GOVERNMENT OF THE REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF CIPTA KARYA
DIRECTORATE OF CITY AND REGIONAL PLANNING

DITADA TRANSMIGRATION ADVISORY PLANNING GROUP

Final Report

Sir M. MacDonald & Partners Limited
Hunting Technical Services
Water and Power Consultancy Services
with
Overseas Development Administration

JUNE 1983

DITADA TRANSMIGRATION ADVISORY PLANNING GROUP FINAL REPORT JUNE 1983

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LIST OF ABBREVIATIONS

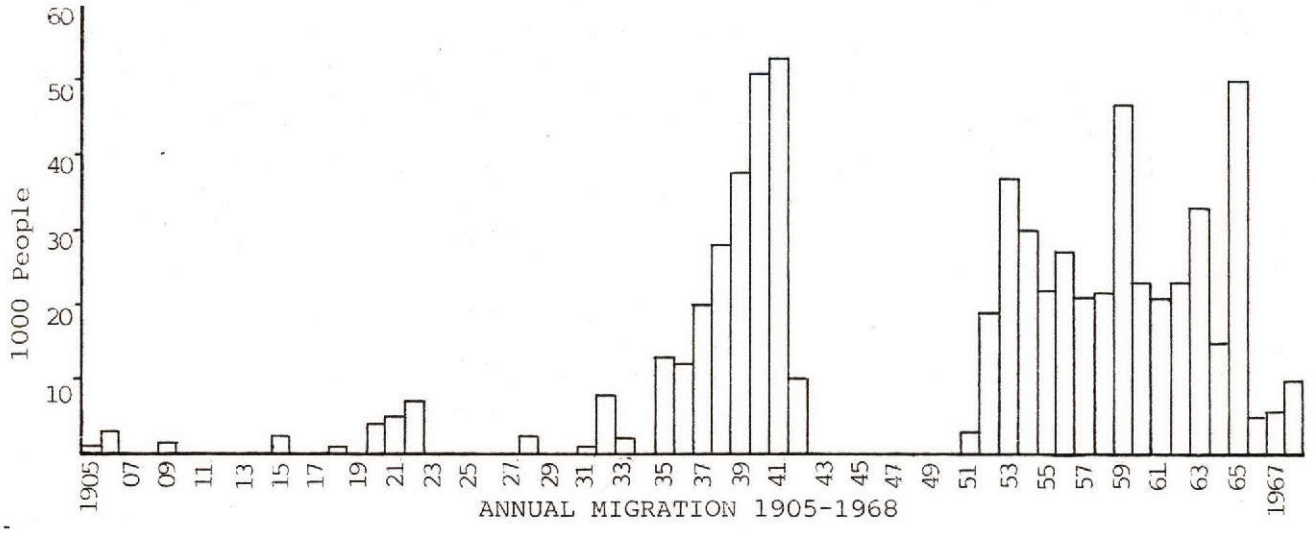
Agraria	Directorate of Land Use.
BAKOPTRANS	Inter Ministerial Body for Co-ordination of Transmigration
Bina Marga	Directorate General of Highways
C I R P	Christmas Island Rock Phosphate
C R I A	Central Research Institute for Agriculture
D I T A D A	Directorate of City and Regional Planning
F A O	Food and Agriculture Organisation, Rome
H T S	Hunting Technical Services Limited
H S L	Hunting Surveys Limited
I B R D	International Bank for Reconstruction and Development
I R R I	International Rice Research Institute, Manila
K K	Family Head
M M P	Sir M. MacDonald and Partners
O D A	Overseas Development Administration, London
P A Y P	Plan - As - You - Proceed
P L P T	Directorate of Transmigration Land Preparation
REPELITA	Five Year Development Plan
Satbin	Transmigration Development Co-ordination Unit
Satlap	Field Unit
S F S E	Screening Feasibility Studies and Detailed Engineering
S K P	Settlement Development Unit
S P	Village Unit
S W P	Regional Development Unit
T O R	Terms of Reference
W A P C O S	Water and Power Consultancy Services (India) Limited
W P P	Partial Development Unit

1 INTRODUCTION

1.1 BACKGROUND

Since the early years of this century successive Governments have fostered programmes aimed at the movement of agricultural populations from the densely settled areas of the 'Inner Islands' (Java, Madura, Bali) to the sparsely populated 'Outer Islands'. The stimulus for such programmes has been the rapid increase in the population of Java and Madura from 4.5 million in 1815 to 28 million by 1900 (the 1982 population being 88 million). The main objectives of the programmes have been to reduce population pressure in the rural areas of the inner islands, to raise the standard of living of the migrating families, and to encourage the development of the outer islands.

The first resettlement scheme was established in Lampung in 1905, and the programme continued with varying annual rates if migration until the suspension of settlement in the early 1940's, following the outbreak of war in the region. It recommenced in the early 1950's. Initially the targets were unrealistic but the programme did succeed in moving an average of 25-26,000 per year up to 1965. However, during the period 1965-1968 the rates dropped to under 10,000 migrants per year, due to the difficult political and economic situation in the country at the time. The annual migration rates up to 1968 are shown below :



The target set for Repelita I (1969/1970 - 1973/1974) was the movement of 190,000 transmigrants over 5 years. By the end of the period, 182,000 people had been moved. For Repelita II (1974/1975 - 1978/1979) the target was increased to 250,000 families or approximately 1,250,000 migrants (250,000 people per year). It proved impossible to achieve this target, which was later reduced to about 540,000 migrants. Actual settlement was in fact much less; only 253,000 were resettled during Repelita II.

For Repelita III the Government adopted a more vigorous approach and all ministries were encouraged to take a more active role. The Ministry of Public Work was brought in to assist with settlement planning, land clearing, and the development of the settlements. The transmigration target was set at 500,000 families(2,500,000 people). Initially, the rate of settlement was slow but

in 1980/1981 the target figure of 75,000 families was actually achieved and this trend had continued during 1981/1982 and 1982/1983.

The targets and actual achievements during the three Repelitas are tabulated below :

	Number of transmigrant families (excluding spontaneous transmigrants)		
	Target		Actual
	Original	Revised	
Repelita I	38,000	38,000	36,400
Repelita II	250,000	108,000	48,000
Repelita III	500,000	500,000	
1979/1980		50,000	50,000
1980/1981		75,000	74,505
1981/1982		100,000	80,072
1982/1983		125,000	Not available
1983/1984		150,000	-

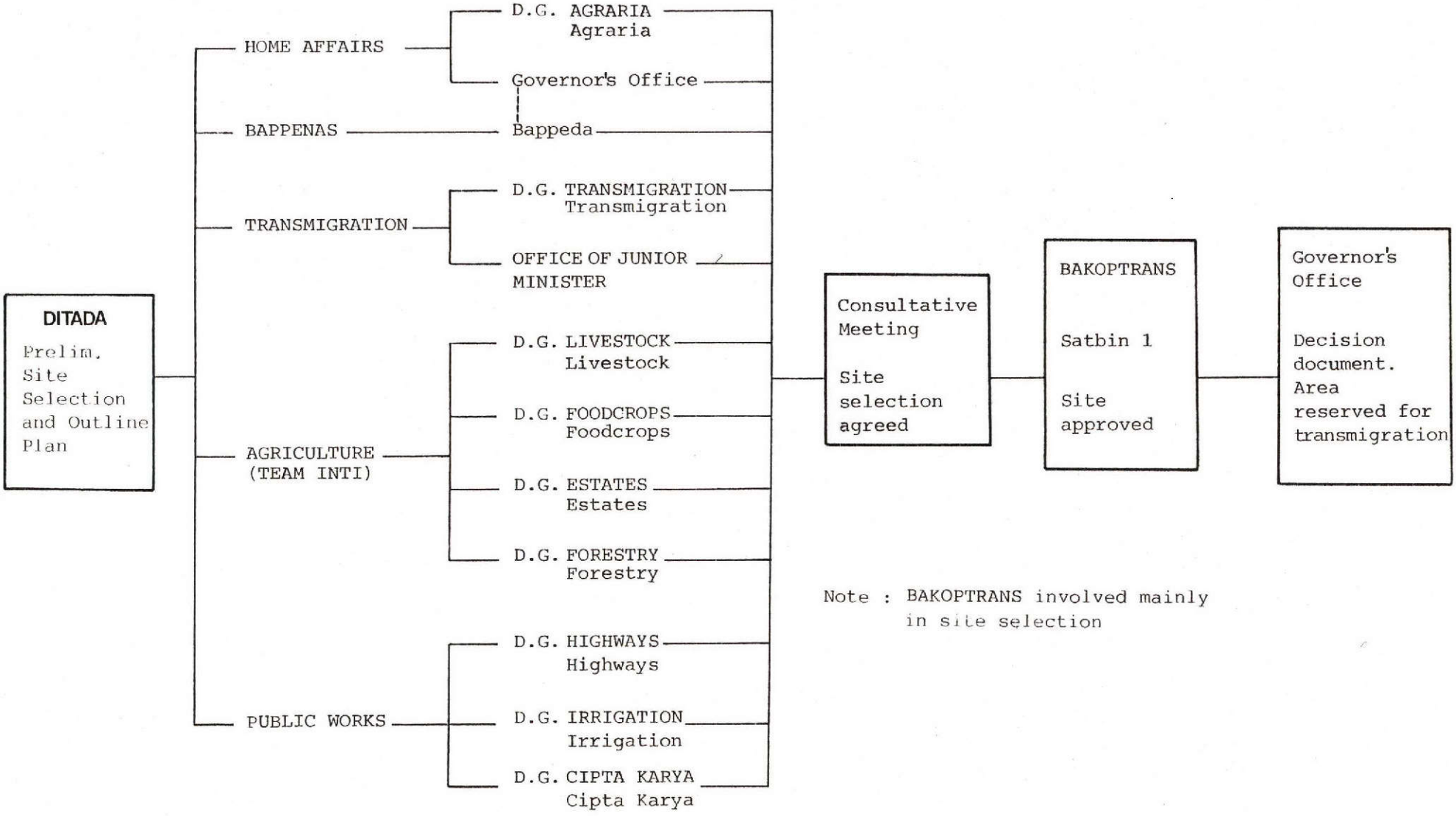
The level of support given to the transmigrants by Government has varied over the years from minimal assistance with moving to the provision of housing and irrigation. At present transmigrants receive title to a minimum of 2ha of land, 1.25ha ready for cultivation, a house and a package of support services which includes planting material, tools, food supplies for one year and health and education facilities.

1.2 INSTITUTIONAL ARRANGEMENTS

Until the start of Repelita III in 1979 the organisation of all transmigration activities was undertaken by the Directorate General of Transmigration. Since then responsibilities have been subdivided amongst various ministries and 53 separate agencies have a role in the programme. Those agencies involved in site selection are shown in Figure 1.1: those involved in site preparation are given below and their responsibilities defined.

Agency	Responsibilities
BAKOPTRANS (Inter Ministerial Co-ordination Body) Satbin I (Development Co-ordination Unit)	Co-ordination of all transmigration activities; chaired by Junior Minister
Office of Junior Minister Transmigration	Liaison and co-ordination of whole Transmigration programme
D I T A D A	Site identification Settlement planning
P L P T	Land clearance
Bina Marga	Road construction
Transmigrasi	Construction of houses and public facilities Water supply
Agraria	Demarcation of holdings Issue of land titles

INSTITUTIONAL ARRANGEMENTS



Note : BAKOPTRANS involved mainly in site selection

Figure 1.1

The World Bank has provided support to the transmigration programme through two loans whilst a third loan was agreed in 1983. The first loan (Trans I) was for the development of settlements in South Sumatera. The second loan (Trans II) was for the development of sites in Jambi Province along the Trans Sumatera Highway. However, Trans II funds were also used to finance the site identification and planning studies discussed in this report, which are referred to as the Screening, Feasibility Studies and Detailed Engineering, SFSE '80 programme. Eleven foreign consultants and their Indonesian associates were engaged to undertake the studies. The location of the study area is shown on Figure 1.2. At the same time advisers were recruited by DITADA to provide assistance with the supervision of the consultants and with the other planning activities of the Directorate.

1.3 THE PLANNING PROGRESS

Planning for transmigration follows a three-phase prccess:

Phase I — National regional planning : long term (20 years) and medium term (5 years).

Phase II — Structure planning of development areas (SKP) often referred to as the screening process.

Phase III — Detailed plans for a settlement unit.

The main activities in these phases are discussed below and shown Table 1.1

Phase I

Phase I is broad regional planning for national development objectives. It is based on a spatial model which is adapted to the special conditions of the country as an archipelago. Development regions are centred on ports, preferably located on inward coastlines which look toward Jakarta, the centre of gravity of the country. Three levels of spatial unit are considered based on zones of influence of a number of central places : the zone of influence is determined by accessibility, that is transport costs and travel times, and by the market for services which in turn is directly related to population distributions.

The spatial units are known as regional development units (Satuan Wilayah Pengembangan - SWP) and part development regions (Wilayah Partial Pengembangan WPP). These are further subdivided into development areas (Satuan Kawasan Pengembangan SKP), which consist of about 2,000 families in village units (Satuan Pemukiman) of about 500 families. Planning for transmigration takes place within the framework of these development units. Relationships between the SKPs are shown on a WPP structure plan.

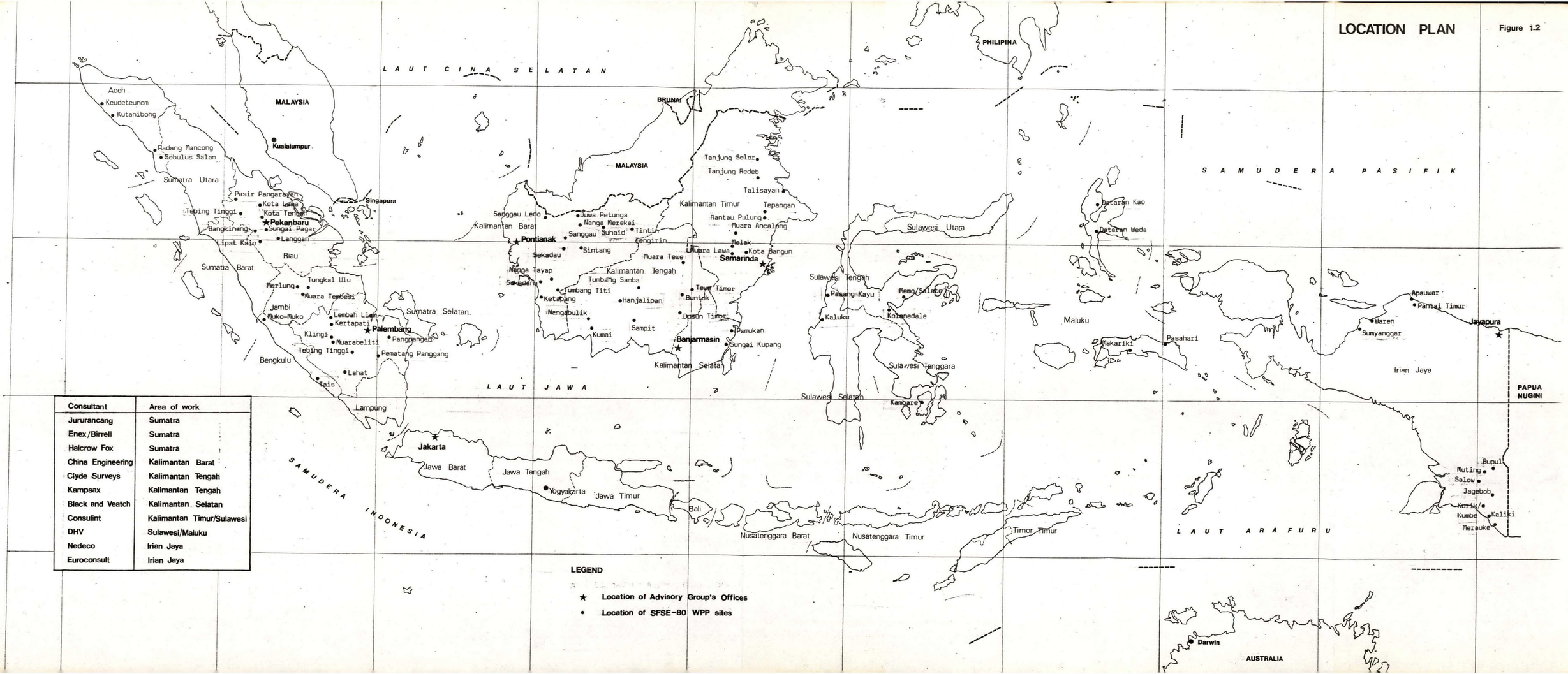
Phase II

This is a rapid reconnaissance of areas identified for transmigration and is often referred to as the screening process. One objective is to assess the suitability of the area for a particular form of development, so that a decision can be made as to whether it is worthwhile undertaking more detailed surveys. A second objective is to prepare an SKP structure plan for development of sites found to be suitable.

Details of the work to be done in Phase II were given in the Terms of Reference published by DITADA and summarised in Table 1.1. The study is an investigation of the natural resources, present land use and potential of the area for agricultural development in general and transmigration settlements in particular.

LOCATION PLAN

Figure 1.2



Consultant	Area of work
Jururancang	Sumatra
Enex/Birrell	Sumatra
Halcrow Fox	Sumatra
China Engineering	Kalimantan Barat
Clyde Surveys	Kalimantan Tengah
Kampsax	Kalimantan Tengah
Black and Veatch	Kalimantan Selatan
Consulint	Kalimantan Timur/Sulawesi
DHV	Sulawesi/Maluku
Nedeco	Irian Jaya
Euroconsult	Irian Jaya

LEGEND

★ Location of Advisory Group's Offices

• Location of SFSE-80 WPP sites

Table 1.1 Main Planning Activities

PHASE I — REGIONAL PLANNING

- Collection of all available data on natural resources, existing population and infrastructure.
- Analysis of data in relation to national development strategies.
- Definition and mapping of development areas in order of :
  . Satuan Wilayah Pengembangan (SWP) or Regional Development Unit
  . Wilayah Partial Pengembangan (WPP) or Partial Development Unit
  . Satuan Kawasan Pemukiman (SKP) or Settlement Unit
  . Satuan Pemukiman (SP)or Village Unit

PHASE II — STRUCTURE PLANNING

Screening of areas identified on Phase I

- Prepare 1: 50 000 scale base map.
- Carry out limited field studies of soils, land form, land use, topography and hydrology with a density of observation of 1 km traverse per 100 ha and 1 slope observation per 100 ha with sampling and local enquiry as required.
- Prepare drainage map, land use map and land form map at 1:50 000 scale
- Plan road alignment, prepare outline settlement plan using agreed criteria.
- Submit full report as findings and recommendations including recommendations on alternative methods of land use.

PHASE III — DETAILED PLANNING

- Prepare 1: 10 000 scale semi controlled mosaic with 5 m contours and 1: 10 000 scale line map with 5 m contours enlarged to 1: 5 000 scale.
- Carry out present land use surveys, semi-detailed soil survey and vegetation survey based on 1 km spaced traverses controlled vertically and horizontally.
- Carry out barometer spot height surveys on 200 metres spaced traverses controlled from 1 km traverse lines
- Carry out investigations leading to the design of a low cost village potable water supply system.
- Survey and design access and main village roads to Bina Marga standards and prepare detailed plans.
- Prepare detailed plans at 1:5 000 scale showing all land holdings (each plot being numbered).
- Report on findings giving full details required to justify settlement plan and prepare detailed cost estimate for settlement

The emphasis is on investigating and mapping the resources in an integrated manner, i.e. in establishing relationships between land forms, soils and vegetation. The screening studies also estabilish the attitudes of the local population to development of the area and the scale and importance of any economic activities within apparently undeveloped areas.

An assessment is then made of the suitability of the area for development as a transmigration settlement. Suggestions may be made as to the most appropriate form of development, bearing in mind constraints imposed by Government policies. An outline plan for the settlement is then produced which is appropriate for the suggested form of development and is based on the planning criteria laid down by DITADA.

Phase III

Phase III work is only undertaken for those SKPs which, following Phase II studies, are found to be suitable for transmigration development. Details of the work to be done at Phase III were also given in Terms of Reference published by DITADA and summarised in Table 1.1.

The activities can be considered in three groups :

- Natural resource surveys to confirm suitability of the site for development and to establish the framework for settlement lay-out.
- Planning to define land allocation and individual holding and blocks for land clearing.
- Financial analysis.

In Phase III studies detailed survey and design are completed prior to land clearing and it is these methods discussed in this report. Recently the Phase III studies have been modified so that detailed survey and design are only completed after land clearing. The activities in the modified Phase III are clearly separated and referred to as Phase IIIA and IIIB. This is further discussed in Chapter 3.

2 THE SFSE-80 PROGRAMME

2.1 GENERAL

In April 1980 the Directorate General of Cipta Karya issued invitations to a large number of consultants to prepare and submit proposals for "Screening, Feasibility Studies and Detailed Engineering for Transmigration Settlements Developments" (SFSE). The studies were to be funded with the assistance of IBRD. A total of 144 sites were to be screened, 37 were to be taken to a detailed design stage and feasibility studies were to be carried out on 19 of these settlements. The work was split into eleven contract packages. Negotiations started in July 1980 and the consultant consortia mobilised during the early part of 1981.

The Directorate General selected Sir M. MacDonald and Partners (MMP) to provide technical advisers to assist with the supervision of the studies being undertaken in the eleven contract packages. Concurrently the Directorate General requested the Overseas Development Administration (ODA) to supply four technical advisers and it was agreed to form a combined advisory team known as the Transmigration Settlement Planning Advisory Group.

World Bank staff also assisted DITADA with supervision of the programme and in 1981 visited all consultant offices. Frequent discussions were held with DITADA throughout the programme.

2.2 THE SFSE CONTRACT PACKAGES

Each of the eleven consultancy contracts consisted of a 'package' of Phase II and Phase III studies. These are shown in Table 2.1. The number of studies actually completed and the results of the studies are discussed in more detail in Sections 2.4 and 2.5.

2.2.1 The SFSE-80 Consultants

The eleven consultant firms and their Indonesian associates selected to undertake the SFSE-80 programme of studies are shown in Table 2.1 together with their country of origin, area of work and contract package.

During the programme difficulties arose with three consultant firms due to both technical and contractual factors exacerbated by an apparent lack of co-operation between the foreign and local associates.

James Birrell and Partners withdrew in October 1981 and their services were terminated at the end of the 9 months contract period; ENEX took over this contract in May 1982. Perentjana Djaja Consortium operated in association with both James Birrell and Partners and ENEX. In addition they carried out limited operations assisted by the Advisory Group during the period when neither international consultant was working.

Difficulties were also encountered with Consulint and their contract was altered to exclude any Phase III work. Again a major factor was the apparent inability of the foreign and local consultants to co-operate, though the situation improved with changes in both the Consulint team and the Indonesian associates.

Table 2.1 SFSE-80 Consultancy Contracts

Contract Package	Consultant	Country of origin	Indonesian associate	Area of work	Number of Studies		
					Phase II	Phase III	
					Screening	Design	Feasibility
A	Jururancang Bersekutu	Malaysia	Nasuma Putra Consortium	Sumatera	17	5	-
B	ENEX (1) Perentjana Djaja	New Zealand	Perentjana Djaja Consortium	Sumatera	13	4	1
C	Halcrow Fox and Associates	Gt. Britain	Indulexco-Parama Consortium	Sumatera	11	4	2
D	China Engineering Consultants, Inc.	Taiwan	BIEC International	W. Kalimantan	17	3	1
E	Clyde Surveys	Gt. Britain	Tri Tunggal	C. Kalimantan	12	4	4
F	Kampsax	Denmark	Amythas-PiBeta Consortium	C. Kalimantan	16	2	2
G	Black and Veatch	U S A	Wiratman Consortium	S. Kalimantan	14	2	-
H	Consulint	Italy	Saeti Engineering	E. Kalimantan/ Sulawesi	12	3	2
I	D H V	Netherlands	Desatami	Sulawesi and Maluku	13	5	3
J	N E D E C O	Netherlands	Deserco	N. Irian Jaya	9	3	2
K	Euroconsult	Netherlands	Nusvey	S. Irian Jaya	10	2	2
	Total				144	37	19

Black and Veatch International experienced difficulties at the start of their Phase III programme as their surveyors, who had been recruited from another firm, were unable to manage the personnel, technical and logistic requirements of the work. A temporary withdrawal from Phase III activities was necessary while Black and Veatch reorganised their staff and improved arrangements with their associate consultants. The reorganised team performed satisfactorily and completed the work.

2.2.2 Extension Contracts

Five consultants were asked to undertake 10 additional Phase II studies each as an extension to the original contract. The five consultants and their areas of work are shown in Table 2.2.

