

THE GOVERNMENT OF MALAYSIA
THE STATE OF SARAWAK

WOSSAC: 3552
631
(595)

MIRI-BINTULU

REGIONAL PLANNING STUDY

SUPPORTING REPORT

No. 2

AGRICULTURE
PART III
AGRICULTURAL
PRODUCTON SERVICES

—1974—

HUNTING TECHNICAL
SERVICES LTD. LONDON

HOFF AND OVERGAARD
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CHAPTER I

CONVERSIONS

THE PRESENT SITUATION

INTRODUCTION

Linear Measures:

1 inch	=	25.4 millimetres
1 foot (12 inches)	=	30.48 centimetres
1 yard (3 feet)	=	0.9144 metre
1 chain (22 yards)	=	20.117 metres
1 mile (1 760 yards)	=	1.609 kilometres

Square Measures:

1 square inch	=	6.45 square centimetres
1 square foot	=	9.29 square decimetres
1 square yard	=	0.836 square metre
1 acre (4 840 sq. yards)	=	0.405 hectare
1 square mile (640 acres)	=	259.00 hectares

Weights:

1 ounce (16 drams)	=	28.350 grammes
1 pound (16 ounces)	=	0.454 kilogram
1 tahlil	=	12 tahils
1 kati (16 tahils)	=	1.33 ounces
1 kilogram	=	1.33 pounds
1 cwt (112 pounds)	=	1.65 katis
1 ton (20 cwt)	=	50.8 kilograms
1 picul	=	16.8 piculs
	=	100 katis

Measure of Capacity:

1 pint	=	0.568 litre
1 quart (2 pints)	=	1.137 litres
1 gallon (4 quarts) (or 1 gantang)	=	4.546 litres

II. THE DEPARTMENT OF AGRICULTURE

The Department's headquarters are in Kuching with Divisional headquarters in each Division of the State and offices established in each District and Sub-district. The whole Department is divided into branches each associated with a specific aspect. This arrangement is shown in Figure 1.1 which traces the chain of command to the Study Area.

The objectives of the Ministry of Agriculture have been sum-

CHAPTER 1

THE PRESENT SITUATION

INTRODUCTION

The Government can influence and promote agricultural production in many ways. Apart from the direct method of clearing forest land and developing it for agriculture there are also indirect, yet more important methods. These are the services that Government can provide; agricultural research, education, extension, credit, supply and marketing. These services are mutually dependent and an ideal chain of activities would be that commercially viable research findings and innovations would be passed to the farmers via the education and extension services; credit would be available to purchase the supplies needed to implement the research findings and efficient marketing channels, especially orientated to the particular conditions, would exist for the farm produce. Furthermore, the links in the chain would be mutually balanced. The research services would be large enough to investigate all the possible enterprises, the education would be able to train sufficient extension staff; similarly the credit, supply and marketing links would be sufficiently widespread and numerous to reach all farmers and, finally, the markets for the produce would be able absorb the volume of goods produced. Such ideal balanced situations seldom exist, especially in developing countries. Sarawak is a developing country and the ideal agricultural production conditions cannot be expected to be found here, particularly so in the Fourth Division and the Study Area which are some of the least developed parts of the State. Generally the marketing of agricultural produce has been neglected throughout the State but considerable progress has been made with all the other services.

Given below are short reviews of the present organisation and activities of the various services in Sarawak and in the Fourth Division. After describing the present situation recommendations are given for future changes. The Sarawak Land Development Board (SLDB) is included here because, although it is not part of the Department of Agriculture now under the Ministry of Agriculture, it is intimately connected with agricultural development.

1.1 THE DEPARTMENT OF AGRICULTURE

The Department's headquarters are in Kuching with Divisional headquarters in each Division of the State and offices established in each District and Sub-district. The whole Department is divided into branches each associated with a specific aspect. This arrangement is shown in Figure 1.1 which traces the chain of command to the Study Area.

The objectives of the Ministry of Agriculture have been sum-

marised in the publication, "Department of Agriculture - Second Malaysia Plan 1971-1975", as follows:-

- (a) to develop and exploit agricultural resources to the maximum in accordance with sound agricultural development;
- (b) to increase the range and quantity and to improve the quality of agricultural produce;
- (c) to improve the economic status and social conditions of the primary producers;
- (d) to increase employment opportunities in primary production and assist the development of employment opportunities in agro-based industries.

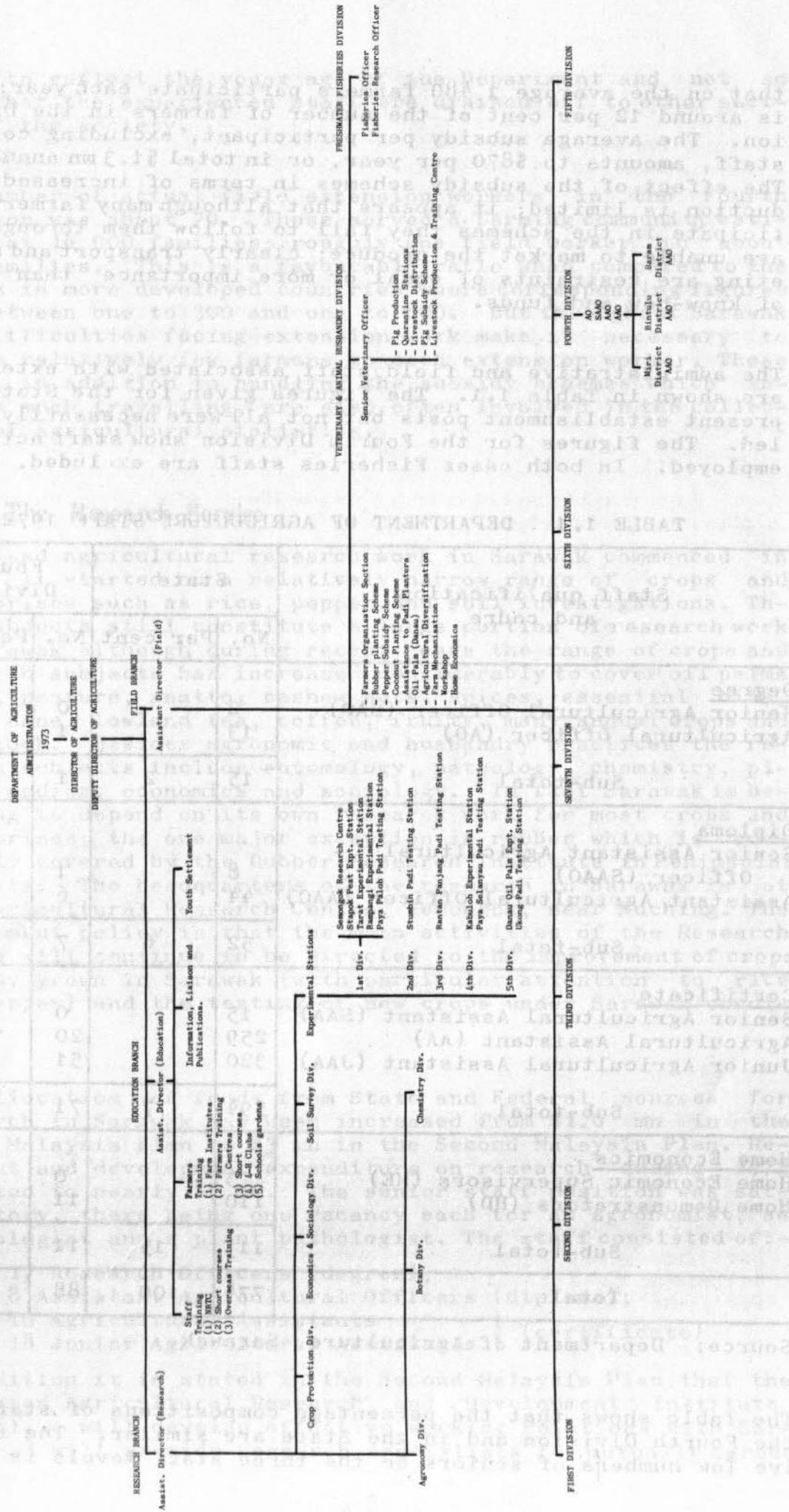
1.1.1 The Extension Service

At present in Sarawak and in the Fourth Division the Department's extension efforts are concentrated around the following two main aspects in addition to staff working in Home Economics:-

- (a) the execution of subsidy schemes covering rice, coconuts, cocoa, pepper, coffee, fruit trees, annual crops, cattle, pigs, poultry and fish ponds. In each Division annual targets for each scheme are drawn up and finance allocations made. The organisation and achievements of these schemes are summarised in Appendix I. Some recommendations for their future application in the Study Area are given;
- (b) the organisation and running of Youth Settlement Schemes; so far only one scheme, the Pujut-Lopeng Settlement Scheme near Miri, has been started in the Fourth Division. A summary of the functioning of this scheme is given in Appendix II. Following sociological studies of this scheme it has been recommended, in Supporting Report No. 4, that this system of settlement should be stopped but that the training of youths should continue. These young persons should then be given priority in the allocation of small-holdings on SLDB developed State Land.

The extension service throughout the State, but particularly in the Fourth Division, has been created under conditions fraught with difficulties. For example, widely scattered farming communities consisting of people differing greatly in religion, customs and language; many of the farmers still practising shifting cultivation; poor communications and transport facilities; generally low education levels of staff and farmers; haphazardly created marketing and processing chains for farm produce. It is little wonder that achievements have often been less than expected. Nevertheless progress has been and is being made and, under the existing conditions, it is difficult to see how any great improvement in the services could be made. The subsidy schemes do reach a reasonable proportion of the people. An analysis of the past three years' activities on subsidy schemes in the Fourth Division reveals

FIGURE 1.1



that on the average 1 480 farmers participate each year; this is around 12 per cent of the number of farmers in the Division. The average subsidy per participant, excluding cost of staff, amounts to \$870 per year, or in total \$1.3 mn annually. The effect of the subsidy schemes in terms of increased production is limited; it appears that although many farmers participate in the schemes they fail to follow them through or are unable to market the produce; clearly transport and marketing are restraints of equal or more importance than lack of know-how and funds.

The administrative and field staff associated with extension are shown in Table 1.1. The figures given for the State represent establishment posts but not all were necessarily filled. The figures for the Fourth Division show staff actually employed. In both cases Fisheries staff are excluded.

TABLE 1.1 DEPARTMENT OF AGRICULTURE STAFF 1972

Staff qualification and cadre	State		Fourth Division	
	No.	Per cent	No.	Per cent
<u>Degree</u>				
Senior Agricultural Officer (SAO)	2		0	
Agricultural Officer (AO)	13		1	
Sub-total	15	2	1	1
<u>Diploma</u>				
Senior Assistant Agricultural Officer (SAAO)	8		1	
Assistant Agricultural Officer (AAO)	44		6	
Sub-total	52	6	7	8
<u>Certificate</u>				
Senior Agricultural Assistant (SAA)	15		0	
Agricultural Assistant (AA)	259		20	
Junior Agricultural Assistant (JAA)	320		51	
Sub-total	594	77	71	78
<u>Home Economics</u>				
Home Economic Supervisors (HE)	3		0	
Home Demonstrators (HD)	110		11	
Sub-total	113	15	11	13
Total	774	100	88	100

Source: Department of Agriculture, Sarawak.

The Table shows that the percentage compositions of staff in the Fourth Division and in the State are similar. The relative low numbers of seniors on the three staff levels is bel-

ieved to reflect the young age of the Department and not so much that the experienced staff are drained off to other sectors of the society.

The number of actual field extension workers in the Fourth Division was about 70. These served a farming community estimated at 14 000 families; roughly one field worker to about 200 families. This is a favourable ratio when compared to the ratios in more developed countries where corresponding figures are between one to 300 and one to 800. But throughout Sarawak the difficulties facing extension work make it necessary to have a relatively few farmers to each extension worker. These staff, in addition to handling the subsidy schemes which involves much travelling, are also often involved in the collection of agricultural statistics.

1.12 The Research Service

Organised agricultural research work in Sarawak commenced in 1962. It started on a relatively narrow range of crops and enterprises such as rice, pepper and soil investigations. These subjects still constitute a large portion of research work in Sarawak although during recent years the range of crops and research subjects has increased considerably to cover oil palms, cocoa, pasture, anatto, cashew nuts, spices, essential oils, sugar cane, lowland tea, coffee, fruits, many annual crops and livestock. Besides agronomic and husbandry practices the research subjects include entomology, pathology, chemistry, plant breeding, economics and sociology. In fact Sarawak is beginning to depend on its own research work for most crops and enterprises; the one major exception is rubber which is adequately covered by the Rubber Research Institute in Peninsular Malaysia. The headquarters of the research in Sarawak is at the Agricultural Research Centre, Semongok, near Kuching. The Government policy is that the main activities of the Research Branch will continue to be directed to the improvement of crops already grown in Sarawak (with particular attention to rice and pepper) and the testing of new crops under Sarawak conditions.

The allocation of funds from State and Federal sources for research in Sarawak has been increased from \$1.6 mn in the First Malaysia Plan to \$3 mn in the Second Malaysia Plan. Recurrent and development expenditure on research during 1972 amounted to nearly \$7 mn. The senior staff position was satisfactory, there being one vacancy each for an agronomist, an entomologist and a plant pathologist. The staff consisted of:-

- 17 Research Officers (degree);
- 8 Assistant Agricultural Officers (diploma);
- 40 Agricultural Assistants
- 18 Junior Agricultural Assistants } (certificate)

In addition it is stated in the Second Malaysia Plan that the Malaysian Agricultural Research and Development Institute (MARDI)... will develop effective working relations with Sarawak and will provide research specialists for mutually agreed

projects, furnish essential equipment and provide training opportunities for Sarawak personnel. Thus it is reasonable to expect that a modest request for additional research staff, as is proposed in this Report to support a planned development programme, will be fulfilled. MARDI undertakes a comprehensive scholarship programme for future research workers leading to degree of BSc, MSc and PhD in Malaysia as well as abroad.

In the Fourth Division research work is mainly undertaken at Kabuloh Research Station where activities started in 1964 with oil palm. Since then observations and trials have been started on many other crops. At Paya Selanyau trials on varieties and double cropping of rice commenced in 1971. During 1973, as a result of Government's policy to build up the Kabuloh Research Station into the Department of Agriculture's main centre for the northern region of Sarawak, the staff has been strengthened by the posting of a graduate Research Officer to the station. The other technical research staff now stationed at Kabuloh and Paya Selanyau consist of one AAO, four AAs and one JAA. Planning and supervision of research in the Fourth Division is carried out by the Department of Agriculture's Research Branch in Kuching.

1.13 Education and Training

Present Malaysian agricultural education can be summarised as follows: training at university degree level takes place in Peninsular Malaysia and abroad, primarily in Australia, New Zealand and the United Kingdom; the technical diploma level training is provided by Serdang Agricultural College in Peninsular Malaysia and Agricultural Colleges in Australia; certificate level training of junior Department of Agriculture staff takes place in Sarawak at the Natural Resources Training Centre (NRTC), Semongok as well as in Peninsular Malaysia. Training of farmers is undertaken at two levels: youths are trained at Farmers Training Centres and Farmers Institutes; practising farmers are given short courses at Agricultural Stations.

Departmental Staff Training

The general educational policy for staff of the Department in Sarawak is based on demands of its various branches. The students are normally contracted for a specific post at the start of their studies. This means that the Department has to wait some two to six years (the study time plus a couple of years of experience) before efficient work can be expected from new appointees. This time lag results in a fairly constant understaffing of the Department and makes the task of planning for the natural loss of staff (resignations, deaths, etc.) practically impossible. In addition the position is made more difficult because the agriculturally trained staff are sometimes employed by private and quasi-Government institutions who are not able to make the planning of personnel several years ahead of their requirement.

The output of existing institutions and already planned expansion are discussed below.

(a) Degree Training

The present planned annual output of agricultural graduates from the University of Malaysia is around 100 in addition to about 50 obtaining their degrees abroad. The figure of 100 includes graduates in agriculture, veterinary science and forestry. This output, in relation to the number needed in Malaysia, is low and, in the Second Malaysia Plan, the need to expand the Faculty of Agriculture at the University of Malaysia as well as starting a new University of Agriculture was foreseen. Nevertheless, for many years it is unlikely that the supply will meet the demand which is steadily increasing not only from the Departments of Agriculture throughout Malaysia but also from bodies and institutions such as the SLDB, the Sarawak Economic Development Corporation, the Sarawak Pepper Marketing Board, Sarawak Timber Industry Development Corporation and the Rice Marketing Board.

(b) Diploma Training

This level of technical training takes place at the College of Agriculture, Serdang. Expansions are planned to increase output to 320 diplomates by 1974. However, in the Second Malaysia Plan, even this number is estimated to be insufficient to meet demand throughout Malaysia.

(c) Certificate Training

The NRTC opened for education in 1967 and at present conducts a one year course for 60 students in agriculture in addition to courses in forestry, land survey, home economics and in-service training of Department of Agriculture staff. Veterinary courses are given at the Kluang Veterinary Training Centre in Peninsular Malaysia.

The entrance requirement for agricultural staff is Cambridge School Certificate and farming background is preferred. Comparing junior staff requirements of the Department up to 1982 with the expected output of the NRTC shows that there is likely to be a deficit. From Table 1.1 it can be seen in 1972 the number of AAs and SAAs employed in Sarawak was 274 while the Department's own estimated requirement in 1982 is 998, an increase of 724. The NRTC output should provide 600 AAs in the ten years 1972 to 1982 indicating a deficit of 124 AAs without accounting for staff losses. The particularly high demand for AAs during these ten years is due to the abolishment by 1982 of the cadre of Junior Agricultural Assistant, of which there were 320 in 1972, and not to the needs of development in the Fourth Division or elsewhere. Thus even if the training capacity of the NRTC at Semongok is doubled in the next ten years

the out-turn of AAs will only just be sufficient to meet the requirements of the Department's extension service in its efforts to maintain the existing level of extension effort, though the average educational level and training of the staff will be considerably higher.

Farmers Training

(a) Farmers Training Centres

The object of these Centres is to give agricultural training to primary educated youths from farming families. The hope is that they will return to their homes and take up farming on their own account. The Centres accept both men and women and the courses cover the basic principles of agriculture. Sometimes, depending on the standard of education of a particular group, farm management is included in the course. Also the courses can be weighted towards the type of agriculture that is followed in the locality from which the majority of the students come. The minimum age for acceptance on the courses is: men 17, women 15. The required educational standard is primary standard six or lower secondary. Selection of trainees is usually done by the District agricultural staff. Each course lasts 14 weeks and there are three courses a year and about 30 students per course; so that roughly 90 people are trained per year per Centre. Full board and lodging is provided free at each Centre, in addition, each student receives 50 cents pocket money per day and is provided with a set of agricultural hand tools which can be taken with them at the end of the course.

There are seven Centres actually operating throughout Sarawak and three more are planned for construction during 1973-1974, as shown in Figure 1.2.

The existing Centres are:-

Semongok	}	First Division
Sungai Pinang		
Temudok	}	Second Division
Ridan (20 trainees only)		
Oya Road		Third Division
Kapit		Seventh Division
Kubong		Fifth Division

The planned Centres are:-

- Bintulu - Fourth Division (the site is about ten miles from Bintulu on the road to Miri; estimated capital costs for this Centre are given in Table 1.2 and recurrent costs in Table 1.3);
- Jakar - Sixth Division;
- Bau - First Division;
- New Ridan - Second Division (this will be a replacement of the existing centre).

EXISTING AND PROPOSED FARMERS TRAINING CENTRES,
INSTITUTES AND COMMODITY STATIONS IN SARAWAK

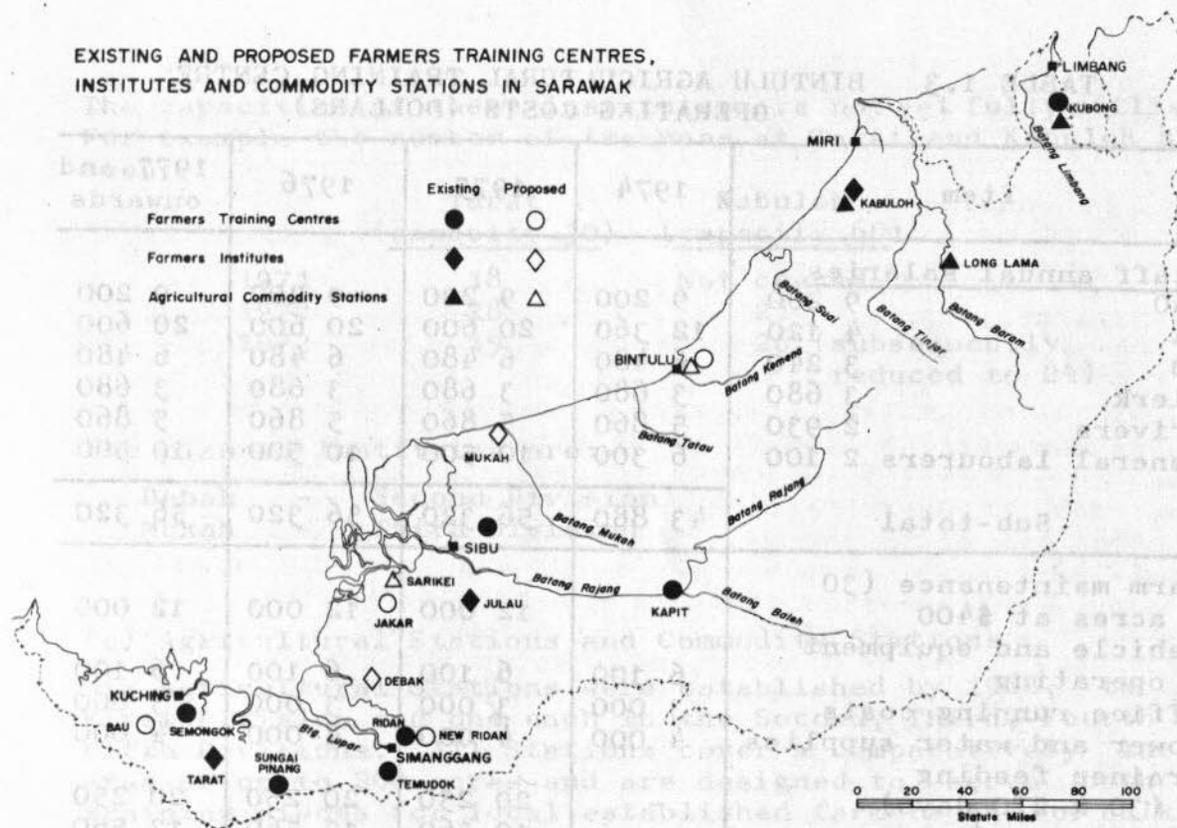


TABLE 1.2 BINTULU AGRICULTURAL TRAINING CENTRE CAPITAL COSTS
(THOUSAND DOLLARS)

Item	1974	1975
<u>Farmer training section building</u>		
Training buildings and accommodation	150.0	
Staff quarters	95.0	64.0
Storeroom and workshop		30.0
Electrical fittings	40.0	
Furniture	12.0	6.0
Contingencies	30.0	10.0
Sub-total	327.0	110.0
<u>Agricultural station buildings</u>		
Staff quarters	101.0	
Farmers hostel, plant house, piggery	90.0	
Sub-total	191.0	-
<u>Farm development</u>		
Land development	25.0	
Machinery and equipment	29.0	
Transport	15.0	
Water supply	60.0	
Power generator	35.0	
Land aquisition	5.0	
Sub-total	169.0	-
Total	687.0	110.0

TABLE 1.3 BINTULU AGRICULTURAL TRAINING CENTRE
OPERATING COSTS (DOLLARS)

Item	1974	1975	1976	1977 and onwards
Staff annual salaries				
AAO	9 200	9 200	9 200	9 200
AA	4 120	12 360	20 600	20 600
HD	3 240	6 480	6 480	6 480
Clerk	3 680	3 680	3 680	3 680
Drivers	2 930	5 860	5 860	5 860
General labourers	2 100	6 300	10 500	10 500
Sub-total	43 880	56 320	56 320	56 320
Farm maintenance (30 acres at \$400)				
Vehicle and equipment operating	6 100	6 100	6 100	6 100
Office running costs	3 000	3 000	3 000	3 000
Power and water supplies	4 000	4 000	4 000	4 000
Trainee feeding (30 x 270 days)	-	20 250	20 250	20 250
Buildings maintenance	-	10 360	12 560	12 560
Sub-total	13 100	55 710	57 910	57 910
Total	56 980	112 030	114 230	114 230

(b) Farmers Institutes

The training courses here are aimed at the more educated future male farmers. The minimum education standard required from 1974 will be to have attended Form Three, that is three years at secondary school together with a farming background. The courses, which last one year, cover general agriculture including farm management, but can be weighted to the requirements of a particular student group. On completion of the course the students can elect to go home to farm or to join a Youth Settlement Scheme.

