1st

TRANSMIGRATION PROGRAMME

SECOND PHASE

EVALUATION

UNDP/OPE INS/79/001

1ST DRAFT

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

CHAPTER I

INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

This Report follows virtually the same format as the Draft Framework Paper for the 'Evaluation of the Transmigration Programme, Mid-term Repelita III, Phase 1' of January 16th, 1982. That framework was discussed and broadly agreed at the first meeting of the JMT Evaluation Team on January 21st. At that meeting, it was decided that Mr. Evans, with Dr. Butcher and Mr. Sediono, should collaborate closely with Mr. Napitupulu in seeking data from the major implementating agencies prior to the next meeting of the Team, scheduled for two weeks thence. Due to the pressure of other commitments, there was no meeting of the Team in February, nor in the first three weeks of March. In view of the deadline of March 31st in the Junior Minister's Instruction No. 17/82, Mr. Evans has produced this Report unilaterally for discussion at a meeting of the Team scheduled for end-March, 1982.

This report will accordingly be limited in two major respects :

i) due initially to the extremely busy February schedule of Mr. Napitupulu and subsequently to his ill health, he and Mr. Evans were able to meet only with the Directors of PLPT and DGT's Lakpintrans, with sub-Directors in TKTD and Agraria and with Staf Ahli in JMT, but were unable to meet with relevant Directors in P4S, DG Estates (re the NES/PIR programme) nor DG Food Crops; the report accordingly presents no physical performance data from these latter three important implementing agencies;

ii) due to the non-covening of the Evaluation Team in February or early March, the identified issues and constraints have not been discussed as widely as would have been wished, and they tend to reflect more the observations of the author alone.

1.2 SUMMARY OF THE REPORT

This Phase I Report presents data and analyses Issues and constraints with respect to the transmigration programme of Repelita III up to the point of settlement. Beyond that, as outlined in the methodology of Chapter II, is left to Phase II of this Evaluation Study to be undertaken later in 1982. Chapter III gives a brief sketch of the immediate historical background to Chapter IV, which is an analysis of the performance of four main implementing agencies (TKTK, PLPT, Agraria and DGT) to date.

1.2.1 Data

Highlights from Chapter IV's data research include the following :

i) from a historical perspective, Repelita III's performance to date has been impressive, with 164,012 families settled in two and three quarter years (to December 31, 1981),compared with 55,083 in the five years of Repelita II ;

ii) from an operational perspective, the agencies' performance has been less impressive, with overall physical slippage of about one third in the settlement programme;

iii) TKTD's average lead time from the beginning of the financial year to submission of BLC (Batas Land Clearing) to PLPT under the PAYP crash planning process was 5½ months in both 1980/81 and 1981/82, despite the revision in the PAYP process so that 1:5000 topographical mapping is now carried out after land clearing;

iv) TKTD experienced a high drop-out rate of new sites in 1981/82 - some 31 out of 130, of which 9 had progressed as far as RSKP Stage I planning and 3 as far as BLC Stage III -largely as a result of identification of inappropriate land type or of conflicting land use / land tenure;

v) TKTD's rapid planning (as opposed to normal or crash planning) process was employed for the first time in 1981/82 with disappointing results; 43% of sites examined under Phase II by the SFSE consultants were rejected outright, implying a dearth of properly planned sites for the 1983/84 programme and the necessary continuation of the PAYP crash planning / crash settlement process;

vi) TKTD experienced a tight financial situation in the last few months of 1981/82, leading to delays in Stages V and VI planning;

vii) PLPT's land clearing operations have quintupled since the last year of Repelita II, but are still showing some slippage; of PLPT's total land clearing target of 312,000 Hectares from 1979/80 to end-December 1981, PLPT had realised some 80% by end-1981; lahan basah realisation was consistently higher than that for lahan kering; overall slippage of programme completion seemed to improve from about 1½ years for the 1979/80 programme to 6 - 9 months in 1980/81, before lengthening in 1981/82 as a consequence of the forestry delays;

viii) Agraria's programme showed the greatest incidence of slippage of the four agencies examined; by the end of 1981, Agraria's sub-division tasks had been completed at only 88% and 76% of