Table 2.2 Consultants Engaged on Phase II Studies as a Contract Extension

Consultant	Area of study
Halcrow Fox and Associates	Jambi and South Sumatera
China Engineering	W. Kalimantan
Clyde Surveys	E. Kalimantan
Kampsax International	C. Kalimantan
Euroconsult	S. Irian Jaya

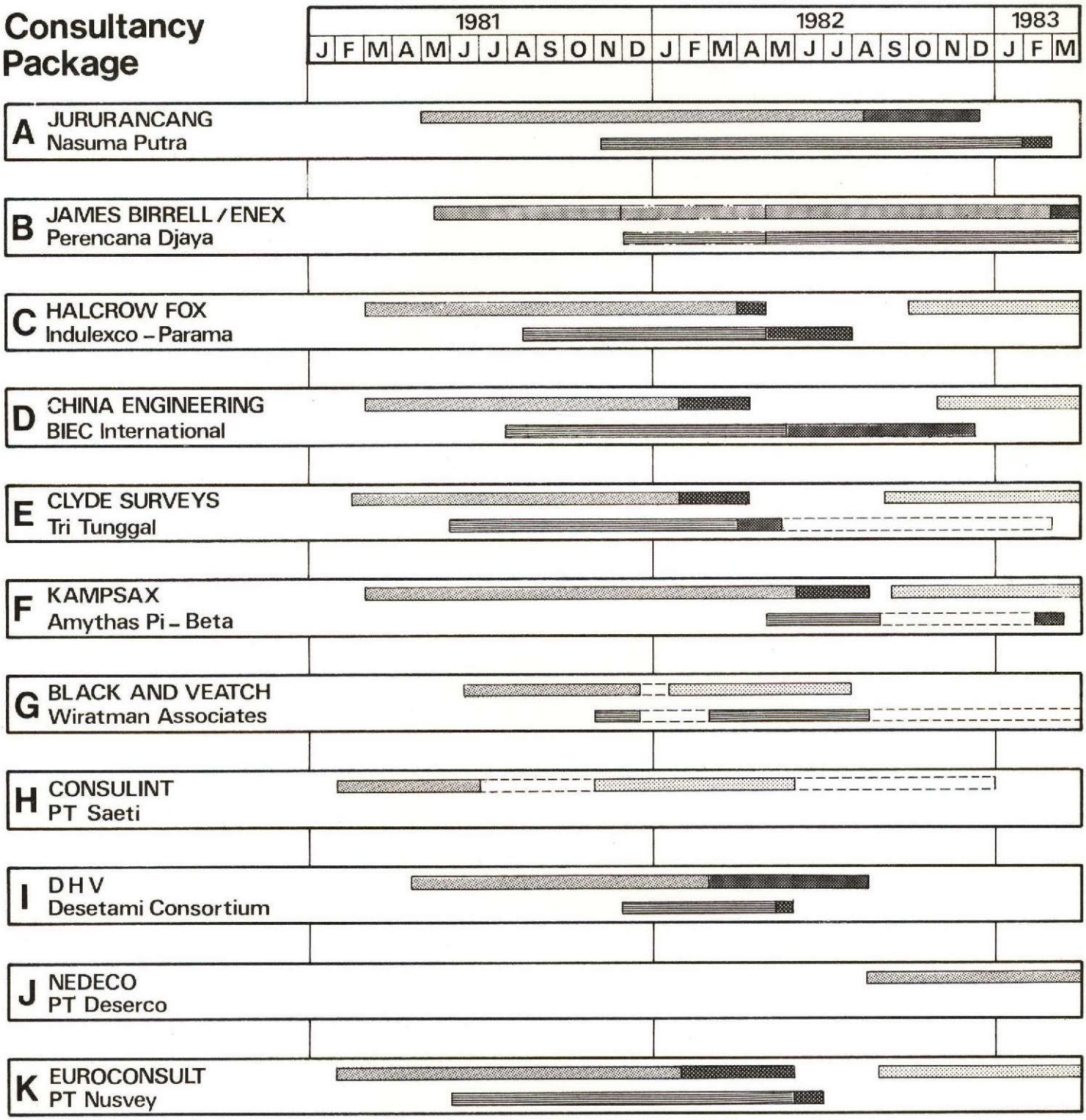
2.2.3 The Work Programme

The contracts were let with a planned duration of nine months with the provision that Phase III work should commence in month 5. Mobilization took place between February and June 1981 with one exception and work was initially concentrated on priority Phase II studies in areas planned for development in 1981. In most cases it proved possible to identify areas for Phase III study within 5 months. The Phase III studies all took longer than planned to complete and it became apparent that a more realistic contract length would have been 15 months with the provision that all draft reports should be submitted by month 13 with a nucleus team being retained to prepare final reports. The consultants'actual work programme is illustrated in Figure 2.1 which also shows the extensions to contract for additional Phase II studies.

It must be acknowledged that all consultants were faced with a very major task often in inhospitable terrain. The main difficulty encountered by all consultants was a logistic one. The organisation of transport, supplies and food for a field team comprising of 5 to 10 professionals, 10 to 20 technicians and up to 100 labourers is a major organisational task. The maintenance of adequate staffing and labour levels is also a problem. In addition the processing of data and production of a constant stream of reports and a huge number of maps often in towns with limited supplies of materials needed for reproduction, required considerable managerial skill.

Because of the short overall time scale many of the inputs to the teams were of short duration. Consultants faced difficulties in ensuring that short term specialists arrived at the appropriate time. It is therefore no coincidence

SFSE-80 CONSULTANTS WORK PROGRAMME



that the most successful consultants were those with good managers, able logistic personnel and good financial management.

One other problem encountered by all consultants was in finding sufficient trained local professional and technical staff prepared to work in remote locations. A simultaneous requirement for the large number of staff employed on the programme inevitably meant that well trained staff were in short supply. Consultants therefore had to spend time in training staff so that initially progress was slower than predicted. However this training was one important objective of the whole programme. Consultant difficulties were on the other hand reduced by the flexible approach adopted by DITADA in the management of contracts, provided changes were within the original budget.

2.3 THE ADVISORY GROUP

The Advisory Group was formed to assist in the direction and supervision of the eleven SFSE-80 consultants, with the improvement of planning procedures and with other transmigration planning activities as requested. The group was expanded in June 1982 so that advisers could be assigned to six Provincial Offices.

2.3.1 Staff

Staff of the Advisory Group are listed in Table 2.3 together with their parent organisations. Staff assignments are shown in Figure 2.2.

2.3.2 Organisation

The relationship between the Advisory Group, DITADA and the SFSE-80 consultants is shown in Figure 2.3. In practice it has been found that there has been direct and easy contact between Advisers and DITADA staff at all levels up to and including the Director. Links with consultants are purely technical.

Within the Advisory Group work has been organised to meet the requirements of the important task of supervising the SFSE-80 consultants and yet retain the flexibility to respond rapidly to other requests for advice or assistance from DITADA. Thus, the management of the whole team was the responsibility of the team leader, assisted by other members of the team as necessary. For technical matters, a land use planner or soil scientist and a topographer supervised the work of two or three consultant firms with assistance from agriculture, economics, forestry and physical planning advisers. With the re-location of some advisers to provincial offices, technical links are maintained through visits by the Central Group Advisers to the field and by regular visits by the Provincial Advisers to Jakarta.

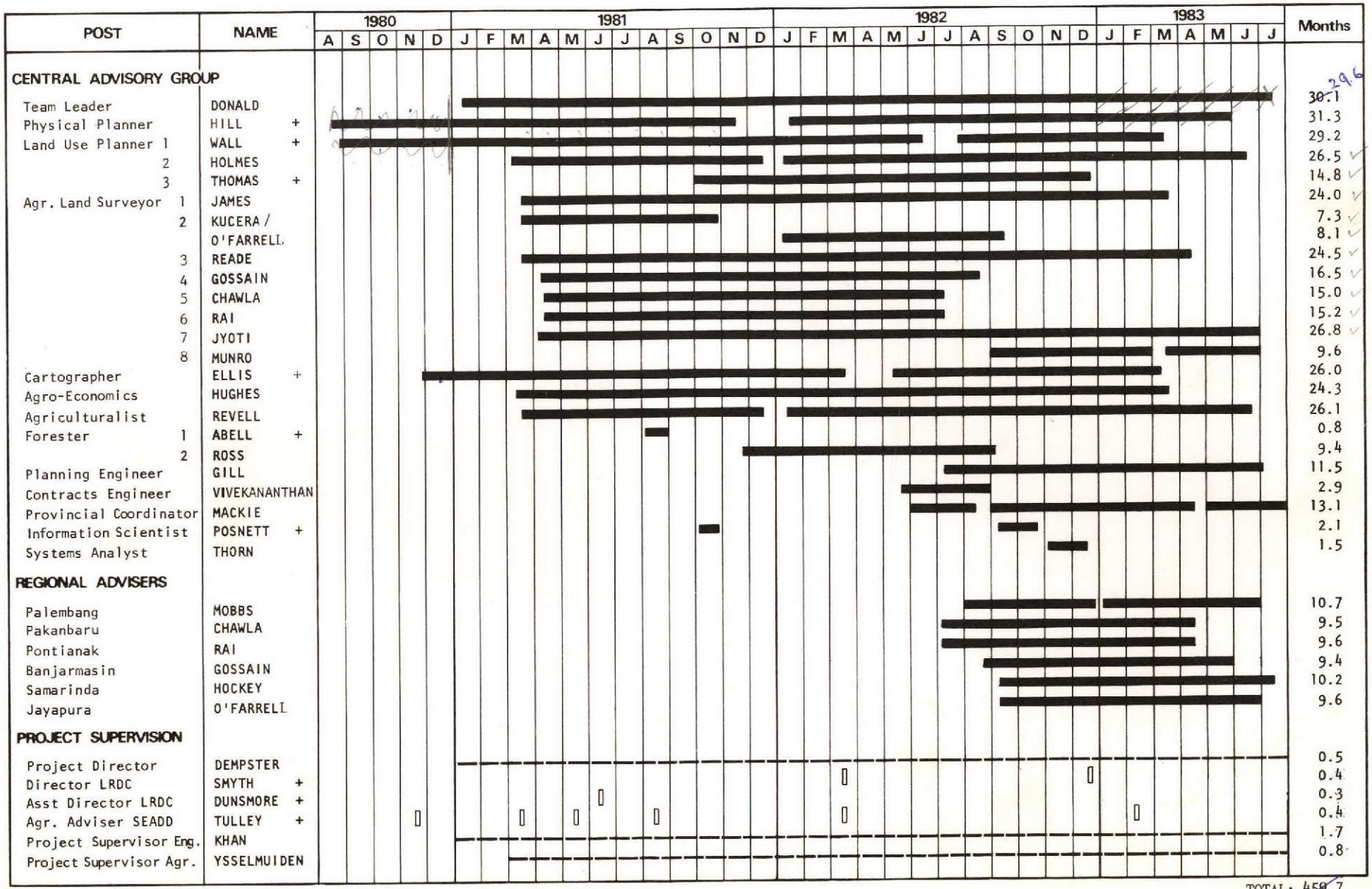
2.3.3 Advisory Group Activities

The Advisory Group activities are summarised below.

Consultant supervision The Advisory Group has assisted DITADA staff with the supervision of the SFSE-80 consultants, through monitoring the progress of the work, evaluating the results and where necessary providing assistance.

Work progress was monitored mainly through discussions with consultants. Monthly reports were produced but were generally received too late to provide

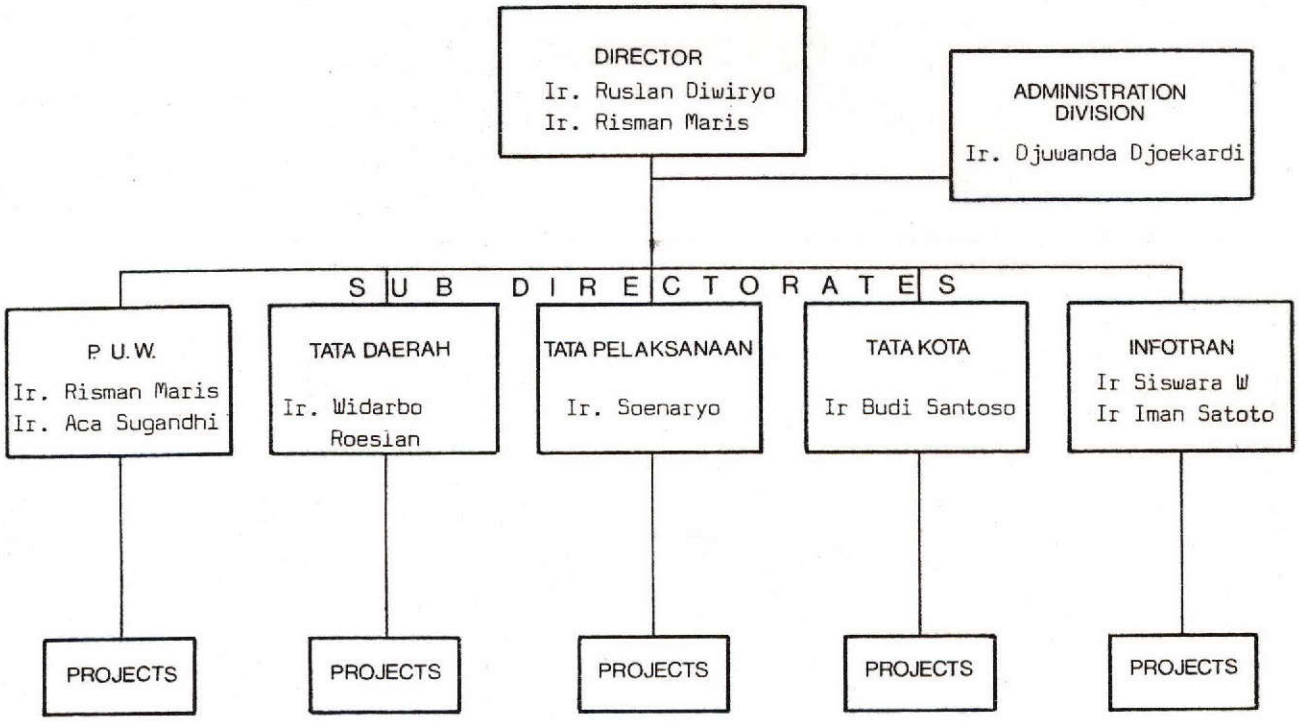
TRANSMIGRATION ADVISORY GROUP
STAFFING SCHEDULE



\+ ODA inputs

Figure 2.2

DITADA STRUCTURE



RELATIONSHIPS BETWEEN DITADA STAFF AND SFSE CONSULTANTS

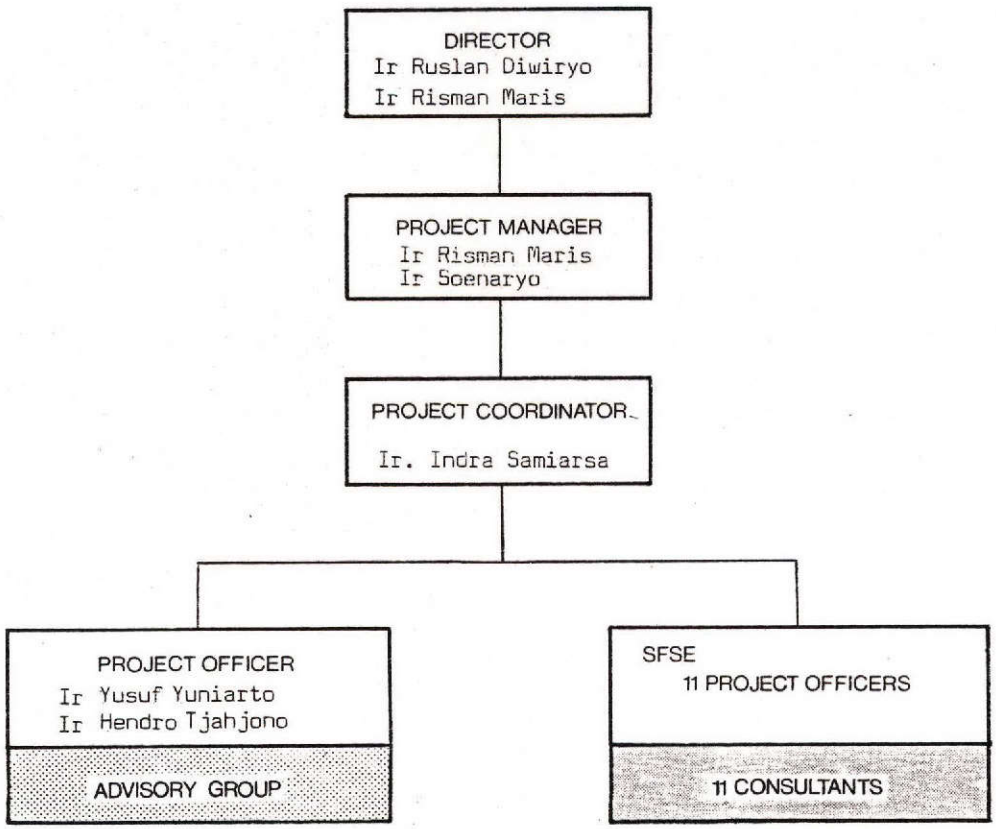


Table 2.3 Advisory Group, Staffing

Name	Parent Organization	Discipline
Central Advisory Group		
D J T Donald	M M P	Team Leader
I D Hill	O D A	Physical Planner
J R D Wall	O D A	Land Use Planner
D A Holmes	H T S	Land Use Planner
P Thomas	O D A	Land Use Planner
A R James	H T S	Agricultural Land Surveyor, Soils
G B Reade	H S L	Agricultural Land Surveyor, Topography
T C Jyoti	WAPCOS	Agricultural Land Surveyor, Topography
P Ellis	O D A	Cartographer
A C Hughes	H T S	Agricultural Economist
R G J Revell	H T S	Agriculturalist
M S Ross	M M P	Forester
B Gill	M M P	Planning Engineer
A C D Mackie	M M P	Provincial Co-ordinator
R N Munro	H T S	Agricultural Land Surveyor, Soils
Provincial Advisers		
Pekanbaru — A C Chawla	WAPCOS	Agricultural Land Surveyor, Topography
Palembang — J C Mobbs	M M P	Planning Engineer
Pontianak — S Rai	WAPCOS	Agricultural Land Surveyor, Topography
Banjarmasin — A N Gossain	WAPCOS	Agricultural Land Surveyor, Topography
Samarinda — R A Hockey	M M P	Planning Engineer
Jayapura — S O'Farrell	H T S	Agricultural Land Surveyor, Soils
Short Term Staff		
T Abell	O D A	Forester
W Posnett	O D A	Information Scientist
D Thorn	M M P	Systems Analyst
Supervisory Staff		
J I M Dempster	M M P	Project Director
I L A Ysselmuiden	H T S	Project Supervisor
M H Khan	M M P	Project Supervisor
A J Smyth	O D A	Project Supervisor

M M P : Sir M. MacDonald and Partners Ltd.
H T S : Hunting Technical Services Ltd.
H S L : Hunting Surveys Ltd.
WAPCOS : Water and Power Consultancy Services (India) Ltd.
O D A : Overseas Development Administration

a useful means of watching progress, though they do provide a record. A board showing progress in each study area was kept up to date in the Advisory Group office.

Evaluation of the consultants' work was initially through discussions, and subsequently by field visits and a review of reports. This applied to all aspects of the work, both at Phase II and Phase III. Reviews of draft reports normally took the form of comments on essential technical issues, where for example additional data were required or interpretation or processing of data was in need of revision. In addition consultants were provided with a detailed list of comments on each draft report.

Assistance was given to the consultants in a general way through the provision of Advisory Notes. These were an attempt to ensure uniformity in the approach to the work and in the interpretation of data. More specifically assistance was given to Perentjana Djaja, associate consultants to James Birrell and Partners and subsequently associated with ENEX, during the period no foreign consultant was present : most assistance was given with topographic and soil surveys. Direct assistance was also provided to China Engineering in the preparation of topographic and soil maps at Phase III : initial review indicated certain inadequacies in the original survey work and Advisers assisted China Engineering in an attempt to produce maps of an acceptable standard.

The Advisory Group was also involved with Consulint teams engaged on Phase II studies, providing more assistance with basic photo interpretation and field survey than would normally be expected with an international consultant.

Forestry issues Site selection for transmigration settlements has been affected by the forest classification and hence the availability of land for development. In addition the complex regulations concerning timber utilisation on sites being developed or recommended for development affect the timber utilisation plans proposed by consultants. It also became clear that the TOR concerning forest inventory at Phase III required clarification. Consequently a nine and a half month input was made by a forester with experience of the Indonesian timber industry and a short term input by a forest inventory specialist. In an effort to stimulate alternative uses of timber from settlement sites a paper was produced in which various factors affecting large scale charcoal production were discussed. Visits were also made by Advisers to Nusa Tenggara to consider agro-forestry development in the area.

Development of planning methods Experience during the SFSE-80 programme in undertaking Phase II and Phase III studies and experience with the application of the Plans produced showed that certain changes should be made to the TOR. Consequently revised TOR were prepared and published by DITADA. They differ from the original SFSE-80 TOR in that Phase III is divided into IIIA and IIIB. Phase IIIA is aimed at the preparation of a structure plan at 1:20,000 scale and Phase IIIB includes detailed survey and planning after land clearing in houselots and first arable areas. Detailed discussions of the reasons for changes in the TOR are presented in subsequent chapters of this report.

The new TOR are deliberately restricted to a definition of what activities are to be undertaken. Background information and an explanation of the rationale for the work is given in an Advisory Manual : the Manual also contains guidelines for the interpretation and presentation of data.

Provincial activities Since June 1982 Advisers have assisted DITADA staff in six Provinces (See Table 2.3), with monitoring progress on all settlement sites where site preparation or construction is taking place. This involves ensuring

that plans produced by DITADA or its consultants are available and understood by other agencies and their consultants, and assisting local consultants with the modification of plans where necessary in accordance with criteria agreed by DITADA.

Preparation for future planning The Advisory Group assisted DITADA to prepare for future planning activities through the review of Phase I studies and selection of sites for study, through the preparation of documents giving future planning needs and costs for consideration by IBRD, and through the review of technical proposals submitted by consultants for future work.

Training Assistance was provided in preparing and giving two one-week courses at the Institut Teknologi Bandung, for students involved in the PAYP programme. Advisers were not otherwise involved in formal training but by ensuring that contact with consultant firms was through DITADA Project Officers, training took place "on-the-job". Partly as a result of this, there was a noticeable improvement in the ability of the DITADA staff to deal both administratively and technically with consultant staff.

Three DITADA staff went to UK for formal post-graduate training, one financed directly from the MMP contract and two from ODA awards linked to the ODA component of the Advisory Group. Three staff also undertook English language training at the British Council Jakarta, sponsored by ODA.

Other activities Short term inputs by Advisory staff provided assistance with development of library and publication services within DITADA and with the planning of computer based information systems. A discussion paper was also prepared on training and manpower needs for DITADA during the period 1982-1987.

Reporting Details of the Advisory Group activities are given in monthly and quarterly reports. The quarterly reports are accompanied by Annexes which also presented all visit reports, reviews of Phase II and Phase III consultants reports and technical memoranda prepared by members of the Advisory Group. In addition a number of special reports in information systems, manpower and training needs, forestry issues and a visit to Nusa Tenggara have been prepared and are listed in Appendix 1.

A number of other reports and documents have been published by DITADA with the assistance of the Advisory Group. They include Terms of Reference and Advisory Manuals in both English and Indonesian for future planning studies and a submission for the World Bank Transmigration III Plan.

2.4 PHASE II RESULTS

The results of the SFSE-80 Phase II studies are summarised below and details given in Appendix 2.

Numbers of reports The numbers of Phase II study reports submitted by SFSE-80 consultants are given in Table 2.4. This shows that of 155 reports submitted, 150 provided conclusive results and 3 reports prepared by Consulint were inconclusive. Two further reports were submitted by China Engineering for areas identified as National Parks : full Phase II studies were not made of these areas.

Table 2.4 Numbers of SFSE-80 Phase II reports submitted

Reports	No. of reports
Conclusive results	150
Inconclusive results	3
National Parks; no Phase II study	2
Total	155

Numbers of SKPs and areas of suitable and unsuitable land In Table 2.5 the numbers of SKPs and the areas studied are presented in relation to the suitability of land for further study for transmigration. This shows that of the 150 SKPs for which conclusive reports were submitted 80 were considered unsuitable for further study; the main reasons for this unsuitability are discussed in the following section. Of the 70 SKPs recommended for further study only 24 SKPs had more than 50% suitable land. In terms of area 3360800 ha were studied at Phase II, of which 2706857 ha were unsuitable and 653943 ha were suitable. Thus, only 19.5% of the total area surveyed was found to be suitable for further study. Although this is an overall figure and some SKPs had much higher proportions of land suitable for further study, it emphasises the need to improve the data on which selection of sites for Phase II studies is made.

Table 2.5 Numbers of SKPs and area studied at Phase II in relation to suitability for further study for transmigration

Suitability for further study for transmigration	No. of SKPs		Area ha
> 50% of Phase II study area suitable	24	} 70(1)	653943
> 50% of Phase II study area unsuitable	46		
Unsuitable	80		2706857
Total	150		3360800

Note : (1) 70 SKPs studied at Phase II provided 89 SKPs for Phase III studies.

Estimated numbers of families The numbers of families that the consultants estimated could be accommodated in those SKPs selected at Phase II for further studies are shown in Table 2.6.

Consultants recommended three main farm models depending on site conditions. For the wetland model some consultants assumed a holding size of 3.5 ha whilst others assumed a smaller holding, with a corresponding increase in the numbers of settlers. Thus, consultants estimated on the basis of their Phase II work that 139,824 settler families could be accommodated in the sites examined, of which 92,940 would have the standard holding of 3.5ha for rainfed agriculture.

Table 2.6 Estimated numbers of families to be accommodated in 70 SKPs identified as suitable for further study in relation to farm models recommended by the SFSE-80 consultants

Farm model	No. of families
Standard rainfed 3.5ha	92,940
Wetland 3.5ha	17,296
Wetland < 3.5ha	29,588
Total	139,824

The numbers of families estimated at Phase II are presented in Table 2.7 by Province. These figures can be used to calculate an average figure of 42 families as the estimated number of families that can be accommodated for every 1,000 ha studied at Phase II.

Table 2.7 Numbers of families estimated from Phase II studies in each Province

Province	No. of families
Aceh	n i l
Riau	41,992
South Sumatera	15,820
Bengkulu	1,240
West Kalimantan	16,240
Central Kalimantan	25,310
South Kalimantan	4,160
East Kalimantan	11,142
Central Sulawesi	n i l
South Sulawesi	n i l
South-east Sulawesi	1,600
Maluku	6,490
Irian Jaya	15,830
Total	139,824

Main factors resulting in unsuitability of land In Table 2.8 the main factors resulting in unsuitable land in the SKPs studied at Phase II are presented. Percentages by area of SKPs affected by the various factors are given only for those SKPs which were regarded as completely unsuitable or in which more than half of the SKP was regarded as unsuitable. The figures show that steep slopes and the presence of swamps or waterlogged and flooded land were the principal reasons for the unsuitability of the areas studied.

Table 2.8 Percentage area affected by factors resulting in land unsuitability in 80 SKPs identified as unsuitable for further study and 46 SKPs with more than 50% unsuitable for further study

Factor	Percentage of area
Steep slopes	33
Very poor soils	7
Swamp/waterlogging/flooding	43
Land use	9
Forestry or nature reserve	7
Already allocated to other SKP	1

2.5 PHASE III RESULTS

The results of the SFSE-80 Phase III studies are summarised in Table 2.9 and discussed briefly below : more details are given in Appendix 3.

Table 2.9 Number of SKPs, area studied and numbers of families (KK) to be accommodated in SKPs studied at Phase III compared with Phase II estimates

	Phase III result	Phase II estimate
Number of SKPs	25	25
Area studied (ha)	134,798	203,043
No. of KK	30,323	42,556

Numbers of SKPs and area studied The figures given in Table 2.9 show that a total of 25 SKPs were studied at the Phase III level, of which 16 areas are presently being developed, 3 await decision and 6 are delayed by forestry restrictions. The total area studied amounted to 134,798ha, which was about two thirds of the area recommended for further study at Phase II.

The reasons for this reduction are summarised in Table 2.10 which shows that the main reason was the occurrence of slopes steeper than indicated at Phase II, and a corresponding reduction in land suitable for rainfed arable and houselots. In about half the cases, slopes recorded at Phase III were steeper than those recorded at Phase II. In the other half, the slopes recorded were much the same at both Phase II and Phase III, but the flatter land occured in blocks too small for development; this became clear at Phase III but more attention should have been paid to the distribution of suitable land during Phase II.

Table 2.10 Factors leading to exclusion of land from Phase III studies : percentage of land excluded

Factor	Percentage of land excluded
Slopes	58
Flooding/waterlogging	21
Poor soils	11
Present land use	10

Number of families (KK) It can be seen from Table 2.9 that the reduction in area studied was accompanied by a reduction in the number of families to be accommodated in the 25 SKPs.

