1105	0.0774	0.2531	0.1522	0.1000
Total	1.0501	0.7116	0.5226	1.8541	1.2154	0.8514	2.7836	1.6745	1.0998

Appendix Table A-4-5 (3) Vehicle Operating Cost (without Taxes)

Vehicle.km

Cost Item	CAR			VAN/PICK-UP			BUS		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.4167	0.1875	0.1250	0.3734	0.2241	0.1494	0.2703	0.1560	0.1014
Fuel Consumption	0.0407	0.0339	0.0271	0.0848	0.0678	0.0509	0.1018	0.0853	0.0688
Oil Consumption	0.0034	0.0028	0.0024	0.0041	0.0034	0.0030	0.0050	0.0042	0.0037
Tyre Wear	0.0231	0.0139	0.0069	0.0500	0.0278	0.0132	0.0566	0.0297	0.0156
Maintenance; Parts	0.0216	0.0156	0.0132	0.0559	0.0366	0.0258	0.3893	0.2271	0.1298
; Labour	0.0041	0.0030	0.0023	0.0057	0.0036	0.0027	0.0203	0.0117	0.0072
Wages	–	–	–	–	–	–	0.2250	0.1688	0.1350
Insurance	0.0297	0.0222	0.0178	0.0457	0.0343	0.0274	0.0183	0.0138	0.0110
Overhead	0.0539	0.0279	0.0195	0.0620	0.0398	0.0272	0.1087	0.0697	0.0473
Total	0.5932	0.3068	0.2142	0.6816	0.4374	0.2996	1.1953	0.7663	0.5198

Cost Item	MEDIUM TRUCK (6 Ton)			HEAVY TRUCK I (10 Ton)			HEAVY TRUCK II (20 Ton T. Trailer)		
	Earth	Gravel	Paved	Earth	Gravel	Paved	Earth	Gravel	Paved
Depreciation	0.1735	0.1084	0.0744	0.2855	0.1785	0.1165	0.4880	0.2628	0.1525
Fuel Consumption	0.1018	0.0853	0.0688	0.1458	0.1100	0.0825	0.2200	0.1650	0.1238
Oil Consumption	0.0050	0.0042	0.0037	0.0106	0.0088	0.0077	0.0151	0.0125	0.0109
Tyre Wear	0.1536	0.0805	0.0423	0.3410	0.1779	0.0909	0.6138	0.3203	0.1637
Maintenance; Parts	0.1457	0.1041	0.0833	0.2570	0.1770	0.1428	0.4099	0.2596	0.2050
; Labour	0.0203	0.0117	0.0072	0.0225	0.0135	0.0090	0.0325	0.0187	0.0115
Wages	0.1800	0.1350	0.1080	0.2970	0.2229	0.1697	0.3086	0.2160	0.1543
Insurance	0.0206	0.0155	0.0124	0.0356	0.0267	0.0204	0.0566	0.0396	0.0283
Overhead	0.0801	0.0545	0.0400	0.1395	0.0915	0.0640	0.2145	0.1295	0.0850
Total	0.8806	0.5992	0.4401	1.5345	1.0068	0.7035	2.3590	1.4240	0.9350

Appendix Table A-4-5 (4) Price of Representative Vehicle [1/]

Vehicle Type	Average Market Price	Duty, Surtax Sales Tax	Price Without Taxes
1. Car (Toyota Corolla)	14,770	2,560	12,210
2. Van/Pick-up (Toyota Land Cruiser)	25,940	3,930	22,010
3. Medium Truck [2/] (Toyota 6 Ton)	45,000	11,020	33,980
4. Heavy Truck I (Isuzu 10 Ton)	81,000	19,800	61,200
5. Heavy Truck II (Nissan 20 Ton)	180,000	36,000	144,000
6. Bus [2/] (Bedford)	50,000	10,000	40,000

1/ Including tyres
2/ Excluding body

Appendix Table A-4-5 (5) Price of Body, 1978

Vehicle Type	Market Price	Tax	Price Without Tax
Medium Truck	11,000	1,650	9,350
Bus	30,000	4,500	25,500

Source: Interviews with dealers

Appendix Table A-4-5 (6) Fuel Consumption

Liter/1,000km

Vehicle Type	Road Type		
	Earth	Gravel	Paved
Car	120	100	80
Van/Pick-up	250	200	150
Medium Truck	370	310	250
Heavy Truck I	530	400	300
Heavy Truck II	800	600	450
Bus	370	310	250

Source: Quantification of Road User Savings, IBRD

Appendix Table A-4-5 (7) Price of Fuel, 1978 1/

Fuel Type	Price, M$/Gallon (M$/Liter) With Tax	Without Tax
Gasoline ; Super	3.45 (0.759)	2.08 (0.458)
; Regular	2.85 (0.627)	1.54 (0.339)
Diesel	1.25 (0.275)	1.25 (0.275)

Source: Interviews with dealers

1/ Average in Miri and Limbang areas

Appendix Table A-4-5 (8) Oil Consumption

Liter/1,000km

Vehicle Type	Road Type Earth	Gravel	Paved
Car	1.6	1.3	1.1
Van/Pick-up	1.9	1.6	1.4
Medium Truck	3.1	2.6	2.3
Heavy Truck I	6.6	5.5	4.8
Heavy Truck II	9.4	7.8	6.8
Bus	3.1	2.6	2.3

Appendix Table A-4-5 (9) Price of Oil, 1978

Oil Type	Price, M$/Gallon (M$/Liter) With Tax	Without Tax
For Gasoline Engine	10.75 (2.365)	9.75 (2.145)
For Diesel Engine	8.05 (1.771)	7.30 (1.606)

Appendix Table A-4-5 (10) Tyre Wear (Life Kilometrage)

000km

Vehicle Type	Road Type Earth	Gravel	Paved
Car	9	15	30
Van/Pick-up	10	18	38
Medium Truck	11	21	40
Heavy Truck I	12	23	45
Heavy Truck II	12	23	45
Bus	11	21	40

Appendix Table A-4-5 (11) Price of a Set of Tyres, 1978

Vehicle Type	Tyre Type	No. of Tyres	Price (M$) With Tax	Price (M$) Without Tax
Car	615 x 13	4	236	208
Van/Pick-up	750 x 16	4	568	500
Medium Truck	825 x 20	6	1,920	1,690
Heavy Truck I	1,000 x 20	10	4,650	4,092
Heavy Truck II	1,000 x 20	18	8,370	7,366
Bus	670 x 13	6	708	623

Appendix Table A-4-5 (12) Maintenance: Parts

Vehicle Type	% of Depreciable Value per 1,000km		
	Earth	Gravel	Paved
Car	0.18	0.13	0.11
Van/Pick-up	0.26	0.17	0.12
Medium Truck	0.35	0.25	0.20
Heavy Truck I	0.45	0.31	0.25
Heavy Truck II	0.30	0.19	0.15
Bus	0.60	0.35	0.20

Appendix Table A-4-5 (13) Maintenance: Labour 1/

Vehicle Type	Hours per 1,000km		
	Earth	Gravel	Paved
Car	1.13	0.83	0.66
Van/Pick-up	1.58	1.00	0.76
Medium Truck	5.64	3.24	2.00
Heavy Truck I	6.25	3.75	2.50
Heavy Truck II	9.03	5.19	3.20
Bus	5.64	3.24	2.00

1/ Hourly Cost of Labour:

$$\frac{\$600/\text{Month}}{150\text{hrs/Month}} = \$4.0/\text{hr.}$$