Boarding facilities and allowance are similar to those for the Farmers Training Centres. Accommodation varies from 30 to 40 students.

There are three Institutes actually operating and two more are planned for construction during 1973-1974 (see Figure 1.2).

Existing Institutes are:-

- Tarat - First Division (capacity 30 students);
- Kabuloh - Fourth Division (capacity 60 students);
- Julau - Third Division (opened in 1973).

The capacities of these Institutes are not yet fully utilised. For example the number of trainees at Tarat and Kabuloh have been:-

	Tarat (capacity 30)	Kabuloh (capacity 60)
1971	18	Not opened
1972	28	21
1973	19	26 (subsequently reduced to 24)

The planned Institutes are:-

- Debak - Second Division
- Mukah - Third Division

(c) Agricultural Stations and Commodity Stations

Six Agricultural Stations were established by 1968, two in First Division and one each in the Second, Third, Fourth and Fifth Divisions. All Stations cover a comparatively large area of up to 200 acres and are designed to serve both as training places for local established farmers and for bulking selected planting material. A smaller station has been established at Long Lama in the Study Area, while one at Senga in the Fourth Division outside the Study Area has been closed.

Two more small stations are planned for construction during the Second Malaysia Plan, one at Sarikei in the Sixth Division and one at Bintulu in the Study Area. The demand by the farmers for the training courses which usually last about two weeks, has increased considerably. For this reason, accommodation facilities have been made available at Temudok, Kabuloh and Kubong in the Second, Fourth and Fifth Divisions respectively.

The selected area for the Bintulu Agricultural Station consists of about 30 acres of State and alienated land adjoining the site of the Bintulu Farmers Training Centre. Construction of buildings and farm development started during 1973.

A recent Sarawak Government policy decision (December 1973) states that all Farmers Institutes will be renamed in 1974 as Agricultural Training Centres. Also the existing Farmers Training Centres and Agricultural Stations will be amalgamated. The changes are designed to enable a more efficient use of the Department of Agriculture's training staff and finance.

1.14 Credit, Supply and Marketing

The most common method by which these services reach the farmers throughout Sarawak is the shopkeeper-money-lender method;

other less important ones are the Sarawak Co-operative Central Bank Limited, the Sarawak Economic Development Corporation and Co-operative Societies.

The Shopkeeper-Money-Lender

This system is operated by private businesses, most often small retail shops, scattered throughout Sarawak. Studies, reported in the Sarawak Gazette (Leonard, P.L., 1964, Morris, S., 1965), state that this type of credit is handled on fairly reasonable terms due to competition between the shopkeepers. The number of customers per shop is usually small and because the shopkeeper wishes to attract and retain farmer customers he is inclined to treat the farmers well. The farmer obtains farm and household materials from the shopkeeper and in return delivers agricultural produce to him. The exchange of goods can extend over a long period. An account of the transactions is usually kept by the shopkeeper but it becomes complicated by changes of local prices and estimates of quality. The chances of loss by the shopkeeper on this type of business are high and it is reasonable for him to require an average return of around 20 per cent. The credit worthiness of a farmer is based more on his record of repayments than on his actual repayment capacity as gauged by his holding size or farming ability.

The Co-operative Central Bank Limited

This was established in 1953 and is operated under the Co-operative Ordinance. The Bank's activities are limited to a few loans (two to six) annually to its member societies. The loans are intended only for agricultural productive purposes but investigations reveal that many loans are used for repairs to buildings, education, vehicles, marriage etc. The Department of Agriculture provides technical assistance to the bank prior to making a loan, but no technical supervision is carried out during the loan period. About 20 per cent of the Bank's total assets are in loans while 55 per cent are deposited with other banks.

The Sarawak Economic Development Corporation (SEDC)

Established in 1963 the SEDC provides medium and long term credit for agriculture and fisheries. The loans extended have been primarily for relatively large projects for rubber and pepper planting, fishing and pig projects. The amount of financing has fluctuated erratically from year to year. The average number of loans approved annually during the ten years of operation is around 400. There is a branch office of the SEDC in the Study Area at Miri, which in total extended 68 loans during the period 1964 to 1972. Trained agriculturalists are employed for the preparation and evaluation of loan applications, but field supervision by the branch staff is very time-consuming due to the transport difficulties in the

Division as well as the long distances between borrowers. Ar-rears and bad debts have been persistently troublesome in the SEDC's agricultural credit activities.

Co-operative Societies

The number of primary co-operative societies under the Co-operative Development Department in Sarawak in 1971 was 221 with about 21 000 members. Forty-three societies with roughly 2 200 members were in the Fourth Division. The volume of produce marketed through co-operatives was, and still is, negligible. Most commodities are handled by the shopkeeper-money-lender system already mentioned. In 1970 for Sarawak as a whole the rubber and pepper handled through the co-operatives amounted to 2.2 and 2.7 per cent respectively of the total value sold from the State. The 1970 report on co-operatives in the Fourth Division revealed that the value per member family of supplies sold to members and of produce marketed was \$430 and \$200 respectively.

Table 1.4 discloses great differences in co-operative marketing in the Fourth Division.

TABLE 1.4 VALUE OF PRODUCE MARKETED 1969 (DOLLARS)

Product	Miri District	Baram District	Bintulu District	Total Fourth Division	Per cent
Rubber	2 457	151 799	18 134	172 390	51
Pigs		7 274		7 274	2
Guano	48 047			48 047	14
Coffee		11 957		11 957	4
Rice		75 510	289	75 799	22
Padi		7 666	144	7 810	2
Other		16 254		16 254	5
Total	50 504	270 460	18 567	339 531	
Per cent	15	80	5		100

Source: Report on Co-operatives, Fourth Division.

1.15 Conclusions and Recommendations Concerning the Work of the Department of Agriculture

Considerable efforts in terms of finance and manpower are channeled into the various agricultural production services in Sarawak and, although the ideal chain of activities is not often created, progress is being achieved. Under the present conditions in most of the Study Area there is little more that could be done from the extension aspect. The present extension effort of the Department is considered correctly orientated because the environment for accelerated development do-

es not exist; communications and transport facilities are poor, the farmers are often widely scattered, isolated groups and they are of differing backgrounds and religions.

However, in and around the planned development areas a very different situation is expected to exist. The Regional Plan provides for large concentrations of agricultural activity, many new villages and a few larger centres as well as the necessary infrastructure such as a road network and marketing, processing and storage facilities. The SLDB has been planned to be responsible for the main agricultural implementation and would undertake final selection and settlement of workers until such time as they may become small-holders. The principles on which these activities should be undertaken are given in Part I of this Supporting Report. SLDB, however, is organised to carry out agricultural operations only on an estate basis as is explained in Chapter 4. SLDB can provide the usual form of plantation management organisation but not the advisory and extension work that will be needed to enable small-holders to achieve success. Neither is the present agricultural extension service trained or organised to operate effectively in the new environment that would be created in the planned area and adjacent Native Customary Land and Titled Land. For these conditions a concentration of advisory staff would be needed in order to support the small-holder enterprises in becoming fully productive in the shortest possible time. The planned new physical infrastructure would make the operation of such a service feasible but, as has been shown, there are too few extension staff available and training facilities cannot be expanded quickly enough to provide a service level over and above that at present attained in the country. Furthermore the new conditions would demand an extension service with a fresh orientation, and would require the adoption of different methods and special training. For these reasons it is recommended that:-

- (a) a new, specialised service should be established to operate in the development areas and in the surrounding lands affected by the development;
- (b) in the remaining farming areas, within the Study Area, the existing level of extension activities and methods should be continued, but efforts should be made to diminish or avoid problems which have sometimes occurred in the past, such as:-
 - i) creating market transport problems by starting production enterprises in too small and too isolated circumstances;
 - ii) inappropriate land use planning resulting in the best land in an area being used for a low return crop. For example, low yielding seedling rubber has sometimes been planted on land which could have been planted to pepper or cocoa.

A major constraint in most areas is the lack of transport facilities for farm produce and inputs; not only long distance transport of products to and from markets but, even more important, short distance transport within production areas for

moving produce to the places of storage or processing. There is no tradition of using pack animals or animal-drawn vehicles in Sarawak; the dug-out canoe has been the donkey and the bullock cart of Sarawak agriculture. This situation suffices so long as subsistence shifting cultivation persists close to rivers and streams. However, as soon as commercial type agriculture is introduced or cultivation moves away from the rivers the situation changes. Often the movement of all farm produce and of all requirements for production must be done by human effort alone. This seriously limits the selection and location of many crops. Those that have heavy and/or bulky products cannot be recommended as a basis for development without first ensuring that reasonable short and long distance transport facilities exist or will be developed.

The possible crops for the more remote, isolated areas are those whose products need only simple processing to prepare them for market, are easily stored, are non-perishable, are of high value and are not bulky. Such products for conditions in the Study Area are Robusta coffee, cashew nuts, anatto seeds, copra, rubber, cocoa and some spices. Picking, drying and bagging is all the processing that is necessary for the first three crops mentioned while the preparation of copra and the fermentation and drying of cocoa beans are simple processes requiring simple equipment and easily learned skills. Small scale wet padi production in selected low lying areas should be encouraged for home consumption. All the other products except Robusta coffee should be aimed at export markets. On those holdings bordering large river systems, and therefore having easy transport facilities, the range of crops considered can be extended to include sugar cane for producing unrefined sugar for local consumption, as well as durian and rambutan fruits for local and nearby export markets.

In addition a particular effort should be given to the improvement of marketing arrangements aimed at stimulating production from the considerable acreage of rubber that exists in the Fourth Division. Future rubber processing facilities, which could help in establishing an improved marketing system are discussed in Part II.

The overall result of the recommendations concerning extension work by the Department of Agriculture would be that two complementary services would be operating:-

- (a) the existing service continuing along lines very similar to the present but with field staff generally better educated and better trained than at present. This service would be handling those areas not affected by the planned, concentrated development;
- (b) a new and expanding service organised and trained especially to support small-holder and small scale independent farmers in and around the planned development areas.

Gradually the area covered by planned development would increase and the area handled by the existing extension service would diminish and result in an eventual reversal of the relative importance of the two extension services. The creation and functioning of the new service is described in Chapter 2 and the specialised training of its staff in Chapter 3.

The research work so far completed in Sarawak and Peninsular Malaysia is sufficient as a basis for continuing or initiating development in oil palms, rubber, rice, cocoa and beef production. Several other activities such as lowland tea, spices, anatto, some essential oils, robusta coffee and cashew nut production require field-type research before commercial-type planting can be recommended. In fact practically all the enterprises require further research of some kind under local conditions. These aspects are dealt with in Parts IV and V where the individual crops and enterprises are discussed, but the overall research organisation, staff requirements and estimated costs for carrying out the work are discussed in Chapter 4.

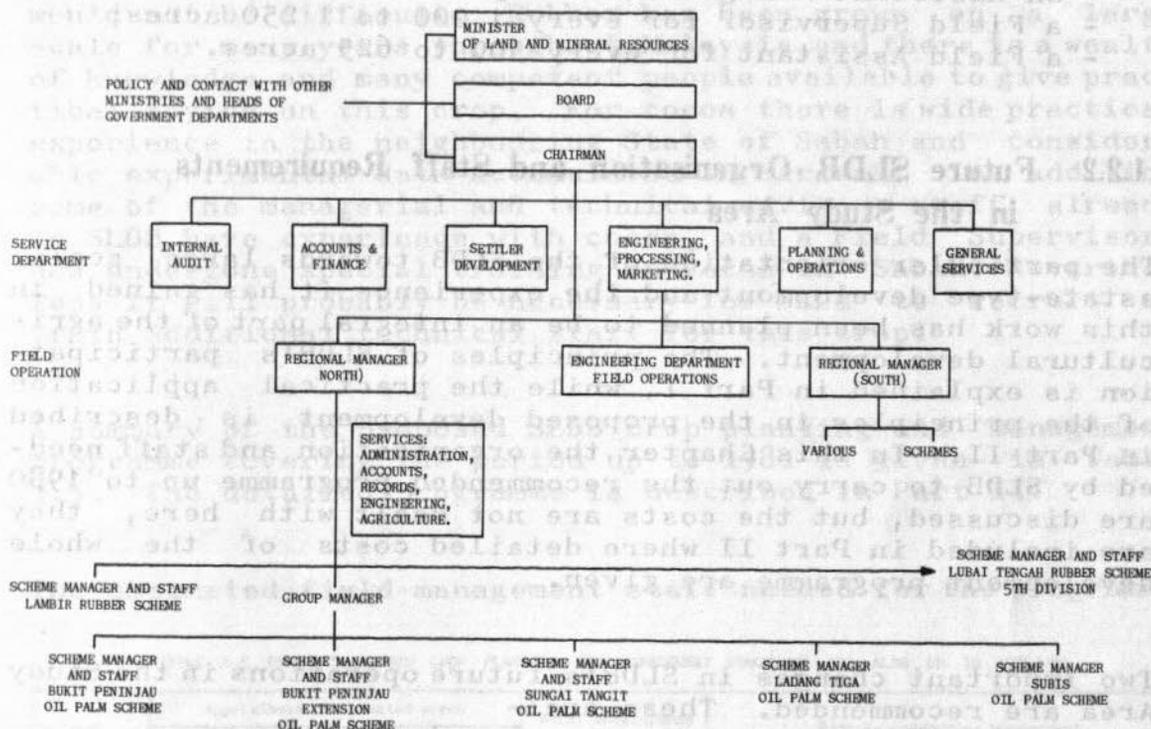
The likely future deficits of trained agriculturists, at all levels, are problems of which the Federal and Sarawak Governments are aware. Expansions of training facilities are already in hand and more are planned. Nevertheless, it would be advisable for any organisation requiring large numbers of trained agriculturists to undertake their own training programmes or, in the case of graduate staff, to consider increasing the number of overseas scholarships. The Farmers Training Centres and Farm Institutes are absorbing a considerable portion of the Department of Agriculture's training effort in a programme which can only give results in the long term future. The greatest difficulty is in organising an efficient follow-up service to support and encourage the young farmers when they attempt to take up farming on their own account. It is known that many of the trainees become submerged in their communities due to respect for their elders who follow the long established farming traditions. However, these young people will eventually form a nucleus of farmers who will be receptive of new ideas. Also the period between learning and the opportunities to practise what they have learned will become progressively shorter as Sarawak develops. Thus it seems reasonable to continue this form of training but it is suggested that those trainees who do not wish to return to their communities should be encouraged to enter normal planned development schemes rather than special youth settlement schemes. The latter are not considered a desirable system of development because no matter how successful they are agriculturally they are likely to be failures socially. The communities formed would consist of people all roughly the same age and the same training; they would be unbalanced and therefore unstable. It would be better, it is considered, to channel trained young farmers into planned, socially broader based schemes such as are planned for the Study Area. In such schemes they could be given priority in becoming small-holder farmers and they could be expected to become leaders in the new communities. This aspect is also discussed in Supporting Report No. 4.

12 THE SARAWAK LAND DEVELOPMENT BOARD (SLDB)

1.2.1 The Present Situation

The SLDB was set up by Government in early 1971 for implementation of its large scale agricultural development on unencumbered State Land. The specific tasks laid down by the Government for the SLDB have been outlined in Part I of this Supporting Report. The wide and important roles which have been given to SLDB make it an ideal body for initiating rural development. Its State-wide organisation is shown in Figure 1.3 which traces the chain of command to the Study Area.

FIGURE 1.3 PRESENT ORGANISATION OF THE SARAWAK LAND DEVELOPMENT BOARD



Although the SLDB has been in existence for only a short time it has already undertaken considerable development. In the Study Area, for example, by the end of 1973 approximately 20 000 acres of oil palms had been planted and about 12 000 acres more land was being cleared and prepared for planting to oil palms.

All this development is of the estate-type and although thought is being given to possible share participation by the workers in the profits of the schemes there are no present plans for demarcating physical land holdings for each participant. In fact the oil palm plantings so far undertaken have been commercial estate-type farming with no direct provision for small-holder development. Even in other fields, despite the assistance given to small-holders, the SLDB has not been directly involved in the establishment of small-holder settlements. For example, the crumb rubber factory at Sarikei and

the ribbed smoked sheet factories at Lambir and Lubai Tengah provide processing and marketing facilities for small-holders but the rubber plantations were established by the Department of Agriculture.

The present field management organisation in the Study Area is comprised of groups of staff allocated to every scheme. The number of each staff cadre is related to the planted acreage of oil palms and is roughly standardised as follows:-

- a Scheme Manager for every 4 000 to 5 000 acres;
- an Assistant Manager for every 2 000 to 2 500 acres;
- a Field Supervisor for every 1 000 to 1 250 acres;
- a Field Assistant for every 500 to 625 acres.

1.2.2 Future SLDB Organisation and Staff Requirements in the Study Area

The particular orientation of the SLDB towards large scale, estate-type development and the experience it has gained in this work has been planned to be an integral part of the agricultural development. The principles of SLDB's participation is explained in Part I, while the practical application of the principles in the proposed development is described in Part II. In this Chapter the organisation and staff needed by SLDB to carry out the recommended programme up to 1980 are discussed, but the costs are not dealt with here, they are included in Part II where detailed costs of the whole development programme are given.

Two important changes in SLDB's future operations in the Study Area are recommended. These are:-

- (a) a slowing down of the rate of land development; and
- (b) adoption of a diversified cropping pattern which would include rubber and cocoa in addition to oil palms.

Point (a) arises from Government's stated intention to increase SLDB's commitments in other parts of Sarawak, so, although the development rate would be reduced in the Study Area, the total rate and demand for more staff will probably not be lessened.

Point (b) would necessitate some increase in the field staffing and in the technical agricultural services.

Rubber and cocoa are more demanding of management than oil palms and require a relatively greater staff input. This need for greater managerial input has been accounted for, in the estimates of staff requirements, by assuming the management requirements for rubber and cocoa would be the same and allowing for the following approximate staffing rate in relat-

ion to planted acreage:-

- an Assistant Manager for every 1 500 to 2 000 acres;
- a Field Supervisor for every 750 to 1 000 acres;
- a Field Assistant for every 325 to 500 acres.

The requirements for management staff and labour for the individual crops are given in Part IV.

On the technical side - the agricultural services - SLDB has so far concentrated mainly on oil palms with very little emphasis on rubber and cocoa. Therefore, in order to cope with the recommended programme, there would be need to strengthen these services with regard to rubber and cocoa. To do this would not be difficult. Rubber has been grown on a large scale for many years throughout Malaysia and there is a wealth of knowledge and many competent people available to give practical advice on this crop. For cocoa there is wide practical experience in the neighbouring State of Sabah and considerable experimental data accumulated in Sarawak. In addition some of the managerial and technical advisory staff already in SLDB have experience with cocoa, and a Field Supervisor has undergone special training on cocoa in Sabah. Nevertheless it will probably be necessary for SLDB to recruit or train additional technical staff for this crop.

A summary of the proposed SLDB crop planting and management programme covering the period up to 1981 is given in Table 1.5. The detailed programme is described in Part II.

The estimated field management staff needed for the programme

TABLE 1.5 PROPOSED FUTURE CROP PLANTING AND MANAGEMENT PROGRAMME FOR SLDB UP TO MID-1981

Year	Approximate net planted acres				Rural development area	Remarks concerning management
	Oil palms	Rubber	Cocoa	Total		
1975	1 890	875	120	2 885	Lambir Subis	Mera-a sub-scheme; developed by SLDB for allocation to small-holders at the end of 1976.
1976	3 245	370	Nil	3 615	Niah-Suai	Central area of public estate (Igang); developed and managed by SLDB.
1977	3 945	1 415	875	6 235	Niah-Suai	Galasah and Sebanah sub-schemes; developed by SLDB for allocation to small-holders at the end of 1980.
1978	5 175	645	780	6 600	Niah-Suai	Southern part of the public estate (Sawai); developed and managed by SLDB. Part of Lamaus sub-scheme; developed by SLDB for allocation to small-holders at the end of 1982.
1979	4 035	2 530	Nil	6 565	Niah-Suai	Remainder of Lamaus and all Ensabang sub-schemes; developed by SLDB for allocation to small-holders at the end of 1982.
1980	5 980	770	450	7 200	Niah-Suai	Northern part of the public estate (Jatan); developed and managed by SLDB. Part of Talabit sub-scheme; developed by SLDB for allocation to small-holders at the end of 1984.
up to mid 1981	1 795	1 370	160	3 325	Niah-Suai	Remainder of Talabit sub-scheme; developed by SLDB for allocation to small-holders at the end of 1984.