The total number of families to be accommodated after Phase III studies is 30,323 or 71% of the Phase II estimate of 42,556. The average number of families per SKP is not very meaningful as the actual numbers range from 580 to 3230. The average number of families settled for 1,000ha studied at Phase III is 225. The numbers of families to be settled in each Province in the 25 SKPs studied at Phase III are shown in Table 2.11.

Table 2.11 Settlemennt capacity from Phase III studies in each Province

Province	No. of Phase III studies	No. of Families
Riau	7	8,022
Bengkulu	1	674
South Sumatera	4	5,594
West Kalimantan	3	3,269
Central Kalimantan	5	4,704
South Kalimantan	2	2,275
Maluku	1	1,006
Irian Jaya	2	4,779
Total	25	30,323

2.6 PARALLEL PROGRAMMES

2.6.1 Plan-As-You-Proceed (PAYP)

The PAYP methodology was devised as an emergency planning method to maintain the rate of settlement development during 1981/1982. It was a very important programme in that a total of 83 sites were studied. The method has similarities to the present Phase IIIA and IIIB in that detailed planning follows land clearance. However the intensity of topographic, soils, land use and forestry surveys are much lower than with the SFSE programme and no attempt is made to define site-specific agricultural systems.

The PAYP programme was undertaken mainly by Universities acting as consultants to DITADA. Teams of students and new graduates under the supervision of faculty staff did all the field work.

Advisory Group involvement The Advisory Group assisted with the revision of TOR and the preparation of guidelines specifically for PAYP. A series of training seminars were given in ITB and UGM for staffs and students who would be involved in PAYP studies. Field liaison was maintained on a limited scale with visits to teams working in Lampung, Bengkulu, West Kalimantan, South Kalimantan and Sulawesi. Visits were also made to ITB Bandung and UGM Yogyakarta to assist with data processing but no systematic review and evaluation of the results was requested.

2.6.2 Planning by Local Consultants

During 1982/1983 the SFSE programme was supplemented by planning undertaken by local consultants in 37 sites. Many of the studies were supplementary to PAYP investigation whilst others were Phase III studies undertaken in areas where SFSE consultants had completed Phase II studies. In all cases the consultants were meant to work to TOR closely corresponding to the Phase IIIA TOR.

Advisory Group involvement The Advisory Group have been mainly involved with the work of the local consultants through the Provincial Advisers. Systematic review of progress and results was not requested by DITADA. An evaluation of the results of work in Baturaja was requested and the Advisory Group has been assisting the consultant with review of the data and advising on additional field work required. In East Kalimantan Advisers assisted PT Saeti with field studies and preparation of reports.

2.6.3 Planning by Foreign Consultants outside the SFSE Programme

Only one foreign consultant, Pacific Consultants International (PCI), have been involved in planning studies outside the SFSE-80 programme. PCI completed studies for three sites in East Kalimantan during 1982 and carried out extension studies in 1982/1983. The work was based on the TOR used by PCI in earlier studies in Muara Wahau which predated the SFSE programme and are thus similar though not identical to Phase III studies.

PCI are also contracted to undertake three studies in Sumatera using Phase IIIA TOR. These studies started early in 1983 and include Phase II studies in two areas.

Advisory Group involvement Members of the Advisory Group have visited PCI teams working in the field in East Kalimantan and undertaken full reviews of their extension study reports and maps. Discussions have been held and field visits made in connection with on going work in Sumatera.

3. PLANNING ACTIVITIES

3.1. SITE SELECTION

Selection of sites for development of transmigration settlements follows the three phase planning process described briefly in Chapter 1.
Thus although site selection is not done by the SFSE-80 consultants, it had a major effect on their work and is discussed here in relation to the three phases.

3.1.1 Phase I

Major problems encountered with Phase I planning which affected the SFSE 80 Programme are discussed below.

Availability of natural resources data There are no comprehensive natural resources maps or data for Indonesia and in places the only information available is derived from small scale maps. Additionally data collected by other agencies may not always be readily available. This lack of data has frequently led to the selection, at Phase, I of sites that have subsequently been shown to be unsuitable for development. Improved resource data carefully collected , checked and mapped should lead to an improvement in the initial selection of sites for development, resulting in an increase in efficiency and a decrease in the net cost of all subsequent planning activities.

Revision of WPP structure plans Many WPP structure plans were revised during 1981 and 1982 with some SKPs renamed, renumbered or transferred to other WPPs. Revisions were sometimes made without adequate reference to detailed plans already prepared for individual SKPs, necessitating yet further revisions. Revisions were further complicated by the fact that there is not a discrete national numbering system for WPPs, so that different WPPs may have the same number in two different provinces.
Revisions to the structure plans are perhaps inevitable as new data becomes available; indeed consultants themselves commonly recommend revisions after Phase II studies are completed. The revisions per se did not adversely affect the SFSE '80 programme but delays in informing all concerned of the changes did create difficulties. In particular contracts for aerial photography were let on the basis of original structure plans, and revisions to these plans were often not notified or not notified in time, so that the wrong areas were photographed.

Mapped record of completed studies Although copies of all planning studies undertaken under the SFSE '80, PAYP and other programmes are held by DITADA, there was no record at small scale of the location of all the studied areas. This lead to duplication of work in certain areas, particularly where the consultants identified an area as unsuitable on the basis of preliminary reconnaissance and were allocated another area for Phase II study: the information from the preliminary reconnaissance was not always incorporated in the WPP structure planning.
A series of maps at 1:250,000 scale was therefore prepared by the Advisory Group, showing the location and boundaries of all known areas already studied. The information for individual SKPs was presented in a series of atlases, compilation of which was difficult because consultants in the PAYP programme did not always provide essential locational information such as grid co-ordinates, or rivers and place names and for some of the areas, which were quickly rejected, no maps were produced.

Table 3.1 Allocation of Phase II study areas for the SFSE '80 Programme

Packet	Provinces	Required in contract	Completed Phase II studies		API only [2.]	Substitutions [1.]				Total number of SKPs considered
			Total	Sites in original contract		Allocated to PAYP	Oil or estate concession	Rejected [3.] as unsuitable	Other reasons	
a	Aceh, Riau West Sumatra	17	17	4	-	8	3	7	7	42
b	Riau, Jambi Bengkulu, South Sumatra	13	12	1	-	4	1	8	16	41
c	South Sumatra	11	10	9	-	3	-	-	1	14
d	West Kalimantan	17	16	8	2	6	-	-	7	31
e	West and Central Kalimantan	12	13	10	-	2	-	-	-	15
f	Central Kalimantan	16	18	10	-	-	-	-	6	24
g	Central and South Kalimantan	14	14	5	-	4	-	-	5	23
h	East Kalimantan Sulawesi	12	12	9	-	5	-	-	-	17
i	South and South-East Sulawesi and Maluku	13	8	7	6	-	-	-	-	14
j	Irian Jaya	9	8	0	9	6	-	-	3	26
k	Irian Jaya	10	10	2	-	-	-	-	-	10
	Total	144	138	65	17	38	4	15	45	257

NOTES : 1. This is not a complete list of substitutions, some of which were made prior to the full establishment of the Advisory Group. Sites that were relocated are not included.
2. Sites rejected for Phase II studies after submission of full API report by consultant.
3. API studies or fieldwork had commended in some of these areas before rejection.

However, the master copy of the 1:250,000 map series held by the Advisory Group is thought to show all known SFSE '80 and PAYP study areas with reasonable accuracy.

SKPs as discrete study areas The programme for the development for transmigration settlements is based on a decision to develop only one or two SKPs in a large number of WPPs, rather than many SKPs in a small number of WPPs. This is clearly a matter of policy but it has two main adverse effects on planning and leads to a potential wastage of air photo cover.

- Adjacent SKPs may be studied by different consultants in different years, possibly working to different terms of reference. This may lead to problems of comparison of results as the boundaries of adjacent SKPs drawn at Phase I do not always coincide and there may indeed be a gap in the air photography.

- There is little opportunity for integrated planning of the WPP as a whole, particularly as presently used land surrounding existing population centres is frequently deliberately excluded. This incidentally often results in the exclusion of necessary air photo control such as roads around these centres.

3.1.2 Phase II

The original SFSE '80 programme planned the study at Phase II level of 144 SKPs in 16 provinces, divided into 11 packets of between 9 and 17 SKPs each. These 144 sites had been selected on the basis of Phase I planning and it was expected that the majority of these sites would be suitable for more detailed study at Phase III.
However, for a variety of reasons, most of the consultants commenced their studies 3 to 6 months later than the originally scheduled commencement of the programme. In order that the target programme of implementation should not be unnecessarily delayed, at least 38 of the original sites were re-allocated to the PAYP programme of surveys.

Unfortunately this was not the only reason for substitution and a large number of the proposed sites had to be rejected because they were not available due to the presence of forestry concessions or conflicting development plans, or because of obvious unsuitability.

Table 3.1 shows that at least 257 sites were considered. Only about 65 sites from the original 144 finally received Phase II studies, the remainder being found from substitutions. The problem was most severe in Sumatra, where packets a and b surveyed only 4 sites and 1 site respectively from their original contract list, after consideration of over 40 sites in each case.

These figures re-emphasise the need for improved Phase I planning based on more comprehensive natural resources data. Such improvements should result in major savings not only in consultant time but more especially in cost of aerial photography: photography for many of the rejected sites had already been taken.

3.1.3 Phase II SFSE '80 Extension

A total of 74 possible sites were originally identified by DITADA for

the SFSE Extension in which consultants were to be asked to study 50 sites at Phase II.

Aerial photographs of all 74 sites were rapidly screened by the Advisory Group prior to consultants starting work. As some of these 74 sites were found to be unsuitable additional sites were screened. In the event a total of 92 sites were considered in order to give 50 sites suitable for Phase II survey.

The rapid screening consisted of an assessment of the quality of the 1:20,000 scale aerial photographs followed by a general interpretation to identify major constraints due to landform, land use and soils such as deep peats or podzols. The exercise also enabled sites to be excluded which grossly overlapped areas that had already been surveyed. Other sites which were considered marginally suitable either qualitatively or in terms of area were accepted for further study.

The results of this screening are given in Table 3.2 which shows that 42 of the sites considered for the Extension Programme were thought not to justify Phase II study; 22 sites were rejected during Advisory Group screening before being allocated to consultants and 20 sites were rejected by consultants in their initial photo interpretation studies. These sites had been considered to be marginal by the Advisory Group, but worthy of a more detailed API than that possible at the first screening stage.

Table 3.2 Results of screening of sites for the SFSE-80 Extension Programme

Consultant	Province	No.of sites contracted	Total No. of sites screened	No.of sites found unsuitable	
				By Adv. Group A P I	By Consultant A P I
Halcrow Fox	Riau, Jambi S. Sumatera	10	20	7	3
C E C I	W. Kalimantan	10	15	3	2
Clyde Surveys	E. Kalimantan	10	30	8	12
Kampsax	C. Kalimantan	10	17	4	3
Euroconsult	Irian Jaya	10	10	0	0
	Totals	50	92	22	20

The large number of sites screened in E. Kalimantan perhaps reflects the lack of reliable data for the initial selection, and in Sumatera the fact that most sites suitable for 'standard' development are already being developed.

3.1.4 Phase III

The results of the Phase II studies are discussed in Chapter 2 and listed as an appendix. These results led to the selection of areas for Phase III study. The highest priority was given to areas where land clearance contracts had already been let and the contractors urgently needed plans showing the proposed land clearing boundaries. 14 sites were selected in this manner. The remaining sites were selected because they fitted or could conveniently be made to fit with both the development programme and the consultants' work programme. At the time of selection of the later Phase III studies the consultants' logistical problems with this work had become clear to all involved.

3.2 TOPOGRAPHIC SURVEYS AND MAPPING

Objectives

PHASE II	PHASE III
Production of 1:50,000 base maps, in order to show (a) The results of rapid reconnaissance surveys (suitability of area for particular forms of development) (b) SKP structure plans for development of suitable sites	Production of 1:10,000 semi-controlled photo-mosaics for subsequent preparation of 1:10,000 and 1:5,000 contoured line maps

Methods

PHASE II	PHASE III
- Mapping from existing photo-mosaics or aerial photographs laid down between identifiable points. - Orientation and scale from existing maps. - No rigid field surveyed control. - Maps to conform to the BAKOSURTANAL index.	- Limited horizontal and vertical ground control, comprising: monumenting, astronomical azimuth, horizontal control, vertical control and determination of spot heights, survey of topographic details, and computations. - Production of 1:10,000 scale semi-controlled photo-mosaics. - Production of contoured photo maps at 1:10,000 scale. - Production of 1:10,000 scale line maps and enlargements at 1:5,000 scale.

3.2.1 Phase II

The base maps at a scale of 1:50,000 were generally prepared according to the TOR. In most cases, aerial photographs at a scale of 1:20,000 were laid down and adjusted to give the best fit between points and details identified on photos and 1:250,000 maps. Uncontrolled photo-mosaics at a scale 1:20,000 were used by some consultants as basis of map preparation. Drainage patterns, roads, tracks and villages were identified on the photographs usually from stereoscopic examination, and plotted. Most consultants prepared a draft of the map at 1:20,000 scale and subsequently reduced it to 1:50,000 scale.

For some areas in Sumatera and Kalimantan, recent topographic maps at a scale of 1:50,000 were available. These were revised with the help of the latest aerial photographs. For SKPs Kumai IX/G and Tumbangsamba V/C in Central Kalimantan no aerial photography was available and the consultants had to depend upon 1:250,000 maps and sketch maps available from Kabupaten offices or logging companies. None of these maps were accurate enough to satisfactorily present Phase II results or calculate areas.

SKP maps did not all conform with the BAKOSURTANAL standard map sheets as it was agreed that a whole SKP could be mapped on one sheet if this was convenient. However, each map had to carry the BAKOSURTANAL index of sheets.

Observations In general, the methods adopted for preparing base maps for Phase II surveys were found satisfactory. However aerial photographs are essential to facilitate area measurements. Insertion of a 1,000m grid on base maps has been recommended.

3.2.2 Phase III

(a) Ground Surveys

Monumenting Permanent monuments were generally established satisfactorily, except in swampy areas. Consultants seldom identified monuments on aerial photographs. This is undoubtedly difficult to do in forested areas but more attention should have been paid to this important activity.

Astronomical azimuth Starting and check azimuths derived from sun observations were generally satisfactory and discordance between sets of readings was within the required limits; where the discordance was excessive observations were repeated. One consultant attempted to use the magnetic bearing determined by compass theodolite as the azimuth but this was unsatisfactory. The work was redone using sun observations.

Horizontal control Not all consultants could achieve the accuracy stipulated in the TOR. The work of some of the consultants had to be revised or re-surveyed. Nevertheless, all consultants eventually produced horizontal control that provided an adequate basis for map production.

Vertical control Double run spirit levelling along primary traverses provided satisfactory result to the specified accuracy. The spot heights determined by using the barometric method laid down in the TOR were neither consistent nor reliable. Only one consultant could achieve acceptable results using barometers (accuracy of $\pm$ 2.5m or half the contour interval). All other consultants discarded the use of barometers and extensive resurvey with spirit levels was necessary to correct errors.

The Advisory Group conducted check surveys at Nanga Tayap, West Kalimantan to determine the reliability of the barometric method. Some 56 spot heights read using barometers were checked using levelling instruments.

The results are summarised below :

Difference range	Number of spot heights	% of samples
< 1 m	8	14
1 - 2.5 m	13	23
2.5 - 5.0 m	19	35
5 -10.0 m	13	23
>10 m	3	5

It can be seen that less than half (only 37%) of spot heights fall within the acceptable limit of ± 2.5m. It was therefore concluded that in most cases the barometric method cannot be used satisfactorily. The errors could be due to rapidly changing weather conditions and vegetation cover which influence the barometric pressure.

Some consultants made an attempt to determine spot heights using Suunto clinometers but this was only satisfactory over short distances of less than 1km and with careful observation. Satisfactory results were obtained in some areas by tacheometry using Wild To instruments.

In areas where consultants recommended development of wetland requiring drainage, spot heights were determined using spirit levels. Dependent on the terrain, contours were drawn at 0.25m or 0.50m or 1.0m.

Topographic detail Most consultants mapped large rivers from air photo interpretation and field data from survey traverses. Smaller streams were more difficult to plot on the aerial photographs and some consultants made compass and tape surveys of stream courses. Most roads were surveyed as part of survey control. There was little other topographic detail in most sites.

Computations Consultants were generally reluctant to do computations in duplicate but most agreed to have a second surveyor check the computations independently.

Field checks Members of the Advisory Group made field checks in the form of profiles intersecting lines of spot heights. Assistance was provided as necessary with the revision of survey observations.

Instruments All survey instruments used by the consultants operated satisfactorily with the exception of some electronic distance measuring (EDM) instruments manufactured by Kern (Model DM 502).
The malfunction was due to moisture penetrating a sealed glass filter and although the filter was redesigned by the manufacturers, consultants still reported problems. This instrument defect affected the progress of survey work for many of the consultants.

(b) Map Production

Semi-controlled photo-mosaics and contoured photo maps were not produced by any consultants, because of the difficulties of preparing rectified photographs at the required scale of 1:10,000 within the short time available.

All consultants prepared the maps directly from survey data : some chose to plot at 1:5,000 scale and others at 1:10,000 scale with subsequent enlargement. In both cases the maps were reduced to 1:20,000 scale for use as base maps for resource maps presenting soil and present land use data.

The position of field survey data and spot heights were plotted on the maps. Stream courses were plotted using field survey data and the aerial photographs, but there was a wide range in the accuracy with which this was done. Contours were plotted mainly by interpolation between spot heights. Few consultants consistently used the aerial photographs to plot contours and this lead to oversimplication of the contour patterns. Symbols used and grid annotation were generally satisfactory.

3.2.3 Observations

Specifications for horizontal control were satisfactory and could be reasonably achieved by competent consultants. Barometric determination of spot heights was unsatisfactory and cannot be recommended for future studies.

In the SFSE-80 Programme, an attempt was made to prepare maps at 1:5,000 scale that were of sufficient accuracy to plan villages in great detail. Even where the surveys were done as well as possible, the maps produced in forested terrain were not sufficiently accurate for detailed planning.

The survey specifications for future studies have been altered and the new Phase IIIA surveys aim to produce a topographic map at 1:20,000 scale with contours at a 10m vertical interval wherever possible based on limited horizontal and vertical control surveys, and field survey of topographic detail. New terms of reference have been published by DITADA (October 1982). Detailed surveys are undertaken only within areas that have been cleared in the new Phase IIIB.

3.2.4 Airborne Radar Profiling

The Stanford Research Institute (SRI) have contracted to develop a mapping system using airborne radar profiling techniques. The system involves measurement of horizontal position of the aircraft using the Del Norte "Flying Flagman", aircraft altitude using a Rosemount altimeter and distance between ground and aircraft using short pulse radar transmitter. The corrected profiles and x and y co-ordinates are fed to a computer for automatic production of maps.

Individual components of the system have been tested separately and have given encouraging results. The SRI contract is for the development of the system so that all components work together. As this is essentially research and development work, a series of 'milestones' have been identified at which achievements will be reviewed and decisions made as to whether the programme should proceed. The major shortcoming of the system is that even if it is proved to work satisfactorily, it produces a contour plot, not a topographic map : aerial photography will still be required for mapping rivers, roads and other detail.

3.3 LANDFORMS

Objectives

PHASE II	PHASE III
a) Identify land units with a repeating pattern of land form or associated land forms. b) Estimate the predominant slopes in each land unit in three slope classes.	Production of slope map showing four slope classes. Slope map derived from the 1:5,000 scale contour topographic maps.

Methods

PHASE II	PHASE III
- Interpretation of aerial photographs and where they exist the use of 1:50,000 scale topographic maps to define land units. - Ground observation of land form and slope in representative parts of each land unit. - Land units to be related to the Catalogue of Land Forms for Indonesia (Desaunettes 1977).	Produce slope maps to delineate areas corresponding to the four slope classes from 1:5,000 scale contour maps and from field checks in areas planned for development.

3.3.1 Phase II Results

Land units All consultants produced maps showing land units at the required scale, but there were variations in the consultants' approach to the definition of the land units. Most consultants used the concept of a 'land system', that is a repeating pattern of land forms, to describe the land units. This was in general a satisfactory basis for assessing the suitability of the area for particular forms of development, but in some sites, the distribution of the various land forms within a land unit was not given in sufficient detail. In areas of complex terrain more information on slope shape and slope length would have clarified the descriptions of land units.

Classification of land units All consultants attempted to classify identified land units according to Desaunettes (1977). Some difficulties were encountered as the Desaunettes classification covers the whole range of land forms occurring in Indonesia, whilst only a fairly narrow range of land forms occurs in the sites studied; some subdivision of this narrow range would have been helpful.

Slopes The TOR specified a minimum of one slope observation per 100ha and the consultants were free to choose the location of such observations, provided they were representative. Consultants chose either 'free' survey, that is, observations along paths and tracks or a grid of observations. Both systems gave satisfactory results, though in a few sites consultants using

the free survey carried out observations in only parts of the study area. Consultants using a grid system achieved a satisfactory distribution of observations but it was sometimes difficult to adopt this more inflexible system to specific site problems.

Consultants measured true, that is maximum slope, though initially some consultants were measuring slope along the rentis line, which may be very different from true slope. One consultant measured slopes along the rentis line and at right angles. Although this may not give true slope it gives reasonable results and has the advantage of simplicity for field staff.

3.3.2 Phase III Results

Slope maps All consultants produced satisfactory slope maps based on the 1:5,000 scale contoured topographic maps.

Field checks The TOR specify field checks of the detailed design, but as these are mainly concerned with checks of slope, it is convenient to discuss them here. Most consultants did not make any field checks, subsequent to the preparation of the slope maps. Some argued that in the very flat areas they worked, such checks were unnecessary. Others claimed that calculation of slope along the rentis from spot height data was sufficient, although this represents rentis slope rather than true slope. Yet others made no checks at all. Only one consultant, Clyde Surveys, made systematic checks of slope data, making a direct slope reading at every spot height. Their results showed that slopes estimated from contour maps are consistently less than true slope. This had a major effect on the settlement capacity on sites that Clyde Surveys worked in.

3.3.3 Observations

The results of the SFSE-80 Programme show that in most of the sites investigated, unfavourable land forms, that is steep slopes and dissected land, are amongst the most important reasons for unsuitability of land for settlement development (See Chapter 2). It is likely that it will become increasingly difficult to identify areas with sufficient land with gentle slopes suitable for arable cropping.

The SFSE-80 land form investigations at Phase II generally provided an adequate basis for the level of planning undertaken. However, the difficulties of accurate interpretation of aerial photographs in forested terrain, particularly in the identification of slopes and small drainage lines, compounded by lack of attention given to land form patterns has led to the conclusion that more ground observations are necessary. TOR for future studies therefore specify slope observations every 50m along rentis lines a maximum of 2km apart. In Phase III the results of the comparison made by Clyde Surveys of direct measurement of true slope and of slopes identified on contour maps, calls into question the whole concept of attempting to prepare detailed plans on 1:5,000 scale topographic maps of forested terrain. The Clyde Surveys work is supported by the steep slopes measured in areas already cleared, that were initially identified as being of gentle slope. These results were a major factor in changing the planning methods for the future, where in Phase IIIA slopes are only measured directly and no attempt is made to prepare detailed contour maps.

3.4 SOILS

Objectives

PHASE II	PHASE III
Identify the major soils in each land unit and any important soil limitations to agricultural development	a) Characterise soils both physically and chemically and classify them b) Map the distribution of soils or associations of soils. c) Identify constraints and make recommendations for the utilisation of the soils.

Methods

PHASE II	PHASE III
Soil data collected from auger borings, but no analysis required. The number of soil observations per unit area dependent on the complexity of the soil pattern.	- Field observations at a density of one observation per 25 - 30 ha. - Soils described and classified. - Samples analysed from each major soil series. - Preparation of soil map at 1:50,000 scale.

3.4.1 Phase II Results

Most consultants identified the major soils in each land unit to enable an assessment to be made of the suitability of the area for development. However, soil descriptions were often very limited and sometimes inadequate and the criticisms made about the distribution of the slope observations made in Section 3.3.1 apply to the soil observations. Of equal significance is the fact that consultants made little attempt to establish catenary relationships between soils : observations were often isolated rather than grouped.

3.4.2 Phase III Results

Characteristics of soils Most consultants described the physical and chemical properties of the main soils encountered, though there were considerable variations in the detail of the descriptions. Soils were also generally satisfactorily classified according to the specified classification system.

Soil distribution The distribution of soils was shown on maps at a scale of 1:50,000 but there were wide differences in the accuracy of such maps. Most consultants achieved satisfactory results, but those produced by one consultant required extensive revision. Even much of the satisfactory work did not provide clear information about the relationships of soils within a soil association and only Clyde Surveys undertook detailed mapping of sample blocks to clarify these relationships.

Identification of constraints Limitations to agriculture due to soil physical properties such as poor drainage were identified but soil chemical properties were much less satisfactorily discussed. Some consultants simply submitted the results of chemical analyses without any comment or attempt at evaluation.

All consultants were, however, in agreement about the acid nature and low fertility of the major soils investigated and all agreed on the very marginal nature of the soils for arable agriculture.

Recommendations for utilisation There was much less agreement between consultants as to what steps were to be taken to ameliorate the adverse soil chemical conditions. Consultants' conclusions are discussed below in general terms and in more detail in Section 3.8. Application of lime was generally recommended but the rate of application varied from 8 tonnes/ha to zero. There were also wide variations in applications of fertiliser recommended by the consultants which can be partly accounted for by site variations. However there was general agreement that the package of fertilisers provided to the transmigrants was inadequate and more significantly, poorly balanced. Saturation of the exchange complex with Aluminium which commonly occurs in acid soil in the tropics is known to reduce crop yields, mainly through its affect on root development. Some consultants did not even discuss the matter but amongst those that did, there was little agreement. Opinions varied from the view that it was of a toxic nature to the view that it was of minor importance.

3.4.3 Observations

The methods used for soil studies at Phase II were mainly satisfactory, though changes have been made to the TOR to ensure a better distribution of observations. In Phase III the level of detail stipulated for soil surveys appears to be satisfactory, but the discussion and interpretation of soil data is less satisfactory. For convenience of presentation, the scale of map has been changed in the new TOR to 1:20,000 but the number and type of observations remain the same.

Based on the experience of the consultants and members of the Advisory Group working on the SFSE-80 Programme a number of soil factors that affect the development of the transmigration settlements in general have been identified. Despite the wide geographical range of sites studied by consultants, the dominant soils of most sites occur within a few Soil Groups of the USDA (1975) classification system. This is due to a broad similarity of soil forming factors in most sites. These factors are discussed below followed by a discussion of the most important soils encountered. Special problems associated with the use of the soils are discussed in Section 3.8 in relation to cropping systems.