1979/80 programme sites for houselots and farmland I respectively, while the equivalent figures of completion of 1980/81 and 1981/82 programmes were lower still at only 50% / 15% and 3% / 1% respectively;

ix) with regard to keeping pace with other agencies' progress, there seems to be some evidence of Agraria's completion of sub-division of houselots lagging too far behind TKTD's submission of final settlement design, and similarly Agraria's sub-division of farmland I behind DGT's settlement of transmigrants;

x) DGT's achievement in realising the transfer of over 90% of annual targets in both 1980/81 and 1981/82 is noted as impressive; such achievements were composed mainly of the realisation of previous years' programme targets, but such slippage (average lead time from start of financial year to completion of settlement was 22 and 20 months for the 1979/80 and 1980/81 programmes respectively) was largely the outcome of the slippage of other agencies which run earlier than DGT in the transmigration relay;

xi) to the end of December 1981, expenditure by all relevant agencies on the transmigration programme of Repelita III had reached nearly half a trillion Rupiah; this reflected a SIAP of some quarter trillion Rupiah (i.e. financial realisation of two thirds), when compared to the total DIP targets to that date (i.e. taking only three quarters of the 1981/82 DIP target);

xii) DGT had been the biggest spender (with 46%), closely followed by Bina Marga (43%);

xiii) SIAP varied between the agencies, depending on where in the transmigration schedule an agency's main inputs occurred; Cipta Karya (28%) had least proportionate SIAP, closely followed by Bina Marga (31%); DGT and Agraria SIAP's (53%) were higher than average, while that of DG Food Crops, reflecting that agency's budgetary emphasis on the pembinaan stage, was highest at 69% of its total Repelita III transmigration budget to date;

xiv) finally, data on physical and financial progress were compared for PLPT and DGT, and found to be rather incompatible, thereby raising some further questions as to the reliability of much of the data circulating on the transmigration programme.

1.2.2 Identified Issues and Constraints

The essential hypotheses of the evaluation are twofold, in that slippage is attributed largely to :

i) the inability of normal planning processes, whereby outline settlement planning should be commenced in Year T-2 even T-3, to be applied throughout Repelita III due to the initial slippage inherited by TKTD between 1979/80 and 1980/81 and to the unremitting pressure of ever higher T-o targets for settlement ;

ii) teething problems both intra and inter-agency, most notably with regard to TKTD and Agraria, many of which have since been resolved.

Other issues are all viewed in relation to these major determining constraints. The issues concerning land availability / suitability (e.g. competing resource use from DG Forestry, identification of inappropriate land type/land tenure/land use) are considered to have been decisive only because such issues have arisen in a context of crash planning/crash settlement. Such site rejection in a normal planning context would have had minimal impact on the eventual implementation schedule.

The issue of land development strategy is similarly viewed in relation to its failure to be incorporated into a normal planning process, whereby development models would be drawn up for each settlement area with the aim of optimising specific natural resource and economic conditions.
Under any crash planning process, no such optimisation can be employed and inflexible development models will be imposed on settlement areas regardless of local resources/conditions. The extent to which the crash planning process may adversely affect the long-term development of settlements is an issue which could usefully be examined in Phase II of this evaluation.

Implementation constraints have been viewed mainly with regard to the problems of coordination, but also with regard to each agency's teething problems. Implementation capacities of PLPT and DGT are confirmed to be high, with those of TKTD and Agraria more limited. Coordination constraints through Repelita III are evaluated to have been modest in relation to the degree of coordination/realisation of settlement actually achieved, and are seen to have been progressively ameliorated each year. Perfect coordination is deemed a theoretical, not a practical, concept, but certain recommendations are tendered which could serve to improve coordinating mechanisms.

1.2.3 Effects of Slippage

The report discusses the opportunity cost of accumulated SIAP and deduces it to be small, effectively dependent upon the degree of success of cash flow forecasting by BAPPENAS/Keuangan. Both the physical and financial slippage are indeed concluded to be no more than the manifestation of the 3 year DIP process, whereby expectations are indeed geared towards an implementation period of 3 years, not 1 year. If Repelita III is accordingly (and realistically) viewed in terms of a seven year implementation period, then any adverse effects of slippage can be minimised. Such a perspective should not, however, obviate the need to measure and assess the operating performance of agencies in terms of their degree of realisation of targets, nor the need for each agency and coordinating bodies to set genuinely realisable annual implementation schedules (JADWAL's).

Finally the evaluation views the degree of slippage of Repelita III as incurring some perhaps beneficial corollaries. With all programme emphasis and energies geared to attempting to attain high targets, there is the strong possibility, in the absence of further Phase II evaluation study, of concomitant adverse effects on the general quality of the transmigration programme. Other things being equal, therefore, the slower the realisation of these targets, the lower the probability that qualitative standards have been sacrificed for quantitative achievement, the greater the learning process from each year's accumulated experience and the greater the likelihood that the transmigrant will be transfered, settled and guided smoothly and successfully.