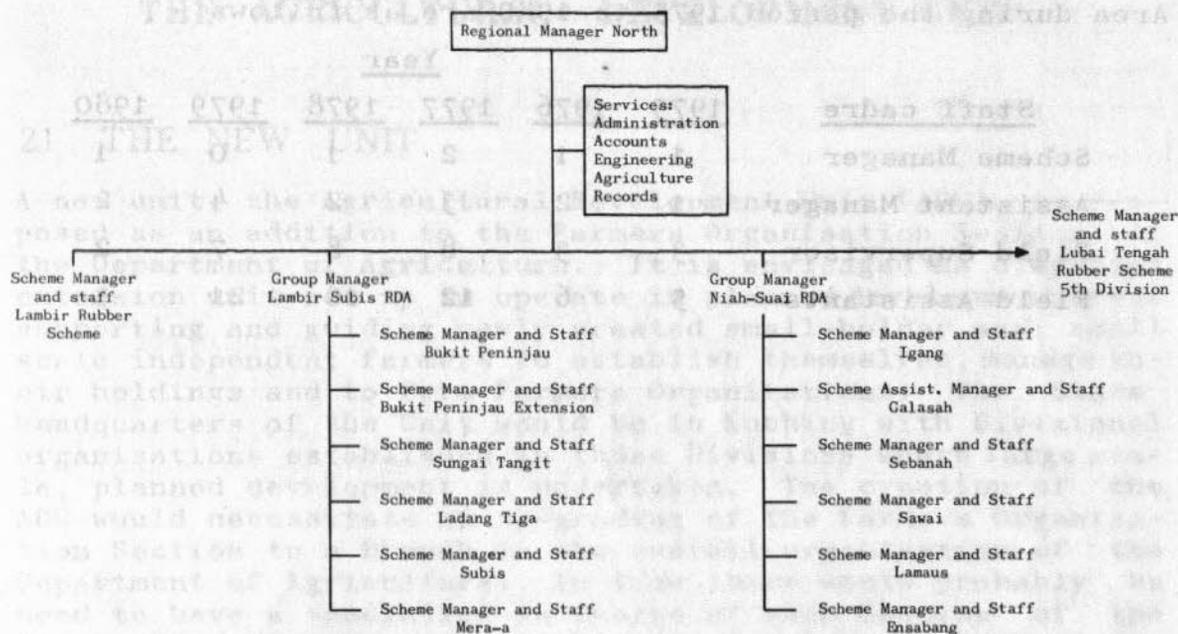
TABLE 1.6 ESTIMATED SLDB FIELD MANAGEMENT STAFF REQUIREMENTS FOR THE DEVELOPMENT PROPOSALS UP TO 1980

Sub-scheme	Staff cadre	Number of staff required in each year													
		1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
Mera-a	Manager	1	1	1	1	1	Management taken over by small-holders and ADU								
	Ass. Manager	1	1	1	1	1									
	Field Supervisor		3	3	3	3									
	Field Assistant		5	5	5	5									
Igang	Manager		1	1	1	1	1	1	1	1	1	1	1	1	
	Ass. Manager		1	1	1	1	1	1	1	1	1	1	1	1	
	Field Supervisor			3	3	3	3	3	3	3	3	3	3	3	
	Field Assistant			6	6	6	6	6	6	6	6	6	6	6	
Galasah	Manager									Management taken over by small-holders and ADU					
	Ass. Manager			1	1	1	1	1							
	Field Supervisor				3	3	3	3							
	Field Assistant				5	5	5	5							
Sebanah	Manager			1	1	1	1	1		Management taken over by small-holders and ADU					
	Ass. Manager			1	2	2	2	2							
	Field Supervisor				5	5	5	5							
	Field Assistant				7	7	7	7							
Sawai	Manager				1	1	1	1	1	1	1	1	1	1	
	Ass. Manager				1	2	2	2	2	2	2	2	2	2	
	Field Supervisor					4	4	4	4	4	4	4	4	4	
	Field Assistant					6	6	6	6	6	6	6	6	6	
Lamaus	Manager				1	1	1	1	1	1	Management taken over by small-holders and ADU				
	Ass. Manager				1	1	2	2	2	2					
	Field Supervisor					4	5	5	5	5					
	Field Assistant					4	9	9	9	9					
Ensabang	Manager					1	1	1	1	1	Management taken over by small-holders and ADU				
	Ass. Manager					1	3	3	3	3					
	Field Supervisor						4	4	4	4					
	Field Assistant						9	9	9	9					
Jatan	Manager						1	1	1	1	1	1	1	1	
	Ass. Manager						1	3	3	3	3	3	3	3	
	Field Supervisor						5	5	5	5	5	5	5	5	
	Field Assistant						12	12	12	12	12	12	12	12	
Telabit	Manager							1	1	1	1	1	1	1	
	Ass. Manager							1	2	2	2	2	2	2	
	Field Supervisor								2	4	4	4	4	4	
	Field Assistant								3	7	7	7	7	7	
Totals	Managers	1	2	3	5	6	6	7	Totals from here on are not meaningful because other schemes are expected to be started but have not been planned in detail.						
	Ass. Managers	1	2	4	7	9	13	15							
	Field Supervisors		3	6	14	22	29	31							
	Field Assistants		5	11	23	33	54	57							

are given in Table 1.6. Land clearing is expected to be undertaken by contractors and would commence in each sub-scheme about six months before the planting is scheduled to start, and although this programme is not shown in Table 1.5 the management staff required to supervise the work are included in the estimates given in Table 1.6. This Table shows that there would be a gradual build-up of total staff numbers until 1980. From then on, other schemes would be started in the Study Area but they have not been planned in detail. However, the staff on the sub-schemes Galasah, Sebanah, Lamaus, Ensabang and Telabit would be available to move into these other schemes at the times shown in the Table.

It is obvious that at some stage during the implementation of the proposed development the responsibilities of the Regional Manager would reach such proportions as to justify the employment of a second Group Manager. The stage at which this should occur would depend largely on the ability and quality of the Scheme Managers; the better they are the longer the

FIGURE 1.4 POSSIBLE FUTURE (1978) ORGANISATION OF SLDB IN THE STUDY AREA



Regional Manager would be able to manage alone. But eventually a second Group Manager responsible for the physical development in the Niah-Suai Rural Development Area would be required. The SLDB organisation in the Study Area as it might appear in, say, 1978 is shown in Figure 1.4.

12.3 Field Staff Training and Recruitment

Scheme Managers and Assistants

Although at present SLDB has a system of on-the-job training for Field Assistants on the existing oil palm schemes and there are opportunities for promotion of these staff, many of the Field Supervisors, Assistant Managers and Managers have had to be, and still are being, recruited from outside SLDB. This is because it is a young organisation and is still expanding. In the future some of the locally trained personnel will move into the higher posts but, during the period covered by the detailed planning presented in this Report, it is expected that the posts of Scheme Managers and Assistant Managers and possibly some of the Field Supervisors, will be filled by recruitment from outside SLDB. But it is important that the present training is expanded. In 1973 an attempt was made by SLDB to turn one of the existing oil palm schemes into a training centre for field management staff but the plan was shelved when a suitable 'instructor' could not be found. However, the idea was sound and should be attempted again.

The number of new staff that would be required in the Study

CHAPTER 2

THE AGRICULTURAL DEVELOPMENT UNIT

21 THE NEW UNIT

A new unit, the Agricultural Development Unit (ADU), is proposed as an addition to the Farmers Organisation Section of the Department of Agriculture. It is envisaged as a special extension unit set up to operate in planned development areas supporting and guiding newly created small-holder and small scale independent farmers to establish themselves, manage their holdings and to form Farmers Organisations. The State headquarters of the Unit would be in Kuching with Divisional organisations established in those Divisions where large scale, planned development is undertaken. The creation of the ADU would necessitate an up-grading of the Farmers Organisation Section to a Branch in the overall organisation of the Department of Agriculture. In time there would probably be need to have a specialist in charge of each Section of the ADU in headquarters in Kuching, but this aspect is beyond the scope of this Study. The present proposal is that a Divisional ADU should be started during 1974 in the Fourth Division where it would be an integral part of the organisation set up to implement the development planned for the Study Area.

Physically the Divisional ADU would consist of several centres (that is offices and buildings), situated in villages associated with the development; organisationally it would be made up of groups of specially trained staff stationed in the Centres carrying out various functions. Although the ADU would be part of the Department of Agriculture it must necessarily be considered separate from the present extension service. For this reason new titles are suggested for the various levels of personnel. For example, the suggestion is that personnel of the executive level be given the title of Leader, while those at the Assistant Agricultural Officer (AAO) level would be called Supervisors, and the Agricultural Assistant (AA) level called Extension Agents. After an initial allocation of staff from the Department to start the ADU it is proposed that all future staff should be separately and specially recruited for this service. Recruitment should be through the Public Service Commission but should be given special attention in order to speed up the normal process. The recruiting should be specifically for this Unit and not be considered as part of the general recruitment for the Department. The terms of recruitment should be such as to allow continual selection and rejection of staff during and after training. Such flexibility would be essential to create the high standard of efficiency necessary for this vital service. The pay, allowances and employment conditions would be basically similar to those in the Department but with some upward adjustment of fringe benefits to compensate for more stringent selection and for the loss of travelling allowances. Service in the ADU would require little or no overnight travel but there would be better chances of promotion than in other Branches of the Department.

It is envisaged that many of the staff of the ADU would eventually become employees of Farmers Organisations while others, after some years of service, would become small-holder farmers in one of the development schemes. Thus various long term opportunities would exist for ADU personnel.

There would be several types of small scale farmers that would be handled, they could be farmers on State Land, on Native Customary Land or on Titled Land. On State Land the farmers would be:-

- (a) small-holder farmers of all races emerging from development undertaken by the SLDB and generally these farmers would be people specially selected from the SLDB labour force. The principles involved in this process are described in Part I and their practical application is shown in Part II;
- (b) groups of people, generally long house people, who would have been allocated an area under a Block Alienation Scheme. Such alienations would be closely associated with the development planned to be undertaken by SLDB;
- (c) small scale private farmers, these would be individual persons with sufficient capital to develop the land themselves. They would be allocated undeveloped stretches of land closely associated with that planned for development by SLDB.

On Native Customary Land and Titled Land the farmers would be present holders of plots in areas closely associated with land planned for development by SLDB. It is in these areas of Native Customary and Titled Lands that road-based improvement schemes are envisaged to operate. This type of development could possibly be initiated in other parts of Sarawak wherever the infrastructure of roads and markets exists. In these areas the farmers already have rights to use the land which, in most cases, has already been cleared of jungle and may be partially developed.

Although the patterns of farming and settlement would differ under each of these situations the planned development would, by concentrating and integrating the development effort (incorporating urbanisation, road construction and the provision of marketing, processing and storage facilities), create a physical, social and economic environment where it is possible and desirable to provide intensive agricultural inputs through the new, specially trained and orientated ADU staff.

The overall administrative organisation whereby the SLDB and ADU efforts would be co-ordinated is described in the Main Report. In the remainder of this Chapter the creation and operation of the ADU is described.

2.2 ORGANISATION OF THE ADU

The ADU would eventually to be a State-wide organisation under the control of a Farmers Organisation Branch of the Department of Agriculture. The existing Farmers Organisation Section would require gradual expansion to undertake this extra work. The Kuching headquarters would eventually include senior staff to head the following Sections of the Branch:-

- (a) an Extension Section;
- (b) an Economic Section to handle agricultural supplies marketing and farm mechanisation;
- (c) a Credit Section to handle agricultural loans and savings;
- (d) an Accounts Section for keeping records of all transaction.

However, the envisaged Kuching organisation does not yet exist and perhaps need not for several years until at least the staff training programme has got under way. But this fact necessitates that the ADU in the Fourth Division, which would be the first Divisional ADU and would be associated with considerable development, should be larger and stronger than subsequent ADUs. It would require a headquarter of its own and a staff training organisation which could train staff for the State-wide ADU. The training would come under the jurisdiction of the Department of Agriculture's Training Branch.

2.3 THE FOURTH DIVISION ADU

The Divisional headquarters would consist of an Agricultural Leader (an agriculturist with a degree and several years experience), a Training Leader (a specialist in extension training), an Administrative Leader (a trained administrator), and office staff.

The field staff would be grouped into Teams each consisting of staff trained in the work of the various Sections of the Unit. The Teams would be organised to form ADU Centres in villages associated with the development and located as close as possible to the farmers with whom the staff would be dealing. The staff would live in the village and they would share a composite office block. In this way physical Centres, consisting of offices and stores, and staffed by people catering specifically for the requirements of the small-holders and small scale independent farmers would be created in the villages. Thus the ADU would not be spread throughout the development areas but grouped together in teams.

The Divisional headquarters should be started during 1974 and located at the existing Kabuloh Training Centre. The Agricultural Leader would be in charge of the Divisional ADU. He would be responsible for the technical aspects of the field work and would be in regular contact with the Divisional Act-

ion Committee where, at the Divisional level, the activities and services of the various Government Departments and Institutions would be co-ordinated. In addition close contact would be necessary with the Regional Manager and Scheme Managers of the SLDB in order to ensure a co-ordination of effort. In many instances the ADU would require the assistance of SLDB; for example, in the purchase of agricultural supplies, hire of heavy equipment and maintenance of tractors. Much of the Agricultural Leader's time would be in the field checking the work and assisting the extension staff of the Teams. He would be the initiator and chief organiser of farm competitions, agricultural shows, visits by farmers to research stations and other such activities which would promote interest and a competitive spirit among farmers to improve their holdings. He would be responsible for deciding the maximum value of materials and farm services that would be supplied to each farmer.

The Training Leader would be responsible mainly for directing and organising on-the-job training of the ADU staff but would be closely associated with a special training centre at Kabuloh where he would assist with the teaching and would ensure that the syllabus is correctly orientated to the needs of the ADU (this aspect of the work is explained in Chapter 3). He would assist the Agricultural Leader and research staff in preparing crop and enterprise extension manuals for use by the ADU Teams. The manuals would provide detailed guidance to the ADU staff and thus ensure that the same type and a standard of advice and services are made available to all the farmers handled. The basis for the initial extension manual could be the agronomic and economic assumptions made for each crop in Part IV together with numerous Department of Agriculture publications. The Training Leader's duties would also cover the encouragement and training of farmers to form Farmers' Organisations.

The Administrative Leader would be responsible for the smooth operation of the ADU. He would eventually have under him a fully equipped office, secretaries and clerks. Much of his time would be occupied with day-to-day problem such as organising the construction of houses, offices and stores for the staff; purchase of vehicles and other equipment; staff recruitment; pay and allowances for the staff. In fact he would relieve the Agricultural Leader of non-technical administrative problems. In particular he would be responsible for compiling and forwarding to the Kuching headquarters summarised monthly statements of farmers accounts (see paragraph 2.3.4 (d)). His office duties would also cover the safe custody of records of small-holding allocations made to farmers of land developed by SLDB. The principles for allocation of small-holdings are explained in Part I while their practical application is described in Part II.

The staff making up the Teams at the ADU Centres would consist of:-

- (a) one or more Extension Teams, each consisting of a Sup-

ervisor, up to five Extension Agents and a Home Demonstrator. The actual number of Agents would depend on the number of small-holders and other farmers being handled from the Centre. If the number of farmers would be too great for one Extension Team then a second one would be moved in rather than over-stretch the capabilities of one Extension Team. On the assumptions used in Paragraph 2.5 the maximum number of farmers that one Extension Team could handle would be 250. A Supervisor would be nominated leader of each ADU Centre, and for every seven Centres a Senior Supervisor or Section Leader would be nominated to supervise and co-ordinate the work of the Centres;

(b) staff from the Economic Section to handle:-

- supply of materials for production;
- mechanical assistance for certain agricultural operations;
- marketing of farm produce;

(c) staff from the Credit Section who would be the only members of the ADU Centre who would handle cash transactions with the farmers. These transactions could be:-

- cash payments to farmers for work done;
- provide a savings or banking service to the farmers until such time as a proper banking service is established in the area;

(d) staff from the Accounts Section who would be responsible for keeping records of all the transactions undertaken between the farmers and the staff of the Economic Section;

(e) Forest Guards; these staff who would be attached to the ADU from the Forest Department would be stationed only in those Centres which have areas of operation containing land unsuitable for agriculture and therefore allocated to permanent forest, but which are too small or too isolated to be included in State Forest Reserves.

The specific tasks of these various staff are described below.

2.3.1 The Extension Team

The Supervisors would be the leaders of each ADU Centre but their main work would be in the field supervising, training and assisting the Extension Agents under their control. The fact that all the staff of the ADU Centre would be living in the same village implies that there would be almost daily contact between the Supervisor and all the staff.

The Extension Agents would be in daily contact with the farmers and would endeavour to become their friends. The Agents' tasks would be to show and to teach the farmers the cultural

methods of crop and animal husbandry as specified in the extension manuals; also to ensure the farmers know exactly what would be expected of them, where they fit into the scheme, what aids and facilities would be available, how to obtain these and to use them correctly.

In those sub-schemes in which the land would be developed by SLDB and later divided into small-holdings, an ADU Team would move in together with the first specially selected potential small-holder farmers. The Team would be responsible for division and allocation of the land. First the rice land then later the oil palm, cocoa and rubber lands. The principles of this process are explained in Part I, and their practical application in Part II. The ADU personnel would also be responsible for ensuring that the small-holders understood exactly the terms on which the plots of crop land, houses and homestead garden plots would be handed over. The transfer would be recorded and should take the form of a simple, easily understood written agreement between the ADU (representing the Government) and the farmer. It should be in triplicate; one copy kept by the farmer, one sent to the Land Registry in Kuching and the third copy kept in the Divisional headquarters. Recommendations concerning the terms of the agreement are given in Part I.

An important task of the Extension Agents would be to assist the farmers they serve in drawing up plans of work for every crop each season. These plans would include work involving whole groups of small-holders; for example, arranging the harvesting of oil palm so that contiguous groups of holdings would be harvested on the same day, or, in the case of small scale private farmers developing their own land, deciding upon the acreage of land to be cleared and planted to oil palms or cocoa. Only those crops or enterprises considered suitable for the particular holding or situation and detailed in the extension manuals would be recommended and supported by the ADU Team. Either the farmer or the Extension Agent could be the initiator of a particular undertaking but only with the farmer's full agreement and co-operation would an enterprise be implemented.

In effect the details of work for individual farmers would form annual farm budgets. These should be simple documents drawn up at the same time each year, covering every crop and enterprise for the coming year. Three tables for each crop or enterprise would suffice. The basic layout and headings of the tables for each enterprise could be standardised and printed on one page for issue to Extension Agents. The first table could contain:-

- the area of crop or size of enterprise;
- the weight of produce expected for sale;
- the unit value of produce at farm gate;
- the gross value of produce.

The total of gross values for all crops and enterprises would

give the gross income expected from the holding.

The second table could contain the material inputs required for every crop or enterprise as laid down in the extension manuals. These would show the standard input packages to be supplied by the ADU. The quantity and value of all inputs would be shown. By subtracting the total value shown in the second table from the gross income shown in the first table an estimate of the net income from the holding would be obtained.

The third table could show the estimated number and timing of man days labour that the farmer would have to work.

The basis of the first budgets would have to be existing information from the Department of Agriculture and the information given for each crop in Part IV. However, such budgets could become more and more accurate as experience is gained. They would show the farmer his year's work programme and likely financial status. But possibly a more important use of the budgets would be as the source of information for estimating the quantity of materials and the level of services required in the development areas. In addition they would provide valuable teaching material and would assist the Agricultural Leader in his control of the quantities and value of inputs provided to every farmer. An example of a budget covering the standard input package for swamp rice is given in Appendix III.

A similar and equally important task would be the drawing up of a farm plan for every farmer. This would be a map or set showing the modules of land making up the holding and would show the locations of various crops and enterprises. The plan would include a farming calendar in diagram form showing operations to be performed in every month. Also included would be an analysis of every enterprise over its life time. These would show the expected performance and profitability of every undertaking. Thus the farmer would be fully aware of his commitments. Again the information given in Part IV would provide a basis for the first enterprise budgets and labour input calendars.

Inevitably there would be a degree of overlapping between the annual budgets and the farm plans but this would be desirable in that it would ensure that the farm plan is realistic and continually brought up to date. Every farm budget and farm plan would be made in duplicate; one kept by the farmer and one passed to the Agricultural Leader.

In those sub-schemes where patches of forest have been left it would be necessary for Forest Guards to be included among the first ADU staff to move into the centre. Their work would be to supervise and assist, initially the farming community

and later the Farmers Organisations, to protect and manage the patches of forest left in the agricultural development areas. These patches of forest would be on land unsuitable for agriculture and therefore allocated to permanent forest but they would be too small or too isolated to be included in State Forest Reserves.

Guidance on the technical aspect of handling the patches of forest would come from the Forest Department, but the use of, and any revenues from, these patches would be exclusively for the farming community concerned.

2.3.2 The Staff of the Economic Section

Their tasks would fall into three main categories each handled by different groups of persons:

- i) to supply, on credit, the materials for production;
- ii) to supply, on credit, mechanical assistance for certain agricultural operations;
- iii) to organise and assist in the marketing of farm produce.

These services would be part of the whole package service operated by the ADU. Having provided the farmers with the materials and means to carry out the improvements and innovations promoted by the Extension Team, the task of the Economic Section would be to recover the cost of these through the marketing of produce from the oil palm, rubber and cocoa areas on the farms served. Generally there would be no provision of credit in the form of cash. Only limited cash payments to settlers are foreseen, these would be made by the staff of the Credit Section and are explained in Paragraph 2.3.3.

The tasks and functions of the staff of the Economic Section would be as follows.

(a) The Supply of Materials

A trained Storeman and an Assistant Storeman would be attached to each Centre and would handle the supply of materials such as fertilisers, insecticides, herbicides, seeds, bags etc., to the farmers. The materials would be in accordance with standard input packages as laid down in the extension manuals. Only the specified items would be supplied and generally the whole package, not only part of it, would have to be accepted by all participating farmers.

Finance for the purchase of the materials in bulk would be provided as credit to the ADU by the Bank Pertanian, for instance, which would be required to set up an office in Sarawak.

Purchase of the materials, at least during the early years, would be through the SLDB who would be requested to add the estimated requirements of the whole ADU to their bulk orders. SLDB would handle the supplies right up to their stores in the development areas. At this stage the supplies would be handed over in bulk to the ADU who would be responsible for their safe keeping and further distribution to the farmers. This would be handled like in any retail delivery store. Materials required in large quantities, or heavy bulky goods like fertilisers, would be delivered to specific places at specific times as arranged with the farmers or the Extension Team. Individual farmer requirements of materials in small quantities like pesticides, could be collected personally from the store.

Every participating farmer would have an account with the ADU Centre in his particular village, and every delivery, whether in the field or at the store, would be recorded against the individual receiving the supplies. There should be special printed forms for this purpose and the farmer's signature would have to be obtained each time for every delivery of material. There would be a limit to the value of goods and services that any one farmer could obtain. This limit would vary from farmer to farmer and would be set by the Extension Team Supervisor upon guidance from the Agricultural Leader. Generally the limit would be equivalent to about 60 per cent of the estimated value of sales of produce for which the only outlet would be through the ADU organised marketing. Such produce would be oil palm fresh fruit bunches (ffb), fresh rubber latex or sun-dried rubber sheets or rubber coagulum (either poly-bag or bucket), wet cocoa beans and essential oil material. Estimates of the likely sales value of these products from every holding could be obtained from the farm budgets. The sum of the budgets would be the source of estimates for the total quantity of materials to be ordered by the ADU.

(b) The Provision of Mechanical Aids

Every ADU Centre would have a trained mechanic who would have trained machine operators under him. Their purpose would be to operate and maintain certain machinery to assist the farmers in working their holdings. The major assistance would be to provide mechanical preparation of wet rice land. Equipment required for this should be of two types. Large units consisting of tractors of the Ford 5000 type fitted with cage wheel extensions and operating heavy duty rotovators; one such unit for every 200 acres of wet rice land developed within a reasonable distance of the village. Small units of the power-tiller type to handle smaller total acreages and small isolated blocks of rice land. In addition there should be:-

- i) spraying equipment of the knapsack type, both hand operated and motor operated;
- ii) motor driven rice threshing equipment and chain saws;
- iii) hand tools such as cross-cut saws, axes, spades, hoes etc.

All the mechanically driven equipment (tractors, power-tillers, sprayers and chain saws) would be worked by the trained mechanic and operators. The services of this equipment would be for hire (on credit terms) by the farmers. The hand operated equipment would be available on similar terms for use by the farmers themselves. Records of all hiring would be kept; again by a system of printed forms which would be signed by the farmer.

Requirements for heavy equipment like bulldozers, graders and ditchers for road construction and maintenance or for land drainage would be met by contracting the work out to SLDB, Public Works Department (PWD), Drainage and Irrigation Department (DID) or any suitable private contractor.

Generally the ADU would not become involved in the processing of farm produce. Expensive installations such as palm oil mills, large cocoa fermenting and drying centres and essential oil stills are expected to be erected and run by organisations such as SLDB and SEDC. However, the building and running of small cocoa processing centres by groups of smallholders, for example, could be encouraged and supported as part of the process of forming Farmers Organisations. Also private firms could be encouraged to set up padi drying and milling facilities.

(c) The Marketing of Farm Produce

At each Centre a trained Recorder would be in charge of this service and would have under him trained Assistant Recorders. Their task would be to ensure that there is an organised marketing outlet for all products from enterprises recommended and supported by the ADU Team.