Soil forming factors The consultants' soil investigations confirm that under the prevailing high temperature and high rainfall regimes soil weathering is intense and leaching of soluble bases, silica and clay are the most significant soil processes. This leads to development of argillic horizons in mature soils and cambic horizons in all others except the most recent soils. Only where a dry season is evident are variations noted.

For example, in some sites in southern Kalimantan, and in south-east Irian Jaya, where for six months, average rainfall is less than 100mm/month, segregation of iron and manganese in lower subsoils can be pronounced, plinthic horizons are recognised and in some areas hardening and cementation has produced a discontinuous iron pan which outcrops on valley sides. Oxic, very strongly weathered subsoils have been identified but are rare. Except for sites with impeded drainage, topsoils are poorly developed and ochric.

Soil parent materials vary widely amongst the sites studied but have in common a high content of silica. Volcanic materials occur in several areas, ranging from basalt and andesite lavas to diorite and gabbro intrusions; siliceous volcanic sediments and outwash deposits appear to be restricted to sites in Sumatera. Sedimentary rocks, common in all areas, are predominantly siliceous sandstone, shales and metasediments, weakly to moderately indurated and which commonly have been through one or more cycles of weathering and deposition : some marls and limestones have been noted in Kalimantan and northern Irian Jaya sites. Recent alluvium tends to be of fine grade, relatively well sorted, and locally overlain by peat.

Dominant soils At the suborder level, Udults, Tropepts and Aquents (USDA), 1975) are the most common soils identified. They occur in all sites, except those with a marked dry season, and are those of most importance in transmigration development areas. Because the SFSE-80 Programme stresses development for rainfed arable crops it is the Udults on low hills and plains which are most important for development of settlement.

Udults: Common to all the Udults is their acid, strongly leached profile with an argillic horizon, they are also base deficient and low in weatherable minerals and available phosphorus. Their ability to retain cations or fertilisers is weak and extractable aluminium levels tend to be high. Organic matter is restricted to the topsoil which is shallow and easily lost by erosion or oxidation. Physically, most Udults of the sites investigated are deep, well drained but poorly structured. The greatest variation is in texture, which ranges from coarse over medium to medium over fine. Plint- , Trop - and Paleudults are most common. Management problems centre on raising fertility to sustain food crop production on transmigrants' small farms and the use of cover crop to minimise erosion.

Tropepts: Found mainly on less stable, sloping sites than the above soils the Tropepts tend to be more common in those parts of settlements proposed for tree crop development. They are weakly developed soils that are less weathered and leached than the Udults, hence marginally more fertile. Most of those described by the consultants are deep, well drained and of medium texture classed mainly as Dystropepts. The main management problems are erosion control and the maintenance of soil fertility.

Aquents: These soils are developed from recent, mainly fine-graded riverine alluvium. Characteristically they are little weathered (though developing from strongly weathered sediments with poor mineral reserve) and weakly leached, ranging from low to moderate fertility. By definition they are poorly drained

and may have thick surface organic matter as muck or peat. The chief management problems relate to improving drainage and flood control.

Minor soils A range of minor soils have been reported of which the following are regarded as being unsuitable for transmigration purposes. Fortunately, most are readily identifiable in the field and several have distinctive associated vegetation that can be identified during airphoto interpretation.

Aquods/Psamments:These soils have developed in unconsolidated silica sands of low, presumed Quaternary terraces, in east-central Sumatera locally, and as an extensive discontinuous band to the landward side of coastal swamps in Kalimantan. The profiles are distinctive. Where the terraces are low in relation to the local water table, as in the Kalimantan sites, groundwater humus podsols have developed in which the thin humus pan is close to the surface : surface peat develops locally. Where the groundwater is deeper, profiles of deep white sand occur which overly a humus pan at depths of one metre or more. These areas and their associated vegetation are known as 'keranggas' and superficially resemble heath forest. Coniferous trees are present (Casuarina and Dacrydium), also ground orchids, pitcher plants and several other hardy, semi-aquatic plants. Farmers normally avoid these sites for cultivation.

Acrorthox/Haplorthox : Parts of Sulawesi and Halmahera are underlain by ultrabasic rocks which weather to produce residual and alluvial soils rich in heavy metals such as chrome and nickel, with inverted Ca:Mg ratios and with grossly deficient levels of available major nutrients. The soils are deep well drained reddish clays often difficult to distinguish from other 'normal' similar soils. They are however usually avoided for cultivation by local farmers and sometimes bear a distinctive, heathlike natural vegetation.

Hemists/Fibrists: Throughout lowland Indonesia extensive peat swamps have commonly developed in slight topographic depressions between major rivers. While some are relatively shallow, less than one metre deep, others have peat several matres deep and are clearly unsuitable for all forms of transmigration development. Consultants have found that demarcation of peat swamps, from airphotograph interpretation is usually,but not always,straight forward. There appear to be several different associations of characteristic vegetation, all of which have to be learned by local field experience. Some peat swamps have been drained and used for transmigration, especially in Kalimantan. Some disagreement between agencies over whether development for wetland rice should take place on deep peat may result from the fact that many successful developments are on the more easily drained peats of marine plains : in the SFSE Programme many of the peats were found to occur in the interior swamps and have not been recommended for develoment.

Aquents: Unlike the Aquents described above, these soils are derived from alluvium subject to tidal incursions. They are rich in soluble salts, locally are thionic and would be expensive to reclaim. They have a distinctive associated vegetation of mangrove or nipah. The palm nibong (Oncosperma sp) is a useful indicator of brackish water conditions.

Other soils: Shallow, rocky soils occur in several SKPs. Exceptionally, they occupy extensive areas as in the karst country of East and Central Kalimantan.

3.5 PRESENT LAND USE

Objectives

PHASE II	PHASE III
a) Establish present land use b) Determine availability of land for transmigration settlement development	Similar to Phase II

Methods

PHASE II	PHASE III
- Identify main land use categories from air photo interpretation	Identify main land use categories from air photo interpretation
- Field checks (minimum 1km of traverse per 1000 ha)	Field checks at a density of one observation per 50 ha
- Interview local population and government staff	Interview local population and government staff
- Production of 1:50,000 scale map	Production of 1:20,000 scale map

3.5.1 Phase II results

Most consultants provided adequate maps showing the distribution of the major land use categories. Delineation of forest concession boundaries was less good, partly due to the difficulty of obtaining the required information at sufficiently detailed scale: many maps showing the boundaries of concessions are on maps of 1:500,000 scale. The description of various land use categories was usually limited to the definition given in the TOR. In particular areas of shifting cultivation and secondary vegetation were poorly described as it was not clear what proportion of the land was used at any one time. Nor did consultants adequately describe the nature of areas used for cultivation of rubber which may range from intensive management of improved stock to widely distributed old trees - so called jungle rubber. Consultants' work on existing cropping systems is discussed separately in Section 3.8 and forestry issues are discussed in Section 3.6.

The distribution of ground observations in some areas was inadequate. As traverses used for slope and soil investigations were also used for the land use studies, the same criticisms of traverses being concentrated in only part of the study area apply.

3.5.2 Phase III results

In general Consultants did not add much information on present land use to that collected at Phase II. This was particularly needed in areas of shifting cultivation or rubber gardens. Some consultants did however, investigate the value of forest products such as rotan, which is a significant contribution to the income of the local people.

3.5.2 Observations

The specifications for present land use studies in both Phase II and Phase III have been altered in the new TOR to ensure a better distribution of ground observations throughout the SKP under study. Greater emphasis has also been given to the need to establish land availability by a careful description of areas where land is extensively used : this is to include both a physical description and information on average holding size and land availability derived from interviews. The land use map will also incorporate the boundaries of concessions and information of forest classification which is discussed in Section 3.6.

Observations on present land use made by the SFSE '80 consultants confirm the known general pattern of land use. This is described below as it is of significance for settlement planning.

Traditionally, settlement in the outer islands has been on the levees of major rivers which have the most fertile soils, due to regular flooding. From the rivers, shifting cultivation has spread outwards and recently this spread has increased due to increased population and the construction of many new roads, including logging roads.

In Sumatera the tradition of smallholder rubber is widespread : clearance for dryland crops (ladangs) steadily erodes the forest margins, but whereas formerly these would have been left to regenerate after one or two years, they are now commonly planted with seedling rubber. The shifting cultivator thus establishes some permanent rights to the land, although he may clear the surrounding secondary growth and tap the rubber only if market conditions are favourable. Forest rubber now covers enormous areas and is a major factor affecting land availability. Superimposed on this, are government development schemes, private concessions and earlier transmigration schemes. Much suitable terrain for transmigration settlements in Sumatera is now largely unavailable, because the land is under low quality rubber which is often lying idle. Rationalization of this situation is required if many more transmigrants are to be settled in Sumatera.

In Kalimantan population density is lower and rubber cultivation is less than in Sumatera. Nevertheless the same pattern of shifting cultivation expanding outwards from the main rivers can be observed. In West Kalimantan, deforestation for shifting cultivation has occurred in much of the non-swampy lowlands, and is still encroaching into the remotest hills and up to the Sarawak boundary. Thus huge areas lie under grassland or secondary growth, and although they are cultivated only once every 7 to 15 years the local population have some customary (adat) right of tenure.

Consultants have generally classed this land as used and therefore not available for settlement. In some areas it has been possible to resolve the problems of compensation and tenure, and this process should continue as a means of introducing more intensive and less wasteful methods of land use. Shifting cultivation ceases to be a satisfactory system once population growth has exceeded the capacity of the land to accomodate it.

In forested areas in all the outer islands, the local people have traditional rights to forest products, not only for domestic use but also for sale, for example belian timber (ironwood), rotan, jelutung and damar gums. In parts of Central Kalimantan, rotan is planted as a forest crop. Along

with these, there is hunting of game for meat and fishing. In many areas of Irian Jaya, the local population are mainly hunter-gatherers, dependent on forest products (sago, game) for their existence.

In general these traditional rights have not been codified in law, but the customary (adat) laws are firmly entrenched. There may be strong arguments for reviewing and rationalizing the customary rights, particularly now that regional development of communications has resulted in abuse, overharvest of products for quick profit and depletion of stocks. However the fact remains that these traditional rights are lost when the forest is cleared. This is a potential source of social conflict, though may be mitigated if the existing population benefits in other ways from the establishment of transmigration settlements. In West Kalimantan, Government has been making serious attempts to resolve the issue of under-utilised land and along the Kapuas river has brought a substantial proportion of the present population into transmigration settlements. Settlements have been dealt with on a case by case basis, and substantial areas which had been designated as used areas have now been settled combining present population and transmigrant settlements.

3.6 FORESTRY INVESTIGATIONS

Objectives

PHASE II	PHASE III
a) Establish Department of Forestry's plans for the area b) Establish type of forest cover over the SKP. c) Determine future plans for any logging concessions.	a) Determine stocking volumes in each mapped unit, by species and stem diameter b) Estimate costs of land clearing, value of timber on site, plan disposal of timber

Methods

PHASE II	PHASE III
- Identify main forest categories from air photo interpretation - Obtain views of the Provincial Forestry Service. - Obtain data on concessionaires and stocking volumes - Obtain from all concessionaires status of, and plans for the concession	- Sampling design for forest inventory left to the discretion of the consultant.

3.6.1 Phase II Results

Data and maps Consultants provided the data requested and mapped the boundaries of forest types and concessions. However, the maps produced by the Department of Forestry showing concession boundaries are often at small scales so the transfer of these boundaries to maps at a scale of 1:50 000 is often unsatisfactory.

Forest status Consultants did not generally provide information on forest status, that is the classification into Production, Conversion or Conservation forest. Although this was not specifically requested in the TOR, it is a factor affecting land availability and should therefore have been considered by the consultants.

The problem of the status of the forest and its availability should in fact be properly resolved at Phase I. During the early part of the SFSE '80 Programme it was the cause of changing many of the sites selected for study (See Section 2). The situation improved through regular meetings of a co-ordination committee with representatives from DITADA and the Department of Forestry. The committee decided whether Phase II or Phase III studies should be commissioned on a case by case basis.

3.6.2 Phase III results

Sampling Most consultants used line samples along the rentisan. Only three consultants correctly sampled each forest type and presented correct statistical data for the samples. Mapping of the forest was generally poor and most consultants calculated average volumes for the whole of an SKP, though this was based on sampling of only a part of the SKP.

Species determination Most consultants provided adequate information on the species present but the division of the species into durability classes was not always done.

Stem diameter All consultants provided the data required on stem diameter in the appropriate diameter classes.

Timber disposal Generally consultants did not deal adequately with the problems of timber disposal. Even where the issues were discussed, inadequate attention was paid to the existing Government regulations or the willingness or ability of local forest industries to process timber derived from a site. Halcrow Fox proved a notable exception with a careful discussion of timber disposal problems.

Land clearing The results of the forest studies in relation to land clearing are discussed in Section 3.12.

3.6.3 Observations

The TOR for future Phase II studies have been modified to ensure that consultants pay more attention to the forest classification and to the collection of information about the concessionaires. Existing data on stocking volumes is also to be collected and assessed. For future Phase III studies, the TOR have been altered to ensure that the forest inventory provides an estimate of the volume of all species with a diameter of 35cm or more, with a sampling error of 10% or less at the 95% significance level. The results must be presented in relation to forest type and land units and a plan for timber disposal must be presented.

The clearance of forested areas for transmigration settlement is an emotive issue involving conflicts between the desire for preservation of the natural environment and the needs of development. This emphasises the need for full discussion and agreement on the availability of land for development at an early stage in the planning process. As such agreement can only be meaningful if the forestry issues are considered in the light of the natural resources and national development plans. It also emphasises the need for revision and up-dating of the Phase I studies.

3.7 WATER RESOURCES

Objectives

PHASE II	PHASE III
a) Assess main hydrological characteristics b) Assess flood risk c) Assess suitability for irrigation development d) Compile existing climatic data e) Map drainage network at 1:50,000 scale	a) Determine sources of potable water b) Prepare monthly water balance for proposed cropping pattern c) Design and cost recommended domestic water supply system

Methods

PHASE II	PHASE III
- Examination and extrapolation of existing climatic data - Analysis of rainfall records to determine potential for agriculture - Availability of shallow water and sources of perennial streams determined from local enquiry. - Assessment of flood risk from topographic information and from local enquiry. - Drainage network mapped from existing maps, aerial photographs and results of field investigations.	- Repeat of climatic data and analysis from Phase II report - Field tests and limited geological investigation to determine suitability of shallow wells - Analysis of daily rainfall records to forecast possible periods of water shortage.

3.7.1 Phase II Results

Climatic analysis All consultants provided analysis of climatic data which showed the frequency of dry periods. However, in many areas data had to be extrapolated over long distances due to the lack of nearby climate stations.

The drainage network The quality of air photo interpretation to establish the drainage network was very varied, with some consultants showing little more than the major rivers. Few consultants made major efforts to map the

drainage in detail with corrections based on ground observations. In sparsely populated areas information on the presence of perennially flowing streams was difficult to obtain.

Estimation of flooding hazard This was of necessity a subjective estimate, and the main variations were between consultants who made some attempt at assessment and those who maintained such estimates were impossible to make with the limited data available. China Engineering made flood risk estimates using approximate measurements of channel dimensions and slopes, rainfall records and assumed run-off factors. Euroconsult was the only consultant to immediately establish water level recorders at critical sites within their study areas.

Sources of potable water The lack of time available and the unused nature of the land made it very difficult to provide reliable information on sources of potable water. Some consultants carried out surveys of existing wells, others relied on geological data and the results of the soils/landform surveys. Generally lack of an identified source of water was not taken as a major constraint to development in these relatively high rainfall areas.

3.7.2 Phase III Results

Estimation of water consumption The estimate of water consumption made by D.G. Transmigration is 60 l/capita/day. Consultants' estimates of demand are given in Table 3.3 which shows a wide range. These figures are largely theoretical as actual water consumption will be closely linked to ease of extraction and the distance between the house and the supply point.

Table 3.3 Estimates of water consumption made by SFSE '80 Consultants

Consultants	Water consumption l/capita/day
Jururancang Bersekutu	35
E N E X	30
Halcrow Fox and Associates	75
China Engineering	27
Clyde Surveys	55
Kampsax	55
Black and Veatch	55
Consulint	-
D H V	50
N E D E C O	-
Euroconsult	15 *

(*) Water for drinking and cooking only

Sources of potable water supply Most consultants dug some test wells and made recharge measurements. Some tests of water quality were made but it would have been useful if more tests of electro-conductivity had been made in areas where saline water was expected. Two consultants carried out resistivity surveys and borehole tests down to a maximum depth of 10 metres, in proposed village areas.

Where a high water table existed, all consultants recommended shallow wells for water supply. In areas where it was thought that the water table fluctuated beyond the range of shallow wells, a supplementary system with collection of rain water from roof tops was recommended. In some areas without shallow groundwater, small reservoirs in stream beds were suggested but usually without the support of a detailed survey.

All consultants provided designs and estimates for rainfall collection systems from house roofs but the proposed size of storage tank varied considerably. Some examples are given in Table 3.4.

Table 3.4 Volume of potable water storage suggested by SFSE Consultants

Consultant	Package	Potable water storage
Jururancang Bersekutu	a	all shallow wells
E N E X	b	2.6m³ supplementary
Halcrow Fox and Associates	c	0.4m³ supplementary
China Engineering	d	5.0m³
Clyde Surveys	e	1.0-3.0m³ supplementary
Kampsax	f	0.4m³ supplementary
Black and Veatch	g	15.0m³
Consulint	h	No Phase III studies
D H V	i	All shallow wells
NEDECO	j	No Phase III studies
Euroconsult	k	18.0m³

The high volumes of storage tanks suggested by packet g and k are for South Kalimantan and South Irian Jaya where very long dry periods have been recorded; in the case of packet k a 50 percent seepage loss was expected from the clay floored tanks. One reason for the high storage volumes is that the full daily requirement of water is assumed and no account was taken of the likelihood that settlers will conserve water, once it becomes evident that there is a water shortage. Several different designs and materials have been proposed for storing water, such as thin walled lightly reinforced, above-ground ferro cement tanks (ENEX); multi-chambered, reinforced concrete, above-ground tanks (BLACK AND VEATCH) and underground reservoirs with vertical corrugated plastic sheets, reinforced by a framework of wooden poles (EUROCONSULT).

Where dams across small streams, usually constructed of clay or timber faced with clay, have been proposed, they provide a supplement to the limited supplies available at the transmigrant's house.

Although perennial streams are a traditional source of water throughout Indonesia consultants only recommended these as a standby source, usually because of the distance from the houses.

3.7.3 Observations

There have been only minor changes made to the methods used to investigate water supply in future as shortcomings in the results of investigations of water resources are due to the lack of data available and to the short period of the study rather than to the methods used. Further detail has been included in the guidelines to encourage consultants to increase the amount of local investigation of existing wells etc.

Provision of domestic water supply is critical to successful development and special problems associated with supply to transmigration settlements are discussed below.

Shallow groundwater and surface water supply Although wells are recommended wherever shallow groundwater is available there are a number of drawbacks which were not fully discussed by consultants: because houselots should be on the better drained land with no risk of flooding, the depth to the watertable on the higher interfluves may be greater than a feasible construction depth; in some soils a large variation in the depth to groundwater can occur annually, and it is sometimes difficult to determine the dry season level; risk of pollution is an ever-present problem, especially if a proper closed top is not fitted, or spilled water adjacent to the well is prevented from flowing away.

Problems can also arise in the design and operation of small dams as it is difficult to estimate dry season flows in the upper reaches of small rivers and therefore the amount of water to be stored. Pollution, especially during periods of low flow, can cause severe problems. However one possible solution to this problem, which has not yet been tried in any of the SFSE '80 sites which are under development, is to provide gravel filled drainage galleries from the reservoirs to adjacent shallow wells.

Deep groundwater supply In general the planning and development of transmigration settlements has been based on the assumption that shallow groundwater will be available for domestic water supply. More sophisticated water supply systems are seen as a second phase of development. However, where shallow groundwater is not available, pumping from deep ground water or other sources should be considered as first phase development, prior to the arrival of the transmigrants. This poses some difficulties as deep groundwater studies cannot be meaningfully done for individual SKPs. Special water resources investigations should therefore be commissioned on a regional basis for those areas where domestic supply from shallow groundwater will be difficult. Southern Irian Jaya is known to be one problem area and it is recommended that a regional water resource survey be started as soon as possible.

3.8 AGRICULTURE

Objectives

PHASE II	PHASE III
a) Describe existing agriculture b) Make general recommendations for the agricultural development of the area	a) Existing agriculture to be described in more detail than at Phase II. b) Recommend farming systems, crops, and inputs. c) Define marketing and processing arrangements.

Methods

PHASE II	PHASE III
- Interviews with local population and field visits. - Recommendations for agricultural development based on consideration of natural resource data. - Extrapolation of results from other similar areas.	Obtain data on transmigration packages, both standard and actual, for each area. Obtain data on other Government agricultural inputs. Make recommendations on farming systems crops and inputs based on study findings on soils and landform.

3.8.1 Phase II results

There was considerable variation in the standard of agricultural investigations by the SFSE-80 consultants.

Description of existing agriculture Most consultants produced lists of crops grown in or close to the area with some description of the farming system. In general there was little evaluation of yield data collected either from the farmer or local or provincial authorities : this was an important omission as some indication of how realistic the data are should be given. Nor did consultants discuss how applicable to sedentary farming systems was the data collected from shifting farming systems. A further problem which was not always adequately discussed is that much of the existing agriculture may be in atypical areas, for example existing cultivation may be concentrated on river levees that are not representative of site conditions. Descriptions of existing agriculture in reports produced by Clyde Surveys and Halcrow Fox in the SFSE-80 Extension Programme were amongst the most satisfactory.

Recommendations for development Most consultants simply accepted the land utilisation types given in the TOR as the recommended forms of development. There was little discussion of them.

3.8.2 Phase III results

As at Phase II there were considerable variations in the level of detail and standard of agricultural studies at Phase III.

Description of existing agriculture Consultants generally added more details to the Phase II descriptions of the existing agriculture, but the same criticisms apply, as again there was little evaluation or discussion of the data collected. For example some of the estimates of yield are so low that the farmer barely gets a return of his seed and it is difficult to see why he would grow the crop.

Land suitability This is discussed in Section 3.9 but in general the natural resource data collected during the Phase III studies were interpreted adequately and used in making recommendations for agricultural development.

Crops All consultants gave lists of the crops recommended for each site. However there was little discussion of the varieties thought to be most suited to particular sites. Nor did consultants discuss the possibilities of introducing new crops to an area, for example cotton in southern Irian Jaya.

Cropping systems On dryland areas all consultants recommended the CRIA multiple cropping system or some modification of that system. However, not all consultants discussed the implications of the high input requirements of the CRIA system or the effect of lack of inputs on the system. Surprisingly, all consultants assumed that all cleared areas of a holding would be developed using the CRIA system : none suggested that if inputs were limited then those inputs might be concentrated on part of the cleared area.

On wetland areas some consultants made recommendations for wetland rice cultivation. One consultant Euroconsult was asked to plan for drainage works, but in most wetland areas consultants only recommended development if the area could be drained by the transmigrants themselves using simple technology. Some consultants recommended a smaller holding size given the greater returns and greater labour requirements of wetland rice. However, these smaller holdings were not generally accepted by DITADA.

Fertiliser The amounts of fertiliser recommended by consultants in each of the areas studied at Phase III are summarised in Table 3.5 with recommended levels converted to units of N, P, K and Mg for purposes of comparison, as consultants did not always recommend the same form of fertiliser. Table 3.5 shows that there was a wide variation in the amounts recommended. In almost every instance the amount recommended just for the arable land and houselot exceeds that provided to settlers under the transmigration 'package' which consists of 69 units of N, 71 units of P, 500kg of rock phosphate and 200kg of lime.

Labour requirements All consultants discussed the labour requirements for the farming system they recommended. Although the actual estimates of labour requirements varied, all consultants were in agreement that labour would be a constraint to the development of the settler's holding.

Other inputs Most consultants discussed the need to provide other inputs such as seed, planting material or insecticide.

Yields Estimates of yields given by consultants were extremely varied even where input levels were similar and it is not meaningful to calculate average yields from such widely differing estimates. Only some consultants discussed differences in yields that would result from different levels of inputs, for example the yield expected with the standard package of fertiliser supplied to transmigrants as opposed to the package recommended by the consultant, which was usually much higher.

Markets and processing Consultants discussions of these factors were generally cursory or non-existent.

Implementation Although consultants discussed individual aspects of the agricultural development there was little discussion of how they envisage the actual development taking place, either ideally or within the existing institutional framework. Nor was there detailed discussion of how initial development could lead on to future development.

3.8.3 Observations

The TOR for future Phase II studies have been altered to ensure that the description of the existing agriculture is more specific with details of crop grown, yields achieved by farmers, local knowledge of differences in soil fertility and availability of inputs. The agricultural development proposals will also be more specific though the level of detail is only that required to show that a given farm model is workable. Agricultural studies in future Phase III work have been expanded so that specific requests are made to define farm models, inputs, yields for various input levels, labour requirements, marketing and processing and the farm model in relation to site development.

Factors affecting the agricultural development of the sites are discussed below.

a) The farm model

In transmigration settlements, the area of land allocated to each transmigrant family is 3.5ha, of which 0.25ha is for the houselot and 1.0ha is for annual arable cultivation. The remaining 2.25ha is for future development and will be cleared as and when required by the settlers.

The preferred farm model is based on a system of rainfed arable agriculture with or without a tree crop component. This type of development is 'low cost' as required by Government policy.

Dryland cropping systems The importance of rice to the settler cannot be overemphasised and the crop must occupy a prominent place in any cropping system discussed. Unfortunately there are very few rice varieties that produce acceptable yields under upland conditions, and these are generally slow maturing.

However some of the areas studied in the SFSE-80 Programme are flat, with medium to heavy soils, have a high water table, low percolation rate and could be used for rainfed rice production. Provided climatic conditions are suitable, this form of development is recommended as it has been successful under similar conditions of soil and climate in the Philippines. The main advantage of such rainfed sawah production is that improved rice varieties

can be used which are early maturing, respond well to application of fertilizer and produce sustained and acceptable yields. Research in the Philippines (IRRI Reporter 2/79) shows that yields are more than doubled and the cropping intensity can be increased so that the overall annual yield increase may be five fold. Even at lower levels of production the returns could mean a difference between success and failure of a settlement scheme and offset the increased cost of land preparation. Figure 3.1 summarises this system which is dependent upon high levels of rainfall, but even in areas where rainfall is less reliable the system may be adapted to accommodate a main crop of rice followed by one or two palawija crops. Labour during the early years of settlement may prove to be a limitation to the full development of the wetland, but the intensive development of only part, could result in substantially higher levels of production than the extensive cropping of upland or ladang rice.