1.3 RECOMMENDATIONS

The Evaluation Report's essential recommendations, as opposed to minor, supporting recommendations, are :

i) the transmigration programme is in need of further large investment of finance and professional manpower in properly scheduled and implemented planning, or of significant deceleration in the scale of the programme, or otherwise

ii) crash planning and crash settlement will continue to lead to debatable (pending Phase II investigation) quality of settlement, large degrees of slippage, high incidence of financial and technical wastage and accumulated pembinaan programmes of managerially different magnitude, and

iii) in the absence of deceleration, the programme is likely to come up against the determining constraints of land availability/ suitability, maybe sooner than later; until that stage, optimal utilisation of this scarce and finite natural resource should be the primary economic objective.

With regard to specific recommendations on planning procedures, the following are suggested :

i) flexibility of land development strategy;

ii) the advisability of incorporating 'end user' agencies into the normal planning process (e.g. Agriculture, Dalam Negeri, DGT);

iii) the need for thorough screening of land availability (with regard to land use/land tenure) before expensive surveys are started ;

iv) the vetoing of Phase II studies on land not yet freed from all claims.

With regard to recommendations as to improving the implementation and coordination (which is not evaluated to be a major constraint on progress) of the programme, the Report recommends :

i) the exercise of some degree of budgetary control and financial monitoring over agencies by JMT, via

ii) an extended green light system for critical activities in the sequencing of the programme, and

iii) the rationalisation and strengthening of the Jadwal Waktu Pelaksanaan in order to make it a dynamic, up-to-date tool for planning, monitoring and coordinating the transmigration programme.

Evaluation - Phase II

Summary

41. The study submitted in draft form to the evaluation committee of the JMT in December 1982 is the second phase of an evaluation of the transmigration programme from Pelita I to Mid term Repelita III. It covers the guidance and development stages of transmigration sites, i.e. after the settlements have been constructed and the settlers have arrived. Phase one of this evaluation has already considered the preceding activities.

42. The evaluation needs to be seen against the background of the programme and Pelita objectives. While the basic law, Statute 3 of 1972 lists many objectives, its Clarification of the same year makes it clear that regional development is the major objective. However as a result of the target of large numbers of families to be transmigrated, which has been hitherto been beyond the capacity of the government machinery of the time, a more direct objective of moving people on time has become dominant, and development objectives have become obscured and in part neglected.

43. There is no doubt that the quantity of physical inputs to transmigration has greatly expanded since Pelita I with the cost per family having risen by over 150% in real terms in the period with improvements in physical infrastructure, physical planning and settler guidance. There remain a number of imbalances in the distribution of resources for inputs, both in terms of material items and technical manpower, the effects of which are described in the full report.

44. The transmigration programme has directly moved some 286,000 families between 1969/70 and 1981/82, of which 184,000 were moved in first three years of Repelita III. Indirectly the programme has provided a stimulus for many thousands more families to transmigrate spontaneously. Although such population movement has only a small effect in the areas from which transmigrants originate, its effects in receiving areas have been much greater, in terms of population, land development, production and employment. This is especially so in provinces where population was particularly sparse and lands mainly under forest.

45. The underlying assumption that agriculture will provide the means for transmigrants to achieve sustained development is only evidenced in the case of irrigated projects, managed tree crop projects and most tidal swamp projects. The majority of transmigrants who settled on upland rainfed areas achieve self sufficiency at bare subsistence level, but seldom manage to rise much above this except in circumstances where off farm employment opportunities are present, often of a transient nature.

46. The major single development constraint is identified in this evaluation as having been the imposition of food crop land development models irrespective of agro-environmental conditions, which in terms of slope, rainfall, pests and, especially, soil fertility, may sometimes have been wholly unfavourable to the cultivation of food crops on any other than a shifting cultivation basis. Such models require the settler, formerly a poor landless agricultural labourer, to farm his land as if under research and extension conditions and but with risks of crop failure. With the low probabilities of realising increase in yield sufficient to justify the high inputs/high cost/high risk of the models, the settlers have too often been ensnared in the vicious circle of subsistence farming with eveer decreasing yields.

47. An associated constraint is that of the 3.5 hectares given to settlers in these upland rainfed locations, only the houselot and the one hectare arable plot is planned and budgeted for. The remaining 2.25 ha. plots, most of which are unsuitable for food crops, are ignored by planners or budget officers. In general there is a negative economic rate of return in upland dryfield locations. This could be turned to a positive rate of return if an approximate additional US$ 4,000 per family could be spent on tree crop development. In this connection it must be stated that eight percent of total transmigration budget allocated to agriculture in Repelita III is the same as it was at the beginning of Pelita II. Although this Repelita III figure represents a real increse of 150%, it is inadequate to fully develop the transmigrants' holdings.