The task would fall into two main categories depending on the commodity being handled:-

i) A collection, recording and delivery function which would operate in the case of those commodities for which the only outlet would be the one organised by the ADU. These are the products already mentioned, oil palm ffb, rubber and cocoa beans. For these commodities a time and date collection round would be organised, records of quantities produced by individual farmers would be kept and whole consignments would be delivered to the processing plant.

ii) Assistance would be given to farmers, if they wish it, to sell any other commodities the production of which have been part of the ADU Team's programme but for which other outlets could exist. This includes such products as rice, pepper, fruits, vegetables, fish, poultry, pigs, coffee, anatto and cashew nuts. Some of these commodities the farmers themselves would consume, others they may wish to sell, either privately through some local trader or through the ADU. Genera-

lly there would be no obligation on the farmers as to the disposal of these commodities but the ADU would ensure that there would be convenient outlets; in fact handling the product if there is no other market in the area. Every effort would be made to channel all these products through a State organised marketing organisation: for example, the Pepper Marketing Board.

The value of all commodities handled by the ADU would be credited to the account of the individual farmer. Instances could arise, in practice, where the farmers in an area do not have sufficient crops which would be automatically handled by the ADU to provide sufficient credit-worthiness to obtain the materials and services needed. In such cases arrangements would have to be made for the ADU to become the only convenient outlet for some other specific product. For all the products handled by the ADU records on printed forms should be kept.

2.3.3 The Staff of the Credit Section

There would generally be three specially trained clerks in the ADU Teams; a Senior Clerk and two Assistant Clerks. They would be the only ones who would have cash transactions with the farmers. Transactions could be either payments to farmers or payments by farmers into a savings or banking service. The Senior Clerk would be ultimately responsible for correct recording of all transactions and safe keeping of cash.

Payments to farmers would be made only for work done. This could occur in three situations:-

- (a) in compliance with a recognised subsidy scheme;
- (b) in Block Alienation Schemes where participants would be paid for work done during the period before their main crops come into bearing;
- (c) after the transference of developed land from SLDB management to small-holder management there would be a two or three years period of maintenance for all rubber plantations before tapping could start and the plantation divided into small-holder plots (see Part I). Farmers would be paid for all work done in the rubber plantations during this period.

Every farmer would have an account at the Centre and payments into the account could occur in three ways:-

- cash paid in by the farmer;
- a credit statement from the Accounts staff;
- a credit due for work done by the farmer.

Facilities would be made for cash withdrawals by the farmers as well as allocations to particular Federal and State saving schemes which are discussed in Supporting Report No. 9.

2.3.4 The Staff of the Accounts Section

Trained accountants would keep accounts of all transactions undertaken by the ADU Team. The accountants would be required to make up monthly statements of every farmer's account and arrange payment of amounts due to the farmers and to the bank which provided the original loan.

At each Centre a copy of the forms recording every transaction carried out by the staff of the ADU Team in their area would be passed to the Accounts staff who would also receive monthly payments from the processing plants and other outlets for bulk deliveries of farm produce. Thus a monthly statement of all farmers' transactions could be made. This should show the value of materials and services received by every farmer from the ADU Team and the value of the produce handled by the Team. The amounts due to every farmer could be calculated by deducting from the total sales value a previously agreed sum for the materials and services received. Included in the deductions could be payments to cover the farmers obligations to Government for the land. The acceptance, by the farmer, of these deductions from his earnings would be a pre-requisite for participation as a small-holder or selection as a small scale private farmer.

A vital aspect in the working of the whole system would be the recording of the transactions. This should be kept as simple, practical and foolproof as possible. Given below are some suggestions as to how the system could be run at each ADU Centre:-

- (a) Every farmer could be identified by name and by a number. Both these should appear on every form recording any transaction involving the farmer.
- (b) All transactions involving a farmer should be in triplicate; one copy for the farmer, one for the particular ADU staff involved and one passed to the ADU Accounts staff.
- (c) Records of bulk deliveries of farm produce to the processing plants should also be in triplicate; one copy for the plant, one for the ADU Marketing staff and one passed to the Accounts staff. In addition, a summary record, showing the quantities contributed by every farmer, should be made for every bulk delivery. These summaries should be in duplicate; one for the Marketing staff and one for the Accounts staff.
- (d) Monthly statements of every farmer's account should be made in triplicate; one for the farmer, one kept by the Accounts staff and one passed to the Agricultural Leader. The statement should show, very simply:-
 - the type and value of materials and services received by the farmer during the month. These should be itemised and totalled;
 - the value of produce sold, itemised and totalled;
 - deductions for the month, itemised and totalled;

- total outstanding for production materials and services received (not including land development costs);
- amount due to the farmer.

The set of copies passed to the Agricultural Leader would enable him to obtain valuable information on the progress of every farmer, and, indirectly the efficiency of the ADU staff at the different Centres. This information could also be used in making assessments of the farmers credit worthiness.

At the Divisional ADU headquarters the monthly statements from the ADU Centres would be combined into a Divisional statement and forwarded to the Branch headquarters in Kuching.

24 SOURCE OF FUNDS AND PAYMENT PROCEDURE

The Bank Pertanian, it is suggested, could be the source of funds required by the Economic and Credit Sections of the ADU. The Bank would need to start an office in Sarawak and a system could be established whereby the Bank would operate under its basic charter and regulations and would have its own accounts and staff but the Department of Agriculture would be responsible for auditing and supervision of the accounts kept by the ADU staff at each Centre. Such checks, would need to be combined with supervision and on-the-job training, and be made about every three months by senior accounts staff of the Department. The handling of funds should be simple. The ADU could be allocated annually a credit account with the Bank. The amount would be appropriate to the estimated combined requirements of the Divisional ADUs. Repayments to the Bank would be made by the headquarters Accounts Section using the deductions from every farmer's account.

The visits of the senior accounts staff should be made the opportunity for taking any necessary disciplinary action against farmers who are not complying with the terms of their agreement. These actions should, as far as the farmer is concerned, be unassociated with the local ADU staff but should be seen as a result of the inspection of the records and accounts. Application of the discipline, whether a warning or eviction, should be administered by the visiting senior staff accompanied, if necessary, by representative of the District Action Committee. It would be most important that the local ADU staff would not be directly involved because success in their work would depend largely on their maintaining friendly relations with the farmers.

25 BUILD-UP OF THE ADU

Specially trained staff would be required to undertake the type of work expected of the ADU and the earliest that trainees could become available would be beginning of 1976, as is explained in Chapter 3. However, there is already a need in

the Study Area for ADU-type Centres: there is the block alienation scheme covering about 3 000 acres started at Sepupok close to Batu Niah, and a road-based improvement scheme, planting oil palms has commenced along the main road close to the SLDB Bukit Peninjau scheme. It is important that the Sepupok and the road-based improvement schemes succeed and act as proof of Government's intention to assist the local people of the Region to improve their livelihood. But to succeed the participants will require as soon as possible far more intensive support and assistance than can be given by the existing Department of Agriculture Extension Service. It is therefore recommended that the Fourth Division ADU is started during 1975 by the secondment of staff from the existing Extension Service. The staff could come from all Divisions in the State not only the Fourth Division. But the teams so formed would work only within these two particular schemes. Further commitment of the ADU should not start until 1976 when the first trainees from the Kabuloh Training Centre would become available. Subsequent build-up of the Unit would then be consistent with the overall development rate in the Region, taking into account the rate at which small-holder farmers would be created, road-based improvement undertaken and the training capacity of Kabuloh Training Centre. Applying these principles to the development programme presented in Part II the following would be the build-up programme of the Fourth Division ADU:-

1974 Establish a headquarters at Kabuloh Farm Institute. Recruit a Training Leader and trainees to start the course in 1975. Build houses, offices and stores for two Centres that would be formed in 1975.

1975 Start the Kabuloh Training Centre. Form, by secondment of staff, two ADU Centres at:-

- (a) Bukit Peninjau to work on the road-based improvement scheme already started and extend activities along the Miri-Bintulu road and the road to Beluru.
- (b) Batu Niah to work with the participants of the Sepupok Block Alienation Scheme.

Build houses, offices and stores for Centres that would be formed in 1976.

1976 Maintain the first two Centres, and continue training course at Kabuloh. Form new Centres at:-

- (a) Mera-a Village to help settlers there with the management of their homestead and rice plots.
- (b) At the new Farmers Training Centre (about ten miles from Bintulu on the road to Miri) to undertake road-based improvement along the Miri-Bintulu road.
- (c) At Beluru to undertake road-based improvement along the new road extending from Beluru towards Long Lama, and along the road to Mera-a Village.
- (d) Marudi to undertake road-based improvement along the existing circular road and along the new road to Long Linei.

- (e) Bekenu to undertake road-based improvement along the existing road to Bekenu. Build houses, offices and stores for the Centre to be established in 1977.
- 1977 Maintain all previous Centres and continue training course. Form new Centres at:-
- (a) Long Lama to undertake road-based improvement along the new road extending from Beluru to Long Lama.
 - (b) Labang to undertake road-based improvement along the new road joining Labang to the Miri-Bintulu road.
- Move in a second Extension Team at Batu Niah to extend road-based improvement in the area. Build houses, offices and stores for Centres to be established in 1978.
- 1978 Maintain all previous Centres and continue the training course. Form new Centres at:-
- (a) Galasah Village and Sebanah Village to help settlers with the management of their homestead and rice plots. Two Extension Teams would be required at Sebanah.
 - (b) Tubau to undertake road-based improvement on the new road from Labang to Tubau.
- Reinforce Extension Teams at Bukit Peninjau and Batu Niah. Build houses, offices and stores for Centres to be established in 1979.
- 1979 Maintain all previous Centres and continue training course. Reinforce second Extension Teams at Batu Niah, Mera-a, Long Lama, Bekenu, Beluru, Galasah and Sebanah to undertake road-based improvement into surrounding legally occupied land.
- 1980 Maintain all previous Centres and continue the training course. Form Centres at Lamaus and Ensabang (two Extension Teams each) to help settlers with the management of their homestead and rice plots.
- Move in a second Extension Team at Bukit Peninjau to extend road-based improvement in the area.
- Reinforce Extension Team at Labang.
- 1981 Maintain all Centres and continue training course. Move in new Extension Teams at Batu Niah, Bekenu and Beluru. Reinforce Extension Teams at Tubau and Ensabang. Build houses, offices and store for Centre to be formed in 1982.

1982 Maintain all previous Centres and continue the training course. Form a Centre at Telabit village to help the settlers with the management of their homestead and rice plots.

Move in second Extension Teams at Beluru and Bekenu. Reinforce teams at Galasah, Sebanah and Tubau.

This build-up of the ADU Centres is given in detail in Appendix V. A summary of the Centres formed is given in Table 2.1 and the locations of the Centres are shown in Figure 2.1.

TABLE 2.1 SUMMARY OF BUILD-UP OF ADU CENTRES

ADU Centre formed at	Main purpose of Centre	Year formed	Extension teams		
			Initial number	Year of other teams	Year of reinforcements
Bukit Peninjau	Road based improvement	1975	1	1980	1976, 1980
Batu Niah	Block Alienation	1975	1	1981	1976, 1979
	Road based improvement	1977	1		
Bekenu	Road based improvement	1976	1	1981	1979
Mera-a	Support of small-holders	1976	1		1979
Bintulu 10th Mile	Road based improvement	1976	1		1979
Beluru	Road based improvement	1976	1	1981	1979
Marudi	Road based improvement	1976	1		1979
Long Lama	Road based improvement	1977	1		1980
Galsash	Support of small-holders	1978	1		1979
Sebanah	Support of small-holders	1979	2		1979
Labang	Road based improvement	1977	1		1980
Tubau	Road based improvement	1978	1		1981
Lamaus	Support of small-holders	1980	2		1981
Ensabang	Support of small-holders	1980	2		1981
Telabit	Support of small-holders	1982	2		

2.6 STAFF REQUIREMENTS

Summaries of the estimated staff requirements to fulfil the build-up described above are given in the following Tables while the assumptions used to obtain the estimates are given in Appendix IV:-

- the headquarters and the Extension Teams together with the number of farmers handled - Table 2.2;
- the supply, marketing and farm mechanisation services, (the Economic Section) - Table 2.3;
- the credit, savings and accounting services - Table 2.4.

It is shown that the supply, credit, farm mechanisation, marketing and accounting functions are kept to a minimum during 1975. This is because these activities require specially trained men who would not be available in any numbers until the ADU training scheme comes into operation; this would not be before 1976. The marketing function would not be required until sufficient progress has been made by each Centre to warrant it or until the oil palm and cocoa plantations come into bearing.

FIGURE 2.1

LOCATION OF AGRICULTURAL DEVELOPMENT UNIT (ADU) CENTRES

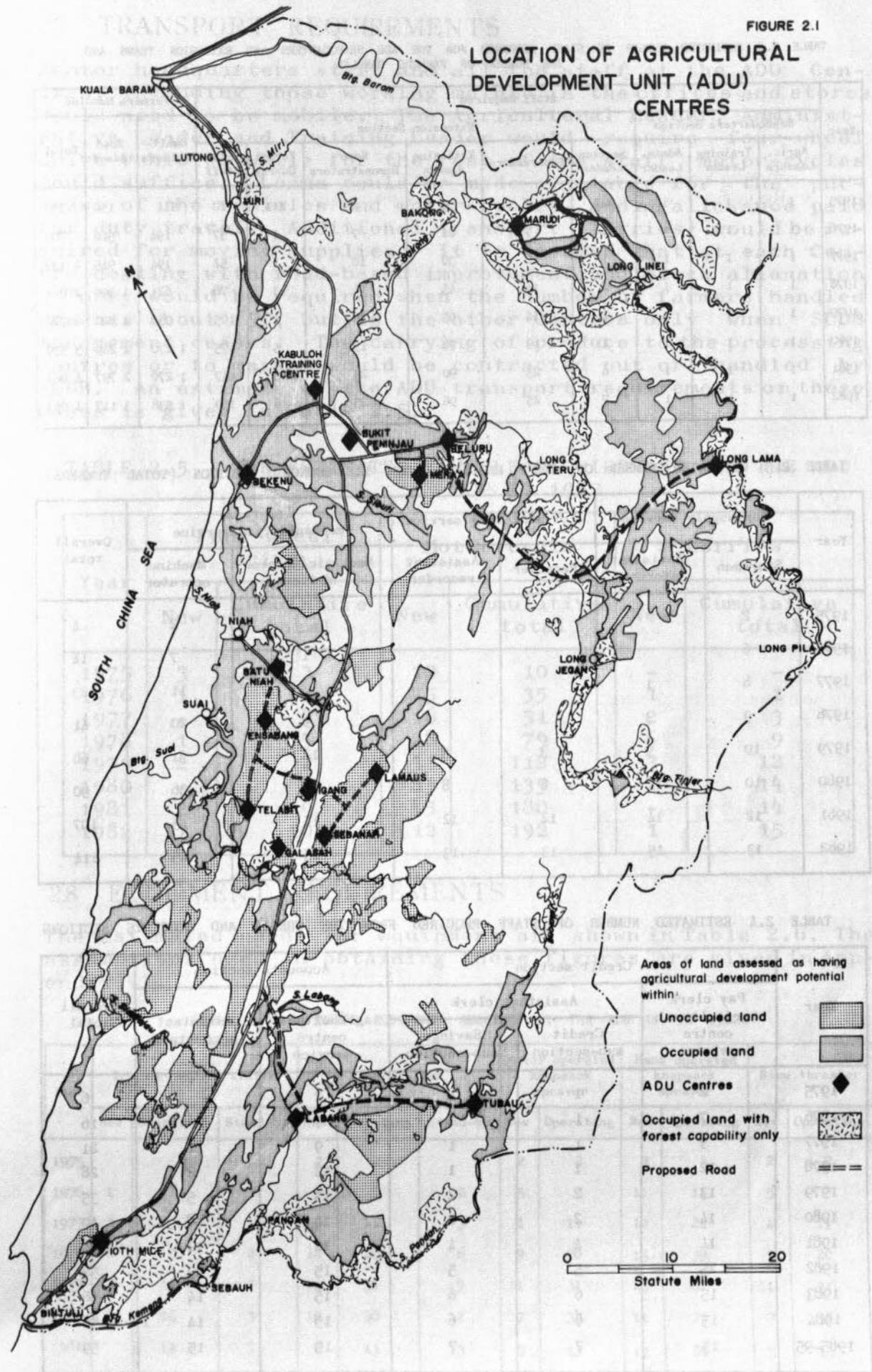


TABLE 2.2 ESTIMATED NUMBER OF STAFF REQUIRED FOR THE ADU HEADQUARTERS AND EXTENSION TEAMS AND THE NUMBER OF FARMERS HANDLED

Year	Staff Required									Farmers Handled		
	Headquarters Section			Extension Section						Small-holders	Road Based	Total
	Agric. Leaders	Training Leader	Admin. Leader	Section Leader	Supervisors	Extension Agents	Home Demonstrators	Forest Guards	Total Staff			
1975	1	1	1	Nil	2	6	2	Nil	10	Nil	150	150
1976	1	1	1	1	7	21	7	1	37	194	510	704
1977	1	1	1	1	10	30	10	1	52	194	945	1 139
1978	1	1	1	2	14	45	14	3	78	621	1 990	2 011
1979	1	1	1	4	14	65	16	4	105	952	1 620	2 772
1980	1	1	1	4	19	78	19	5	175	1 270	2 269	3 539
1981	1	1	1	6	23	90	23	5	147	1 270	2 797	4 067
1982	1	1	1	7	25	96	25	6	159	1 538	1 147	4 683

TABLE 2.3 ESTIMATED NUMBER OF STAFF REQUIRED FROM THE ECONOMIC SECTION (TOTAL NUMBERS)

Year	For supply service		For marketing service		For farm mechanisation service		Overall total
	Storeman	Assistant storeman	Recorder	Assistant recorder	Mechanic/tractor driver	Machine operator	
1975	2					2	4
1976	6				1	7	14
1977	8	1			3	11	23
1978	9	3			9	20	41
1979	10	9	3	3	12	31	66
1980	10	12	8	8	14	36	90
1981	12	14	12	12	14	43	107
1982	13	15	13	13	15	45	114

TABLE 2.4 ESTIMATED NUMBER OF STAFF REQUIRED FROM THE CREDIT AND ACCOUNTS SECTIONS

Year	Credit section				Accounts section		Overall total
	Pay clerk agricultural centre service	Assistant clerk		agricultural centre service	Assistant accountant		
		Credit sub-section	Savings sub-section				
1975	2	1	1			6	
1976	7	1	1	2		16	
1977	9	1	1	7		21	
1978	12	1	1	9	1	28	
1979	13	2	2	12	2	35	
1980	14	2	2	13	5	40	
1981	14	4	4	14	8	48	
1982	15	5	5	14	12	53	
1983	15	6	6	15	13	56	
1984	15	6	6	15	14	56	
1985-95	15	7	7	15	15	59	

2.7 TRANSPORT REQUIREMENTS

Senior headquarters staff and all the staff at the ADU Centres, including those working mainly in the offices and stores would need to be mobile. The Agricultural Leader, Administrative Leader and Training Leader would require four-wheel drive vehicles while for the rest of the staff motor-cycles would suffice. Loans could be made available for the purchase of the vehicles and motor-cycles, and an allowance paid for duty travel. Additional transport (lorries) would be required for moving supplies. It is assumed that at each Centre dealing with road-based improvement and block alienation a lorry would be required when the number of farmers handled reaches about 150, but in the other Centres only when SLDB management ceases. The carrying of produce to the processing centres or to market would be contracted out or handled by SLDB. An estimate of the ADU transport requirements on these bases is given in Table 2.5.

TABLE 2.5 THE ESTIMATED VEHICLE REQUIREMENT FOR THE ADU UP TO 1982

Year	Four-wheel drive		Motor-cycle		Lorries	
	New	Cumulative total	New	Cumulative total	New	Cumulative total
1975	3	3	10	10	-	-
1976	1	4	25	35	1	1
1977	-	4	16	51	2	3
1978	1	5	28	79	6	9
1979	2	7	33	112	3	12
1980	-	7	23	135	2	14
1981	2	9	45	180	-	14
1982	1	10	12	192	1	15

2.8 EQUIPMENT REQUIREMENTS

The estimated needs for equipment are shown in Table 2.6. The assumptions used in obtaining these figures are given in Appendix VI.

TABLE 2.6 ESTIMATED EQUIPMENT REQUIRED BY THE ADU UP TO 1982

Year	Tractor and rotavator			Power-tiller			Motor operated knapsack sprayer		Hand operated knapsack sprayer		Rice thresher	
	New	Operating	Stand-by	New	Operating	Stand-by	New	Operating	New	Operating	New	Operating
1975				2	2		2	2	3	3	2	2
1976	1	1		7	7	2	5	7	11	14	5	7
1977	2	3		5	11	3	4	11	10	24	4	11
1978	8	9	2	12	20	6	9	20	15	39	9	20
1979	3	12	2	14	31	9	11	31	23	62	11	31
1980	3	14	3	10	38	12	7	38	14	76	7	38
1981		14	3	6	43	13	5	43	12	88	5	43
1982	1	15	3	3	45	14	2	45	6	94	2	45

2.9 THE CREATION OF FARMERS' ORGANISATIONS

Farmers' Organisations (FOs) are new to Sarawak. A modest start was made in 1971 with four organisations which are still in their earliest stages of development. They are under the direction of the Farmers Organisation Section of the Department of Agriculture (see Figure 1.1 on page 3 in Chapter 1). The Farmers' Association Act of 1967 and the Farmers' Organisations Act of 1973 show that this type of organisation is regarded by Government as an integral part of agricultural development. The intention to create FOs in the planned development areas would be stressed from the earliest stages of ADU staff training. In fact the establishment and functioning of the ADU is seen as an essential stage in the creation of FOs.

The formation of FOs should also be an important lecture subject in the sociological efforts to orientate and assist the settlers to adapt themselves to their new environment (see Supporting Report No. 4). On those sub-schemes destined for allocation to small-holders the settlers should be encouraged to take an active part in the running and organising of the social activities even before they become small-holder farmers. The same principles should be applied to the agricultural activities. Co-operation would be necessary for such activities as harvesting of oil palms; large blocks of oil palms although, consisting of numerous individual holdings, would have to be harvested on the same day; similarly for mechanical preparation of rice land, all the holdings in a particular area would need to be handled together. Other examples can be thought of; at first this co-operation would be organised by the ADU but the natural leaders among the farmers would be constantly encouraged to take over the task. In this way farmer participation in the running of the everyday work would start and expand, and the farmers would take over an increasing responsibility for their own affairs. Initially individual functions, like transport of oil palm fresh fruit bunches to the mill, could be undertaken. Later combined packages of operations could be taken over from the ADU, for example, all the functions associated with oil palm production. At this stage an Oil Palm Growers Co-operative could be formed. Gradually, function by function and enterprise by enterprise, the whole role of the ADU could be absorbed and the scene would be set, first for the creation of a series of Growers Co-operatives and finally for a Farmers' Organisation. The first ones could be Village Organisations, later two or more of these organisations could combine into Rural Development Area Organisation and ultimately into a Divisional Organisation.

All the executive and managerial positions in these organisations could not be expected to be filled by persons emerging from the farming community; many would have to be employees especially chosen and recruited for the job. Priority candidates for these posts would be the experienced members of the ADU. These persons would be known to, and trusted by, the farmers of the area. These direct methods would not be the only opportunities for the ADU staff to enter the management

of the FOs. It would be expected and hoped that some of the ADU staff would be convinced that opportunities in farming in a planned development scheme would be equal to, or even better than, the opportunities within the ADU. Those who so wished to take up farming as their occupation should be welcomed to do so, and it could be expected that some of these would become leaders in the core of the FOs.