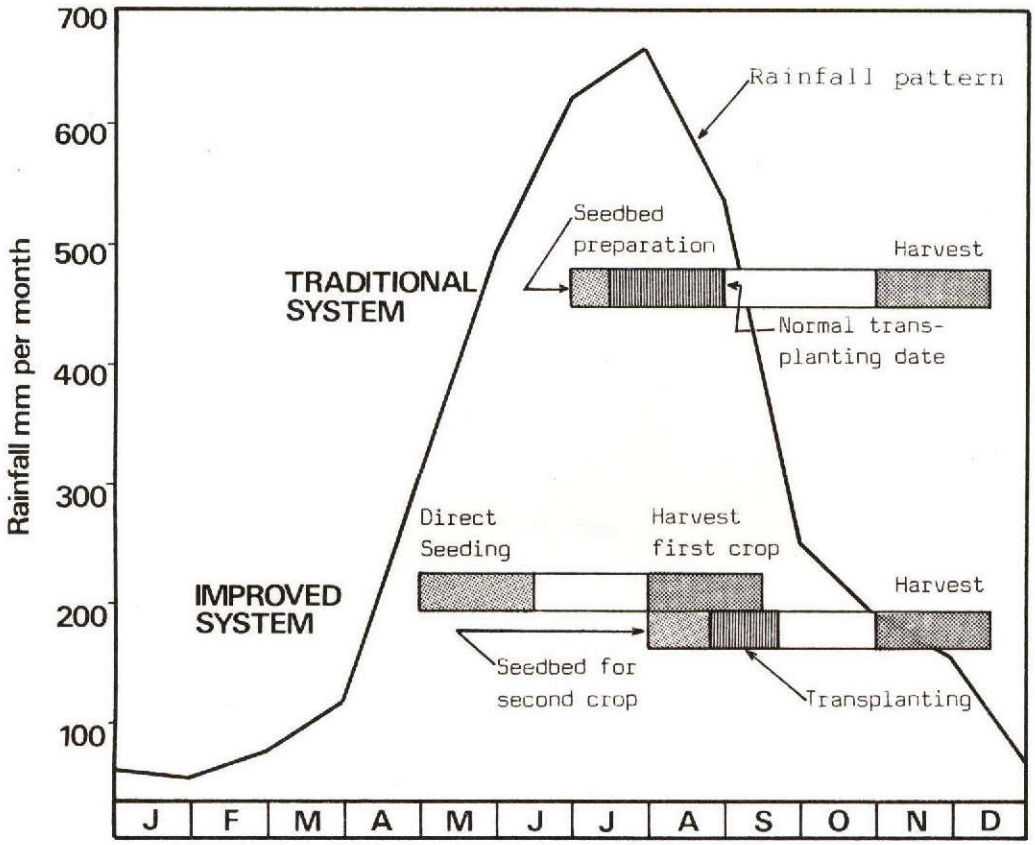
Tree crops Since tree crops are generally more tolerant of adverse soil conditions than annual crops and labour requirements are lower, settlers may choose tree crops to provide the major source of income. However tree crops require a considerable investment and as they are slow to mature, returns from such investment may take years to realise. In addition it is impossible for the farmer to change the farming system in the short term, in response to rapid changes in prices, so his income may be seriously affected.

Nevertheless tree crops generally provide the settlers with a secure source of income, but their establishment requires careful consideration of factors, such as the supply of planting material, care and maintenance of the crop, harvest, processing and marketing and the provisions of credit facilities. In most transmigration sites, it is assumed that much of the uncleared land will eventually be planted to tree crops, but there is little attention being paid to the mechanisms to ensure that the areas can be planted. Specialist agencies in the Department of Estates have their own programmes and are fully extended at present. There is therefore an urgent need to make provision for the many hundreds of thousands of hectares on transmigration settlements that could be developed for tree crops.

Soil conservation Since arable land is selected in areas with slopes of 0-8%, immediate soil conservation measures are not required. However where soils are marginal and are physically weakly structured, some form of soil protection may be required on slopes of 3-8%. In addition where mechanical clearing is practised, the contractor should locate the forest debris in windrows along the 1m vertical interval contour.

Tree crop areas may be located on slopes of 0-25% but on slopes exceeding 15% bench terraces should be constructed. In all slope categories trees should be planted along the contour. Where soils are liable to erosion, earth bunds should be established at 1m vertical intervals and where appropriate grassed with a suitable and preferably rhizomatous grass. In all cases the tree crop areas should be sown to a leguminous cover crop. The establishment of legumes on the highly acidic soils found within most of the proposed sites is poor and unless some effort is made to improve the pH levels growth rate will be slow and ultimate cover poor. Provisions are made within the settlement package to provide a small quantity of CIRP (rock phosphate) to assist with the establishment of the cover crop but 500kg to dress 1.25ha is likely to have little effect as either a soil ameliorant or fertilizer. However where burning has been undertaken the residual ash has the quality of temporarily correcting low pH levels and provides a medium suitable for the establishment of acid susceptible plants such as legumes.

RAINFED SAWAH DEVELOPMENT



ENVIRONMENT	TECHNOLOGY	SUPPORT
- Rainfall of 250 mm/mth for 6 months - Suitable soils - Slope < 8%	- Early & thorough land preparation to conserve moisture control weeds. - HYV rice varieties - Early planting of 2nd crop - Timely harvesting to avoid planting delays	- Credit - Availability of inputs - Markets - Labour available when needed

Source: The IRRI Reporter 2/79

The need for flexibility Selection of sites for transmigration settlement has been based on the presence of sufficient land suitable for rainfed arable agriculture. In the SFSE-80 Programme many sites have not been recommended for development because of steep slopes or flooding. Greater flexibility in the choice of farm model would enable much of this land to be used and flexibility in determining the holding size would enable more efficient use to be made of wetland areas. Certain factors have to be considered as constraints to development and these are discussed in the following section. The lack of flexibility and the use of a 'standard' farm model means that these constraints are often more severe than necessary : with a more flexible approach many would be minimised.

b) Constraints to agricultural development

A number of factors affect the range of crops and the type of agricultural development possible and these are discussed below.

Climate On the sites studied during the SFSE-80 Programme, climate, particularly a long dry season, was a constraint only in south east Irian Jaya. In that area the choice of crops is restricted to early maturing annual crops. Data collected by the SFSE-80 consultants in the area show that yields of rice are very low even in the wet season. The second crop which is generally a drought tolerant legume has fared better, yields have been reasonable and a surplus available for cash sales. The poor rice yields could be improved by irrigation by pumping water from fresh water swamps but the few schemes that have been implemented have been allowed to run down. An alternative would be to replace rice with a more suitable crop that would supply the income for farmers to purchase rice for food. A crop that would perform well under these conditions is cotton and because of local Indonesian demand, the marketing should be relatively easy. However processing facilities are required locally to 'gin' the crop and bale the fibre.

Perennial tree crops are likely to suffer from the droughty conditions and because the groundwater is sometimes saline in this part of Irian Jaya, they may not be able to utilise soil moisture reserves.

Drainage The SFSE-80 consultants were unable to recommend large areas of land for development because of the danger of flooding. Many of these sites are flat and contain some of the better alluvial soils. They would be suitable for both wetland and dryland agriculture if drainage and flood protection measures were undertaken. However, the installation of large drains is expensive and there is no provision within the Transmigration programme for such drainage works.

Simple dykes and conservation measures along river levees would be less expensive and could provide protection against floods caused by water spilling over river banks.

Topography It is estimated that about 40% of the total land area studied has not been recommended for development on account of unsuitable topography. In many areas topographic constraints to the development of a site occur as isolated hills or depressions which divide otherwise suitable land into small and fragmented blocks that have a limited settlement capability and are too small to be considered within the SFSE-80 Programme. However, other than size and accessibility, the land may be suitable for agricultural settlement and could be developed as small satellites to larger settlements, provided access is improved. This would be more costly but could lead to a more coherent development of a whole region.

Many areas have not been recommended for development because there has been insufficient land with slopes of less than 8%. Clearly this land could be developed either for tree crops or by introducing appropriate soil conservation measures. However, the decision to provide either tree crops or conservation measures must predate the acceptance of the site for development.

Soil fertility Reference to Section 3.4 shows that all consultants were agreed on the very low fertility of almost all the soils described on all the sites investigated.

Most of the available nutrients are contained in the shallow surface organic layer. However, clearing of the forest cover results in a rapid decomposition of the organic matter.

The value of this short lived surface layer is recognised by the SFSE-80 consultants as important to the establishment of many of the proposed sites. Provision of fertilizer to the transmigrant is often delayed and the initial cropping is often dependent on the residual fertility of the soil. The consultants have therefore recommended that efforts be made to conserve this surface layer through hand clearance of the forest and the planting of a cover crop to conserve soil and residual fertility.

In the long term low soil fertility must be treated with applications of fertilizer. Table 3.5 shows the wide range of applications of fertilizer recommended by the SFSE-80 consultants. All agree on the beneficial effects of liming and it has been clearly shown by experiments undertaken by CRIA that the liming of these soils has a larger impact on increasing production than any other single cultural activity. Local sources of limestone should therefore be exploited and facilities made within the transmigration package to provide settlers with sufficient lime to assure a five year cropping period free of the hazards created by acidic soils. Lime should be applied as quick acting but short lived burnt limestone. This is easy to use, corrects soil acidity levels in the immediate vicinity of the plant and also acts as a fertility agent. Lime should also be applied as ground limestone which is cheaper than burnt lime, more slowly available to the plant and longer lasting. Recommended dosages, per ha, of these ameliorants will depend on soil and climate, but in general the application of half a ton of burnt lime and 2 tons of ground limestone in the first few years of settlement followed by 1 ton of ground limestone every second year may satisfy immediate crop requirements and keep the cost to an acceptable level.

The poor soil fertility also necessitates the application of artificial fertilizers. The 'package' of fertilizers which should be supplied to settlers contains both urea and triple super phosphate to allow the farmer to obtain acceptable yields. The 'package' does not contain potash fertilizer, so for certain root crops which have a high demand for potash the failure to supply potash may reduce the effectiveness of the other nutrients supplied and make their use less economic.

It is not meaningful to provide a blanket recommendation for fertilizer for a country as large and varied as Indonesia. The fertilizer requirements will be different for each crop and site, and on-site research to establish these requirements should be given a high priority.

Soil fertility may also be improved by the use of green manuring with legumes and regular fallow periods, though it is difficult to get settlers to adopt the practice. The effectiveness of green manuring is dependent on soil conditions, but where establishment is possible, legumes such as lamtoro (Leucaena spp) can

provide as much as 200kg Nitrogen/ha/year and smaller quantities of available phosphate; such crops can therefore make an important contribution to the development of these sites and significantly reduce the costs of production.

Input requirements The recommendations made by the SFSE-80 consultants for fertilizers have been discussed earlier in this Section. If such recommendations are implemented, enormous quantities are required just for the sites investigated by the consultants. Thus, it can be seen from Table 3.5, that almost 60,000 tons of lime and fertilizer are required. In addition over 40,000 tons of seed for arable crops, 3 million seedlings for fruit trees around the home garden and over 10 million rubber seedlings for the development of the first hectare of rubber. There are data for 21 sites accommodating 27,000 families but the target for the whole transmigration programme is 100,000 families per year. The total quantities required for new settlers alone are therefore enormous and these figures take no account of the large quantities required by existing settlers.

It is clear that there are very considerable logistic difficulties in the supply of such large quantities of inputs and this in itself may prove a major constraint to development.

Extension and Research Facilities The consultants have recognised an urgent need to supply the transmigration sites with qualified extension staff to assist in settlement. The settlers come from varied backgrounds which include retired military personnel, inner city dwellers and landless labour from rural areas. Although the latter group may have some agricultural experience, other groups have little basic knowledge of agricultural practice and need to be provided with close supervision and guidance. Field extension staff are planned for each settlement site at an intensity of 1 extension worker/1000 KK. Because of the pace of settlement development, these targets are seldom achieved and staff provided may be inadequately trained and poorly supervised.

Many transmigration sites are located in areas where there is no tradition of agriculture. Information on crop performance within these areas is extremely limited and crop trials are urgently required in order to formulate recommendations for use by extension workers. Most consultants have stressed the need to establish trials in at least one site in each of the SKPs recommended for development.

Labour Labour is expected to be a major constraint to the development of transmigration sites as the settler is dependent on family labour, generally two adults and two to three children below the age of 12 years. The settler's wife is unlikely to make a major contribution to the agricultural development of the site, as she will be fully employed looking after the children and maintaining the household. Figures from CRIA for dryland farming and from FAO for wetland cropping show that during the early settlement period, there is a 'short fall' in the supply of labour. As a result, it is unlikely that all the cleared land will be cropped until at least year three and even this could be optimistic.

Mechanical cultivation could overcome the labour constraint, but breeding and training of draught animals is a long term programme that may take in excess of 10 years to fully satisfy the settlers' demands. Tractors could also be used but costs are high and use may be limited by the presence of stumps. The only realistic solution to this problem is the adoption of enterprises with a low labour requirement, for example tree crops such as rubber and coconuts.

Table 3.5 Recommended Fertilizer Usage

Consultant	SKP	Crop System	Fertilizer Recommendation Units/ha N	P	K	Mg	tons/ha CRIP	LIME
Jururancang Bersekutu	Lipat Kain A	Dryland	118	114	82	-	-	1
		Wetland	-	-	-	-	-	-
		Houselot	104	59	47	2	-	0.25
		Cover crop	15	15	16	4	0.25	-
		Tree crop	110	188	94	27	-	-
		TOTAL	347	376	239	33	0.25	1.25
Jururancang Bersekutu	Lipat Kain C	Dryland	111	107	57	-	-	1
		Wetland	-	-	-	-	-	-
		Houselot	104	59	47	2	-	0.25
		Cover crop	15	15	16	4	0.25	-
		Tree crop	110	188	94	27	-	-
		TOTAL	340	369	214	33	0.25	1.25
Jururancang Bersekutu	Lipat Kain D	Dryland	118	114	82	-	-	1
		Wetland	-	-	-	-	-	-
		Houselot	104	59	47	2	-	0.25
		Cover crop	15	15	16	4	0.25	-
		Tree crop	110	188	94	27	-	-
		TOTAL	347	376	239	33	0.25	1.25
Jururancang Bersekutu	Lipat Kain H	Dryland	118	144	82	-	-	1
		Wetland	-	-	-	-	-	-
		Houselot	104	59	47	2	-	0.25
		Cover crop	15	15	16	4	0.25	-
		Tree crop	110	188	94	27	-	-
		TOTAL	347	406	239	33	0.25	1.25
E N E X	Bangkinang B	Dryland	98	69	78	-	-	0.28
		Wetland	-	-	-	-	-	-
		Houselot	5	2	2	-	-	0.01
		Cover crop	-	-	-	-	-	-
		Tree crop	97	64	36	4	-	-
		TOTAL	200	135	116	4	-	0.29
E N E X	Bangkinang D (Model A)	Dryland	98	69	78	-	-	0.22
		Wetland	-	-	-	-	-	-
		Houselot	18	9	6	-	-	0.05
		Cover crop	-	-	-	-	-	-
		Tree crop	97	63	36	4	-	-
		TOTAL	213	141	120	4	-	0.27

Table 3.5 (cont'd)

Consultant	SKP		Crop system	Fertilizer Recommendation Units/ha N	P	K	Mg	tons/ha CRIP	LIME
E N E X	Bangkinang D (Model B)		Dryland	93	76	85	-	-	0.22
			Wetland	-	-	-	-	-	-
			Houselot	18	9	6	-	-	0.05
			Cover crop	-	-	-	-	-	-
			Tree crop	97	63	36	4	-	-
			TOTAL	208	148	127	4	-	0.27
Halcrow Fox	Lembah Liam I/A		Dryland	85	109	119	-	-	-
			Wetland	-	-	-	-	-	-
			Houselot	7	8	12	-	-	-
			Cover crop	-	-	-	-	-	-
			Tree crop	55	-	130	-	0.26	-
			TOTAL	147	117	261	-	0.26	-
Halcrow Fox	Lembah Liam I/A_1	(a)	Dryland	85	109	119	-	-	-
		(b)	Wetland	69	47	30	-	-	-
			Houselot	7	8	12	-	-	-
			Cover crop	-	-	-	-	-	-
			Tree crop	25	-	-	-	0.26	-
		(a)	TOTAL	117	117	131	-	0.26	-
		(b)	TOTAL	101	55	42	-	0.26	-
Halcrow Fox	Lembah Liam I/A_2	(a)	Dryland	91	65	59	-	0.57	
		(b)	Wetland	23	47	30	-	-	-
			Houselot	23	24	30	-	0.11	-
			Cover crop	-	-	-	-	-	-
			Tree crop	23	-	-	-	0.25	-
		(a)	TOTAL	137	89	89	-	0.93	-
		(b)	TOTAL	69	71	60	-	0.36	-
Halcrow Fox	Klingi C	(a)	Dryland	69	47	30	-	-	-
		(b)	Wetland	69	47	30	-	-	-
			Houselot	23	24	30	-	-	-
			Cover crop	-	-	-	-	-	-
			Tree crop	23	47	60	-	0.25	-
		(a)	TOTAL	115	118	120	-	-	-
		(b)	TOTAL	115	118	120	-	0.25	-
China Engineering	Nangatayap A Nangatayap B Sukadana A		NO INFORMATION ON AGRICULTURAL INPUTS AVAILABI						

Table 3.5 (Cont'd)

Consultant	SKP		Crop System	Fertilizer Recommendation Units/ha N	P	K	Mg	tons/ha CRIP	LIME
Clyde Surveys	Kumai C		Dryland	69	53	60	-	-	up to 10
			Wetland	-	-	-	-	-	-
			Houselot	15	15	20	-	-	-
			Cover crop	6	6	-	-	0.8	-
			Tree crop	10	16	9	3	-	-
			TOTAL	100	90	89	3	0.8	up to 10
Clyde Surveys	Hanjalipan C,D, & G	(a)	Dryland	107	92	81	-	-	0.55
		(b)	Wetland	55	35	30	-	-	0.55
			Houselot	18	17	15	-	-	0.25
			Cover crop	-	-	-	-	0.5	-
			Tree crop	120	81	81	18	-	-
		(a)	TOTAL	245	190	177	18	0.5	0.8
		(b)	TOTAL	193	133	126	18	0.5	0.8
K a m p s a x	Nangabulik D		Dryland	114	146	85	-	0.5	7.0
			Wetland	-	-	-	-	-	-
			Houselot	32	24	24	-	-	0.25
			Cover crop	-	-	-	-	0.5	-
			Tree crop	92	94	48	-	-	7.0
			TOTAL	238	264	157	-	1.0	14.25
Black and Veatch	Pamukan A		Dryland	92	94	60	-	-	0.20
			Wetland	-	-	-	-	-	-
			Houselot	9	7	9	-	-	0.02
			Cover crop	-	-	-	-	-	-
			Tree crop	50	66	59	5	-	0,00
			TOTAL	151	167	128	5	-	0.22
Black and Veatch	Pamukan B		Dryland	92	94	60	-	-	0.20
			Wetland	-	-	-	-	-	-
			Houselot	9	7	9	-	-	0.02
			Cover crop	-	-	-	-	-	-
			Tree crop	50	66	59	5	-	0.02
			TOTAL	151	167	128	5	-	0.24
D H V	Pasahari B/C	(a)	Dryland	70	62	55	-	-	-
		(b)	Wetland	52	53	45	-	-	-
			Houselot	12	6	8	-	-	-
			Cover crop	-	-	-	-	-	-
			Tree crop	73	74	136	16	-	-
		(a)	TOTAL	155	142	199	16	-	-
		(b)	TOTAL	137	133	189	16	-	-

Table 3.5 (Cont'd)

Consultant	SKP		Crop System	Fertilizer Recommendation Units/ha N	P	K	Mg	CRIP tons/ha	LIME
Euroconsult	Kurik/Kumbe B		Wetland	55	70	-	-	-	-
			Houselot	14	10	-	-	-	-
			TOTAL	69	80	-	-	-	-
Euroconsult	Jagebob I		Dryland	20	30	28	-	-	0.18
			Wetland	40	30	30	-	-	0.25
			Houselot	5	8	7	-	-	0.05
		(a)	TOTAL	25	38	35	-	-	0.23
		(b)	TOTAL	45	38	37	-	-	0.30

3.9 ASSESSMENT OF LAND SUITABILITY

Objectives

PHASE II AND PHASE III
Identification of land suited to the planned uses.

Methods

PHASE II AND PHASE III
Assessment using principles laid down by FAO (1976) and guidelines prepared by DITADA.

3.9.1. Results

Most consultants adequately interpreted the data collected in terms of their suitability for the planned uses. Some difficulties were encountered in areas that were classed as suitable on purely physical factors, but were unsuitable due to present land use, as consultants did not always make this distinction. A few consultants were clearly unfamiliar with the FAO classification, in particular the concept that suitability is assessed for defined types of use, that is for specific land utilisation types. However final results were satisfactory.

The presentation of the land suitability assessment was not standardised as not all consultants produced land suitability maps. In most cases land suitability was shown on the map legend in relation to mapped land units.At Phase III it was often difficult to use the land suitability information together with the village plan as it was often presented on a map of different scale to the plan.

3.9.2. Observations

No changes have been made in the methods used for assessment of land suitability, though greater emphasis has been given to the need to distinguish suitability based on relatively unchanging physical factors from suitability based on factors due to the activities of man. Land suitability mapping has also been specified at the same scale as that at which the plans are produced.

The main reasons for the unsuitability of sites for development of transmigration settlements based on rainfed arable farming can be seen in Chapter 2. Steep slopes and flooding are the predominant factors. However in most sites selected for development all consultants stressed that the suitability was Class S3-marginally suitable. FAO (1976) define marginally suitable as follows :

" Land with limitations that in total are severe for sustained application of a given use : production will be so reduced and/or the needed inputs will be so high that the use of this land will be only marginally justified".

The classification as S3 was generally due to the very low fertility of the soils and one extremely important result of the SFSE-80 Programme is the fact that all the consultants were unanimous on this point : soils of low fertility in all the areas selected for development will pose a major constraint to the success of that development.

3.10 ROADS

Objectives

PHASE II	PHASE III
a) Identification of tentative road alignments for access and main village roads. b) Road alignments to be shown on the structure plan at 1:50000 scale	a) Survey of alignments for access and main village roads. b) Design and tender drawings for roads and associated structures

Methods

PHASE II	PHASE III
Alignments chosen from consideration of drainage network, aerial photographs and location of village centres.	Designs produced after standard survey procedure had been used.

3.10.1 Phase II results

Tentative road alignments at Phase II were generally satisfactory, though some consultants found difficulty in complying with the requirements that access roads should not cut across SPs but follow the boundaries.

3.10.2 Phase III results

Alignment Most consultants based road alignments along existing logging tracks wherever feasible. As the logging tracks are normally located along watersheds, this was satisfactory.

Road surveys and designs In general the surveys were satisfactory though some consultants did not tie the road survey to the other topographic survey work. Survey and design specifications were unnecessarily detailed for roads which are essentially simple rural roads. Design guidelines provided by Bina Marga were followed, though these resulted in excessive cut and fill in certain areas of steep topography. In some cases existing road conditions were inadequately described and consultants prepared designs and cost estimates as if none of the existing road was usable.

Road material One major problem found by several consultants, especially in areas of Kalimantan and Irian Jaya, is the lack of suitable roadstone with which to construct the gravel pavement. Some consultants e.g. Euroconsult in Irian Jaya, proposed a laterite pavement as a substitute for gravel. Black and Veatch, in South Kalimantan, proposed opening up a quarry as a source of roadstone for two SKPs in the Pamukan area.

3.10.3 Observations

There have been no changes in methods for planning of roads at Phase II. However at Phase III, the specifications for road survey and design have been greatly simplified in the new TOR. Complete horizontal and vertical profiles and detailed designs of road structures are no longer required. Consultants have, instead, to undertake a road alignment survey, setting out intersection points. Details of stream crossings and sources of construction materials are also to be given.

3.11 PLANNING

Objectives

PHASE II	PHASE III
a) Preparation of a structure or outline plan at 1:50,000 scale to show boundaries of village units and tentative road alignments b) Estimation of number of settlers in each village unit	Preparation of detailed plans at 1:5 000 scale to show boundaries of individual holdings, location of public facilities and alignment of all roads

Methods

PHASE II	PHASE III
Plans drawn after assessment of land suitability and availability	- Detailed plan based on contoured 1:5 000 scale topographic map - Allocation of land from consideration of land suitability, social factors, requirements for infrastructure and needs of future development - Plans to meet criteria defined by DITADA

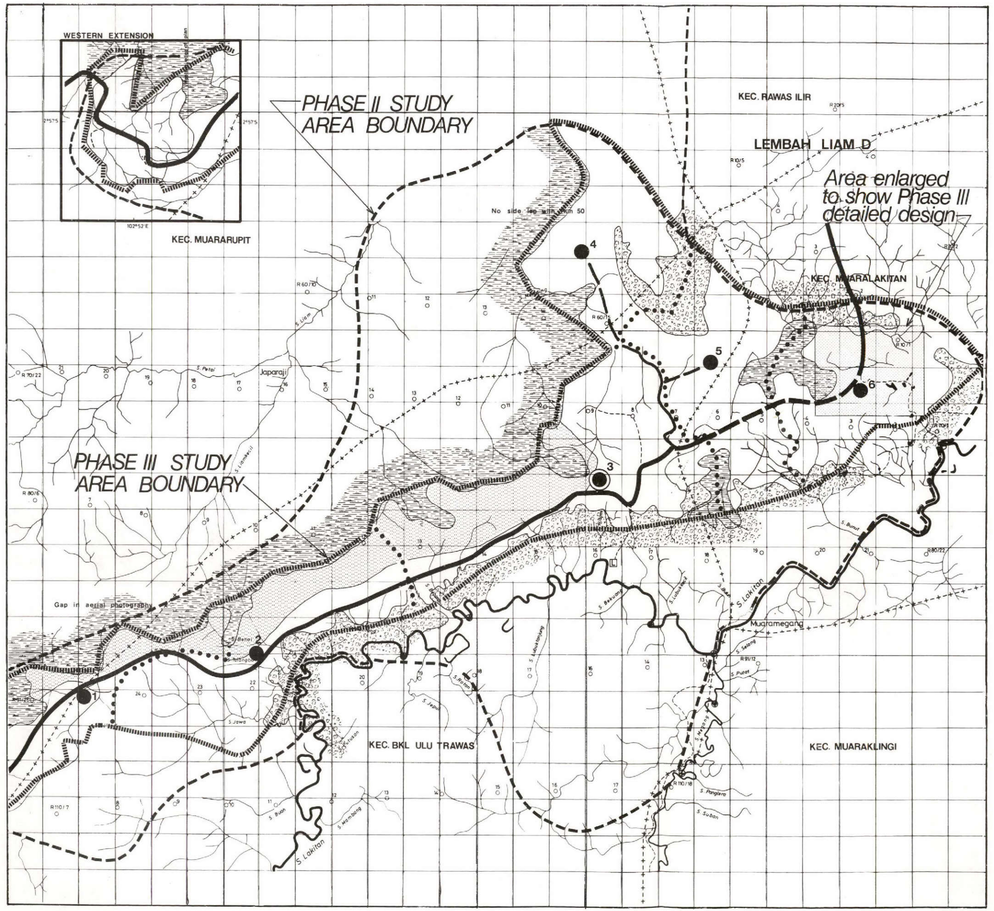
3.11.1 Phase II Results

In general consultants prepared structure plans satisfactorily, although reductions in the numbers of settlers during Phase III planning suggests that too optimistic a view of settler capacity was the rule.