48. Other constraints to development include the difficulty of line agencies in providing sufficient staff to service the settlers, either in quantity or in quality; the shortage of medical staff illustrates the former, the agricultural extension workers the second. Appropriate incentives to serve in transmigration areas have to be given, and appropriate training and selection are required to ensure that government agencies' services are effective.

49. In addition the physical layout currently employed in Repelita III settlements is less conducive to extensive farm development when compared to those of more linear form - for example at Rimbo Bujang - and can be regarded as a serious development constraint.

50. The current forecast of the economic viabililty of Repelita III settlements appears, in the case of rainfed locations, to be scarcely more favourable than such settlements implemented during Pelita II. The conclusion is drawn that the additional investment in infrastructure can only be justified by a corresponding increase in investment in agricultural production, processing and marketing. A more even

balance should be sought between investment in social/physical infrastructure and in economic development.

51. The well being of settlers is closely related to their financial situation. Where they are able to produce a saleable agricultural surplus or obtain off farm employment, they can rise above subsistence. Too often they do not. However most settlers become better off than they would have been if they had not transmigrated.

52. For the future, the evaluation leads to a number of alternative policy and development options. These indicate that where possible irrigation should be provided to transmigration settlements, and where this is not feasible, new settlements should be planned for full and appropriate agricultural development with adequate budgetary provision to achieve this. For settlement schemes already implemented but without plans or funds for full agricultural development, the government should consider second phase redevelopment/rehabilitation projects to upgrade not only the settlers moved during Repelitas I-III, but also the local inhabitants. These should be undertaken on a regional development basis, perhaps with the Kabupaten as a regional unit.

53. Transmigration in Repelita IV should contain an appropriate mixed strategy to both promote the movement of new settlers and the consolidation of existing settlers. Government should take cognisance of the numbers of unregistered transmigrants moving spontaneously and include these as part of the overall target; make careful plans for the redevelopment of existing settlers; plan and budget more comprehensively for future public transmigration, to ensure they will have the means for sustained development.

54. The transmigration programme has made much progress since Pelita I, but to maintain its impetus as a regional development tool, and for it to produce an adequate economic return to the site, it is recommended in this evaluation that the above modifications be effected.

Chapter I INTRODUCTION AND OBJECTIVES

1.1 The Nature of Transmigration

Transmigration is the programme under which poor people from the over crowded islands of Indonesia are encouraged and assisted in settling in areas of the less crowded islands, where villages and farm lands are prepared for them to start a new life.

The prime target group for recruitment the very poor farmers and landless labourers in the rural areas of Java, Bali, Lombok and Madura. These islands are the most densely populated in the archipelago with average numbers of people per square kilometer as high as 690 in the case of Java, which at the time of the 1980 census had 91 million inhabitants, amounting to 62 percent of Indonesia's population. In addition some urban poor and ex-servicemen and their families are given the opportunity to transmigrate to new settlements in the outer islands.

The island of Sumatra was the first to receive settlers, originally under a programme organized by the Dutch, called Kolonisasi, at the beginning of this century. After Independence in 1945 transmigration proper was started, and was continued as an integral part of the Five Year Plans following the formation of the new Government in 1966. Repelita I (1969/70 - 1973/74) succeeded in moving 46,268 families to transmigration areas. Repelita II's stated aims were to effect a large expansion of the programme and settle 250,000 families. Faced with implementation constraints, this target was eventually scaled down to the movement of 88,900 families. With constraints tacked with the incorporation of the Department of Public Works and other agencies through Presidential Decree No. 26, 1978, Repelita III aimed for the settlement of 500,000 families over the five year period 1979/80 - 1983/84.

1.2 Phase I Evaluation Background

Following the Junior Minister's Instruction No.17/82, a team was formed to carry out a mid-term evaluation of the Repelita III transmigration programme, to be completed by March 31st 1982. The team suggested the division of the evaluation into two phases. The first considered all aspects of the programme up to the point of settlement, and was completed by March 31st 1982. The second, a lengthier study, was to consider the developmental aspects of settlement, both absolutely and in relation to the development of Repelitas I-II settlements. This Phase II was to be completed by October 31st 1982.

The Phase I Study found an impressive acceleration in the pace of settlement in Repelita III, yet found some one third slippage of the programme as a result of the time scale of even crash planning programmes and due to some intra and inter-agency teething problems. The Report found that land availability/suitability constraints had arisen largely because they occured in the context of crash planning.