2.10 RECOMMENDED MINIMUM QUALIFICATIONS OF STAFF IN THE FOURTH DIVISION ADU

(a) Agricultural Leader

He would require a general degree in agriculture with at least four years experience as a confirmed Agricultural Officer in the Department of Agriculture in Sarawak or other parts of Malaysia.

(b) Administrative Leader

The post would require a trained administrator with at least three years experience in the Sarawak Civil Service. The appointee would need to be familiar with accountancy and book-keeping.

(c) Training Leader

Because the whole concept of the ADU is new to Sarawak and because particular techniques would have to be taught to the staff it would be necessary to have a training specialist during the first few years to orientate correctly and guide the training. The qualifications required for the post of Training Leader should be a degree in agriculture with specialisation in extension education. Practical experience in teaching and working within an organisation similar to the ADU would be essential.

It is unlikely that a suitable man would be found locally and it is suggested that application should be made to FAO or, for instance, to the Swedish Aid (SIDA) for assistance in providing the right type of person.

(d) Supervisors

The first two Supervisors should be appointed from the AAO cadre in the Extension Branch of the Department of Agriculture. These staff will have obtained a diploma from Serdang, or equivalent college, and should have had several years extension experience in the Department. Later appointees should be by selection and promotion of Extension Agents who would

have been trained at Kabuloh and proved themselves in the field.

(e) Extension Agents

Like the Supervisors the first six Extension Agents should be appointed from the AA cadre of the Department of Agriculture. They will have attended the one year's certificate course at the Natural Resources Training Centre, Semongok, and should have had one or two years field experience in the Department of Agriculture. Later appointees should enter the ADU through the training centre at Kabuloh and should receive further on-the-job training. The minimum educational requirements for entering Kabuloh should be Form V.

(f) Home Demonstrators

The first two should be appointed from the existing Department of Agriculture staff. Later appointees could be specially selected and trained for these posts. The training would have to be at the NRTC and would mean an increase in the annual number of women trained there because no plan to include this type of training at the Kabuloh Training Centre is contemplated.

(g) Storemen, Assistant Storemen, Recorders and Assistant Recorders

These would need to be educated (minimum Form V) trustworthy persons and specially selected for six months training at the Kabuloh Training Centre.

(h) Mechanics and Machine Operators

These persons would require prior training or considerable practical knowledge in the maintenance and repair of tractors and/or vehicles and other machinery. They would undergo further short training at Kabuloh on the type of machinery and equipment they would use in the field.

(i) Accountants, Assistant Accountants, Pay Clerks and Assistant Clerks

Prior training in book-keeping would be necessary and the Accountants would also require some practical knowledge of banking procedure: all would attend a short orientation course at Kabuloh Training Centre.

(j) Forest Guards

These would be persons having passed through the normal Forest Guard training of the Forest Department. The number required should be included in the training expansion planned for the Department.

2.11 CAPITAL AND RECURRENT COSTS OF THE ADU

The total capital costs of establishing the ADU organisation to deal with schemes initiated under the Action Programme have been estimated at about \$7.5 mn and recurrent costs at about \$2.3 mn per annum. These costs which do not include the cost of training the staff are summarised in Table 2.7. A detailed breakdown of the basis on which these estimates have been prepared is given in Appendix VI. The analysis of the disposition of these costs given in Table 2.8 shows that of the total capital \$2.5 mn would be directed to small-holder settlements developed by SLDB and taken over by ADU, the balance of about \$4.6 mn would be required on road-based or block alienation projects located in various parts of the Study Area. Thus the overall disposition would be roughly in the ratio of 2 : 1.

TABLE 2.7 SUMMARY OF ADU EXPENDITURE 1975-1999 COVERING ONLY THE SCHEMES STARTED DURING THE ACTION PROGRAMME PERIOD (\$ THOUSAND)

Year	Capital			Recurrent						Total annual cost
	Buildings and furniture	Vehicles and equipment	Sub-total	Salaries and wages	Building maintenance	Vehicles and equipment operating	Vehicles and equipment replacement	General running costs	Sub-total	
1975	782.0	86.6	868.6	192.4	16.1	17.0		17.3	242.8	1111.4
1976	1058.5	157.0	1215.5	433.8	39.8	41.4		31.8	546.8	1762.3
1977	552.0	160.7	712.7	562.8	51.3	63.8		37.6	715.5	1428.2
1978	912.0	488.9	1401.4	868.2	70.4	124.3		46.3	1109.2	2510.6
1979	881.5	329.2	1210.7	1057.8	89.3	171.9		49.2	1368.2	2578.9
1980	686.5	224.5	911.0	1233.4	103.3	199.0	19.8	52.1	1607.6	2518.6
1981	532.0	165.9	697.9	1453.7	113.6	230.2	99.2	52.1	1948.8	2646.7
1982	307.5	109.1	416.6	1569.4	119.4	247.2	57.9	55.0	2048.9	2465.5
1983		22.4	22.4	1611.6	119.4	251.4	82.0	55.0	2119.4	2141.8
1984				1611.6		251.4	103.9		2141.3	2141.3
1985		22.4	22.4	1652.8		254.7	168.0		2249.9	2272.3
1986				1752.8		254.7	237.2		2319.1	2319.1
1987							381.5		2463.4	2463.4
1988							240.6		2322.5	2322.5
1989							311.0		2392.9	2392.9
1990							199.0		2280.9	2280.9
1991							284.3		2366.2	2366.2
1992							104.6		2186.5	2186.5
1993							224.6		2306.5	2306.5
1994							159.0		2240.9	2240.9
1995 to 1999							161.6		2243.5	2243.5
							178.0		2259.9	2259.9
Total	5712.5	1766.7	7479.2	35386.7	2633.0	5418.1	3546.2	1276.4	48260.4	55739.6

TABLE 2.8 ANALYSIS OF ADU COSTS BY SECTIONS COVERING ONLY THE SCHEMES STARTED DURING THE ACTION PROGRAMME PERIOD (\$ THOUSAND)

Cost item	Small-holder schemes	Road based schemes	Headquarters section	Total ADU
<u>Capital</u> (Total for scheme)				
Buildings and furniture	1771.0	3576.5	365.0	5712.5
Vehicles and equipment	700.3	1012.4	54.0	1766.7
Total	2471.3	4588.9	419.0	7479.2
<u>Recurrent</u> (Average per annum at full development)				
Salaries and wages	686.0	867.0	99.8	1652.8
Buildings maintenance	35.9	76.2	7.3	119.4
Vehicles, equipment operating and replacement	176.8	240.3	19.4	436.5
General expenses	17.4	26.1	11.5	55.0
Total	916.1	1209.6	138.0	2263.7

The average cost of ADU per settler or farmer would be \$450 of which \$320 would be attributed to economic services. It is assumed that on the schemes these services costs would be recoverable from farmers either as an on-cost on commodities purchased through the ADU or as a levy on produce marketed.

In addition to the costs outlined above, which are those directly involved in setting-up and running the ADU organisation, there would be the development costs of the crops established on the land. For the small-holder schemes developed by the SLDB covering roughly 25 000 acres and settling about 1 548 farmers, these costs fall into three categories. Firstly there are the crop development costs including land clearing, drainage, roads, planting and maintenance. Secondly there are the costs of the housing for the settlers themselves, and thirdly the scheme management costs. Detail of these costs are given in Part II which describes the overall agricultural development plan. The estimated total expenditure for these development aspects would be \$3.5 mn up to 1980, and thereafter a further \$11.3 mn to complete the programme.

The road-based development and block alienation schemes which would handle about 2 800 farmers would require disbursement of the development costs (detailed in Part II) amounting to \$14.8 mn. The source of these funds as mentioned in Section 2.4 would probably be the Bank Pertanian.

CHAPTER 3

EDUCATION AND TRAINING OF ADU STAFF

3.1 INTRODUCTION

Success in any new scheme or organisation can nearly always be credited to a well trained and educated staff. However, the level of training and education needed is often exaggerated or misused. The highest efficiency of efforts and funds spent on training and education is gained where every participant has the precise know-how needed for the job he or she is doing.

The belief that an Extension Agent must be able to answer all agricultural questions in order not to lose face is a misconception; an honest answer admitting lack of knowledge with a promise to find out the correct facts introduces respect and understanding between farmer and agent. However, the misconception has often led to the belief that specialist advisors are necessary at the farm level. Such specialisation would be extremely costly and would place too great and unnecessary demands on education and training.

A particular principle envisaged in the operation of the ADU is that the staff of the ADU would be in frequent, direct contact with the farmers. The efficiency of these staff would therefore depend on their personality, on their ability to converse with the farmers in the language of the farmers, on their familiarity with local and practical agriculture and particularly on their knowledge of, and ability to operate, the current extension or development programme. The training scheme described in this Chapter is designed specifically to provide staff for the ADU. Training would commence at a special centre and would continue during service. Trainees should be of all races.

3.2 THE AGRICULTURAL TRAINING CENTRE AT KABULOH

It is proposed that the Farm Institute at Kabuloh be converted into an Agricultural Training Centre aimed at catering specifically for the needs of the ADU. The Kabuloh Institute has been particularly chosen because it is conveniently situated in the Study Area and would have the advantage of active land development taking place close by where practical training and demonstration could be undertaken. The capacity of the existing boarding and teaching accommodation is 60 which, as can be seen from Table 3.1, is somewhat greater than the requirements of the Fourth Division ADU. However, it is probable that agricultural development similar to, and running concurrently with, that planned in the Study Area would be taking place in other parts of Sarawak and it too would re-

quire specially trained staff. Thus the out-turn from the Centre is expected to be fully utilised.

TABLE 3.1 ESTIMATED NUMBER OF NEW STAFF REQUIRING TRAINING EACH YEAR UP TO 1982

Year	Extension Section (excluding forest guards)	Credit and Accounts Section	Economic Section (Supply and Marketing Services)	Total
1975	10	6	2	18
1976	26	10	4	40
1977	15	5	3	23
1978	24	7	3	34
1979	26	7	13	46
1980	19	5	13	37
1981	22	8	12	42
1982	12	5	4	21

The Centre should remain under the Training Branch of the Department of Agriculture but the teaching syllabus should be specially orientated to include subjects related to new settlements and planned agricultural development. Extension Agents should undergo a one-year course followed by on-the-job training directed and supervised by the Training Specialist attached to the ADU. The training would rely heavily on local research for providing much of the technical details of cultural and managerial practices. The method of study would include considerable practical work aimed at teaching the techniques of dealing with farmers and assisting them to adjust to the new agricultural environment. This would be in addition to the general agricultural syllabus now followed at the Institute. The additional training needed by all staff to work eventually in Farmers' Organisations would also be taken into account and special short courses (about six months) in the handling of credit, marketing, supply and machinery would be given.

The incentives of planned, practical training leading to assured employment, following a successful completion of the training, are expected to prove sufficiently attractive to eliminate problems of enrolment. Prospective students should be males having passed Form V and be at least 17 years old, slightly older students would be preferable. This academic requirement is the same as demanded by the NRTC, thus students having completed their course would be equivalent to the AA cadre in the Department of Agriculture.

The conversion of the Farm Institute into an ADU Training Centre is not likely to take place before January, 1975 because this Report will not be submitted until after April, 1974 and it is unlikely that the Training Specialist will be recruited sufficiently quickly to take up his post before January, 1975. Thus the first output of trainees could be expected in January, 1976. This timing has been taken into account in the

projected build-up of the Fourth Division ADU described in Chapter 2.

INTRODUCTION

3.3 COSTS OF TRAINING ADU STAFF

The existing facilities at Kabuloh would be fully utilised. In addition a bus costing about \$35 000 and teaching equipment totalling about \$45 000 would be necessary. Recurrent annual costs, based on present expenditures of operating the Farm Institute, are estimated as follows:-

	\$
Agricultural Officer, Principal of the Centre (salary plus allowance)	20 000
Two Assistant Agricultural Officers (salary plus allowances)	15 000
Woodwork and Machinery Instructors	12 000
Maintenance of buildings	10 000
Provision of electricity and maintenance of water supplies	4 000
Training and travelling	6 000
Messing (say 40 students for 330 days and 20 students for 180 days all at \$2.50 per day)	42 000
Other student allowances	5 000
Farm expenditures (in addition to sale of farm produce)	15 000
Labour (cooks, drivers and farm labour)	16 000
Administration (office and teaching equipment, telephone etc.)	4 000
	<hr/>
Total	\$149 000
	<hr/>
say	\$150 000

CHAPTER 4

AGRICULTURAL INVESTIGATIONS

4.1 INTRODUCTION

It is the Government's intention that the Kabuloh Research Station should become the main centre of agricultural research for northern Sarawak. Also the Government plans to establish a Livestock Production and Animal Husbandry Training Centre not far from Kabuloh; and to build an agricultural university at Bintulu which would have considerable research facilities. Thus the investigation aspect of the agricultural production services in the Study Area is likely to be well cared for, but it is important that the work should be orientated towards the specific requirements of the development. In this Chapter some guidelines and ideas are given for achieving this. Further details of investigations needed for specific crops are given in Part IV, and for fisheries and livestock in Part V.

Generally plans for agricultural research have to be of a long term and tentative nature because the work is seldom short term. For example, to prove commercial viability of a crop variety could take several years, with some luck a true indication of its worth might be obtained in four or five years. Reliable findings from livestock research could easily take 15 or more years if cross-breeding has to be examined. The unpredictable nature inherent in agricultural research makes the estimation of future requirements for staff and resources particularly difficult.

Basically the aims in the Study Area should not differ greatly from the present objectives, namely:-

- (a) to investigate the feasibility of growing new crops and crop varieties in the area;
- (b) to investigate new agronomic and husbandry practices for crops already grown commercially;
- (c) to evaluate successful commercial farming and pinpoint subjects requiring investigation.

It will be particularly important for the work to provide the basic practical farming information which would be used as teaching material for the extension services and which would be fundamental to the economically sound operation of the Supply and Credit systems of the ADU.

New commercially viable techniques and innovations can be expected to be adopted quite rapidly on the SLDB managed areas and on large private estates. This would be due most often to the high level of education and training of the managers of these enterprises, but the generally poorly educated smallholders and farmers in Native Customary Land would require teaching and persuading to adopt new ideas. In the planned

Intensive development areas this persuading and teaching of farmers would be a function of the staff of the Extension Section of the ADU. An important responsibility of the staff on the research establishments should be to direct their activities towards local problems, and in doing this to work closely with the farmers and extension services. No specific crop or livestock specialists are planned to be attached to the ADU; the normal tasks of a specialist service have been delegated to the research staff. These tasks consist of:-

- aid to and collaboration with the ADU in setting up practical extension manuals;
- packages of supplies;
- programmes for demonstrations; and
- generally aid the ADU in the problems of getting farmer acceptance of new research results.

4.2 FUTURE AGRICULTURAL INVESTIGATION IN THE AREA

4.2.1 Existing Stations

(a) Kabuloh Research Station

The cocoa hybrid trials should be greatly extended. Not only to include more hybrid-crosses but also covering different soil types. The trials should not attempt to establish new husbandry techniques or find new shade species but should aim at finding the best hybrids to use, the best soils to select and the most suitable fertiliser and pest control regimes using techniques and shade species already proven in Sabah and Sarawak. Field-scale (two or five acres) plantings of Robusta coffee, lowland tea, anatto, lemon grass, citronella grass and patchioui are required to establish their suitability for planting as diversification crops. The present cashew nut trial should be continued and extended to other soil types. Also the possibility of grazing beef cattle among the cashew trees should be investigated. Several other crops require further production trials; they include various spices (turmeric, ginger, chillies, vetiver grass) for extraction of colouring and flavouring material; tapioca for production of dried chips, various fruits and illipenuts. Of the fruits, special attention should be given to citrus, rambutan, durian, papaya, mangosteen, pineapple and bananas. A mango variety trial is already established. The investigations on oil palms should continue but adjusted whenever necessary to search for solutions to specific problems encountered in the oil palm plantations in Sarawak. The effects of grazing beef cattle among the palms should be investigated and soil conservation trials, particularly associated with pepper growing, should be undertaken. For coconuts, trials of high yielding, dwarf and hybrid varieties should be started.

(b) Paya Selanyau Rice Station

The rice double cropping and variety trials should continue. In addition the growing of short term crop vegetables, soya

beans and maize for green cob production, in unirrigated wet rice areas during the rice off-season should be started. The work should cover cultural and fertiliser requirements, weed control, entomology, pathology and product processing as well as the economic aspects of applying new innovations.

4.2.2 Planned Research Establishments

(a) The Livestock Production and Animal Husbandry Training Centre

This Centre has been planned by Government to be established on land adjoining a proposed commercial beef cattle breeding ranch at Karabungan. Recommendations concerning the ranch are given in Part V. The Government planned Centre should have the responsibility of carrying out practical investigations on pasture development and pasture management as well as cattle, buffalo, pig and poultry rearing. The beef cattle investigations should support and be complementary to the activities of the ranch which is recommended to be based on imported animals and aimed at producing beef stock for other ranches as well as young steers for rearing and finishing on estates, private farms and small-holdings. Thus an important aspect of work on the Livestock Centre would be working out and testing details for such a programme. Tests and investigations with pigs and poultry on locally available feeds-tuffs (waste from oil palm mills, trash sea fish, pond fish, tapioca etc.) should also be carried out.

(b) The Agricultural University

The intentions of the Malaysian Council for Higher Education are that the proposed university should, in addition to its teaching aspects, carry out investigations relevant to Sarawak's needs. These ideas are supported. Besides agronomic trials and demonstrations which could be undertaken on a university farm there will be vast areas of new development closeby where important sociological studies could be carried out. Recommendations for such research are given in Supporting Report No. 4 and include studies to gain knowledge from the development schemes of the difficulties faced by participants, whether they are estate workers, small-holders or private farmers.

The location of the existing and proposed research institutions and the beef ranch are shown in Figure 4.1.

4.3 FUTURE RESEARCH STAFF REQUIREMENTS

An estimation of the staff requirements for research (not including administration) in the Fourth Division is given in Table 4.1. The Table shows that as the work load builds up in the future so an increase in research staff can be expect-

FIGURE 4.1

LOCATION OF PRESENT AND FUTURE AGRICULTURAL RESEARCH CENTRES

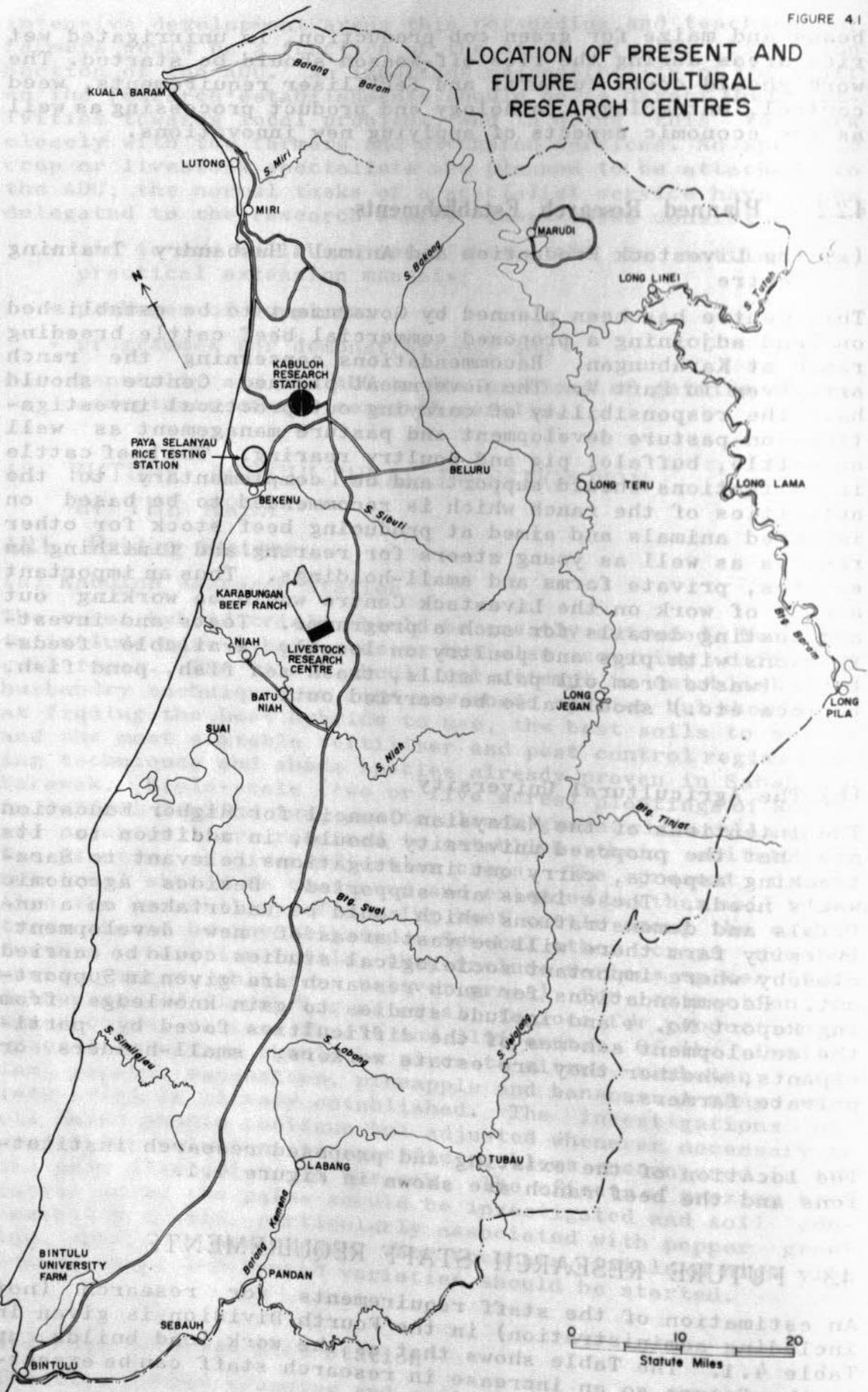


TABLE 4.1 ESTIMATED TECHNICAL STAFF REQUIRED FOR AGRICULTURAL INVESTIGATION IN THE FOURTH DIVISION

Items	1974	1975	1976	1977	1978	1979	1980	1990
<u>Kabuloh Research Station</u>								
General Research Scientist and Officer I/C	1	1	1	1	1	1	1	1
Agricultural Economist		1	1	1	1	1	1	1
Farm Manager (SAAO)	1	1	1	1	1	1	1	1
Research Assistants (certificate)	4	4	5	6	7	7	7	7
<u>Livestock Production and Animal Husbandry Training Centre *</u>								
General Manager (an animal husbandry specialist)		1	1	1	1	1	1	1
Pasture Agronomist		1	1	1	1	1	1	1
Veterinary Officer		1	1	1	1	1	1	1
Agricultural Assistants		1	2	3	4	4	4	4
Laboratory Assistants		1	2	3	4	4	4	4
Experienced Herdsmen		1	2	2	2	2	2	2

* All personnel would be local except for the general manager and two experienced herdsmen, but these would be replaced by trained local staff after about five or six years.

ed. The projections beyond 1980 are subject to considerable change and it will be necessary to keep the work under continual surveillance and to adjust staff numbers in accordance with the long term outlook.

The broad nature of the work in both crop and animal husbandry will require that close co-operation is maintained with the specialist research staff at Semongok and such an arrangement is assumed to occur in the estimation of staff requirements.

4.4 STAFF QUALIFICATIONS AND JOB DESCRIPTIONS

Academic qualifications and job descriptions for the senior research staff are given below. All staff would be recruited by, and be responsible to, the Research Branch of the Sarawak Department of Agriculture. They would be required to live on, or very near, their respective stations. Any expatriates appointed should have assignments for an initial period of two years and the training of local understudies should be part of their duties. The duties of all the senior staff would include involvement in the training of ADU staff at the Kabuloh Training Centre. For example, the staff of the Extension Section of the ADU would require special training in the rearing of steers, and the care of pigs and poultry. Thus the livestock and pasture research staff would be responsible for checking this part of the Kabuloh training syllabus as well as giving occasional lectures and demonstrations.