3.11.2 Phase III Results

Plans produced by consultants were generally in accord with the criteria established by DITADA. For example walking distances between the houselots and various parts of the holdings were within the limits set. All consultants also attempted to use land suitability as the framework for planning. The presentation of the plans was also generally satisfactory, Figure 3.2 gives an example of the maps produced by one consultant, Halcrow Fox and Associates. A number of difficulties were encountered in the preparation of plans and these are :

PHASE II OUTLINE PLAN — 1:100 000



PHASE III DETAILED LAYOUT PLAN — 1:10 000

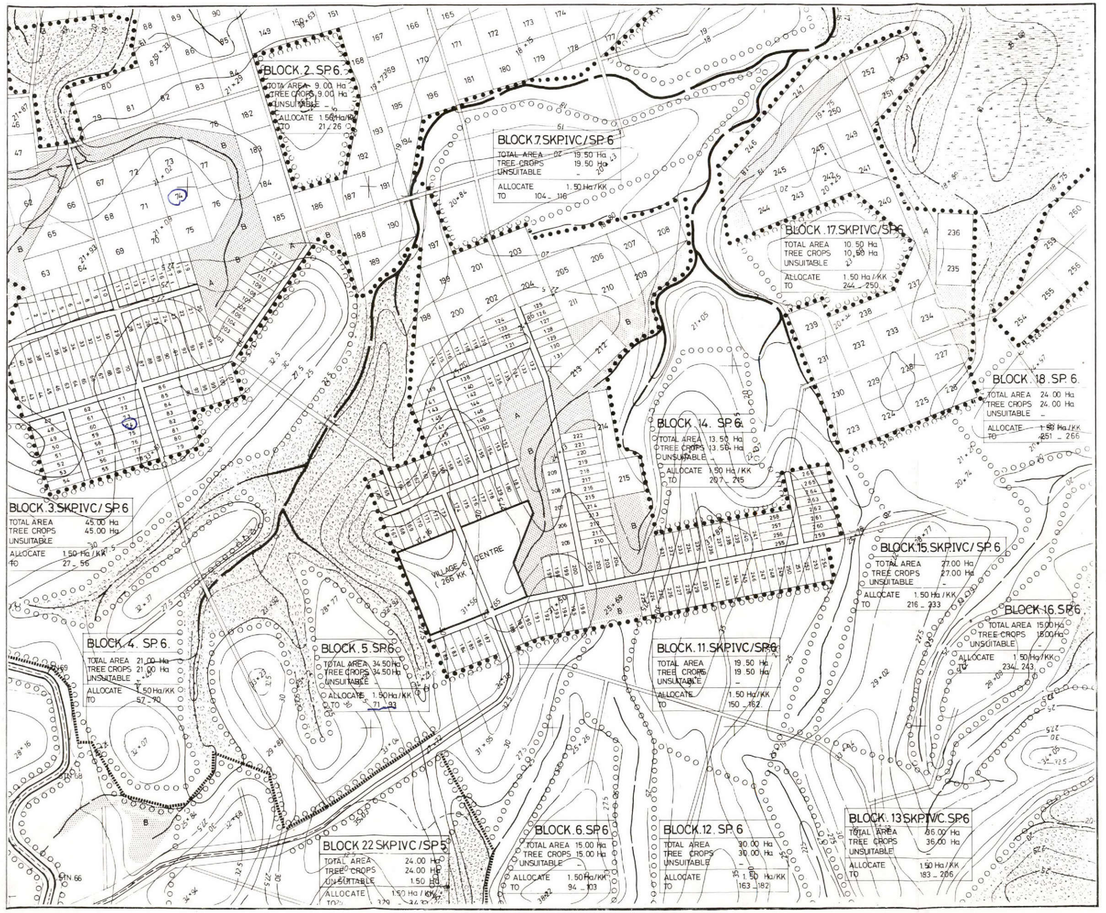


Figure 3.2

PLANNING PROCESS

SAMPLE

SKP KLINGI IVC
SOUTH SUMATRA

Reduced reproduction of Sheet Nos. KC 3 and 7/24 prepared by
HALCROW FOX AND ASSOCIATES
in co-operation with
INDULEXCO-PARAMA CONSORTIUM

Size of settlement In some areas consultants suggested settlements of less than 200 families, in order to maximise the use of flat land. Only where such small settlements could be considered as satellite villages, within easy access of a larger village, was the plan accepted.

Settlement pattern The preferred settlement pattern is a nucleated village with housing grouped around the public facilities. Consultants found it difficult or impossible to use this pattern in areas where suitable land was distributed in small blocks. A variety of alternative patterns were presented, mainly based on houselots of 30 families or more and these were accepted where determined by land suitability considerations.

Shape of holdings Some consultants' did not pay sufficient attention to the need to keep individual holdings of regular shape. If very irregular shaped holdings were presented the consultant was asked to revise the plans.

Tanah Bengkok The need to include areas of land for community use presented some consultants with difficulties. Most consultants allocated irregularly shaped areas, occurring between blocks of holdings as tanah bengkok. The fact that 150 ha of tanah bengkok was allocated to each village regardless of the number of families, reduced the total number of settlers.

Boundaries of land clearing blocks Many consultants plans resulted in a very complex boundary to the area to be cleared. This was not acceptable and revisions were made as necessary. The way in which the boundaries were identified on the land clearing maps was not always very clear. Bearings were usually given of the main boundaries, but relationships to survey monuments or the rentis network were not always given.

Reliability of detailed planning The results of field checks of slope undertaken by Clyde Surveys (See Section 3.3.2) and more importantly the comparison of topography as mapped at 1:5,000 with the actual topography as seen after clearing, suggests that detailed plans drawn by the SFSE '80 consultants require modification during construction. Thus the planning itself was satisfactory but the basis for planning, the 1:5,000 scale contoured maps, was insufficiently accurate.

3.11.3 Observations

No changes have been suggested in the methods used for Phase II structure planning. At Phase III experience showed that changes were necessary to the 1:5 000 scale plans during construction, so it was decided not to attempt to produce such detailed plans before the land is cleared. In the new TOR prepared by DITADA for future studies, the planning is divided into two. At Phase IIIA, activities prior to land clearing aim to prepare a plan at 1:20 000 scale which shows blocks of land for various purposes allocated to 30-50 families together with tentative village road alignments. At Phase IIIB, activities are to prepare a plan showing individual holdings, public facilities and actual road alignments within the cleared land.

3.12 LAND CLEARING

Objectives

PHASE II	PHASE III
No input required	Production of maps at 1:5000 scale showing land to be cleared

Methods

PHASE II	PHASE III
-	After production of base maps and detailed plans, maps were prepared showing blocks of land to be cleared for houselots, village centres and first arable plots

3.12.1 Results

As well as producing the required land clearing plans most consultants included in their Phase III reports discussions on the merits and drawbacks of the three main methods of land clearing which have been used in Indonesia : hand clearing, semi-mechanical clearing and mechanical clearing.

Hand clearing Involves only the use of hand tools to fell the trees and undergrowth. The lighter timber branches and undergrowth are piled around the larger logs and burnt.

Advantages: Hand clearing means that there is no physical damage to soils from the use of heavy machines, little soil disturbance and the surface-layer which contains most of the available plant nutrients is preserved. Ash and therefore nutrients from burnt timber are distributed over most of the cleared area. Fallen logs and the stumps provide some form of protection against erosion.

Disadvantages: The large logs scattered over hand cleared areas may reduce the effective cropping area by as much as 40% in the early years of settlement. Cultivation will be restricted to small irregularly shaped plots between the fallen timber and stumps. The other main disadvantage of hand clearing is that it is slow or involves very large numbers of labourers with associated management problems.

Semi-mechanical land clearing Involves the felling of large trees using Chain-saws and underbrushing by hand. Large logs are cut into manageable lengths using chain-saws and piling into windrows is done by machine. The cleared area is not de-stumped.

Advantages: The advantages of semi-mechanical clearing are similar to those of hand clearing with respect to soil disturbance and preservation of nutrients. The use of chain-saws and machinery for some activities also speeds the process.

Disadvantages: Where machinery is used for piling cut timber into windrows, there is a danger of soil compaction and disturbance of topsoil and consequent loss of nutrients.

Mechanical land clearing Heavy machinery is used to fell all but the largest trees. In Indonesia the machines used are tracked tractors, sometimes fitted with a K.G. shearing blade, but more usually with a standard construction blade. All felled material is piled into windrows by machine. The cleared area is sometimes also de-stumped using machines.

Advantages: The main advantages of mechanical clearing is speed in achieving a clean cleared area in which almost all the cleared area is available for cropping.

Disadvantages: Most consultants stress the adverse effects of mechanical land clearing on the soils of the settlement sites. The most important is considered to be disturbance of the humus rich topsoil due to the uprooting of trees, tractor skid or concentration of topsoil in windrows. Compaction of soils is known to take place and adverse effects on the structure and porosity of the soil result from smearing due to tractor skid. This impedes root development and results in poor crop establishment. Compaction may increase surface run off and lead to accelerated erosion.

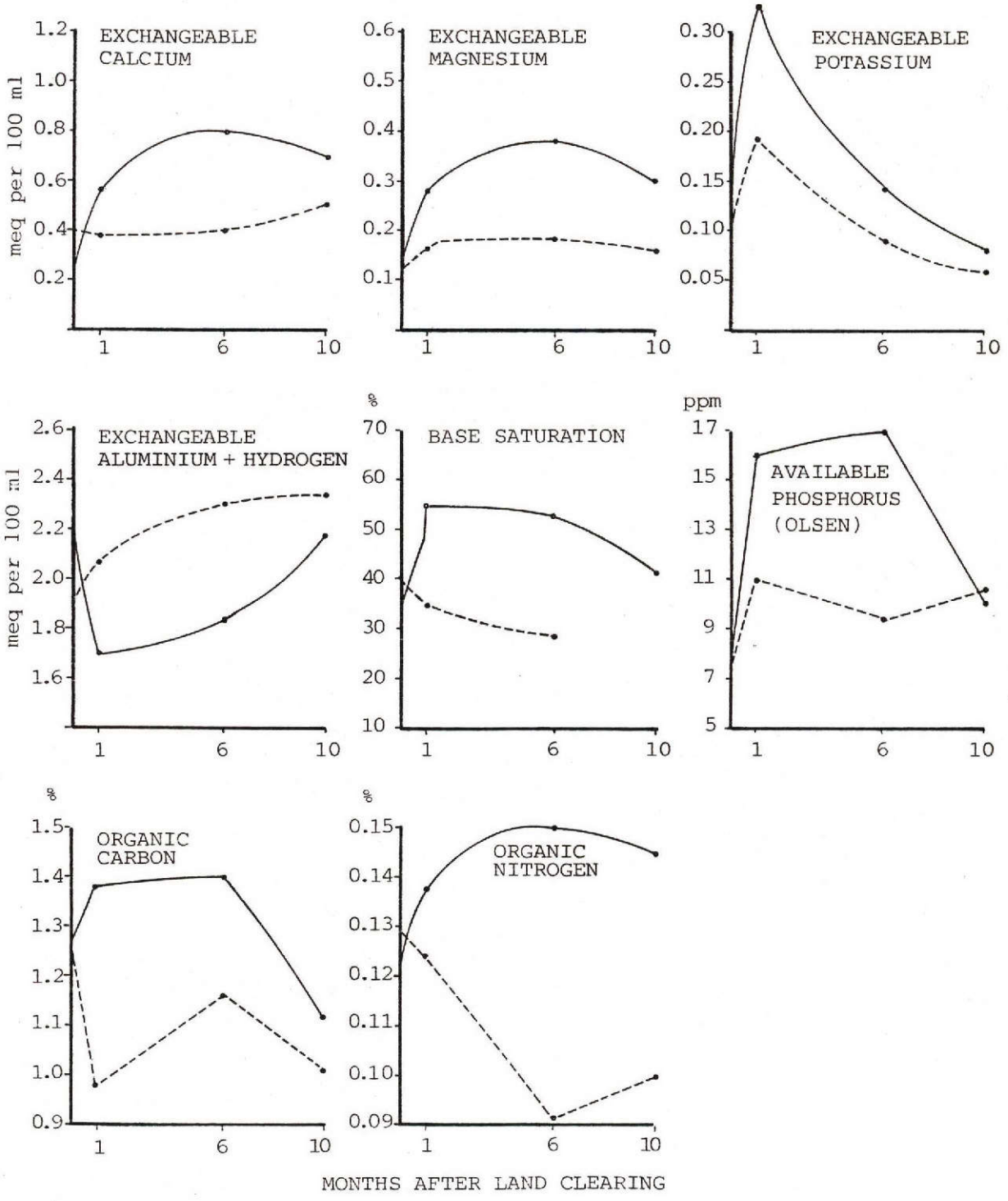
3.12.2 Observations

Effects on soils Most of the SFSE '80 consultants agreed that land clearing leads to loss of topsoil, particularly the humus rich layer. Even with hand clearing this humus layer will be lost due to rapid mineralisation of the humus after land clearing. With mechanical clearing the loss may be accelerated. Consultants were also agreed on the adverse physical effects on the soil of mechanical land clearing. Little evidence was produced of such adverse effects to support their contention. Nevertheless, work by Seubert et al (1977) on similar soils in Peru is probably relevant to Indonesian conditions and Figure 3.3 shows the lower levels of all important plant nutrients after mechanical clearing compared with manual clearing.

Recommended methods of clearing Many consultants recommended manual clearing as the preferred method, but most accepted that mechanical land clearing is likely to be used and made the following recommendations.

- Clearing should be undertaken when soils are dry to reduce smearing and compaction resulting from tractor skid.
- Machines of the correct specification should be used with engine power appropriate to the equipment used and wide tracks to reduce ground pressure. Under-powered and wheeled tractors result in greater slip and increased soil damage.
- Appropriate implements should be used for clearing. Shearing blades should be used for felling and rakes for windrowing rather than

EFFECT OF LAND CLEARING METHODS ON TOP SOIL PROPERTIES



——— SLASH AND BURN

------- BULLDOZER CLEARING

Note: Changes in properties refer to the top 10 cm in a Typic Paleudult of Yurimaguas, Peru.

Source: Low Input Technology for Managing Oxisols and Ultisols in Tropical America. Advances in Agronomy Vol. 34 Seubert et.al. 1977.

normal construction blades.

- Only trained operators who use machines in accordance with the makers recommendations should be employed.
- Adequate supervision to ensure operators work to the specified land clearing procedures is essential.

Given the implementation of these recommendations even marginal areas can be cleared mechanically without serious damage. SKP Kumai C is an example. Conversely a less critical area in Hanjalipan has sufferd severe damage due to poor clearing methods. Therefore it is clear that the way in which the clearing is undertaken is of vital importance.

3.12.3 Costs of clearing

The unit rates of costs of clearing presented by consultants varied widely. The rates used are shown in Table 3.6. Some of the variation may be attributed to differences in costs in different provinces and some due to differences in site conditions. Nevertheless there remains a wide range in estimated costs.

Table 3.6 Unit rates used by SFSE '80 Consultants for manual and mechanical land clearing.

Consultant	Province	Cost Rp 1,000/ha	
		Manual clearing	Mechanical clearing
Jururancang	Riau	184	160
E N E X	Riau	375	460
Halcrow Fox	S. Sumatra	150	150
China Engineering	W. Kalimantan	-	1,420
Clyde Surveys	C. Kalimantan	1,297	1,320
Kampsax	C. Kalimantan	321	-
Black & Veatch	S. Kalimantan	-	1,390
D H V	Maluku	-	179
Euroconsult	Irian Jaya	-	121

3.13 ECONOMIC STUDIES

Objectives

PHASE II	PHASE III
No input required	Calculation of **farm budgets** showing costs and returns to the individual settler for the proposed farm model. Where a feasibility study was requested determination of the financial and economic viability of the proposed development

Methods

PHASE II	PHASE III
-	Terms of Reference did not specify particular methods for the economic studies. Consultants used conventional economic analysis

3.13.1 Changes in requirements

In the original terms of reference consultants were required to make a full economic feasibility study of all sites in which Phase III was undertaken. It was subsequently agreed that the full feasibility study was not required in all sites. Unfortunately some consultants assumed that this also meant that there would be no requirement to prepare farm budgets or project cost estimates.

3.13.2 Results

(a) Numbers of studies

Only five full feasibility studies were undertaken : by Euroconsult for SKP Jagebob I and for SKP Kurik B in Irian Jaya, and by Clyde Surveys for 3 SKPs in Hanjalipan in Central Kalimantan. Farm budgets and cost estimates were prepared for all other sites studied at Phase III but the value of the farm budgets was very variable. This was directly linked to the quality of the agricultural studies which have been discussed in Section 3.8. Where data were inadequate the farm budget inevitably had little meaning. The conclusions in relation to the various farm models studied are discussed in the following sections.

(b) Farm Budgets

Rainfed dryland arable cropping The farm budget analysis indicated that the sites investigated are only marginally suited to development for sustained arable agriculture, in terms of yields, returns to the transmigrant's labour, and in the ability to generate sufficient income to accumulate a surplus for the future development of the transmigrant's holding. Most of the analysis indicate that, excepting the first one or two years, transmigrants can feed themselves and their families from their arable plots, but that very little cash surplus will be generated.

The analysis assume that the standard transmigration agricultural input package will be available to the transmigrant during the first three years of settlement, and that subsequently Bimas inputs will be available. Without these inputs yields will drop and transmigrants will be unable to meet their minimum food requirements.

Many of the projected crop yields are low despite the high level of inputs recommended by consultants. The high cost of the inputs can only be justified by the fact that the transmigrant must be able to feed himself and his family within one year of settlement. Even if yields can be sustained, or gradually increased, some off-farm employment is likely to be necessary in order that transmigrants have a cash income for the purchase of essential consumer goods.

The farm budget analysis show that for most of the proposed transmigration sites, farmers dependent solely upon rainfed arable cropping for their main income, are unlikely to rise much above the subsistence level except on the very best soils. For this reason all consultants proposed farm models that included tree crops grown on all or part of the 2.25ha of land in each holding that is not cleared prior to the settlers' arrival.

Tree crops The farm budgets indicate that returns per hectare and returns per manday are much higher from tree crops than from arable cropping. The proportion of total farm income generated by tree crops ranges up to 85% depending upon location. The tree crop most commonly recommended is rubber, but coffee and coconuts have also been recommended for several sites. Cloves, cocoa and a variety of fruit trees have been included in the proposed farm plans as minor tree crops. Under the physical conditions of the sites investigated all give superior returns to rainfed arable crops.

The development of tree crops has been discussed in Section 3.8.3 (a) but it is important that as most recommended tree crops do not become productive for 5-7 years after planting, the transmigrant will be dependent on his arable holding for his basic income during that time. The lack of a significant cash income from the arable plot will mean that the settler will not be able to develop this tree crop area from his own resources and it will be essential to supply the necessary inputs on credit.

Rainfed wetland arable cropping Consultants calculated farm budgets for a farm model in which the holding size is 2.25ha with all the arable land devoted to wetland crops. This showed that at full production, returns to the transmigrant from this wetland model are lower than for a 3.5ha holding using a farm model that includes arable and tree crops. This is due to the smaller holding size. However, the wetland farm model has a number of advantages.

Provided land clearing and drainage have been carried out satisfactorily, the returns to the farmer will be higher in the early years than from rainfed arable crops, the transmigrant will become self sufficient more rapidly and credit requirements reduced. Production from rainfed sawah is more assured even during years of adverse climatic conditions and it is possible to obtain acceptable yields from rainfed sawah even if the recommended inputs are not available.

(c) Cost effectiveness of farm models

The original decision to concentrate the transmigration programme on areas suitable for the standard form of development was, in part, due to the fact that in terms of per family settled, it appeared to be a low cost method of transmigration.

Although in terms of initial land clearing and settlement it is a low cost model, considerable additional investment will be required to develop the tree crop holding, if the transmigrants are to achieve a level of living much above subsistence. For example, Clyde Surveys have estimated that total development costs for the Hanjalipan sites based on the rainfed arable/tree crop model will be US$ 12,500 per family, and if physical and price contingencies are taken into consideration the costs increase to about US$ 17,000 per family. This contrasts with the Euroconsult cost estimates for developing the rainfed sawah model at Kurik/Kumbe SKP B, of US$ 7,150 per family. Thus on the poor soils of parts of Sumatera and Kalimantan the model is likely to prove expensive, if self- sustaining agricultural development is to be achieved.

(d) Economic Feasibility Studies

In the 5 SKPs studied, 3 basic farm models were considered. In Central Kalimantan the upland arable/tree crop model was studied by Clyde Surveys. In Irian Jaya, Euroconsult analysed two farm models, one based on rainfed sawah on land requiring major drainage works. The holding comprised 2.0ha of rainfed wetland and a 0.25ha houselot. The second was based on a 0.25ha houselot, 1ha wetland arable land, 1ha dryland and 1ha reserve land.

All the above studies indicate that the economic returns to the nation are low. However other factors, such as GOI objectives of encouraging regional development, have to be taken into account when assessing the overall viability of the programme.

The estimated Economic Internal Rate of Return (EIRR) for the three farm models studied are:

	E I R R (%)
Upland arable, tree crops	7.3
2ha rainfed wetland	7.0
1ha wetland arable/1ha dryland arable/1ha reserve	7.0

(e) Estimated Development Costs

The consultants' cost estimates for developing the transmigration sites studied at Phase III have been tabulated and are presented in Table 3.7. It can be seen that a number of consultants who were not required to submit economic feasibility studies only prepared cost estimates for construction of the settlement, and did not include estimates for mobilization, agricultural supplies and planting material. It will be noted that the construction cost estimates for most of the Sumatera sites range between US$ 2,000 and US$ 3,500 per family for the development of mainly dryland arable/tree crop holdings. For the two Sumatera sites for which full cost estimates were prepared, average cost per family was projected to be between US$ 7,500 and US$ 8,500.

The Kalimantan sites for which full cost estimates were prepared indicate that development costs are likely to be considerably higher than in Sumatera, if self-sustaining agricultural development is to be achieved. This is due mainly to the poorer physical conditions of the Kalimantan sites, and consequently the need for much larger quantities of agricultural inputs.

It will be noted that for two sites (Kumai C and Nangabulik D), it has not been possible to make an assessment of development costs, as the reports only contain cost estimates for land clearing and road construction. The cost estimates presented for the Nangatayap and Sukadana sites are considered to be gross overestimates, due mainly to unrealistically high cost estimates for road construction. This was pointed out in the review of the draft Phase III reports, but the consultants chose not to modify their figures.

The estimates for the sites in Seram and Irian Jaya indicate that these are not particularly high cost developments, even though the Kurik/Kumbe and Pasahari sites will require drainage and flood protection measures. In addition the wetland model proposed for the Kurik/Kumbe site provides for a much higher settlement capacity, thus lowering development costs per family, and providing a farming system preferred by the average Javanese transmigrants.

Table 3.7 Estimated Development Costs for SKPs Studied at Phase III in the SFSE '80 Programme

S K P	Type of Report	Type of Development Proposed			Estimated No. KK to be settled	Total Estimated Development Cost ($Rpx10^6$)	Total Estimated Development Cost / KK		Remarks
		Dryland (ha)	Wetland (ha)	Tree Crop (ha)			$Rpx10^3$	US$	
1. Lipat Kain XIb/A Riau	Final	1.25 (1,339)	-	2.25 (2,410)	1,071	2,234	2,086	3,338	Only construction costs
2. Lipat Kain XIb/C Riau	Final	1.25 (1,658)	-	2.25 (2,984)	1,326	2,964	2,235	3,576	Only construction costs
3. Lipat Kain XIb/D Riau	Final	1.25 (1,506)	-	2.25 (2,711)	1,205	1,698	1,409	2,254	Only construction costs
4. Lipat Lain XIb/G Riau	Final	Full Phase III report not completed, due to forestry constraint.							
5. Lipat Kain XIb/H Riau	Final	1.25 (1,950)	-	2.25 (3,510)	1,560	1,560	1,000	1,600	Only construction costs
6. Bangkinang X/B Riau	Final	1.25 (1,381)	-	2.25 (2,486)	1,105	3,753	3,397	5,435	Only construction costs
7. Bangkinang X/D Riau	Final	1.25 (769)	-	2.25 (1,384)	615	2,394	3,893	6,229	Only construction costs
8. Lembah Liam I/A South Sumatra	Final	1.25 (1,554)	-	2.25 (2,797)	1,243	1,851	1,489	2,382	Only construction costs
9. Lembah Liam I/A1 South Sumatra	Final	a. 0.25 b. 1.25 (810)	1.0 (620)	1.5 2.25 (2,109)	(620 Wetland) (524 Dryland) (1,144)	2,213	1,934	3,094	Only construction costs
10. Lembah Liam I/A2 South Sumatra	Final	a. 0.25 b. 1.25 (1,602)	1.0 - (221)	1.5 2.25 (3,115)	(221 Wetland) (1,237 Dryland) (1,458)	1,486	1,019	1,630	Only construction costs

Table 3.7 (cont'd)

S K P	Type of Report	Type of Development Proposed			Estimated No. KK to be settled	Total Estimated Development Cost ($Rpx10^6$)	Total Estimated Development Cost / KK		Remarks
		Dryland (ha)	Wetland (ha)	Tree Crop (ha)			$Rpx10^3$	US$	
11. Klingi IV/C South Sumatra	Final	a. 0.25 b. 0.25 c. 0.25 (437)	1.0 1.0 2.0 (1,995)	1.5 1.0 - (2,178)	(1,350 Wetland+rubber) (153 Wetland + coffee) (246 Wetland) 1749	2,489	1,423	2,277	Only construction costs
12. Sukadana X/A West Kalimantan	Final	1.25 (1,324)	-	2.25 (2,383)	1,059	11,011	10,397	16,635	Only construction costs
13. Nanga Tayap XIII/A West Kalimantan	Final	1.25 (1,484)	-	2.25 (2,671)	1,187	10,401	8,762	14,019	Only construction costs
14. Nanga Tayap XIII/B West Kalimantan	Final	1.25 (1,279)	-	2.25 (2,302)	1,023	8,592	8,398	13,437	Only construction costs
15. Kumai IXa/C Central Kalimantan	Final	1.25 (865)	-	2.25 (1,557)	692	Data inadequate to make assessment (Cost of land clearing + roads $2,001/family)			
16. Hanjalipan VI/C Central Kalimantan	Final	a. 1.25 b. 0.25 (793)	- 1.0 (470)	2.25 2.25 (2,273)	(540 Dryland) (470 Wetland) (1,010)	9,009	8,920	14,272	
17. Hanjalipan VI/D Central Kalimantan	Final	1.25 (788)	-	2.25 (1,418)	630	5,643	8,957	14,331	
18. Hanjalipan VI/G Central Kalimantan	Final	1.25 (1,825)	-	2.25 (3,285)	1,460	12,048	8,252	13,203	
19. Nangabulik XI/D Central Kalimantan	Final	1.25 (1,369)	-	2.25 (2,464)	1,095	Data inadequate to make assessment (Cost of land clearing and roads $2,068/family)			

Table 3.7 (cont'd)

S K P	Type of Report	Type of Development Proposed			Estimated No. KK to be settled	Total Estimated Development Cost ($Rpx10^6$)	Total Estimated Development Cost / KK		Remarks
		Dryland (ha)	Wetland (ha)	Tree Crop (ha)			$Rpx10^3$	US$	
20. Pamukan II/A South Kalimantan	Draft	1.25 (1,406)	-	2.25 (2,531)	1,125	7,481	6,650	10,640	
21. Pamukan II/B South Kalimantan	Draft	1.25 (1,438)	-	2.25 (2,588)	1,150	7,418	6,451	10,322	
22. Pasahari XI/B+C Malukus	Final	1.25 (1,258)	-	2.25 (2,264)	1,006 (Includes 50 fishing families)	6,114	6,078	9,725	
23. Kurik XXIVa/B Irian Jaya	Final	0.20 (807)	2.0 (6,456)	-	3,228	17,482	5,416	8,666	
24. Jagebob XXIVc/I Irian Jaya	Final	1.25 Plus 1.0 dryland or wetland (Total 5,041)	1.0	-	1,551	9,596	6,187	9,899	

Notes : Dryland area includes 0.25 ha houselot.