Implementation and coordination constraints were assessed and found to be less prominent than those of planning. Slippage of the programme was considered to have been beneficial, for the sheer pace of planning and settlement in Repelita III may have led to some sacrifice of quality, as opposed to quantity, of settlement. One objective of this Phase II Study is to investigate that possibility.

1.3 Phase II Evaluation Approach

To analyse the developmental aspects of Repelita III transmigration, it is necessary firstly to analyse those of Repelitas I-II. Due to the early stage of settlement at most Repelita III sites, it is as yet too soon to make any absolute predictions of their development. An analysis, however, of Repelitas I-II development progress would enable a better assessment of Repelita III's development prospects.

This Phase II Study conducts, simultaneously, an ex-post evaluation of the Repelitas I-II transmigration programmes and an on-going evaluation of the Repelita III transmigration programme. A discussion of the difference between such evaluations can be found in Chapter II of the Phase I Evaluation Study. Chapter II of this Phase II Study analyses the inputs put into the transmigration programme over the thirteen years of Repelita I to mid-term Repelita III. Chapter III assesses the outputs from transmigration areas settled during Repelita I and II, and puts these outputs in a regional development context. The Chapter then assesses the impact of the Repelita III transmigration programme on the basis of attaining outputs similar to those of Repelitas I and II.

Chapter IV discusses the development constraints which have hindered development progress at transmigration areas and which in many cases have led to levels of development barely above subsistence living. Chapter V applies the observed development progress at Repelitas I and II settlements to the development prospects of Repelita III settlements, and forecasts the economic impact of Repelita III transmigration. The development of settler welfare is similarly forecast in Chapter VI. Finally the Study concludes with a discussion of options for further development of Repelita I-II settlements, and options for transmigration policy in Repelita IV.

The approach used in this has been via the analysis of macro data, the absorption of much secondary data and reports on transmigration, and by direct field visits. Field trips were made in June to Sumatra (12 settlements), in August to Sulawesi (6 settlements) and in September to Kalimantan Barat (2 settlements) by members of the evaluation team (see Chapter IV for more details of the field trips). The field trips were undertaken to settlements considered representative of the whole transmigration programme.

It is necessary before embarking on the forthcoming analysis of inputs, outputs and economics of Repelitas I-III transmigration, to firstly examine Governments stated objectives for the transmigration programme.

1.4 The Objectives of Transmigration

In the Statute No. 3, 1972 concerning the basic stipulations of transmigration, it is stated that "the target in general transmigration policy is the implementation of organised, self-motivated (spontaneous) transmigration on a large scale to achieve:

a. an improvement in living standard;
b. regional development;
c. a balanced distribution of population;
d. equally distributed development throughout Indonesia;
e. beneficial use of natural and human resources;
f. national union and unity;
g. a strengthening of national defence and security."

Furthermore, in the "General Clarification" of the Statute it is stated in the first paragraph that "the earth and the sea and the natural wealth contained (in Indonesia) .... must be used ..... for the greater prosperity of the people, both spiritual and material". The clarification proceeds: "Hence the Government and the people of Indonesia are obliged to open up, to extract and to process, as well as to develop, those natural resources .....".

Great emphasis is put on the full exploitation of Indonesia's natural resources. Then the clarification introduces the national problems of the uneven distribution of population and states that the "increase in population, especially in Java, Madura and Bali, is not proportionate to the availability of employment opportunities". Transmigration therefore faces a two-sided problem:

"a. the problem of population distribution, ... which carries with it the consequence that part of the dense population in some areas must be moved to other islands that are at present sparsely populated, and

b. the problem of the supply of labour, in which case transmigration represents the transfer of labour needed to carry out the development of various projects in areas where labour is in short supply".

The clarification concludes "thus the main aim is not the achievement of an evenly and balanced distribution of population, but rather the carrying out of development projects considered necessary for the raising of national production" (this Study's underlining).

The stated objectives of the large Repelita III transmigration programme were not very different from those of the above 1972 Statute, and can be summarised as follows:

i. relief of population pressure in densely populated islands/reduction of damaging effects of population density in ecologically threatened areas, and

ii. acceleration of economic development in less densely populated areas, with the emphasis on smallholder agricultural development on new lands.

It can be assumed that the main aim remains that of regional development as in Statute No. 3/1972. This Evaluation Phase II sets out specifically to address that main aim, but also in Section 4.1 analyses the other major aim of population distribution.