4.4.1 Staff at the Agricultural Research Centre - Kabuloh

(a) General Research Scientist I/C

The position is already occupied by a graduate agriculturist who is responsible for the efficient working of the whole station. He is responsible for the technical aspects of the research work which is planned and executed in co-operation with Specialist Research Officers based at Semongok.

(b) Agricultural Economist

The economic aspects of agriculture will be so important among the private and small-holder farmers that it is considered essential to have this part of farming taken care of by a trained agricultural economist. Although there are Agricultural Economists stationed at Semongok they are too far away and too occupied with economic problems affecting agriculture as a whole in the State that the practical on-the-farm problems which will affect farmers in the development areas will tend to be neglected.

The qualifications required for the post would be a degree in agriculture with agro-economics, either as a speciality or, preferably, as a post-graduate degree. At least two years post-graduate practical experience would be desirable.

The economist would be responsible for ensuring the economic soundness of any production, processing or marketing innovations recommended to farmers, and to formulate the recommendations into a convenient form for use by the extension staff of the ADU and the Department. In this respect he would need to co-operate in work already started at Semongok on present farm management and farm accounts in order to establish benchmarks on which to base new research and against which to gauge changes in farming methods. He would also take part in teaching the ADU staff.

(c) Farm Manager

This position too is already filled. The duties of the post are mainly in the field organising and carrying out the cultural and managerial practices required by the various treatments on the different experiments. The man occupying the position is in charge of the labour and machinery on the Station and allocates tasks to the Research Assistants who supervise and help the labourers in actually carrying out the work.

4.4.2 Staff at the Livestock Production and Animal Husbandry Training Centre

(a) General Manager

He would need to be an animal husbandry specialist. His technical responsibilities would include primarily problems relating to management of beef cattle, pigs, buffaloes and poultry under local conditions. Another major aspect would be the preparation in detail of schemes for rearing on private farms, estates and small-holdings, steers which have been bred on the nearby ranch.

The position would require the academic qualifications of a degree in animal husbandry (as distinct from veterinary science) and preferably a post-graduate degree in animal nutrition. The appointee should have wide practical experience from similar jobs abroad, and should be familiar with livestock research as well as livestock economics.

(b) Pasture Agronomist

The tasks for this position would include all aspects for establishing suitable pastures and for their management under local conditions.

The qualifications required would be a degree in agronomy with either a post-graduate study of pasture and fodder crops, or considerable experience of pasture in the wet tropics.

(c) Veterinary Officer

The position would require a person with a general degree in veterinary science together with experience or special training in tropical diseases. The task would involve the prevention and control of diseases among the animals on the Centre as well as assisting in providing services to the commercial ranch and farms involved in the schemes for rearing the steers. His work would also extend to buffaloes, pigs and poultry and lecturing at the Kabuloh Training Centre.

45 COSTS

45.1 Kabuloh Research Station and Paya Selanayau Rice Station

The future costs of running these stations would not be affected much by the proposed investigational programme. The only substantial increase would be associated with the Agricultural Economist. This post would require an A-class house costing about \$60 000 (required in 1975) and an annual salary of \$15 000.

4.5.2 The Livestock Production and Animal Husbandry Training Centre

The estimated costs for establishing and running this Centre together with returns are summarised in Table 4.2. Details of these costs are given in Appendix VII.

TABLE 4.2 SUMMARY OF LIVESTOCK PRODUCTION AND TRAINING CENTRE COSTS AND RETURNS
(\$ THOUSAND)

Year	Land development costs	Production material costs	Production labour at \$5	Estate costs	Total costs	Revenue	Net cash flow
1975	272.5	230.0	21.0	491.0	1014.5		-1014.5
1976	234.6	262.4	42.0	307.5	846.5	6.5	-840.0
1977	420.8	1330.0	84.0	450.3	2285.1	12.2	-2272.9
1978	221.5	338.8	105.0	528.0	1193.3	57.4	-1135.9
1979	16.9	165.8	105.0	245.0	532.7	76.1	-456.6
1980	17.4	203.0		257.8	583.2	184.5	-398.7
1981	17.9	204.8		202.5	530.2	186.0	-344.2
1982	18.5	207.2		206.5	537.2	345.4	-191.8
1983	18.9	208.8		206.9	539.6	421.7	-117.9
1984	19.2	210.0		208.2	542.4	485.6	-56.8
1985	19.4	210.8		340.7	675.9	494.8	-181.1
1986	19.7	212.0		211.9	548.6	518.0	-30.6
1987	20.0	213.2		213.7	551.9	612.0	60.2
1988	20.1	212.6		213.8	551.5	648.7	97.2
1989	20.2	214.0		213.8	553.0	687.9	134.9
1990	20.2	214.0		273.8	613.0	687.9	74.9
1991				213.8	553.0		134.9
1992				213.8	553.0		134.9
1993							
1994							
1995							
1996							
1997							
1998							
1999							

4.5.3 The Agricultural University

No cost estimates for this have been made during this Study because the university is being planned by the Malaysian Council for Higher Education.

APPENDIX I
SARAWAK STATE
DEPARTMENT OF AGRICULTURE SCHEMES

In order to appreciate the sort of assistance that is available to farmers a brief description is given in this Appendix of the various agricultural subsidy schemes presently operating.

II ASSISTANCE TO PADI PLANTERS SCHEMES (APPS)

In an effort to increase padi production in Sarawak and, wherever possible, to reduce the area of hill padi cultivation the Department of Agriculture introduced, in 1958, a scheme to encourage the opening-up of new swamp lands and to improve the standards of cultivation of swamp lands already farmed. It is well known that in Sarawak in any given year large parts of the already opened up swamp rice area remain fallow.

APPENDIX I

The scheme provides a subsidy of \$10 per acre spread over two years and a maintenance grant of \$10 per year for five years. Also incorporated in the scheme is a subsidy for the supply of ammonium phosphate to hill padi areas. This is not aimed at encouraging hill padi farming, but at enabling a family to meet its rice requirements from a smaller area by increasing yields, thus converting unfilled jungle. This is necessary under present day conditions because there are many occupied areas in Sarawak where no suitable swamp land exists. The use of ammonium phosphate at planting has shown an average increase in yield of about 30 per cent.

In general the APPS only operates in swamp areas of up to 100 acres where drainage and flood control are the limiting factors. The minimum acreage allowed in a scheme is ten acres with at least five participants. The scheme provides for assistance in kind, although a small cash element is available based on work actually completed. Larger schemes or those where irrigation is involved are restricted by the DID.

III Implementation

A local APPS committee is formed which normally consists of a chairman and four members. All participants of the scheme. This committee, with the advice and co-operation of the Department of Agriculture, organizes all the work on the scheme, makes requests for materials, receives and distributes subsidies and materials, settles land disputes and ensures good discipline among the participants.

APPENDIX I

SARAWAK STATE

DEPARTMENT OF AGRICULTURE SCHEMES

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The scheme provides for a subsidy of \$150 per acre spread over two years and a maintenance grant of \$10 per year for five years. Also incorporated in the scheme is a subsidy for the supply of ammonium phosphate to hill padi areas. This is not aimed at encouraging hill padi farming, but at enabling a family to meet its rice requirements from a smaller area by increasing yields, thus conserving unfelled jungle. This is necessary under present day conditions because there are many occupied areas in Sarawak where no suitable swamp land exists. The use of ammonium phosphate at planting has shown an average increase in yield of about 30 per cent.

In general the APPS only operates in swamp areas of up to 300 acres where drainage and flood control are the limiting factors. The minimum acreage allowed in a scheme is ten acres with at least five participants. The scheme provides for assistance in kind, although a small cash element is available based on work actually completed. Larger schemes or those where irrigation is involved are constructed by the DID.

I.1.1 Implementation

A local APPS committee is formed which normally consists of a chairman and four members, all participants of the scheme. This committee, with the advice and co-operation of the Department of Agriculture, organises all the work on the scheme, makes requests for materials, receives and distributes subsidies and materials, settles land disputes and ensures good discipline among the participants.

I.1.2 Subsidy Entitlement

First and second years: \$250 per acre. The money to be used for:-

- (a) jungle felling (where required) - \$30 per acre;
- (b) construction of drains and bunds - \$1 per cubic yard;
- (c) destumping (second year) - \$30 per acre;
- (d) tools, sprayers, pesticides, materials for watergates, seed.

It is expected that with the \$250 assistance per acre the land will be completely improved by the end of the second year.

Third year	full fertiliser cost	\$60 per acre;
Fourth year	75 per cent fertiliser cost	\$45 per acre;
Fifth year	50 per cent fertiliser cost	\$30 per acre;
Sixth year	25 per cent fertiliser cost	\$15 per acre.

I.1.3 Assistance for wet Padi Planting under Drainage and Irrigation Scheme

\$200 can be awarded during the first and second year for tools, drains, bunds and fertilisers.

Funds which cannot be spent in one year can be carried over to the next year. The third to sixth year subsidy entitlement are the same as for APPS.

I.1.4 Assistance for Hill Padi Planting

Ammophos (11:48) is sold only to hill padi planters at the subsidised rate of \$1 per ten pounds.

I.1.5 Recommendation

The APPS should be continued as at present throughout the Fourth Division, and be available, through the ADU, to farmers in road-based development schemes and small-holders on SLDB developed State Land. In these cases it would be reasonable to expect the farmers to repay the 'subsidy' money through the ADU system. This has been assumed to be the situation in the economic and financial analyses of the agricultural plan presented in Part II.

I.2 COCONUT PLANTING SCHEME

This scheme, which was initiated in 1959, aims mainly at assisting people in the coastal areas to establish permanent small-holdings of coconuts, but farmers in other suitable

riverine areas are also eligible to participate. The effect of the scheme in Sarawak as a whole can be seen in the gradual increase of production of copra and oil over the years. However, the scheme has not attained the success that was expected. A survey on the crop has shown that only about 50 per cent of the oldest coconuts planted under the scheme are producing. The highest yield recorded was about 15 piculs (2 000 pounds) of copra per acre per year. The average yield ranges from 1.5 to 10 piculs (200 to 1 333 pounds) of copra per acre at different locations. An economic yield is considered to be ten piculs (1 333 pounds) of copra per acre per year. The low percentage of productive acreage coupled with the low average yields has painted a black economic picture of the Coconut Planting Scheme. The Department of Agriculture considered that one of the chief reasons for this was the lethargic attitude of most participants many of whom are interested solely in the cash element. This results in generally poor maintenance of the garden. For this reason, the amount of the cash subsidy has been halved since 1971. Also there is a more stringent selection of participants, more extension work on crop husbandry and the improvement of the quality of copra produced.

I.2.1 Implementation

Nurseries of specially selected seed are raised by contract under the supervision of the Department of Agriculture. Planting is done under the supervision and advice of the Department.

There is a procedure for cancellation of participants from schemes if the person does not comply with advice given in accordance with the rules of the scheme.

I.2.2 Subsidy

The subsidy of \$210 is spread over the first four years of the growing period, after which time the palms should have reached the stage where routine maintenance only is required.

I.2.3 Recommendation

No great effort is recommended for this Scheme in the Fourth Division until much higher yielding varieties of coconuts have been successfully grown in the area. Then together with a revival of effort a copra marketing organisation should be established.

I.3 THE AGRICULTURAL DIVERSIFICATION SCHEMES

This scheme was started in 1966 during the First Malaysia

Plan. It was, and still is, aimed at a diversification of Sarawak's agriculture away from the heavy dependence on rubber and pepper. The scheme is designed to encourage the planting by small-holders of such crops as have potential local and overseas markets. Crops like oil palm, cocoa, coffee, fruit and several annuals (maize, soya beans, vegetables, tobacco, essential oils and spices). The Government consider that the Diversification Programme could make a substantial contribution to the State's foreign exchange earnings as well as protecting the individual small-holders' income against fluctuating commodity prices.

There is also a Farm Unit Scheme whereby farmers who have received a course in practical agriculture in the Farmers Training Centres are assisted to start a sound agricultural enterprise using the knowledge they have acquired at the Centres.

For economic reasons and ease of implementation the following minimum and maximum acreages or units are allowed for each of the schemes.

<u>Scheme</u>	<u>Minimum</u>	<u>Maximum</u>
Perennials:		
(a) cocoa	3 acres	15 acres with not more than 3 acres annually
(b) coffee	0.5 acre	3 acres
(c) fruit trees	1 unit (30 trees)	1 unit (30 trees)
(d) others	0.5 acre	3 acres
Annuals	0.5 acre	3 acres
Farm unit	0.25 unit	1 unit

A scheme to supply high quality planting material from Agricultural Commodity Stations was started in 1969. The material is for issue under the Agricultural Diversification Scheme. Concentration is particularly on maize, soya bean, groundnuts and robusta coffee, but also the bulking-up of special padi seed, Indian and Australian sugar cane varieties and the production of budded fruit trees is undertaken. The work is handled by the normal staff on the station but some bulking-up of seeds is done by selected small-holders.

I.3.1 Recommendation

Both the schemes should continue in the Fourth Division and be available through the ADU to farmers in the intensive development areas. Special efforts should be made with market gardening in the Miri and Bintulu Rural Development Areas (see Part II).

14 LIVESTOCK DISTRIBUTION SCHEME (PAWAH)

The Government is aware of the shortage of local beef and realises the importance that improved beef supplies would have in improving the nutrition of the population. The local beef market potential is high and should act as an incentive to local farmers to embark on beef production. In the past several schemes have been started aimed at stimulating production.

The first attempt was a scheme whereby Government sold buffaloes at a subsidised rate to farmers. In 1969 the Pawah Scheme, from Peninsular Malaysia, was introduced to Sarawak. Units of ten female cattle or buffaloes plus one male were given free to groups of selected farmers. The female calves born from these animals were returned to Government for re-issue to other farmers. Experience and observation subsequently showed that the cattle units were relatively more successful and popular than the buffalo units. The buffaloes caused damage to the fields by their wallowing habits. A modified scheme which was discontinued in 1973 catered for distribution of cattle only. It was found that the scheme was very expensive and extremely difficult to administer due to land ownership, transport and accessibility problems.

1.4.1 Recommendation

Any further cattle distribution in the Study Area should await the outcome of the recommended investigations on the Livestock Production and Animal Husbandry Training Centre (see Chapter 4 and Part V). In the latter a proposal to start the foundation of a national beef industry within the Study Area is given.

15 PIG SUBSIDY SCHEME

The Department of Agriculture has, for many years, been maintaining herds of pigs for the purpose of supplying commercial breeders with high quality stock. It is the Department's aim to have nucleus herds in all Divisions in order to be able to maintain the supply of good stock to the breeders in the event of any major disaster such as the swine fever epidemic of 1967. This nearly wiped out the pig industry in Sarawak. Until 1969 the main breeds kept by the Department were Tamworth and Berkshire imported from Tasmania. In 1970 Landrace and Large Whites were imported from Western Australia. Weaners are supplied to commercial breeders who sell pork into the local market. But some breeders are selected to supply the Pig Subsidy Scheme with weaners.

The Pig Subsidy Scheme was started during the First Malaysia Plan. It has proved popular as a Government effort to improve the standard of husbandry and to improve the diet of the rural people. It is common for the longhouse and villages

farmers to keep pigs but the animals are usually of the local breed which is small and unthrifty. Under the scheme a selected farmer, generally one who has passed through one of the Farmers Training Centres, receives a unit of assistance consisting of three crossbred weaner pigs for fattening, building materials for a sty and sufficient high protein concentrate to mix with locally grown carbohydrates to fatten his pigs. On the sale of these he is expected to purchase new stock and concentrate feed mix, and in this way gradually to build-up the size of the enterprise.

A criterion for selection into the scheme is that the applicant must have planted sufficient carbohydrate feed, usually tapioca, to feed the pig unit; a market must also be available. The weaners for the scheme are usually supplied by selected commercial breeders who have been supplied with good breeding stock from Government maintained herds.

The cost of a unit is as follows:-

Three weaners at \$60 each	\$ 180
Building material for sty	50
Protein supplement (nine bags at \$17 each)	153
	<hr/> \$383 <hr/>

I.5.1 Recommendation

These schemes should be continued in the Fourth Division, but concentration of effort should be in the Miri and Bintulu Rural Development Areas (see Part II) and be made available to the farmers in the intensive development areas.

I6 POULTRY SUBSIDY SCHEME

This provides up to \$200 worth of day-old chicks, material and food to successful applicants.

The scheme should be continued in the Fourth Division but concentrated around the towns of Miri and Bintulu and in the intensive development areas.

I7 INLAND FISHERIES SCHEME

The main object is to encourage the rural communities to undertake freshwater fish culture to supplement their diet and make good the shortage of fish which has been brought about by destructive fishing practices such as the use of fish poisons.

The scheme was started during the First Malaysia Plan and aims not only at the development of fish culture in ponds and dams but also at the stocking of lakes, rivers and wet padi areas. More recently the cultivation of turtles and in brackish waters, of mussels and oysters has been undertaken. In addition, there are Departmental Fish Breeding Stations producing fish fry for issue to pond owners, and there is an Inland Fisheries Training programme designed to train staff, commercial pond-keepers, farmers and school leavers. The courses, which last two weeks to a month, cover freshwater fish culture, brackish water fisheries and aquarium fish keeping.

There is a Fish Pond Subsidy which provides cash and kind subsidies for development in both fresh water and brackish water areas. The aim is to encourage farmers to construct ponds of the recommended size (about one-tenth of an acre). A cash subsidy of \$200 per acre is paid in addition to the issue of fish stock, pipes, cement for sluice gates and spillways, and lime and fertilisers for treatment of the completed ponds.

In brackish water areas materials such as earthenware pots and plastic coated wire are issue to farmers starting oyster culture. Those people who have completed a course in tropical fish-keeping are eligible for issue of popular varieties of tropical aquarium fish.

1.7.1 Recommendation

The inland fisheries effort and the Fish Pond Subsidy should continue in the Fourth Division. The greatest effort for the subsidy scheme should be in the Miri and Bintulu Rural Development Areas.

18 PEPPER SUBSIDY SCHEME

This is a new subsidy scheme started in March, 1972. The objectives are to assist farmers:-

- (a) to take measures for the control and prevention of foot-rot in established gardens. Assistance is given at 50 per cent of the cost of the recommended rate of fertiliser plus trace element application. The subsidy is given up to the third year only;
- (b) during the period before immature gardens come into bearing. The assistance is given in both cash and kind for drainage and foot-rot prevention. Drainage subsidy is paid at five cents per vine whilst foot-rot prevention is given in the form of Bordeaux mixture at 50 per cent of the tender price of the recommended rate of Bordeaux mixture;
- (c) to establish new pepper gardens. Assistance is given for the following:-
 - to purchase posts up to the value of \$100 per appl-

icant, this is given in cash on condition that the total number of posts required are delivered on site;

- 50 per cent of the cost of the fertiliser and trace elements required for the holding from the time of establishment up to the end of the third year.

Rooted cuttings are supplied free by the Department of Agriculture.

I.8.1 Recommendation

This scheme should continue in the Fourth Division. It will be of particular value in the road-based improvement schemes and in establishing a valuable subsidiary crop on the small-holders homestead plots.

I.9 RUBBER SUBSIDY SCHEMES

Government development policies for rubber have for many years been directed towards improvement and expansion of the rubber acreage. The efforts have been conducted exclusively as subsidy schemes for small-holders. Two types of schemes were operated:-

- (a) Scheme 'A' started in 1956 was for new plantings and replanting of high yielding rubber on small-holdings. This scheme provided assistance in cash and kind spread over a period of five years;
- (b) Scheme 'B' started in 1964 was for planting high yielding rubber on State Land for settlement schemes.

These schemes continued until the end of 1972 when they were suspended except for the field maintenance sections of the schemes which are being continued until 1975.

I.9.1 Recommendation

Scheme 'A' should be started again in specific areas where road-based improvement schemes have been planned to be undertaken by the ADU, and where small scale private farming has been recommended. However, consideration should be given to the repayment of the 'subsidy' by the farmers through the ADU system. In the economic and financial analyses of the agricultural plan presented in Part II, the recovery of all rubber planting costs have been assumed.

APPENDIX II

THE PUJUT - LOPENG SETTLEMENT SCHEME

This Government scheme is situated within a State Reserve just inland of Miri. Much of this swampy land has been previously cultivated and a rudimentary drainage system existed on part of the area. New drainage and irrigation works have been planned and construction started in July, 1972. The object of the scheme is to combine the agricultural training of secondary school leavers with a settlement scheme.

The first youths to join the scheme were 17 students from the Kabuloh Farm Institute where they had completed their course at the end of July, 1972. The students were a mixture of all ethnic groups. The second batch of about 20 trainees also from Kabuloh completed their course in January, 1974. The plan is that initially the land will be developed communally then, in the second or third year depending on how well the scheme as a whole progresses, holdings of land will be issued under title to individuals. Each settler will receive about 13 acres of land (eight acres for crocots, three for padi and two for a house and crops of the settlers own choice). Participants will be entitled to assistance from the various schemes, for example the Coconut Planting and Assistance to Padi Planters Scheme.

APPENDIX II

Once titles have been issued the settlers will be able to obtain credit from the Sarawak Economic Development Corporation for housing and farm projects. The settlers will receive a maintenance allowance of \$50 per month for the first three years on the scheme after which they will be expected to have developed sufficiently to maintain themselves. This allowance may be terminated earlier at the request of the settler thus reducing the total loan.

Tools and equipment (which could include vehicles and power-tillers) will be loaned to the settlers initially. On receipt of titles all this equipment will become the property of the group and the capital cost will be repayable to Government. The settlers will not be charged for Departmental staff wages, scheme development costs or temporary accommodation.

Repayment of their accumulated loan, which is expected to be about \$1,500 per settler, will commence in the eighth year and be payable in monthly installments of not less than \$50. The loan will be interest free.

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Repayment of their accumulated loan, which is expected to be about \$5 800 per settler, will commence in the eighth year and be payable in monthly installments of not less than \$50. The loan will be interest free.

APPENDIX III

EXAMPLE OF A BUDGET FOR
WET RICE CULTIVATION

The ADU Extension Agents would draw up budgets, similar to the example given below, for all enterprises of each farmer.

TABLE III.1 OUTPUT

Area of wet rice	1.5 acres
Expected weight of produce per acre	2 750 pounds
Expected total weight of produce	4 125 pounds
Expected total weight for sale	2 000 pounds
Unit value of produce	\$19 per picul*
Estimated value of rice for sale	\$286

Note * One picul is equivalent to 133.3 pounds.

TABLE III.2 INPUTS

Operation	Estimated cost		Quantity required
	per acre	to farmer	
Mechanical cultivation	30	45	1.5 acres (two passes of cultivator)
Fertilizers	22	33	180 pounds Nitro 36 57 pounds Triple-Super phosphate
Seeds (treated with seed dressing)	5	7.5	20 pounds
Herbicides, one application	7	10.5	4 1/2 pints NEPA
Festicides, two applications	4	6	3 pounds Agericide 20 dispersible powder
Tags (provided by Marketing Section of ADU)	nil	nil	10 bags
	68	102	

APPENDIX III

TABLE III.3 LABOUR REQUIREMENTS

Operation	No. of man days	When required
Drain maintenance	3 x 2	July/August and February
Nursery	6	late August
Re-levelling and hand-planting	50	September
Transplanting	12	Late September/early October
Weeding, pest control	4	November to January
Bird scaring	8*	January/February
Harvesting	24	February/March

Note * Sharing with neighbours.