: Rupiah converted to US dollars at rate US$1 = Rp 625 as this rate used by consultants in their reports.

: Under type of development proposed, the figures in brackets indicate total area to be developed for the land use proposed.

3.14 TENDER DOCUMENTS

Objectives

PHASE II	PHASE III
No input required	a) Preparation of tender documents for land clearing and road construction b) Presentation of cost estimates for land clearing, road construction and water supplies

Methods

PHASE II	PHASE III
-	Use of standard documents where applicable, with particular clauses or amendments to standard clauses inserted where applicable

3.14.1 Results

Because of the large amount of standard documentation available, several consultants condensed their tender document submissions and instead of submitting full documentation made reference only to where this could be found.

Table 3.8 sumarises the actual documents submitted by consultants who carried out Phase III studies.
In general these reduced submissions were acceptable , especially as in several cases the contracts for land clearing and road construction were let before the consultant had completed his studies and the contract documents submitted at a later date by the consultant were not used.

Unit rates for land clearing and roadworks varied widely between consultants and provinces. Unit rates for roadworks are presented in Table 3.9 ; rates for land clearing have been given in Table 3.6.

3.14.2 Observations

Consultants, under the new Phase III A Terms of Reference, are now asked to review the available standard documents and prepare particular additions and modifications. Only estimated quantities are now required for roadworks, as the consultants are not required to prepare full designs and working drawings.

Table 3.8 Tender Documents Submitted by Consultants

	Jururancang	ENEX	Halcrow Fox	China Engineering	Clyde Surveys	Kampsax	Black and Veatch	D H V	Euroconsult
1. General Conditions of Contract	*	*	*	Yes	No	No		No	No
2. Technical Specifications	Yes	Yes	Yes	Yes	Yes	**		**	Yes
3. Bid Schedule + Schedule of Rates and Prices	Yes	Yes	Yes	Yes	Yes	***		Yes	Yes
4. Invitation to Bid	No	No	No	Yes	No	No		No	No
5. Instruction to Bidders	No	No	No	Yes	No	No		No	No

* Consultant has referred to a particular set of General Conditions of Contract to be used.

** Road specifications only.

*** For roads only.

Table 3.9 Unit rates for road construction used by SFSE '80 consultants

Consultant	Province	Cost Rp 1000		
		Gravel pavement per m^3	Timber bridge 5 x 4m	1m x 1m timber culvert per m length
Jururancang	Riau	9	900	32
Enex	Riau	8.9	400	47.5
Halcrow Fox	S. Sumatra	8	7680	60
China Engineering	W. Kalimantan	37	9740	217
Clyde Surveys	C. Kalimantan	6.3	4250	45
Kampsax	C. Kalimantan	6.4	3700	17
Black and Veatch	S. Kalimantan	-	-	-
D H V	Maluku	4.5	-	60
Euroconsult	Irian Jaya	3.2	-	100

4. THE FUTURE PROGRAMME

4.1 SETTLEMENT TARGETS

The target for Repelita IV, the 1984-1989 development period, is the settlement of approximately 600,000 families in large settlements of 2,000 families each, the KBLK programme. In theory, this will mean planning for 300 SKPs but in practice the number will be higher as SKPs do not always hold 2,000 families. The planning for most of the targeted number of SKPs will be undertaken by foreign and Indonesian consultants, partly financed from a World Bank loan, Transmigration III.

The Trans III programme is discussed below. Any shortfall in planning will necessitate further studies but no information is available about these at present.

4.2 TRANS III

The objectives and benefits of the Project Preparation component of the Trans III Project are given in the World Bank Staff Appraisal Report 1982 as follows:

"The major objective of the proposed project would be to improve the quality of transmigration settlements. Locating settlements in areas with relatively good agricultural potential would benefit the nation by increasing the agricultural productivity in transmigration areas and reducing costs associated with the rare failed settlement or the more frequent unproductive plots on areas with otherwise acceptable risks. Proper site evaluation would have additional benefits to the nation by reducing soil erosion and protecting watershed and forest resources. Greater lead time and improved planning would reduce costly delays in implementation and lessen the hardships faced by migrants as a result of poor agency coordination. The project would also facilitate national development objectives by promoting large scale movement and laying the groundwork for further programme expansion.

Although initially expensive because of improved planning procedures and the infusion of expatriate manpower, the project would lead to increased cost efficiency by supporting training and formalizing the transfer of authority to local firms. It would also reduce waste associated with delays, duplication and selection of unsatisfactory sites."

As part of the Project Preparation component of Trans III DITADA would:

- contract domestic aerial photography firms to produce air photos and 1:20,000 photo mosaics for all sites;
- engage ten expatriate firms with domestic associates for a period of two years to undertake site selection and evaluation and assess the long-range development potential of the areas in which they work;
- employ local consultants to complete detailed village design for 500-750 villages;
- engage expatriate technical assistants for six provincial planning units to supervise and assist domestic consultants;
- maintain and extend the existing consultant advisory group to aid DITADA with supervising the consulting firms, screening sites and air photos, providing support for the provincial planning units, and

assisting training and institutional development; provide financial assistance for monitoring and evaluation of the impact of agency policies.

Domestic consulting firms would be developed by :

- soliciting proposals for Phase IIIA work done to SFSE standards from the most capable domestic firms, and supporting this work with technical advice and supervision from the regional advisers;
- requiring that the proposals of the ten expatriate firms be drawn up in association with their domestic counterparts and that workplans indicate the training to be provided and the degree of responsibility to be transferred to the domestic associates by the end of year two;
- requiring that by year two that each expatriate firm field and supervise at least one Phase IIIA team made up primarily of domestic consultants;
- requiring that regional advisers provide periodic training and supervision to local firms undertaking detailed village design (Phase IIIB).

The number of studies to be carried out under the TRANS III programme in each province are shown in Table 4.1. The studies have been divided into 10 packages each of which will be let to a consortium of consultants, both local and foreign. It is planned that consultant teams will mobilise in mid 1983 and that the studies should be completed in a two year period.

Table 4.1 Phase II and Phase III studies to be undertaken under the Trans III Programme

Package	Province	No. of studies	
		Phase II	Phase III
A	Aceh, Riau, Jambi	25	15
B	S. Sumatera Bengkulu	26	15
C	W. Kalimantan	22	14
D	W. Kalimantan	22	14
E	C. Kalimantan	25	15
F	E. Kalimantan	22	14
G	Maluku, C. and s.E. Sulawesi	10	6
H	Irian Jaya	28	19
I	Irian Jaya	28	19
J	Irian Jaya	30	20
Total		238	151

By April 1983 contracts had been negotiated for nine of the ten packages, the exception being package G, Sulawesi and Maluku. Four contracts had been approved by Sek.Neg. and signed; the remaining five had been approved by PU, but were still awaiting formal Sek. Neg. approval.

4.3 TERMS OF REFERENCE

The Terms of Reference for all future planning studies of settlements based on the 'standard' form of development will be those published by DITADA in

October 1982 for Phase II, Phase IIIA and Phase IIIB.
The main changes from the SFSE-80 TOR have been discussed in Chapter 3.

An Advisory Manual has been prepared containing guidelines for the activities defined in the TOR. Indonesian versions of both the TOR and the Manual have been prepared. Terms of Reference for 'non-standard' forms of development have not yet been published : it is important to note that the published TOR are not all appropriate for the planning of 'non-standard' settlements at Phase III and consultants are required to specify suitable TOR for each site in their Phase II reports.

4.4 SITE SELECTION

4.4.1 Sites identified at Phase I

DITADA have identified 307 SKPs for the ten packages of consultant work to be undertaken under the Trans III programme. The actual number to be investigated is 238, but the larger number has been identified on the assumption that some will not be available or suitable for further study.

4.4.2 Aerial photography

The programme for aerial photography of the 307 sites identified for the Trans III programme is underway and the progress to May 17, 1983 is shown in Table 4.2.

Table 4.2 Aerial photography for Trans III - Progress to May 17, 1983

Package	Province	No. of SKPs	Aerial Photography		
			completed	in progress	to be flown
A	Aceh, Riau, Jambi	34	5	21	8
B	S. Sumatera Bengkulu	30	1	24	5
C	W. Kalimantan	29	8	7	14
D	W. Kalimantan	30	0	10	20
E	C. Kalimantan	33	4	10	19
F	E. Kalimantan	28	0	9	19
G	Sulawesi and Maluku	15	10	0	5
H	Irian Jaya	35	5	8	22
I	Irian Jaya	35	13	0	22
J	Irian Jaya	38	12	14	12
	Totals	307	58	103	146

4.4.3 Quality of photography

In October 1982 a memorandum (restricted circulation) was prepared commenting on the quality of photography. Quality is extremely variable from very good (complete cover, good contrast, good flight planning) to unacceptable (incomplete cover or overlap, haze or cloud cover etc). A common fault is inaccuracy of flight

index maps (flight lines misplaced or mis-numbered) so that the user needs to compile his own index. Another common fault is irregularity of flight paths, which ideally should be parallel and evenly-spaced with sidelap of specified limits. Irregular flight paths, which in extreme cases even cross each other, are extremely incovenient to the user. They generally indicate that contract specifications have not been adhered to, though photography has always been accepted even if sidelap is minimal. Prior to the implementation of the screening programme, many blocks of sub-standard photography were accepted.

Of the seven survey companies currently engaged in the programme, three companies have produced sub-standard work more consistently, but no company can be singled out for consistent quality. Inevitably, cloud cover is a general problem inherent to the region but an additional problem especially relevant in 1982, was the smoke haze caused by the prolonged dry season.

As noted in Section 5.2, SKPs are frequently located away from major features such as rivers. Generally the survey company will use such features for flight planning : flight runs commence at the river, but the photographs are not supplied as they lie outside the contract area. Wherever possible, the Advisory Group has attempted to obtain these additional photographs, to assist the consultant in base map preparation, but the contractor is under no obligation to supply them.

4.4.4 Screening of sites

The same process of screening of sites undertaken for the SFSE-80 Extension Programme is in progress for the Trans III sites. As of May 17, 1983 aerial photographs were available for only 58 sites as shown in Table 4.3.

Table 4.3 Screening of sites for the Trans III Programme, as at May 17, 1983

Package	Province	No. of sites	Suitable for Ph.II	Other sites	Reject
A	Aceh, Riau, Jambi	5	2	1	2
B	S. Sumatera Bengkulu	1	0	1	0
C	W. Kalimantan	8	7	0	1
D	W. Kalimantan	0	0	0	0
E	C. Kalimantan	4	1	2	1
F	E. Kalimantan	0	0	0	0
G	Sulawesi and Maluku	10	1	6	3
H	Irian Jaya	5	3	0	2
I	Irian Jaya	13	13	0	0
J	Irian Jaya	12	10	0	2
	Totals	58	37	10	11

Among the 37 sites listed as topographically suitable, there are at least 10 sites which are expected to be extremely marginal in terms of soils or drainage, but field studies are required to confirm this.

Other sites include those that would be unsuitable for the standard dryland model of development, but justify Phase II studies for some non-standard form of agricultural development, such as wetland rice or tree crops. In some cases the capacity for settlement may be small even as a non-standard model.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Experience gained from the SFSE-80 Programme has led to changes in the original planning process and hence to the detailed terms of reference. These have been discussed in Chapter 3 and new TOR have been published by DITADA in October 1982. These are accompanied by an Advisory Manual. Both the TOR and Advisory Manual have been produced in Indonesian and English.

The main changes in the planning process are summarised below.

Consultants also made recommendations for development and identified constraints to development: the most important of these factors which were discussed by almost all consultants are also summarised below.

5.2 THE PLANNING PROCESS

Phase I Some of the problems encountered in site selection have been discussed in Section 2.1 and the need to refine the Phase I planning is recognized by DITADA. Steps are being taken to recruit a team of advisers specifically to assist in this task.

The team will concentrate on a revision and refinement of Phase I planning through the collection of all existing natural resources data supplemented by air photo interpretation and limited field work. The results will be presented at a uniform scale of 1:250 000.

Phase II In general the work undertaken by the SFSE-80 consultants for Phase II studies was satisfactory. The level of investigation enabled meaningful decisions to be made on the suitability of the land for development and allowed the decision to be made as to whether more detailed work at Phase III was justified

Few changes have therefore been made to terms of reference for future Phase II studies, but the specifications have been altered to ensure a better distribution of observations throughout the study area. More emphasis has been given to the need to establish land status particularly in areas of production forest and the need to describe the distribution of land thought to be suited to development. More specific discussion of agricultural factors has also been requested and more emphasis has been placed on consultants providing alternative development plans and recommending suitable TOR for planning these non-standard developments at Phase III level.

It must be re-emphasised that no matter what farm model is envisaged the Phase II studies are an essential pre-requisite to development, in order to save both time and money. As the studies must be completed rapidly all the necessary data must usually be collected in one field visit : the interpretation of the data and preparation of reports must also be done rapidly. It is therefore essential that staff have appropriate experience.

Phase III The overall objective of Phase III studies during the SFSE-80 Programme was to produce, before a site was cleared, detailed plans at 1:5,000 scale which were to be used as a basis for land clearing and construction.

It has not proved feasible to produce plans that can be used without modification, due largely to the difficulty of producing sufficiently detailed topographic maps in forested terrain. In addition there was a continuing need to reduce costs or at least keep them to a minimum.

Consequently, methods have been changed so that a structure plan at a scale of 1:20 000 is produced prior to land clearing, whilst detailed plans at 1:5 000 scale are produced only after land clearing: the two groups of activities are referred to as Phase IIIA and Phase IIIB.

The main changes in the terms of reference are to the topographic survey specifications: much less vertical control is required in Phase IIIA than in the previous Phase III surveys and contours are only drawn at a 10m vertical interval in certain types of terrain. Slope information is derived from a dense network of direct slope measurements. These changes are accompanied by changes in the level of planning detail: Phase IIIA structure plans at 1:20 000 scale showing land allocation for various uses, in blocks for 30 to 50 families. Detailed plans showing individual holdings are only prepared at Phase IIIB, after land clearing.

Changes have also been made to the road survey and design specifications with the previous detail replaced by a simpler road alignment survey. Farm budgets are to be calculated for each SKP thought to be representative of a particular farm model and site conditions: this SKP is to be selected after consultation with DITADA on the completion of Phase II studies. Other activities remain essentially the same although the distribution of observations has been altered and the need to produce more specific agricultural proposals and timber utilisation plans is emphasised.

5.3 FACTORS AFFECTING DEVELOPMENT

All consultants are agreed on the main factors that affect development of transmigration settlements in all the sites investigated. Some, such as steep slopes, the presence of deep peat or prolonged flooding result in land being considered unsuitable for development. Others influence development within areas considered suitable for development and these are discussed briefly below.

Land availability It is self-evident that the availability of land for settlement is one of the major factors affecting development. In practice, it was not always easy to determine the status of land, that is the presence of forest and mineral concessions or other planned developments, due to conflicting claims by different agencies. It was often even more difficult to determine land availability in areas of shifting cultivation.

Consultants often obtain information on land availability from local authorities which was not always confirmed by interview with local people and vice-versa. The problem is most difficult in areas where rubber is maintained under very low management levels - so called "jungle rubber". In general consultants may establish the intensity of land use but the incorporation of used land into settlement schemes is determined by social and political factors and must remain a Government decision.

Soil fertility In all the sites investigated consultants were unanimous in their view of the very low fertility of the soils available for settlement

development. This resulted in the classification of these areas as only marginally suitable for development, that is "Land with limitations that in total are severe for sustained application of a given use: production level will be so low and the required inputs will be so high that the use of this land will be only marginally justified" (FAO, 1976).

Consultants were also agreed on the high levels of inputs required for successful cropping on these soils. Levels of fertiliser and lime recommended were very much higher than those supplied to transmigrants in the present "package" of fertilisers. In particular, many consultants emphasised the need to provide a more balanced fertiliser input.

The farm model The SFSE-80 Programme was aimed primarily at the selection and planning of settlement sites for the "standard" form of development, that is a farm model based on rainfed arable cropping with a holding size of 3.5ha. A large number of sites investigated by consultants could not be recommended for this "standard" development, due to the presence of steep slopes or adverse drainage (See Section 2.4 and 2.5). Nevertheless many of these sites could be developed if there was a greater flexibility in the choice of farm model. Clearly development using other farm models, the so-called "non-standard"development would mean that factors such as settler support and provisions of drainage, or irrigation works would need to be considered. Difficulties associated with these factors, particularly higher costs, might be more than offset by the more integrated development of an area as a whole. It must be emphasised though that planning for "non-standard" development must be associated with changes in construction contracts and future support to settlers. There is no point in planning a sophisticated drainage system if the land clearing and construction contract makes no provision for construction of drainage works, as was the case in SKP Kumbe in Irian Jaya.

Land clearing All consultants who discussed the subject expressed concern about the adverse effects of mechanical clearing. They suggested that mechanical clearance disturbs the top soil in which most of the available nutrients are held. It may also result in soil compaction and through careless windrowing lead to an irregular distribution of top soil, difficulties in establishment of the cover crop and hence to accelerated erosion. Consultants favoured land clearing using chain saws or some form of semi-mechanical clearing causing a minimum of soil disturbance, allowing more uniform distribution of burnt material and giving a subsequent improvement in crop yields. Many consultants also considered that manual clearing would be cheaper.

Water supply A major difficulty in the Phase II studies was to adequately predict the availability of domestic water supplies. Most consultants simply assumed that water would be available from shallow ground water. At Phase III this assumption was sometimes shown to be unjustified and consultants suggested some form of water storage from roof catchment or small dams. Pumping from deeper groundwater provides a safe alternative in some areas but deep ground water studies cannot be meaningfully undertaken for individual SKPs. It is recommended that special water resource investigations be commissioned on a regional basis with southern Irian Jaya as a high priority area.

5.4 CONCLUSIONS

The SFSE-80 Programme has meant that site selection and planning of many transmigration settlements has been systematically done. The methodology for Phase II has proved successful and based on the experience gained the Phase III methods have been modified. The very large programme of studies planned for Repelita IV should ensure that future settlements are firmly based on adequate plans.

Sound planning based on appropriate principles can ensure that settlements are on land suitable for the planned use. Increasing concern with the agricultural development of the settlements is reflected in the emphasis now given to agricultural studies in the future programme of work.

Planning is only the first stage of the develoment of the settlements. Proper use must be made of the plans and there have been sites where plans have not been fully utilised, which reflects the need for closer co-operation between planners and implementers. Recently announced institutional changes should help to ensure their co-operation, but difficulties will remain so long as the interval between site investigation and planning remains as short as at present. This lack of lead time is probably one of the majors reasons for many of the problems encountered in the implementation of the transmigration programme.

Appendix 1

REPORTS AND TECHNICAL NOTES

APPENDIX 1

REPORTS AND TECHNICAL NOTES PREPARED BY THE ADVISORY GROUP

(i) Inception report

(ii) Monthly reports

(iii) Quarterly reports, including as appendices
- Visit reports
- Technical memoranda
- Reviews of Phase II and Phase III reports
- Progress of Phase IIIA and Phase IIIB studies
- Pre-phase II air photo screening reports

(iv) Mid-term report

(v) Final report

(vi) Physical planning for transmigration, Terms of Reference-Phase II, Phase IIIA and Phase IIIB in English and Indonesian

(vii) Advisory Notes

(viii) Advisory Manual, Guidelines for Physical Planning for Transmigration Phase II, in English and Indonesian

(ix) Advisory Manual, Guidelines for Physical Planning for Transmigration Phase IIIA, in English and Indonesian

(x) Manual for Planning Transmigration Settlements (PAYP)

(xi) Request for proposals for Phase II and Phase IIIA studies

(xii) Request for proposal for Phase IIIA studies from local consultants

(xiii) Project preparation for Trans III

(xiv) Proposal for World Bank participation under Trans III loan

(xv) General Atlas of SFSE sites surveyed 1981/1982 and PAYP sites surveyed 1977-1982

(xvi) Atlas of Structure Plans showing SKPs allocated to 1981/1982 SFSE programme

(xvii) PAYP Programme 1977-1982, Area Location Atlases
- Book 1 Sumatera
- Book 2 Kalimantan, Nusa Tenggara
- Book 3 Sulawesi, Maluku, Timur, Irian Jaya

(xviii) Report on library and information advisory visit

(xix) Possibility of wood for energy on a national basis

(xx) Information systems for DITADA

(xxi) Notes of standard documents on land clearance

(xxii) Aspects of agricultural development in parts of Nusa Tenggara

(xxiii) DITADA training and manpower needs (discussion paper)

(xxiv) Substitution of charcoal for kerosene as a domestic cooking fuel

(xxv) A concept for timber disposal in connection with the establishment of transmigration settlements, plantations and other activities which require large scale land clearing operations

(xxvi) Decisions required to utilize the biomass for Trans III areas

Appendix 2

PHASE II RESULTS

APPENDIX 2 RESULTS OF PHASE II STUDIES

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
a	Jururancang Bersekutu	D.I. Aceh	Kutanibong Vc/A	11 Oct. 1982	-	Reject; deep peat and flooding
			Keudeteunom Vb/C	7 Jul. 1982	-	Reject; steep slopes
			Keudeteunom Vb/D	11 Oct. 1982	-	Reject; land use and steep slopes
			Padang Mancang XVI/A	16 Aug. 1982	-	Reject; peat swamp
			Padang Mancang XVI/B	7 Jul. 1982	-	Reject; peat swamp
		Riau	Lipat Kain XIc/A	14 Sep. 1982	1,274	Standard rainfed model; part rejected because of steep slopes
			Lipat Kain XIc/B	21 Aug. 1982	1,963) 1,896)	Standard rainfed model; 2 SKPs now designated G and H
			Lipat Kain XIc/C	16 Aug. 1982	1,981) 1,744)	Standard rainfed model; 2 SKPs now designated C and D
			Lipat Kain XId/E	11 Sep. 1982	1,876	Wetland/tree crop model (3·5 ha/KK); part rejected because of land use and flooding.
			Lipat Kain XId/F	14 Sep. 1982	1,821	Standard rainfed model; part rejected because of steep slopes.
			Kota Tengah XIII/A	21 Sep. 1982	1,940 1,324 1,512	3 SKPs all wetland (2·25ha/KK)
			Kota Tengah XIII/E	11 Oct. 1982	-	Reject; peat swamp

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
a. (cont.)	Jururancang Bersekutu	Riau	Pasir Pangarayan XIIb/I	24 Jan. 1983	1,429 1,227 1,295	3 SKPs; 1,733 KK standard rainfed model; 2,218 KK wetland/tree crop model (3·5ha/KK); both wetland and dryland proposed in all 3 SKPs. Part rejected because already allocated to neighbouring SKP.
			Pasir Pangarayan XIIb/J	24 Jan. 1983		
			Tebing Tinggi XIII/D	1 Nov. 1982	1,473	Wetland/tree crop model (3;5ha/KK); part rejected because of steep slopes and flooding.
			Tebing Tinggi XIII/E	30 Dec. 1982	1,140 1,703	2 SKPs using standard rainfed model; likely that imperfectly drained land will have to be used for houselots.
			Bangkinang X/F	1 Nov. 1982	-	Reject; poor drainage; no land for houselots.
b.	ENEX/ Perentjana Djaja	Riau	Bangkinang X/B	3 Sep. 1982	2,210	Standard rainfed model; part rejected because of steep slopes.
			Bangkinang X/D	3 Sep. 1982	2,015	Standard rainfed model; part rejected because of flooding/water logging.
			Bangkinang X/E	24 Feb. 1983	800	Standard rainfed model; part rejected flooding and poor drainage.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
b. (cont.)	ENEX/ Perentjana Djaja	Riau	Kota Lama XIIIb/A Kota Lama XIIIb/B	3 may 1983 3 May 1983	655] 984	Recommended for development as a single SKP; 1,114 KK using wetland/dryland model (2·25ha/ KK) and 525 KK using standard rainfed model; parts rejected because deep peat swamp and flooding.
			Kota Tengah XIII/B	3 May 1983	1,410	Wetland model (2·25 ha/KK); part rejected because of flooding.
			Kota Tengah XIII/C	3 May 1983	1,060	Standard rainfed model; part rejected because of flooding and waterlogging
			Kota Tengah XIII/D	3 May 1983	[1,655 1,610]	2 SKPs using wetland model (2·25 ha/KK)
			Langgam VIa/B	3 May 1983	[1,930 1,135]	2 SKPs using standard rainfed model
			Sungai Pagar XId/B	3 May 1983	925	195 KK standard rainfed model; 730 KK wetland model (2·25 ha/ KK); suggested combination with Lipat Kain F; remainder rejected because of peat swamp and land use.
		Bengkulu	Tais IX/F	17 Oct. 1982 *	600	For KKLK;standard rainfed model;remainder rejected because of steep slopes, peat swamp and land use.