Chapter II INPUTS

2.1 Pelita I and II

The concept of transmigratioin schemes in Pelita I was very much modelled on the earlier irrigated schemes of the Kolonisasi programme; there was a basic assumption that the mainly Javanese transmigrants would grow rice on irrigated land. Each farmer was given a total of two hectares, one hectare of "sawah", three quarters of a hectare upland of "ladang", and a homelot of a quarter hectare. Unfortunately many settlements were put on land which had not been subjected to capability studies or irrigation feasibility. In addition, the Directorate General of Irrigation had its work cut out to rehabilitate existing projects and to complete those already started before World War II. These early transmigration projects assumed the eventual provision of irrigation.

In the early days of the programme only Rp.260,000 (1972-1973), or US$ 625, was provided in the budget of the DGT for one family. This amount was intended to provide the following:

1.	recruitment costs	Rp. 4,000
2.	transport and subsistence during travel	58,000
3.	house construction	65,000
4.	land clearing, one hectare	20,000
5.	food during 12 months	38,000
6.	some tools and farm inputs	20,000
7.	miscellaneous items and overheads	55,000
	TOTAL	Rp.260,000

Item 6. above, covering tools and farm inputs amounts to 7.7% of the total, which is similar to the proportion allotted to agricultural development during Repelita III. Such inputs are today provided over successive years, whereas in 1972 it was a one shot supply. The total cost per family in Pelita I was Rp. 260,000 which in 1982 prices would be US$ 2,300. There was the assumption that the Ministries of Public Works, Health, Education, etc., would provide roads, irrigation, and other services. In many cases these were not carried out for very many years. The above costs were for Government fully sponsored settlers going to then dry settlement areas. Tidal irrigation schemes cost Rp. 310,000 per family, while assisted spontaneous transmigrants cost only Rp. 30,000 per family, to cover transportation and some site preparation in the new area.

By the beginning of Pelita II it was brought to the notice of the DGT that the DG Irrigation had a target of about 95,000 hectares in the outer islands scheduled to be provided with irrigation during the Five Year Plan period; all of which was to be in existing transmigration areas and farm lands of local people. There was no hope that new settlers during Pelita II could be provided with irrigation for a very long time in the future.

By this time a number of important changes in implementation had been introduced by the Director General of Transmigration, among them was the creation of a new Directorate of Guidance or "Pembinaan" responsible for assisting and nurturing the settlers after heir arrival and up to the time of handover to the local governments. At the field level, "Kepala Unit Desa", or Village Heads were appointed by the DGT, together with a number of assistants; teachers and health workers recruited as transmigrants were givene honoraria as remuneration for assisting their fellow settlers.

As a result of the unlikelihood of irrigation for new settlers in the foreseeable future and the problems of sustaining reasonable yields on two hectares of dry fields, three important new principles were introduced into project planning:

i. planning would be for upland rainfed agriculture.
ii. settlers would be provided with up to five hectares per family.
iii. settlers would be encouraged to grow perennial crops and raise cattle and other livestock.

In addition it was decided to design large scale projects with several villages rather than to plan and build one village at a time. To support this intention the budget for survey was greatlyu increased in order to cover the cost of new activities such as aerial photography, soil surveys and land capability studies.

The first large scale upland project to be planned and built was at Pematang Panggang in South Sumatra. In this project each settler was given five hectares, all near to his house, and the intention was that each would be assisted to plant one hectare of rubber and would be given onoe cow. These inputs were considered necessary due to the low level of nutrients in the red yellow podzolic soils in the location. Construction started early in 1975 and within two years 3,500 families had been settled. Unfortunately, because of the fixed standard costs for each family, there were no funds for either rubber development or for livestock. Only later, under a WFP project, was some rubber planted, but it did not grow well since the rubber was planted on dispersed individual settler holdings and no funds were provided for continued management or maintenance.

Also at this time a number of other projects based on similar premises were designed and built, notably those at Rimbo Bujang, Singkut and Baturaja, the latter being assisted by the World Baank under the Transmigration I loan. Rimbo Bujang also received assistance with tree crop development under NES III World Bank project. The majority of transmigration projects still received only two hectares of dry fields per family, but a new trend in developing upland rainfed areas through transmigration had begun.

Towards the end of Pelita II (1977), fully assisted transmigrants (umum) were provided not only with cleared land, a house, tools and farm inputs, but also with health centers in the form of "Puskesmas" constructed under the INPRES programme. There was

also a new policy to provide one cow to each ten families, a ratio which since been raised to 1:5 in Repelita III. With the improvements in survey and planning, coupled with the additional inputs and services provided to settlers, the costs had risen to an average of about US$ 2,400 by 1977. In real terms, this was some 50% higher than the unit costs of settlement at the end of Pelita I. Nevertheless estimates by various international agencies, including the World Bank, FAO and the Asian Development Bank, put the amount actually required for full development at the time at between US$ 4,000 to US$ 5,000 per family.