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Fertilisers	22	33	180 pounds Nitro 26 37 pounds Triple Super phosphate
Seeds (treated with seed dressing)	5	7.5	20 pounds
Herbicides, one application	7	10.5	4½ pints MCPA
Pesticides, two applications	4	6	3 pounds Agrocide 26 dispersible powder
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Harvesting	24	February/March

Note * Sharing with neighbours.

APPENDIX IV

IV.1 ASSUMPTIONS USED IN ESTIMATING THE STAFF REQUIRED FOR THE ADU EXTENSION TEAMS

- (a) That the Supervisors, Extension Agents, Home Demonstrators and Forest Guards required to form the teams in 1974 would be appointed directly from the Department of Agriculture and Forest Department. From 1975 onwards the Supervisor and Extension Agent positions would be filled by staff trained in the Training Centre at Kabul.
- (b) That the Extension Team in an ADU Centre working with small-holders on SLDB developed land would consist initially of a Supervisor, three Extension Agents, a Home Demonstrator and a Forest Guard. The number of families that an Extension Agent could handle would start and remain at about 20. During the first four years the work would consist only of support and guidance for the homestead and rice plots, that is a low level of work with each family at the time when the Extension Agents and Farmers are unknown to each other and relatively inexperienced. By year five when SLDB management would be withdrawn the Extension Agents would be and should be sufficiently experienced and acquainted with each other to enable the necessary increased support and guidance to be achieved with roughly the same ADU staff.

APPENDIX IV

If there is a legally occupied land closely in which improvement work is to be undertaken then the ADU Team would be reinforced especially for this work in year two.

- (c) Teams working on road-based improvement would also consist of a Supervisor and three Extension Agents. The number of farmers that would be handled in each of the road-based improvement schemes is not known but it is assumed that the number of participants that an Extension Agent could handle would gradually increase from about 25 at the outset to around 50 in three years. This arrangement allows for both farmers and Extension Agents to gain experience.

The size of the Holdings arising from road-based improvement are expected to vary considerably, not only from scheme to scheme but also within a scheme. For planning purposes the following assumptions have been made:

- (i) that a diversified cropping pattern would be followed;
- (ii) that improvement work would extend to 500 yards or

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- (b) That the Extension Team in an ADU Centre working with small-holders on SLDB developed land would consist initially of a Supervisor, three Extension Agents, a Home Demonstrator and a Forest Guard. The number of families that an Extension Agent could handle would start and remain at about 50. During the first four years the work would consist only of support and guidance for the homestead and rice plots, that is a low level of work with each family at the time when the Extension Agents and farmers are unknown to each other and relatively inexperienced. By year five, when SLDB management would be withdrawn and the oil palm and cocoa plantations would be sub-divided into holdings, the Extension Agents and the farmers should be sufficiently experienced and acquainted with each other to enable the necessary increased support and guidance to be achieved with roughly the same ADU staff.

If there is a legally occupied land closeby in which improvement work is to be undertaken then the ADU Team would be reinforced especially for this work in year two.

- (c) Teams working on road-based improvement would also consist of a Supervisor and three Extension Agents. The number of farmers that would be handled in each of the road-based improvement schemes is not known but it is assumed that the number of participants that an Extension Agent could handle would gradually increase from about 25 at the outset to around 50 in three years. This arrangement allows for both farmers and Extension Agents to gain experience.

The size of the holdings arising from road-based improvement are expected to vary considerably, not only from scheme to scheme but also within a scheme. For planning purposes the following assumptions have been made:-

- i) that a diversified cropping pattern would be followed;
- ii) that improvement work would extend to 500 yards on

either side of the road. The gross acreage of land per mile coming under the scheme would be 364 acres but the net usable agricultural land per mile of road would be 255 acres (assuming a loss of 30 per cent for unsuitable land, buildings, tracks etc.);

- iii) that the average holding size would be 16 acres, that is 16 holdings per mile of road;
- iv) oil palms would be grown only within 20 road miles of a mill also it would be grown only on suitable land (slopes less than 20 degrees) within 200 yards of the road. Assuming 90 per cent of the usable agricultural land would be suitable for oil palms then the acreage of oil palms per mile of road would be 90;
- v) sufficient flat valley land would be developed to permit each participating family to plant one acre of wet rice, that is an average of 16 acres of rice per mile of road;
- vi) rubber would be grown on the steeper land (20 to 25 degrees) in the first 200 yards (assumed to be five per cent); equivalent to five acres per mile of road;
- vii) in the next 300 yards, representing a total of about 144 acres of usable agricultural land, less steep land would be planted to pepper, cocoa and other specified crops while the remaining land would be planted to rubber. The acreages of each have been assumed to be:-

Pepper	10 acres
Cocoa	20 acres
Rubber	100 acres
Other crops	14 acres

The overall cropping pattern per mile of road in areas within 20 miles of an oil palm mill would be:-

Oil palms	90 acres
Rubber	105 acres
Cocoa	20 acres
Rice	16 acres
Pepper	10 acres
Other crops	14 acres
Total	255 acres

In those road-based schemes more than 20 miles from an oil palm mill the net crop acres assumed per mile of road would be:-

Oil palms	Nil
Rubber	180 acres
Cocoa	20 acres
Rice	20 acres
Other crops	35 acres
Total	255 acres

- (d) For every seven Extension Teams formed it has been assumed necessary to appoint an experienced Supervisor to the post of Extension Leader to help the Agricultural Leader in the task of checking the Supervisors.

IV.2 ASSUMPTIONS USED IN ESTIMATING THE STAFF REQUIRED FOR THE ECONOMIC, CREDIT AND ACCOUNTING SERVICES

- (a) That a complete coverage of all the services would be gradually built up in each ADU Centre where Extension Teams are located.
- (b) Within each Centre the staff from the Economic Section would consist of:-
- i) for supply: a storeman in-charge (he would accompany the first Extension Team into the Centre) and an assistant (arriving about three years later on when a second team is moved into the same Centre);
 - ii) for marketing: a Recorder and an Assistant Recorder, both would arrive when the oil palms and cocoa commence bearing, sometimes earlier in those Centres where the creation of a marketing organisation is considered important, for example, Marudi and Long Lama;
 - iii) for farm mechanisation: a Mechanic/tractor driver (arriving when about 150 farmers are being handled by the ADU Team) and a machine operator for roughly every hundred farmers handled.
- (c) Within each Centre the staff from the Accounts Section would consist of a trained Accountant in-charge with an Assistant Accountant (both arriving with the first Extension Team).
- (d) The Credit Section staff would consist of one Clerk in those Centres dealing only with road-based improvement, but in those Centres where transference of management of land from SLDB to small-holders would take place or where block alienation schemes would be handled the staff would consist of a Senior Clerk and two Assistant Clerks (one clerk each for the credit and savings functions).

IV.3 ASSUMPTIONS USED IN ESTIMATING THE EQUIPMENT REQUIRED FOR THE FOURTH DIVISION ADU

- (a) Machinery for preparation of swamp rice land: Starting from 1976 each Centre would have a tractor and rotavator (as specified in Paragraph 2.3.2(b)) as soon as the acreage of swamp rice land handled from the Centre apprao-

ched 200 acres (that is 150 to 200 families). A 20 per cent "standby" supply of similar units would be provided to allow for breakdown and ensure an adequate supply of operating units. While building up to this stage and after the arrival of the tractor there would be one power-tiller for each machine operator stationed at the Centre. A 33 per cent "standby" supply of power-tillers would be provided.

(b) Spraying equipment (from 1976):-

i) a motor operated knapsack sprayer for every machine operator stationed at the Centre;

ii) a hand operated knapsack sprayer for every 50 farmers handled.

(c) Other equipment: A power-tiller operated rice thresher for every power-tiller allocated to the Centre.

(d) Hand tools: At each Centre there would be a supply of spades, axes, cross-cut saws, hoes etc. available for hire by the farmers.

(c) Within each Centre the staff from the Accounts Section would consist of a trained Accountant in-charge with an Assistant Accountant (both arriving with the first Extension team).

(d) The Credit Section staff would consist of one Clerk in those Centres dealing only with road-based improvement, but in those Centres where transference of management of land from SIBB to small-holders would take place or where block reclamation schemes would be handled the staff would consist of a Senior Clerk and two Assistant Clerks (one clerk each for the credit and savings functions).

IV ASSUMPTIONS USED IN ESTIMATING THE EQUIPMENT REQUIRED FOR THE FOURTH DIVISION ADU

(a) Machinery for preparation of swampy lands: Starting from 1976 each Centre would have a tractor and rotavator (as specified in Paragraph 213(d)) as soon as the acreage of swampy land handed from the Centre approx-

APPENDIX V

TABLE V.1 THE BUILD-UP OF ADU CENTRES AND STAFF

Year	Number of small-holders on SUE development land	Road based improvement and block alienation		Extension Section			Economic Section				Credit Section		Accounts Section		Farmers handled							
		Miles	Total number of farmers	Supervisors	Extension agents	Home Demonstrators	Forest guards	Storeman	Assistant storeman	Recorder	Assistant recorder	Mechanic	Machine operator	Pay clerk	Assistant pay clerk	Savings clerk	Accountant	Assistant accountant	First extension team	Second extension team	Third extension team	Total farmers
1975		20	320	1	3	1	1	1				1	1	1				75			75	
1976				1	3	1	1	1				1	1	1				105			105	
1977				1	3	1	1	1				1	1	1				150			150	
1978				1	5	1	1	1	1		1	2	2	1				200			200	
1979				1	5	1	1	1	1		1	2	2	1				220			220	
1979				2	8	2	2	1	1		1	3	3	1				250	75		325	
1980				2	8	2	2	1	1		1	4	4	1				250	105		355	
1981(1)																						
1975			210	1	3	1	1	1				1	1	1				75			75	
1976				1	3	1	1	1				1	1	1				105			105	
1977				2	6	2	2	1				2	2	1				150			150	
1978			270	2	8	2	2	1			1	3	3	1				200	75		275	
1979				2	10	2	2	1			1	4	4	1				220	105		325	
1979				2	10	2	2	1			1	5	5	1				250	150		400	
1980				3	13	3	3	1			1	6	6	1				250	200	75	525	
1981(1)																						
1976			256	1	3	1	1	1				1	1	1				75			75	
1977				1	3	1	1	1				1	1	1				105			105	
1978				1	3	1	1	1				1	1	1				150			150	
1979				1	5	1	1	1			1	2	2	1				200			200	
1980				1	5	1	1	1			1	2	2	1				220			220	
1981(1)				2	8	2	2	1			1	3	3	1				250	75		325	
1976	194			1	3	1	1	1				1	1	1				75			75	
1977				1	3	1	1	1				1	1	1				105			105	
1978				1	3	1	1	1				1	1	1				150			150	
1979				1	4	1	1	1				1	1	1				200			200	
1980				1	4	1	1	1				1	1	1				220			220	
1981				1	4	1	1	1				1	1	1				250	75		325	
1976			192	1	3	1	1	1				1	1	1				75			75	
1977				1	3	1	1	1				1	1	1				105			105	
1978				1	3	1	1	1				1	1	1				150			150	
1979				1	4	1	1	1			1	2	2	1				200			200	
1980				1	4	1	1	1			1	2	2	1				220			220	
1981(1)				1	4	1	1	1			1	2	2	1				250	75		325	
1976			320	1	3	1	1	1				1	1	1				75			75	
1977				1	3	1	1	1				1	1	1				105			105	
1978				1	3	1	1	1				1	1	1				150			150	
1979				1	5	1	1	1			1	2	2	1				200			200	
1980				1	5	1	1	1			1	2	2	1				220			220	
1981(1)				2	8	2	2	1			1	3	3	1				250	75		325	
1976			225	1	3	1	1	1				1	1	1				75			75	
1977				1	3	1	1	1				1	1	1				105			105	
1978				1	3	1	1	1				1	1	1				150			150	
1979				1	3	1	1	1				1	1	1				200			200	
1980				1	5	1	1	1			1	2	2	1				220			220	
1981(1)				2	8	2	2	1			1	3	3	1				250	75		325	

Notes (1) Improvement commences along secondary network roads.
 (2) ADU takes responsibility for all land.

TABLE V.1 THE BUILD-UP OF AOU CENTRES AND STAFF (cont'd)

Year	Number of small-holders on SLEB development land	Road based improvement and block alienation		Extension Section			Economic Section					Credit Section		Accounts Section		Farmers handled						
		Miles	Total number of farmers	Supervisors	Extension agents	Demonstrators	Forest guards	Storeman	Assistant storeman	Recorder	Assistant recorder	Mechanic	Machine operator	Pay clerk	Assistant pay clerk	Savings clerk	Accountant	Assistant accountant	First extension team	Second extension team	Third extension team	Total farmers
1977		15	240	1	3	1		1						1			1		75			75
1978				1	1	1		1				1	1	1			1		105			105
1979				1	3	1		1				2	2	1			1		150			150
1980				1	1	1		1				1	1	1			1	1	200			200
1981				1	5	1		1				2	2	1			1	1	220			220
1976	162	4	64	1	3	1	1	1				1	1	1			1		162			162
1979				1	4	1	1	1				2	2	1			1		187			187
1980				1	4	1	1	1				2	2	1			1		197			197
1981(2)				1	4	1	1	1				2	2	1			1	1	212			212
1978	265	4	64	2	6	2	1	1				2	2	1			1		265			265
1979				2	8	2	1	1				4	4	1			1		315			315
1980				2	8	2	1	1				4	4	1			1		339			339
1981(2)				2	8	2	1	1				4	4	1			1	1	359			359
1977		10	160	1	3	1		1				1	1	1			1		75			75
1978				1	1	1		1				1	1	1			1		105			105
1979				1	3	1		1				2	2	1			1		150			150
1980(1)				1	3	1		1				2	2	1			1		175			175
1981				1	4	1		1				2	2	1			1	1	185			185
1978		15	225	1	3	1		1				1	1	1			1		75			75
1979				1	3	1		1				1	1	1			1		105			105
1980				1	3	1		1				2	2	1			1		150			150
1981				1	3	1		1				2	2	1			1		175			175
1982				1	5	1		1				2	2	1			1		200			200
1980	331	2	32	2	6	2	1	1				4	4	1			1		331			331
1981				2	7	2	1	1				4	4	1			1		356			356
1982				2	7	2	1	1				4	4	1			1		363			363
1983(2)				2	7	2	1	1				4	4	1			1		363			363
1980	316	1	16	2	6	2	1	1				3	3	1			1		316			316
1981				2	7	2	1	1				3	3	1			1		334			334
1982				2	7	2	1	1				3	3	1			1		334			334
1983(2)				2	7	2	1	1				3	3	1			1		334			334
1982	268	6	6	2	6	2	1	1				2	2	1			1		268			268
1983				2	6	2	1	1				2	2	1			1		268			268
1984				2	6	2	1	1				2	2	1			1		268			268
1985(2)				2	6	2	1	1				2	2	1			1		268			268

Notes (1) Improvement commences along secondary network roads.
(2) AOU takes responsibility for all land.

TABLE VI.1 - SUMMARY SALARIES AND ALLOWANCES (USD) FOR AGE 1999

Employment category	Class	Number of staff	Basic annual salary	Per cent	Regional Allowance	Total	Notes
Administrative Section							
Administrative Services Officer	A	1,404	16,000	17.5	4,000	20,000	1
Administrative Officer	A	1,700	20,000	17.5	5,200	25,200	1
Typist/ Clerk	A	1,309	15,000	17.5	4,000	19,000	1
Assistant	A	1,300	15,000	17.5	4,000	19,000	1
Administrative Assistant	01-1	300	5,000	20	1,000	6,000	1
Senior Clerk	16-3	700	2,400	20	1,000	3,400	1
Typist/Clerk	01-1	200	2,000	20.5	500	2,500	1
Office Attendant	01-1	100	1,000	25	200	1,200	1
Volunteer	01-1	10	1,000	25	200	1,200	1
Extension Section							
Extension Officer	01-3	1,000	12,000	17.5	3,000	15,000	1
Extension Supervisor	01-3	500	7,000	20	1,500	8,500	1
Extension Agent	01-3	300	3,500	20.5	700	4,200	1
Basic Demonstrator	01-3	200	2,600	21.5	500	3,100	1
Clerk	11-1	200	1,400	22.5	300	1,700	1
Project Officer					600	1,000	1
Driver					200	1,000	1
Accounting Section							
Manager	01-3	200	3,000	21.5	700	3,700	1
Assistant Manager	01-3	100	2,100	25	500	2,600	1
Recorder	01-3	200	2,400	21.5	500	2,900	1
Assistant Recorder	01-3	100	1,600	25	300	1,900	1
Deputy/Operator	01-3	100	2,300	25	500	2,800	1
Account Operator	01-3	175	2,100	25	500	2,600	1
General Section							
Pay Clerk	01-3	200	3,100	21.5	700	3,800	1
Assistant Pay Clerk	01-3	100	2,100	25	500	2,600	1
General Clerk	01-3	100	2,100	25	500	2,600	1
Accounts Section							
Assistant	01-1	100	5,000	20	1,000	6,000	1
Accounts Clerk	01-1	200	2,000	20.5	500	2,500	1

APPENDIX VI

Section/category	Grade	Monthly salary \$	Basic annual salary \$	Per cent	Regional allowance \$	Total \$	House grade
Headquarters Section							
Agricultural Section Leader	A	1 400	16 800	17.5	2 940	19 740	A
Administrative Leader	A	1 300	15 600	17.5	2 730	18 330	A
Training Leader	A	1 300	15 600	17.5	2 730	18 330	A
Accountant	A	1 200	14 400	17.5	2 520	16 920	A
Accountants Assistant	C1-3	550	6 600	20	1 320	7 920	C
Senior Clerk	D4-5	700	8 400	20	1 680	10 080	B
Typist/Clerk	F1-3	250	2 000	22.5	675	3 675	D
Office Attendant	G1-3	160	1 920	25	480	2 400	D
Watchman	G1-3	160	1 920	25	480	2 400	D
Extension Section							
Extension Leader	C4-5	1 060	12 720	17.5	2 226	14 946	B
Extension Supervisor	C1-3	640	7 680	20	1 536	9 216	B
Extension Agent	D1-3	280	3 360	22.5	756	4 116	C
Home Demonstrators	F1-3	220	2 640	21.5	594	3 234	D
Clerk	F1-3	250	3 000	22.5	675	3 675	D
Forest Guard	F1-3	200	2 400	25	600	3 000	D
Driver	G2-3	195	2 340	25	585	2 925	D
Economics Section							
Storeman	D1-3	280	3 360	22.5	756	4 116	C
Assistant Storeman	F1-3	180	2 160	25	540	2 700	D
Recorder	D1-3	280	3 360	22.5	756	4 116	C
Assistant Recorder	F1-3	180	2 160	25	540	2 700	E
Driver/Mechanic	G2-3	195	2 340	25	585	2 925	D
Machine Operator	G2-3	175	2 100	25	525	2 625	D
Credit Section							
Pay Clerk	D1-3	280	3 360	22.5	756	4 116	C
Assistant Pay Clerk	F1-3	180	2 160	25	540	2 700	D
Savings Clerk	F1-3	180	2 160	25	540	2 700	D
Accounts Section							
Accountant	D3-4	550	6 600	20	1 320	7 920	C
Accounts Clerk	F1-3	220	2 640	22.5	594	3 234	D

TABLE VI.2 STANDARD HOUSING AND BUILDINGS COSTS

Grade/Type	Construction and furniture cost \$	Annual (4) maintenance and repairs \$
<u>Staff houses:-</u> A	60 000	1 200
B	35 000	700
C	20 000	400
D	8 000	160
<u>Offices and store-rooms:</u>		
Headquarters Section		
Offices (extension to Kabuloh)	40 000	800
Office furniture and equipment	6 000	600
Extension Section Leader (1)		
Offices (2)	5 000	100
Garage	2 500	50
Office equipment	1 500	150
Extension Teams		
Offices and store-room (3)	25 000	500
Equipment shed	1 500	30
Office equipment	3 000	300

Notes: (1) except on SLDB Schemes.

(2) two offices 10 by 12 feet at \$20 per square foot.

(3) four offices 8 by 10 feet and store-room 20 by 30 feet at \$20 per square foot.

(4) annual maintenance - building 2 per cent
- furniture 10 per cent

TABLE VI.3 STANDARD VEHICLES AND EQUIPMENT COSTS

Type	Capital(1) cost \$	Annual miles/hours	Operating cost per mile/hour \$	Total cost per annum \$	Useful life years	Stand-by units per cent basic
<u>Vehicles and agricultural machinery</u>						
Four wheel drive pick-up	18 000	15 000 miles	0.25	3 750	5	
Lorry	25 000	8 000 miles	0.40	3 200	10	
Motor cycle	2 200	6 000 miles	0.08	480	4	
Tractor and rotavator	25 000	800 hours	4.25	3 400	8	20
Power tiller	3 760	250 hours	1.05	265	6	33
<u>Small scale equipment and tools</u>						
Power rice thresher	900		5	50	10	
Motorised knapsack sprayer/blower	450		15	70	5	
Manual knapsack sprayer	120		10	12	5	
Small tools for extension units	200		20	40	5	

Note (1) Replacement costs calculated assuming 10 per cent scrap value for vehicles and machinery.