* Draft Phase II (final report still awaited)

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
b. (cont.)	ENEX/ Perentjana Djaja	Bengkulu	Muko Muko I/C	28 Oct. 1982 *	1,240	Standard rainfed model; remainder rejected because of steep slopes and land use.
c.	Halcrow Fox & Associates	South Sumatera	Lembah Liam I/A	20 Apr. 1982	4,000	3 SKPs using standard rainfed model; part rejected because of land use.
			Lembah Liam I/B	15 Apr. 1982	1,400	500 KK standard rainfed model; 900 KK wetland model (2·5ha/KK); part rejected because of land use and steep slopes.
			Lembah Liam I/C	15 Apr. 1982	2,050	1,300 KK standard rainfed model; 750 KK wetland model (2·5ha/KK); part rejected because of steep slopes.
			Lembah Liam I/D	15 Apr. 1982	2,100	Wetland/tree crop model (2·5 ha/KK); some land to PAYP.
			Lahat V/C	15 Apr. 1982	-	Reject : land use and slopes; possible 500 KK for D.G. Estates.
			Klingi IV/C	20 Apr. 1982	1,850	Wetland/tree crop model (2·5 ha/KK); part rejected because of peat swamp.

* Draft Phase II (final report still awaited)

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
c. (cont.)	Halcrow Fox & Associates	South Sumatera	Pematang Panggang XXII/E	28 Jan. 1982	-	Reject; land use, flooding; small areas may be suitable for incorporation into neighbouring SKPs.
			Pematang Panggang XXII/F	20 Apr. 1982	3,200	2 SKPs; wetland/tree crop model (2·5ha/KK) plus extra land for wetland.
			Tebing Tinggi VI/A	15 Apr. 1982	-	Reject; conservation forest and steep slopes.
			Tebing Tinggi VI/B	15 Apr. 1982	1,220	Standard rainfed model; recommended decision for Phase III awaits survey of neighbouring SKPs; part rejected because of conservation forest.
d.	China Engineering	West Kalimantan	Ketapang XII/A	13 Apr. 1982	-	Reject; peat swamp.
			Ketapang XII/B	13 Apr. 1982	-	Reject; peat swamp.
			Sukadana X/A	6 Apr. 1982	1,300 1,300	2 SKPs; one standard rainfed model, the other mostly wetland (2·25ha/KK).
			Sukadana X/B	6 Apr. 1982	650	Standard rainfed model; part rejected because of steep slopes.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
d. (cont.)	China Engineering	West Kalimantan	Nangatayap XIII/A	13 Apr. 1982	1,550	Standard rainfed model; part rejected because of steep slopes.
			Nangatayap XIII/B	13 Apr. 1982	1,400	Standard rainfed model; part rejected because of steep slopes.
			Sintang XVIII/J	6 Apr. 1982	2,000	Standard rainfed model; development dependant on 1,700 KK additional local shifting cultivators; part rejected because of land use.
			Sanggau XVI/C	6 Apr. 1982	-	Reject; land use and steep slopes.
			Sekadau XV/B	28 Apr. 1982	-	Reject; steep slopes and land use.
			Sekadau X/C	28 Apr. 1982	-	Reject; land use; possible development of small area (about 590 KK).
			Sekadau X/D	28 Apr. 1982	-	Reject; steep slopes and land use;
			Sekadau X/E	28 Apr. 1982	-	Reject; steep slopes and land use
			Nanga Merekai XVIIa/A	28 Apr. 1982	8,040	Restructured as 5 SKPs using standard rainfed model; some land rejected because of land use.
			Nanga Merekai XVIIa/B	28 Apr. 1982		
			Nanga Merekai XVIIa/C	28 Apr. 1982		

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
d. (cont.)	China Engineering	West Kalimantan	Nanga Merekai XVIIa/D	28 Apr. 1982	-	Reject; steep slopes and land use.
e.	Clyde Survey Ltd.	West Kalimantan	Sanggau XVI/B	16 Apr. 1982	-	Reject; land use and steep slopes.
			Sanggau XVI/D	28 Jan. 1982	-	Reject; land use and steep slopes.
			Sanggau Ledo III/C	30 Mar. 1982	-	Reject; steep slopes, flooding and land use.
			Sanggau Ledo III/D	20 Jan. 1982	-	Reject; steep slopes and land use.
		Central Kalimantan	Kumai IXa/C	1 Sep. 1981	1,500	Standard rainfed model; part rejected because of poor soils, salinity and flooding.
			Kumai IXa/C (extension)	16 Apr. 1982	530	Standard rainfed model; part rejected because of poor soils and swamp.
			Kumai IXb/E	30 Mar. 1982	-	Reject; production forest, land use;could have potential for 1,380 KK if forestry resolved.
			Kumai IXb/F	30 Mar. 1982	-	Reject; land use, production forest and steep slopes; could have potential for 740 KK if forestry resolved.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
e. (cont.)	Clyde Survey Ltd.	Central Kalimantan	Kumai IXb/G	30 Mar. 1982	-	Reject; production forest, land use and steep slopes; potential 12,000ha for tree crops if forestry resolved.
			Hanjalipan VI/C	28 Jan. 1982	4,300	3 SKPs; standard rainfed model (later redesigned as two SKPs for Phase III, C and D).
			Hanjalipan VI/E (formerly D)	28 Jan. 1982	1,600	Standard rainfed model; part rejected because of steep slopes, production forest and land use.
			Hanjalipan VI/G	21 Nov. 1982	1,840	Standard rainfed model; part rejected because of very poor soils, production forest and steep slopes.
			Hanjalipan VI/H	16 Apr. 1982	1,100	Standard rainfed model; part rejected because of production forest, swamp and scattered nature of suitable land.
f.	Kampsax International	Central Kalimantan	Buntok I/A	4 Aug. 1982	-	Reject; peat swamp, very poor podsolic soils.
			Buntok I/B	18 Feb. 1982	-	Reject; peat swamp, very poor podsolic soils.
			Buntok I/C	6 May 1982	-	Reject; peat swamp.
			Buntok I/D	6 May 1982	-	Reject; peat swamp, very poor podsolic soils.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
f. (cont,)	Kampsax International	Central Kalimantan	Nangabulik XI/A	4 Aug. 1982	-	Reject; steep slopes and scattered nature of suitable land.
			Nangabulik XI/B	4 Aug. 1982	2,340	2 SKPs using standard rainfed model; part rejected because of steep slopes and production forest.
			Nangabulik XI/C1	8 Mar. 1983	2,870	2 SKPs using standard rainfed model; part rejected because peat swamp, steep slopes and production forest.
			Nangabulik XI/D	7 Jul. 1982	1,468	Standard rainfed model; part rejected because of slopes and land use.
			Nangabulik XI/H	8 Mar. 1983	1,855	Standard rainfed model; part rejected because of production forest and swamp land.
			Tumbangsamba V/A	4 Aug. 1982	-	Reject; steep slopes,production forest.
			Tumbangsamba V/B	4 Aug. 1982	-	Reject; steep slopes, production forest.
			Tumbangsamba V/C	15 Apr. 1982	-	Reject; steep slopes, production forest.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
f. (cont.)	Kampsax International	Central Kalimantan	Tumbangsamba V/D	5 Aug. 1982	-	Reject; steep slopes, production forest.
			Tumbangsamba V/D1	15 Apr. 1982	-	Reject; steep slopes, production forest.
			Tumbangsamba V/E	1 Jul. 1982	-	Reject; steep slopes, production forest.
			Tumbangsamba V/F	1 Jul. 1982	-	Reject; steep slopes land use.
			Muara Teweh XIX/A	28 Jan. 1982	-	Reject; steep slopes, production forest and land use.
			Muara Teweh XIX/B	28 Jan. 1982	-	Reject; steep slopes, production forest and land use.
g.	Black and Veatch Int.	Central Kalimantan	Dusun Timur II/A	23 Feb. 1982	-	Reject; very poor soils and land use.
			Teweh Timur III/A	17 Mar. 1982	1,690	Standard rainfed model; part rejected because of steep slopes and forestry.
			Teweh Timur III/B	3 Feb. 1982	2,735	Standard rainfed model; part rejected because of steep slopes and forestry.
			Teweh Timur III/C	2 Aug. 1982	855	
			Teweh Timur III/E	17 Mar. 1982	925	
			Sampit VII/A	4 Aug. 1982	-	Reject; deep peat swamp.
			Sampit VII/C	4 Aug. 1982	-	Reject; deep peat swamp.
			Sampit VII/D	4 Aug. 1982	-	Reject; deep peat swamp.
			Sampit VII/E	23 Feb. 1982	-	Reject; deep peat swamp.
			Sampit VII/F	23 Feb. 1982	-	Reject; deep peat swamp.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
g. (cont.)	Black and Veatch Int.	South Kalimantan	Pamukan II/A	28 Jan. 1982	1,375	Standard rainfed model; part rejected because of land use, swamp and steep slopes.
			Pamukan II/B	20 Jan. 1982	1,490	Standard farm model; part rejected because of land use, steep slopes and swamp.
			Pamukan II/D	31 May 1982	-	Reject; land use, steep slopes.
			Sungai Kupang IV/C	31 May 1982	1,295	Standard rainfed model; part rejected because of shallow soils.
h.	Consulint Interna-tional	Central Sulawesi	Kolonodale IX/A	30 Jun. 1981*	-	Reject; ulttrabasic soils (report inconclusive)
			Kolonodale IX/B	30 Jun. 1981*	-	Reject; swamp, steep land, ultrabasic soils (report inconclusive).
			Kolonodale IX/D	24 Sep. 1981*	-	Report inconclusive.
			Mamo X/A	24 Sep. 1981*	Unknown	Report inconclusive.
		East Kalimantan	Tanjung Redeb VIII/A	28 May 1982*	Unknown	Report inconclusive.
			Tanjung Redeb VIII/E	23 Jun. 1982	-	Reject; steep slopes and land use.
			Tanjung Redeb VIII/F	22 Mar 1983	2,853	Wetland/tree crop model (3.5 ha/KK; part rejected because of steep slopes and land use.

* Draft Phase II report (final report still awaited).

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
h. (cont.)	Consulint International	East Kalimantan	Muara Ancalong XII/A	22 May 1982	2,416	Standard rainfed model; part rejected because of land use and steep slopes.
			Muara Ancalong XII/B	12 Apr. 1982 *	-	Reject; very poor soils and land use.
			Muara Ancalong XII/C	29 May 1982	1,623	Standard rainfed model; part rejected because of steep slopes and land use.
			Muara Ancalong XII/D	22 May 1982	-	Reject; steep slopes.
			Muara Ancalong XII/E	31 May 1982	4,250	2 SKPs using standard rainfed model; part rejected because of steep slopes and land use.
i.	D. H. V.	South Sulawesi	Kaluku VII/A	9 Mar. 1982	-	Reject; flooding; land use.
			Kaluku VII/B	17 Aug. 1982	-	Reject; flooding; swamp land.
			Kaluku VII/C	17 Aug. 1982	-	Reject; flooding; swamp land.
			Pasang Kayu XVII/C	1 Jun. 1982 +	-	Reject; waterlogging, small size and scattered nature of potentially suitable areas.
		South Sulawesi and Central Sulawesi	Pasang Kayu XVII/B	9 Mar. 1982 +	-	Reject; swamp land, divided by provincial boundary.
		South-East Sulawesi	Kambara XIV/C (formerly SKP B)	9 Mar. 1982	1,600	Standard rainfed model; part rejected because of land use.

* Draft Phase II report (final report still awaited)
\+ API report only.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II + received	NO. KK	Status
i. (cont.)	D. H. V.	Maluku	Pasahari XI/A	17 Aug. 1982 +	-	Reject; nature reserve, forest concession.
			Pasahari XI/B) Pasahari XI/C) Pasahari XI/D)	1 Jun. 1982	6,091	4 SKPs; wetland(coconut model/ 3;5ha); some areas rejected because of flooding and peat swamp.
			Pasahari XI/E	26 Apr. 1982 +	-	Reject; swamp land.
			Dataran Kao XVI/A	9 Mar. 1982	400	Standard rainfed model; parts rejected because of land use and flooding.
			Dataran Weda XVII/B	2 Apr. 1982 +	-	Reject; very poor soils and access.
			Makariki X/A	2 Apr. 1982 +	-	Reject; steep slopes.
j.	NEDECO	Irian Jaya	Sarmi XIIIb/A	2 Sep. 1982 +	-	Reject; swampland.
			Sarmi XIIIb/B	2 Sep. 1982 +	-	Reject; swampland.
			Sarmi XIIIb/C	2 Sep. 1982 +	-	Reject; swampland and steep slopes.
			Sarmi XIIIb/D	14 Sep. 1982 +	-	Reject; swampland.
			Sumyanggar XIIb/A	1 Oct. 1982 +	-	Reject; swampland.
			Sumyanggar XIIb/B	27 Oct. 1982 +	-	Reject; swampland and fragmented nature of remaining suitable areas.
			Sumyanggar XIIb/C	21 Apr. 1983	-	Reject; swampland, flooding.
			Sumyanggar XIIb/D	21 Apr. 1983	1.100	Standard rainfed model; parts rejected because of swamps.

+ API report only

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
j. (cont.)	NEDECO	Irian Jaya	Pantai Timur XIVa/A	18 Apr. 1983	950	Wetland/dryland/tree crop model (3·5ha/KK); part rejected because of steep slopes and swampland.
			Pantai Timur XIVa/B	18 Apr. 1983	-	Reject; swampland, steep slopes and land use.
			Pantai Timur XIVa/C	7 Oct. 1982 +	-	Reject; steep slopes, land use and swampland.
			Pantai Timur XIVa/E	7 Oct. 1982 +	-	Reject; steep slopes, swampland and fragmented areas suitable for development.
			Apauwar XIIIa/A	7 Apr. 1983	1,830	Wetland/dryland/tree crop model (3·5ha/KK); part rejected because of swampland and fragmented nature of other suitable land.
			Waren XIIa/A	28 Jan. 1983 +	-	Reject; swampland. Small area transferred to Waren B for Phase II study.
			Waren XIIa/B	30 Apr. 1983	-	Reject; swampland
			Waren XIIa/C	30 Apr. 1983	-	Reject; swampland, flooding
			Waren XIIa/D	30 Apr. 1983	-	Reject; swampland, deep peat

+ API report only.

APPENDIX 2 continued

Paket	Consultant	Province	SKP	Final Phase II received	NO. KK	Status
k.	Euroconsult	Irian Jaya	Kurik Kumbe XXIVa/B	27 Oct. 1981	2,650	Wetland model (2·25ha/KK) but will require drainage; part rejected because of flooding and swamland.
			Merauke XXIVb/C	27 Oct. 1981	-	Reject; new forest reserve.
			Merauke XXIVb/F	27 Oct. 1981	-	Reject; new forest reserve.
			Jagebob XXIVc/I	27 Oct. 1981	1,500 1,500	2 SKPs; wetland/dryland model (2;5ha/KK); part rejected because of swamland.
			Jagebob XXIVc/J	11 Feb. 1982	1,500	Wetland/dryland model (2·5ha/KK); part rejected because of flooding and swampland.
			Jagebob XXIVc/H	19 Jan. 1982	-	Reject; flooding, poor access.
			Jagebob XXIVc/K	19 Jan. 1982	-	Reject; flooding, poor access.
			Salow XXIIIa/A Salow XXIIIa/B Salow XXIIIa/C	18 June 1982	1,940 2.860	Restructured as 2 SKPs using wetland/dryland model (3·0ha/KK); part rejected because of flooding.

APPENDIX 2 (continued) RESULTS OF PHASE II STUDIES - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Phase II report received	No. KK	Status
c	Halcrow Fox	Jambi	Merlung XIIc/B	17 Feb. 1983 *	-	Reject; slopes too steep for arable farming, possibly suitable for tree crops
			Merlung XIIc/C	24 Feb. 1983 *	-	Reject; slopes too steep for arable farming, land use
			Muara Tembesi XIc/F	16 Apr. 1983 *	-	Reject; slopes too steep for arable farming
		South Sumatera	Muara Beliti III/E	14 May 1983 *	1,230	Wetland/dryland/tree crop model; part rejected because of present land use
			Tungkul Ulu XIIIb/D	11 Mar. 1983 *	460	Combine suitable area with adjacent SKP F. Areas rejected because of steep slopes
			Tungkul Ulu XIIIb/F	16 Apr. 1983 *	1,430	Standard dryland arable model
			Tungkul Ulu XIIIb/G	2 Apr. 1983 *	2,760	2 SKPs; standard dryland arable model
			Klingi IV/D	2 May 1983 *	2,610	Standard dryland arable model
			Kertapati/ Babat Toman XVI/F	14 May 1983 (API only)	-	Full Phase II study held over
			Pangpangan/ Mesuji XX/I	14 May 1983 (API only)	-	Full Phase II study held over

* Draft report only, final report not yet submitted

APPENDIX 2 (continued) - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Final Phase II received	No. KK	Status
d	China Engineering	West Kalimantan	Nangatayap XIIb/A	5 May 1983 *	490	Only 2 SPs in gross area of 4,800ha. Part rejected because of present land use and flooding. Potential increase capacity
			Nangatayap XIIb/C	8 June 1983 *	1,280	1 SKP, standard dryland arable model. Part rejected because of present land use but potential to increase capacity
			Tumbang Titi XIV/D	23 June 1983 *	1,315	1 SKP, standard dryland arable model. Part rejected because of present land use. Potential to raise capacity with wetland model
			Tintin Tengirin XXIId/B	8 June 1983 *	1,045	1 SKP of 2 SPs, standard dryland arable model. Part rejected because of swamps
			Tintin Tengirin XXIId/C	8 June 1983 *	180	Reject; swamps and land use. Limited land for 180 KK reallocated to SKP B
			Suhaid XXIIb/A	23 June 1983 *	-	Reject; present land use, poor soils
			Suhaid XXIIb/D	23 June 1983 *	-	Rejct; present land use. Limited land available for 410 KK

* Draft report, final report not yet submitted

- APPENDIX 2 (continued) - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Final Phase II received	No. KK	Status
d (cont.)	China Engineering	West Kalimantan	Duwa Petunga XVIIb/D	8 June 1983 *	-	Reject; topography, land use, suitable for tree crops
			Duwa Petunga XVIIb/X	8 June 1983 *	820	1 SKP standard dryland arable model. Part rejected because of present land use
			Duwa Petunga XVIIb/XI	23 June 1983 *	-	Reject; present land use. Limited land available for 460 KK

* Draft reprot, final report not yet submitted

APPENDIX 2 (continued) - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Phase II report received	No. KK	Status
e	Clyde Surveys	East Kalimantan	Muara Lawa XVIc/C	11 Apr. 1983	- -	Reject; poor soils, steep slopes, land use. Limited land for 795 KK
			Melak XVII/A	11 Apr. 1983	-	Reject; coarse soils, steep slopes, land use
			Talisayan IX/A	18 Apr. 1983	1,605	1 SKP, standard dryland model, part rejected due to steep slopes and poor soils
			Talisayan IX/B	18 Apr. 1983	-	Reject; steep slopes, shallow soils
			Talisayan IX/C	9 May 1983	1,504	1 SKP, standard dryland model, part rejected due to shallow soils and steep slopes
			Talisayan IX/D	9 May 1983	1,060	1 SKP, standard dryland model, part rejected due to shallow soils
			Kota Bangun XIVc/E	9 May 1983 *	-	Reject; land use. Limited land for 560 KK, but very remote
			Tanjung Selor VII/A	9 May 1983 *	1,612	1 SKP, standard dryland model, part rejected due to land use
			Rantau Pulung Xa/D	16 May 1983 *	2,887	2 SKPs, standard dryland arable model
			Tepangan Xb/E	16 May 1983 *	-	Reject, steep slopes. Limited land available for 724 KK

* Draft report only, final report not yet submitted

APPENDIX 2 (continued) - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Phase II report received	No. KK	Status
f	Kampsax	Central Kalimantan	Kuala Kuayan VIa/I	24 May 1983	-	Reject, land use and slopes. 730ha of suitable land to be included in SKP J
			Kuala Kuayan VIa/J	24 May 1983	1,160	1 SKP, standard dryland arable model
			Kuala Kuayan VIa/L	24 May 1983	1,030	Standard dryland arable model. Areas rejected due to land use
			Kuala Kuayan VIa/M	24 May 1983	-	Reject, coarse textured soils and swamp
			Kuala Kuayan VIa/R	24 May 1983	-	Reject, coarse textured soils and swamp
			Sukamandang X/C	24 May 1983	2,320	1 SKP, standard dryland arable model
			Sukamandang X/D	24 May 1983	3,090	2 SKPs, standard dryland arable model
			Sukamandang X/G	24 May 1983	1,980	1 SKP, standard rainfed arable model. Areas rejected due to sandy soils
			Tewe Timur III/D	24 May 1983	-	Reject, slopes. 2,225ha of suitable land to be included in SKP A
			Tumbangsamba V/A_1	24 May 1983 *	-	Reject, steep slopes, poor soils

* Draft report, final report not yet received

APPENDIX 2(continued) - EXTENSION PROGRAMME

Paket	Consultant	Province	SKP	Phase II report received	No. KK	Status
k	Euroconsult	Irian Jaya	Bupul XXIIIb/E	18 Apr. 1983	2,310	1 SKP; standard dryland arable model
			Muting XXIIIc/A	18 Apr. 1983	1,900	1 SKP; standard dryland arable model
			Muting XXIIIc/B	18 Apr. 1983	1,720	1 SKP; combined with part of SKP D, standard dryland arable model
			Muting XXIIIc/D	18 Apr. 1983	-	Suitable areas included in restructured SKPs B and E
			Muting XXIIIc/E	18 Apr. 1983	1,350	1 SKP; combined with SKP D, standard dryland arable model
			Kaliki XXIVd/A	19 Apr. 1983 *	2,170	1 SKP, combined with SKP E, wetland based farm model, 3.5ha/KK
			Kaliki XXIVd/B	19 Apr. 1983 *	1,900	1 SKP, combined wetland/dry-land model, 3.5ha/KK
			Kaliki XXIVd/C	19 Apr. 1983 *	1,360	1 SKP, combined with SKP D, combined wetland/dryland farm model, 3.5ha/KK
			Kaliki XXIVd/D	19 Apr. 1983 *	-	Suitable land combined with SKP C
			Kaliki XXIVd/E	19 Apr. 1983 *	-	Suitable land combined with SKP A

* Draft report, final report not yet received

Appendix 3

PHASE III RESULTS

APPENDIX 3 RESULTS OF PHASE III AND IIIA STUDIES

Paket	Consultant	Province	SKP	Final Phase III received	NO. KK	Status
a.	Jururancang Bersekutu	Riau	Lipat Kain XIb/A	9 Dec. 1982	1,071	Standard rainfed model; to land clearance.
			Lipat Kain XIb/C	1 Mar. 1983	1,326	Standard rainfed model; to land clearance.
			Lipat Kain XIb/D	22 Jan 1983	1,205	Standard rainfed model; to land clearance.
			Lipat Kain XIb/G (abbreviated Phase III)	28 Feb. 1983	1,150	Standard rainfed model, construction delayed because of forestry restriction.
			Lipat Kain XIb/H	28 Feb. 1983	1,560	Standard rainfed model, construction delayed because of forestry restriction.
b.	ENEX/ Perentjana Djaja	Riau	Bangkinang X/B (Phase IIIA)	30 Apr. 1983	1,105	Standard rainfed model, to land clearance; area found to contain steeper land than at Phase II.
			Bangkinang X/D (Phase IIIA)	30 Apr. 1983	615	Standard rainfed model, to land clearance; waterlogging and poor soils more extensive than at Phase II.
		Bengkulu	Muko Muko I/C	7 Apr. 1983 *	674	Standard rainfed model, to land clearance; swampland more extensive than at Phase II.
c.	Halcrow Fox & Associates	South Sumatera	Lembah Liam I/A	4 Aug. 1982	1,243	Standard rainfed model, construction delayed because of forestry restriction.

* Draft Phase III or IIIA report (final report awaited)

APPENDIX 3 continued

Paket	Consultant	Province	SKP	Final Phase III received	NO. KK	Status
c. (cont.)	Halcrow Fox & Associates	South Sumatera	Lembah Liam I/A1	4 Aug. 1982	1,144)	1,761 KK standard rainfed model; 841 KK wetland/tree crop model (2·75ha/KK); involves simple drainage of river alluvium/construction delayed because of forestry restriction.
			Lembah Liam I/A2	4 Aug. 1982	1,458)	
			Klingi IV/C	4 Aug. 1982	1,749	1,350 KK wetland/tree crop model (2·75ha/KK); 399 KK wetland only or wetland/tree crop model (2·25ha/KK); involves simple drainage of river alluvium; construction delayed because of forestry restriction.
d.	China Engineering	West Kalimantan	Sukadana X/A	26 Nov. 1982	1,059	Generally standard rainfed model; wetland rice could be grown locally in each SKP; all three to land clearance.
			Nangatayap XIII/A	26 Nov. 1982	1,187)	
			Nangatayap XIII/B	26 Nov. 1982	1,023)	
e.	Clyde Surveys	Central Kalimantan	Kumai IXa/C	14 Mar. 1983	692	Standard rainfed model but infertile soils require special treatment; to land clearance; more steep land and poor soils than at Phase II.
			Hanjalipan VI/C	14 Mar. 1983	1,008	538 KK standard rainfed model; 420 KK rainfed/tree crop (3·5 ha/KK); to land clearance; more broken topography and land use than at Phase II.

* Draft Phase III or IIIA report (final report awaited)

APPENDIX 3 continued

Paket	Consultant	Province	SKP	Final Phase III received	NO. KK	Status
e.	Clyde Survey	Central Kalimantan	Hanjalipan VI/D	14 May 1983	628	Standard rainfed model; to land clearance; more broken topography and land use than at Phase II.
			Hanjalipan VI/G	14 May 1983	1,462	Standard rainfed model, but infertile soils require special treatment for successsful development; to land clearance.
f.	Kampsax	Central Kalimantan	Nangabulik XI/D (Phase III A)	7 Mar. 1983	1095	Standard rainfed model with coconut as tree crop. Construction in pipeline.
g.	Black and Veatch Int.	South Kalimantan	Pamukan II/A (Phase IIIA)	16 Aug. 1982 *	1,125	Standard rainfed model, reassessments of soil fertility/ suitability required; construction in pipeline.
			Pamukan II/B	9 Aug. 1982 *	1,150	Standard rainfed model, some data clarification requested; possibility of extension for 175-200 KK; to land clearance.
i.	D. H. V.	Maluku	Pasahari XI/C and part of B	1 June 1982	1,006	Wetland/dryland model (3·5ha/ KK); possible potential for 900 KK more; some drainage required; to land clearance.

* Draft Phase III or IIIA (final report awaited)

APPENDIX 3 continued

Paket	Consultant	Province	SKP	Final Phase III received	NO. KK	Status
k.	Euroconsult	Irian Jaya	Kurik/Kumbe XXIVa/B	21 Sep. 1982	3,228	Wetland farm model (2·25ha/KK); major drainage required; to land clearance.
			Jagebob XXIVc/I	23 June 1982	1,551	Mixture of wetland and dryland farm model (3·5ha/KK); minor drainage required in wetland areas; construction in pipeline.