It is interesting to note that with the direct involvement of many Government agencies other than the DGT following Presidential Decree No. 26, 1978, the proportion of the budget for each family spent on agriculture has remained the same in Repelita III as it was in Pelita I, i.e. about eight percent. Apart from Rimbo Bujang, the exceptions to this are all projects assisted by either the World or Asian Development Banks. During Pelita II the physical infrastructure was poor in most projects. In Repelita III the infrastructure is good, but full utilisation is dependent upon sufficient investment in agricultural production, processing and marketing.

2.2 Repelita III

The transmigration programme during Repelita III has been characterized by a number of features and innovations. Apart from the very large target number of families to be moved (500,000), the financial alloction per family in the 1982/83 budget is US$6,050. In real terms this is over two and a half times greater than the allocation at the beginning of Pelita II. Tidal swamp projects now cost around US$ 10,000 peer family and for the extension of IBRD Transmigration One unit costs are US$ 10,820 (excluding the rubber factory).

The mode of execution of transmigration is now such that all, or nearly all, important inputs are planned and budgeted for, even though there may still be difficulties in providing all that is planned. Instead of hoping that the various line agencies will provide infrastructure and services, the afore mentioned inputs are directly supplied by the responsible agencies themselves as laid down in Presidential Decree No. 26, 1978. With the increased cost per family and the very large target, the rate of expenditure on transmigration is running at over US$ 600 million per annum. A relatively small proportion of the costs of the programme (8%) is allocated to agricultural development (Table 3.1).

The physical planning and surveying of transmigration settlements has for Repelita III been the responsibility of TKTD. The planning is based on a basic assumption which is incorporated into the terms of reference provided to the TKTD consultants. The assumption is that if transmigrants are settled in locations which have good access, on land with less than 8% slope and if settlers are provided with agricultural inputs, they will rapidly achieve a subsistence standard of living and will then pass through a transitional level to

one of sustained development.

This basic assumption is qualified by the conditioon that of the standard holding size of 3.5 hectares, only the 0.25 ha. houselot and Farm Plot I needs to be of less than eight percent slope. The other 2.25 ha. can be up to 15% slope. Where soil conditions are favourable the settler can produce enough food to live on after one year on 1.25 ha. of his land, however it will be only in very rare circumstances that he can achieve a sustained development on such a small area. At present few plans are made for the development of Farm Plot II, and inputs are seldom provided or budgeted for its development. In many cases (because of the land capability and the constraints of family labour), the only way to develop the larger area is through tree crops and/or livestock, both of which are listed as non-standard inputs in the above mentioned terms of reference. Without any traditional investment in farm development, the second plot of 2.25 ha. will ofteen remain undeveloped for a very long time, with the added danger that in the meantime squatters may move in and practice further food crop agriculture where it is inappropriate.

Standard of infrastructure provided during the Repelita III programme are much higher than they were during the previous plan periods. Standards of roads, bridges, schools, clinics, houses and land cleared are in general good. However this infrastructure may not be fully utilized unless settlers produce surplus agricultural products for export from the settlement. The present low level of investment in agricultural production, processing and marketing shows an imbalance in the distribution of funds allocated to development as opposed to the other inputs for planning, preparation and settlement.

The percentage of the per family cost spent on agriculture in 1972/73 was eight percent, but in 1981/82 had dropped to five percent, and has only in 1982/83 once more climbed to eight percent (Tables 2.2 and 3.1). This is a 150 percent real increase since 1972/73. On the other hand the increase in land clearing and road construction and increased 740 percent in real terms. A situation has arisen in which the full economic benefits of the transmigration programme may not be realised because of the low investment in agricultural inputs and services.

A further cause of underutilisation of infrastructure occurs in the case of schools and clinics, owing to a lack of teacherS, medical doctors and para-medical staff. The Ministry of Health point out that any doctor going to serve in a transmigration area is going to have to forgo income from private practice, and therefore a substantial honorarium would have to be paid to attract them to stay in settlements. So far there has been no provision for such a payment.

There has recently been a move to include some of the key implementing agencies in the planning process. The intention is to assist TKTD in the production of not only physicalk layouts for the new settlements, but also plans for agricultural development and the provision of various services. This involves a commitment by these agencies that the plans are realistic and can be implemented by them.

Table 2.1.