TABLE VI.4 STANDARD GENERAL RUNNING COSTS
(DOLLARS PER ANNUM)

Item	Headquarters Section	Extension Teams
Lighting and power	1 500	500
Water	100	100
Postage	300	50
Printing and stationery	1 000	500
Books and periodicals	200	100
General office running costs	1 200	150
Transport and travelling of staff	4 500	1 200
Medical	100	50
Insurance	600	250
Telephone	1 500	
Entertainment	500	
Total	11 500	2 900

TABLE VI.5 SUMMARY OF ADU STAFF SALARIES AND WAGES COSTS
(DOLLARS)

Year	Headquarters	Extension Section	Economics Section	Credit and Accounts Section	Total staff salaries and wages
1975	99 800	49 600	13 500	29 480	192 380
1976	99 800	198 210	46 060	89 680	433 750
1977		272 610	73 380	117 000	562 790
1978		411 780	197 050	159 600	868 230
1979		565 280	202 650	190 000	1 057 730
1980		659 160	269 120	205 280	1 233 360
1981		801 580	323 190	229 040	1 453 610
1982		875 790	345 020	248 720	1 569 330
1983		897 400	355 960	258 360	1 611 520
1984		897 400	355 960	258 360	1 611 520
1985 to 1995		919 010	366 900	267 000	1 652 710
		919 010	366 900	267 000	1 652 710

TABLE VI.6 SUMMARY OF ADU HOUSING COSTS (DOLLARS)

Year	Staff housing		Office buildings and furniture		Overall total	
	Construction	Maintenance	Construction	Maintenance	Construction costs	Maintenance costs
1975	677 000	13 540	105 000	3 060	762 000	16 600
1976	902 000	31 580	156 500	7 590	1 058 500	39 170
1977	993 000	41 440	59 000	9 250	552 000	50 690
1978	815 000	57 740	97 500	12 120	912 500	69 860
1979	833 000	74 400	48 500	14 330	881 500	88 730
1980	657 000	87 540	29 500	15 160	686 500	102 700
1981	532 000	98 180		15 160	532 000	113 340
1982	278 000	103 740	29 500	15 990	307 500	119 730
1983		↓		↓		↓
1984						
1985 to 1995		↓		↓		↓

TABLE VI.7 SUMMARY OF ADU VEHICLES AND EQUIPMENT COSTS (DOLLARS)

Year	Initial purchase costs		Total purchase	Replacement costs		Operating costs		Total Replacement and operating costs
	Vehicles	Agric. equipment		Vehicles	Agric. equipment	Vehicles	Agric. equipment	
1975	76 000	10 620	86 620			16 050	806	16 856
1976	98 000	59 530	157 530			35 000	6 368	41 368
1977	85 200	75 500	160 700			49 080	14 728	63 808
1978	229 600	259 310	488 910			85 470	38 768	124 238
1979	183 600	145 530	329 130			118 410	53 464	171 894
1980	100 600	123 930	224 530	19 800		135 850	63 142	198 992
1981	135 000	30 870	165 870	98 100	1 134	164 950	65 211	230 161
1982	69 400	39 760	109 160	47 880	10 017	177 660	69 453	247 113
1983	22 400		22 400	55 440	26 514	181 890	↓	251 343
1984				81 540	22 275	181 890	↓	251 343
1985	22 400		22 400	97 740	70 263	185 160	↓	254 613
1986				138 600	98 595	↓	↓	↓
1987				158 940	222 525	↓	↓	↓
1988				144 820	95 823	↓	↓	↓
1989				216 540	94 500	↓	↓	↓
1990				161 020	37 989	↓	↓	↓
1991				232 200	52 119	↓	↓	↓
1992				55 440	49 221	↓	↓	↓
1993				170 920	53 703	↓	↓	↓
1994				97 740	61 191	↓	↓	↓
1995				93 520	68 112	↓	↓	↓

TABLE VI.8 SUMMARY OF GENERAL RUNNING COSTS (DOLLARS)

Year	Extension teams		Headquarters section cost	Total cost
	Number of teams	Cost		
1975	2	5 800	11 500	17 300
1976	7	20 300	11 500	31 800
1977	9	26 100		37 600
1978	12	34 800		46 300
1979	13	37 700		49 200
1980	14	40 600		52 100
1981	14	40 600		52 100
1982	15	43 500		55 000
1983	15	43 500		55 000
1984	↓	↓	↓	↓
1985/95	↓	↓	↓	↓

TABLE VI.9 ADU COSTS FOR ROAD BASED IMPROVEMENT SCHEME (2 797 farmers(1)) (THOUSAND DOLLARS)

Year	Capital costs			Recurrent costs					Overall total	
	Buildings furniture	Vehicles equipment	Total	Salaries	Buildings and furniture maintenance	Vehicles and furniture operating	Vehicles and equipment replacement	General running costs		Total
1975	417.0	32.6	449.6	92.6	8.8	5.7		5.8	112.9	562.5
1976	862.0	90.9	952.9	288.3	28.8	20.7		17.4	354.7	1 307.6
1977	552.0	160.7	712.7	417.3	39.8	43.1		23.2	523.4	1 236.1
1978	408.5	335.8	744.3	602.1	48.4	81.9		26.1	758.5	1 502.8
1979	474.0	145.4	619.4	642.6	58.9	106.3		26.1	833.9	1 453.3
1980	351.0	128.1	479.1	735.9	65.9	119.8	19.8		967.5	1 446.6
1981	512.0	118.8	630.8	877.0	76.2	139.5	40.7		1 159.5	1 790.3
1982		0.1	0.1	866.0	76.2	144.7	57.1		1 170.1	1 170.2
1983				867.0		144.2	48.9		1 162.4	1 162.4
1984				867.0		144.2	60.2		1 173.7	1 173.7
1985				↓		140.8	88.1		1 198.2	1 198.2
1986				↓		140.8	184.8		1 294.9	1 294.9
1987				↓			194.7		1 304.8	1 304.8
1988				↓			143.6		1 253.7	1 253.7
1989				↓			173.1		1 283.2	1 283.2
1990				↓			137.6		1 247.7	1 247.7
1991				↓			180.9		1 291.0	1 291.0
1992				↓			65.3		1 175.4	1 175.4
1993				↓			55.1		1 165.2	1 165.2
1994				↓			62.9		1 173.0	1 173.0
1995				↓			117.7		1 227.8	1 227.8
1996-1999				↓			89.9		1 200.0	1 200.0
Total	3 576.5	1 012.4	4 588.9	19 260.8	1 697.9	3 062.1	1 990.1	620.6	26 631.5	31 220.4

Note (1) Staff provided would handle 3 147 farmers.

TABLE VI.10 ADU COSTS FOR SMALL-HOLDER SCHEMES (1 538 farmers)
(THOUSAND DOLLARS)

Year	Capital costs			Recurrent costs						Overall total
	Buildings furniture	Vehicles equipment	Total	Salaries	Buildings and furniture maintenance	Vehicles and furniture operating	Vehicles and equipment replacement	General running costs	Total	
1975										
1976	196.5	66.1	262.6	45.7	4.2	9.4		2.9	62.2	324.8
1977				45.7	4.2	9.4		2.9	62.2	62.2
1978	504.0	153.1	657.1	166.3	14.7	31.1		8.7	220.8	877.9
1979	407.5	183.8	591.3	315.4	23.1	54.3		11.6	404.4	995.7
1980	335.5	96.4	431.9	397.7	30.1	67.9		14.5	510.2	942.1
1981	20.0	47.1	67.1	476.9	30.1	79.4	9.9	14.5	610.8	677.9
1982	307.5	109.0	416.5	603.6	35.9	91.2	0.8	17.4	748.9	1 165.4
1983		22.4	22.4	644.8	35.9	95.9	33.1	17.4	827.1	849.5
1984				644.8		95.9	43.7		837.7	837.7
1985		22.4	22.4	686.0		102.6	79.9		921.8	944.2
1986				686.0		102.6	52.4		894.3	894.3
1987							138.2		980.1	980.1
1988							97.0		938.9	938.9
1989							137.9		979.8	979.8
1990							61.4		903.3	903.3
1991							103.4		945.3	945.3
1992							39.3		881.2	881.2
1993							120.9		962.8	962.8
1994							96.1		938.0	938.0
1995							43.9		885.8	885.8
1996-1999							88.1		930.0	930.0
Total	1 771.0	700.3	2 471.3	13 630.9	752.6	2 073.5	1 410.3	368.3	18 235.6	20 706.9

TABLE VI.11 ADU HEADQUARTERS COSTS (THOUSAND DOLLARS)

Year	Capital costs			Recurrent costs						Overall total
	Buildings and furniture	Vehicles and equipment	Total	Salaries	Buildings and furniture maintenance	Vehicles and equipment operating	Vehicles and equipment replacement	General running costs	Total	
1975	365.0	54.0	419.0	99.8	7.3	11.3		11.5	129.9	548.9
1976				99.8	7.3	11.3		11.5	129.9	129.9
1977									129.9	129.9
1978									129.9	129.9
1979									129.9	129.9
1980									129.9	129.9
1981							48.6		178.5	178.5
1982									129.9	129.9
1983									129.9	129.9
1984									129.9	129.9
1985									129.9	129.9
1986									129.9	129.9
1987							48.6		178.5	178.5
1988									129.9	129.9
1989									129.9	129.9
1990									129.9	129.9
1991									129.9	129.9
1992									129.9	129.9
1993							48.6		178.5	178.5
1994									129.9	129.9
1995									129.9	129.9
1996-1999									129.9	129.9
Total	365.0	54.0	419.0	2 495.0	182.5	282.5	145.8	287.5	3 393.3	3 812.3

TABLE VI.12 OVERALL SUMMARY OF ADU COSTS (4 335 farmers(1))
(THOUSAND DOLLARS)

Year	Capital costs			Recurrent costs					Overall total	
	Buildings and furniture	Vehicles and equipment	Total	Salaries	Buildings and furniture maintenance	Vehicles and equipment operating	Vehicles and equipment replacement	General running costs		Total
1975	782.0	86.6	868.6	192.4	16.1	17.0		17.3	242.8	1 111.4
1976	1 058.5	157.0	1 215.5	433.8	39.8	41.4		31.8	546.8	1 762.3
1977	552.0	160.7	712.7	562.8	51.3	63.8		37.6	715.5	1 428.2
1978	912.5	488.9	1 401.4	868.2	70.4	124.3		46.3	1 109.2	2 510.6
1979	881.5	329.2	1 210.7	1 057.8	89.3	171.9		49.2	1 368.2	2 578.9
1980	686.5	224.5	911.0	1 233.4	103.3	199.0	19.8	52.1	1 607.6	2 518.6
1981	532.0	165.9	697.9	1 453.7	113.6	230.2	99.2	52.1	1 948.8	2 646.7
1982	307.5	109.1	416.6	1 569.4	119.4	247.2	57.9	55.0	2 048.9	2 465.5
1983		22.4	22.4	1 611.6	119.4	251.4	82.0	55.0	2 119.4	2 141.8
1984				1 611.6		251.4	103.9		2 141.3	2 141.3
1985		22.4	22.4	1 652.8		254.7	168.0		2 249.9	2 272.3
1986				1 652.8		254.7	237.2		2 319.1	2 319.1
1987							381.5		2 463.4	2 463.4
1988							240.6		2 322.5	2 322.5
1989							311.0		2 392.9	2 392.9
1990							199.0		2 280.9	2 280.9
1991							284.3		2 366.2	2 366.2
1992							104.6		2 186.5	2 186.5
1993							224.6		2 306.5	2 306.5
1994							159.0		2 240.9	2 240.9
1995							161.6		2 243.5	2 243.5
1996-1999							178.0		2 259.9	2 259.9
Total	5 712.5	1 766.7	7 479.2	35 386.7	2 633.0	5 418.1	3 546.2	1 276.4	48 260.4	55 739.6

Note (1) Staff provided could handle 4 685 farmers.

Element	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
Aluminum	174.5	176.2	178.0	179.8	181.6	183.4	185.2	187.0	188.8	190.6	192.4	194.2	196.0	197.8	199.6	201.4	203.2	205.0	206.8	208.6	210.4	212.2	214.0	215.8	217.6	219.4	221.2	223.0	224.8	226.6	228.4	230.2	232.0	233.8	235.6	237.4	239.2	241.0	242.8	244.6	246.4	248.2	250.0	251.8	253.6	255.4	257.2	259.0	260.8	262.6	264.4	266.2	268.0	269.8	271.6	273.4	275.2	277.0	278.8	280.6	282.4	284.2	286.0	287.8	289.6	291.4	293.2	295.0	296.8	298.6	300.4	302.2	304.0	305.8	307.6	309.4	311.2	313.0	314.8	316.6	318.4	320.2	322.0	323.8	325.6	327.4	329.2	331.0	332.8	334.6	336.4	338.2	340.0	341.8	343.6	345.4	347.2	349.0	350.8	352.6	354.4	356.2	358.0	359.8	361.6	363.4	365.2	367.0	368.8	370.6	372.4	374.2	376.0	377.8	379.6	381.4	383.2	385.0	386.8	388.6	390.4	392.2	394.0	395.8	397.6	399.4	401.2	403.0	404.8	406.6	408.4	410.2	412.0	413.8	415.6	417.4	419.2	421.0	422.8	424.6	426.4	428.2	430.0	431.8	433.6	435.4	437.2	439.0	440.8	442.6	444.4	446.2	448.0	449.8	451.6	453.4	455.2	457.0	458.8	460.6	462.4	464.2	466.0	467.8	469.6	471.4	473.2	475.0	476.8	478.6	480.4	482.2	484.0	485.8	487.6	489.4	491.2	493.0	494.8	496.6	498.4	500.2	502.0	503.8	505.6	507.4	509.2	511.0	512.8	514.6	516.4	518.2	520.0	521.8	523.6	525.4	527.2	529.0	530.8	532.6	534.4	536.2	538.0	539.8	541.6	543.4	545.2	547.0	548.8	550.6	552.4	554.2	556.0	557.8	559.6	561.4	563.2	565.0	566.8	568.6	570.4	572.2	574.0	575.8	577.6	579.4	581.2	583.0	584.8	586.6	588.4	590.2	592.0	593.8	595.6	597.4	599.2	601.0	602.8	604.6	606.4	608.2	610.0	611.8	613.6	615.4	617.2	619.0	620.8	622.6	624.4	626.2	628.0	629.8	631.6	633.4	635.2	637.0	638.8	640.6	642.4	644.2	646.0	647.8	649.6	651.4	653.2	655.0	656.8	658.6	660.4	662.2	664.0	665.8	667.6	669.4	671.2	673.0	674.8	676.6	678.4	680.2	682.0	683.8	685.6	687.4	689.2	691.0	692.8	694.6	696.4	698.2	700.0	701.8	703.6	705.4	707.2	709.0	710.8	712.6	714.4	716.2	718.0	719.8	721.6	723.4	725.2	727.0	728.8	730.6	732.4	734.2	736.0	737.8	739.6	741.4	743.2	745.0	746.8	748.6	750.4	752.2	754.0	755.8	757.6	759.4	761.2	763.0	764.8	766.6	768.4	770.2	772.0	773.8	775.6	777.4	779.2	781.0	782.8	784.6	786.4	788.2	790.0	791.8	793.6	795.4	797.2	799.0	800.8	802.6	804.4	806.2	808.0	809.8	811.6	813.4	815.2	817.0	818.8	820.6	822.4	824.2	826.0	827.8	829.6	831.4	833.2	835.0	836.8	838.6	840.4	842.2	844.0	845.8	847.6	849.4	851.2	853.0	854.8	856.6	858.4	860.2	862.0	863.8	865.6	867.4	869.2	871.0	872.8	874.6	876.4	878.2	880.0	881.8	883.6	885.4	887.2	889.0	890.8	892.6	894.4	896.2	898.0	899.8	901.6	903.4	905.2	907.0	908.8	910.6	912.4	914.2	916.0	917.8	919.6	921.4	923.2	925.0	926.8	928.6	930.4	932.2	934.0	935.8	937.6	939.4	941.2	943.0	944.8	946.6	948.4	950.2	952.0	953.8	955.6	957.4	959.2	961.0	962.8	964.6	966.4	968.2	970.0	971.8	973.6	975.4	977.2	979.0	980.8	982.6	984.4	986.2	988.0	989.8	991.6	993.4	995.2	997.0	998.8	1000.6	1002.4	1004.2	1006.0	1007.8	1009.6	1011.4	1013.2	1015.0	1016.8	1018.6	1020.4	1022.2	1024.0	1025.8	1027.6	1029.4	1031.2	1033.0	1034.8	1036.6	1038.4	1040.2	1042.0	1043.8	1045.6	1047.4	1049.2	1051.0	1052.8	1054.6	1056.4	1058.2	1060.0	1061.8	1063.6	1065.4	1067.2	1069.0	1070.8	1072.6	1074.4	1076.2	1078.0	1079.8	1081.6	1083.4	1085.2	1087.0	1088.8	1090.6	1092.4	1094.2	1096.0	1097.8	1099.6	1101.4	1103.2	1105.0	1106.8	1108.6	1110.4	1112.2	1114.0	1115.8	1117.6	1119.4	1121.2	1123.0	1124.8	1126.6	1128.4	1130.2	1132.0	1133.8	1135.6	1137.4	1139.2	1141.0	1142.8	1144.6	1146.4	1148.2	1150.0	1151.8	1153.6	1155.4	1157.2	1159.0	1160.8	1162.6	1164.4	1166.2	1168.0	1169.8	1171.6	1173.4	1175.2	1177.0	1178.8	1180.6	1182.4	1184.2	1186.0	1187.8	1189.6	1191.4	1193.2	1195.0	1196.8	1198.6	1200.4	1202.2	1204.0	1205.8	1207.6	1209.4	1211.2	1213.0	1214.8	1216.6	1218.4	1220.2	1222.0	1223.8	1225.6	1227.4	1229.2	1231.0	1232.8	1234.6	1236.4	1238.2	1240.0	1241.8	1243.6	1245.4	1247.2	1249.0	1250.8	1252.6	1254.4	1256.2	1258.0	1259.8	1261.6	1263.4	1265.2	1267.0	1268.8	1270.6	1272.4	1274.2	1276.0	1277.8	1279.6	1281.4	1283.2	1285.0	1286.8	1288.6	1290.4	1292.2	1294.0	1295.8	1297.6	1299.4	1301.2	1303.0	1304.8	1306.6	1308.4	1310.2	1312.0	1313.8	1315.6	1317.4	1319.2	1321.0	1322.8	1324.6	1326.4	1328.2	1330.0	1331.8	1333.6	1335.4	1337.2	1339.0	1340.8	1342.6	1344.4	1346.2	1348.0	1349.8	1351.6	1353.4	1355.2	1357.0	1358.8	1360.6	1362.4	1364.2	1366.0	1367.8	1369.6	1371.4	1373.2	1375.0	1376.8	1378.6	1380.4	1382.2	1384.0	1385.8	1387.6	1389.4	1391.2	1393.0	1394.8	1396.6	1398.4	1400.2	1402.0	1403.8	1405.6	1407.4	1409.2	1411.0	1412.8	1414.6	1416.4	1418.2	1420.0	1421.8	1423.6	1425.4	1427.2	1429.0	1430.8	1432.6	1434.4	1436.2	1438.0	1439.8	1441.6	1443.4	1445.2	1447.0	1448.8	1450.6	1452.4	1454.2	1456.0	1457.8	1459.6	1461.4	1463.2	1465.0	1466.8	1468.6	1470.4	1472.2	1474.0	1475.8	1477.6	1479.4	1481.2	1483.0	1484.8	1486.6	1488.4	1490.2	1492.0	1493.8	1495.6	1497.4	1499.2	1501.0	1502.8	1504.6	1506.4	1508.2	1510.0	1511.8	1513.6	1515.4	1517.2	1519.0	1520.8	1522.6	1524.4	1526.2	1528.0	1529.8	1531.6	1533.4	1535.2	1537.0	1538.8	1540.6	1542.4	1544.2	1546.0	1547.8	1549.6	1551.4	1553.2	1555.0	1556.8	1558.6	1560.4	1562.2	1564.0	1565.8	1567.6	1569.4	1571.2	1573.0	1574.8	1576.6	1578.4	1580.2	1582.0	1583.8	1585.6	1587.4	1589.2	1591.0	1592.8	1594.6	1596.4	1598.2	1600.0	1601.8	1603.6	1605.4	1607.2	1609.0	1610.8	1612.6	1614.4	1616.2	1618.0	1619.8	1621.6	1623.4	1625.2	1627.0	1628.8	1630.6	1632.4	1634.2	1636.0	1637.8	1639.6	1641.4	1643.2	1645.0	1646.8	1648.6	1650.4	1652.2	1654.0	1655.8	1657.6	1659.4	1661.2	1663.0	1664.8	1666.6	1668.4	1670.2	1672.0	1673.8	1675.6	1677.4	1679.2	1681.0	1682.8	1684.6	1686.4	1688.2	1690.0	1691.8	1693.6	1695.4	1697.2	1699.0	1700.8	1702.6	1704.4	1706.2	1708.0	1709.8	1711.6	1713.4	1715.2	1717.0	1718.8	1720.6	1722.4	1724.2	1726.0	1727.8	1729.6	1731.4	1733.2	1735.0	1736.8	1738.6	1740.4	1742.2	1744.0	1745.8	1747.6	1749.4	1751.2	1753.0	1754.8	1756.6	1758.4	1760.2	1762.0	1763.8	1765.6	1767.4	1769.2	1771.0	1772.8	1774.6	1776.4	1778.2	1780.0	1781.8	1783.6	1785.4	1787.2	1789.0	1790.8	1792.6	1794.4	1796.2	1798.0	1800.0

APPENDIX VII

TABLE VII.1 DETAILS OF LIVESTOCK PRODUCTION AND TRAINING CENTRE COSTS AND RETURNS(1)
(\$ THOUSAND)

Scheme years	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
<u>Land development</u>																										
Land clearing	175.0	175.0	350.0	175.0																						
Fencing	16.0	16.0	32.0	16.0																						
Handling pens and shade	14.0	26.0	6.0	4.0																						
Roads	7.5	7.5	15.0	7.5																						
Electricity and water supplies	60.0	5.0	10.0	5.0																						
Water supply	2.7	3.1	4.6	5.1	5.1	5.6	6.1	6.7	7.1	7.4	7.6	7.9	8.2	8.3	8.4	8.4										
Roads and fences maintenance	2.4	4.7	9.4	11.8	11.8	11.8																				
<u>Total land development</u>	272.5	234.6	420.8	221.5	16.9	17.4	17.9	18.5	18.9	19.2	19.4	19.7	20.0	20.1	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2
<u>Production</u>																										
Pasture establishment	85.0	85.0	350.0	175.0																						
Stock purchases	114.0	114.0	853.0																							
Pasture maintenance	31.0	62.0	124.0	155.0	155.0																					
Pasture renovation						35.0	35.0																			
Veterinary and medicines		1.4	3.0	8.8	10.8	13.0	14.8	17.2	18.8	20.0	20.8	22.0	23.2	22.6	24.0	24.0										
<u>Total production costs</u>	230.0	262.4	1330.0	338.8	165.8	203.0	204.8	207.2	208.8	210.0	210.8	212.0	213.2	212.6	214.0	214.0	214.0	214.0	214.0	214.0	214.0	214.0	214.0	214.0	214.0	214.0
<u>Production labour</u>																										
At \$5 per day	21.0	42.0	84.0	105.0	105.0																					
At \$3 per day	12.6	25.2	50.4	63.0	63.0																					
<u>Estate costs</u>																										
Vehicles and equipment	155.5																									
Housing and buildings	185.0	117.5	220.0	257.5																						
Staff salaries (excluding field workers)	117.3	161.9	198.6	233.1	201.1	153.9	153.9																			
Artificial insemination																										
Vehicles and equipment operating	18.2	18.2																								
Vehicles and equipment replacement																										
Building maintenance		4.9	8.5	14.2	20.7	20.7																				
General running costs	15.0	5.0	5.0																							
<u>Total estate costs</u>	491.0	307.5	490.3	528.0	245.0	257.8	202.5	206.5	206.9	208.2	340.7	211.9	213.7	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8	213.8
Total cost labour at \$5	1014.5	846.5	2285.1	1192.3	532.7	583.2	530.2	537.2	539.6	542.4	675.9	548.6	551.9	551.5	553.0	553.0	553.0	553.0	553.0	553.0	553.0	553.0	553.0	553.0	553.0	553.0
Total cost labour at \$3	1006.1	829.7	2251.5	1151.3	490.7	541.2	488.2	495.2	497.6	500.4	633.9	506.6	509.9	509.5	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0
Revenue		6.5	12.2	51.4	76.1	184.5	186.0	345.4	421.7	485.6	494.8	518.0	612.1	648.7	687.9	687.9	687.9	687.9	687.9	687.9	687.9	687.9	687.9	687.9	687.9	687.9
Net cash flow labour at \$5	-1014.5	-840.0	-2272.9	-1135.9	-456.6	-398.7	-344.2	-191.8	-117.9	-56.8	-181.1	-30.6	+60.2	+97.2	134.9	74.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9
Net cash flow labour at \$3	-1006.1	-823.2	-2239.3	-1093.9	-414.6	-356.7	-302.2	-149.8	-75.9	-14.8	-139.1	+11.4	+102.2	139.2	176.9	116.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9	176.9

Note (1) Based on requirements given in "Proposal for Livestock Production and Animal Husbandry Training Centre", Department of Agriculture 1973.

Ministry of Agriculture	1949	Ministry of Agriculture	Ministry of Agriculture
Department of Agriculture	1950	Department of Agriculture	Department of Agriculture
Department of Agriculture	1951	Department of Agriculture	Department of Agriculture
Department of Agriculture	1952	Department of Agriculture	Department of Agriculture
Department of Agriculture	1953	Department of Agriculture	Department of Agriculture

Liao, H.C.

APPENDIX VIII

Liao, H.C.

Liao, H.C. and
Ujang, A.

1949

Ministry of Agriculture	Ministry of Agriculture
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APPENDIX VIII

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