UNIT COSTS OF TRANSMIGRATION, REPELITAS I-III

IN CURRENT PRICES PER FAMILY

	DGT		Other		Total	
	Rp.000	US$	Rp.000	US$	Rp.000	US$
Repelita I						
1969/70	189	456	..	..	..	..
1970/71	269	648	..	..	..	..
1971/72	1,012	2,441	..	..	..	..
1972/73	206	496	..	..	..	..
1973/74	163	393	..	..	..	..
Average	213	513	..	..	..	..
Repelita II						
1974/75	609	1,468	..	..	..	..
1975/76	1,785	4,302	..	..	..	..
1976/77	1,959	4,721	..	..	..	..
1977/78	1,471	3,546	..	..	..	..
1978/79	2,212	5,331	..	..	..	..
Average	1,711	4,122	..	..	..	..
Repelita III						
1979/80	1,357	2,172	1,190	1,904	2,547	4,076
198/81	1,818	2,908	1,467	2,347	3,285	5,255
1981/82	1,915	3,107	1,692	2,707	3,607	5,814
Average	1,771	2,833	1,493	2,389	3,264	5,222

Source: DGT, May 1981

Table 2.2

UNIT COSTS OF TRANSMIGRATION ACTIVITIES
1972/73 AND 1981/82

COSTS PER FAMILY

ACTIVITY	1972/73				1981/82			%Real Change Over 9 yrs
	1972/73 Rupiah		1981/82* Rupiah	1981/82 US$	1981/82 Rupiah		1981/82 US$	(Col(8) : Col(5)
	000	%	000		000	%		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Physical Planning	..	..	..	..	24	1	38	..
Agrarian Matters	..	..	..	..	38	1	61	..
Recruitment/ Transport	62	24	326	522	398	11	637	+22
House/Settlement Construction	75	29	395	632	875	24	1400	+122
Land Clearing)					581	16	930	)
)	35	13	184	194				)+741
Road Building)					964	27	1542	)
Subsistence (12 months)	38	15	200	320	266	7	426	+33
Tools/Farm Inputs/ Agro Development	20	8	105	168	176	5	282	+68
Other Development	-	-	-	-	27	1	43	..
Misc./Overheads	30	12	158	253	253	7	373	..
TOTAL	260	100	1368	2189	3582	100	5732	+162

* Inflation Factor of 5.26 (Annex III, Table 9.3, IBRD 3795-IND, May 1982)

Source: i. IBRD Transmigration Sector Review, 1973
ii. Project Records, 1971/72 and 1972/73
iii. BAPPENAS (Anggaran) for 1981/82.

Chapter III OUTPUTS AND REGIONAL DEVELOPMENT IMPACT

Introduction

The main aim of the Government's transmigration programme is the stimulation of regional development in the underutilised areas of recipient provinces (see Section 1.4). This Chapter looks at the outputs of the transmigration programmes of Repelitas I-II, and assesses them in this regional context.

The outputs examined and impact assessed in this Chapter are grouped under the sectoral headings of population, land development, infrastructure, production, employment and expenditure. However, it has generally proven difficult to obtain aggregate data on the outputs of transmigration. With the exception of population settlement data, which are scrupulously collected and published, other data are sporadically collected and seldom published. In Repelitas I and II, DGT was the sole source of data collection on the transmigration programme, for the pre-settlement as well as post-settlement stages. In Repelita III, the Department of Public Works is the main collector of pre-settlement data, while the Department of Agriculture now collects much post-settlement data. But for data on the development of output at Repelita I and II settlements, virtually the only source of data is the Directorate of Development (DPDT) in DGT. Aggregate data from DPDT publicationS is generally incomplete and unreliable. But the DPDT development surveys of settlements to be handed over to local Government, undertaken in 1980/81 and 1982/82, contain consistent data, and form the basis of most of the output data in this chapter. The approach used here will generally be to take average output data per family settled (taken from DPDT and other sources), and then gross up by multiplying by the number of families settled per province. By comparing these transmigration settlement aggregates with total provincial output data taken from Biro Pusat Statistik publications, an assessment of the provincial impact of transmigration can be made.

Each section below will firstly examine the combined impact of the Repelitas I-II transmigration programmes, and then separately examine that of Repelita III. While the primary aim of this Chapter is to assess the impact of transmigration output in relation to provincial output for each major sector, an underlying theme of the Chapter will be to consider such impact also in relation to the proportionately high levels of Central Government investment expended on transmigration at many recipient provinces. This theme is fully explored in the final Section 3.9.

3.1 Population

3.1.1 Repelitas I and II

The most immediately measurable output of the transmigration programmes of Repelitas I and II is the number of families transferred from their provinces of origin (all Java, Bali and NTB) to the provinces of settlement (all of Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya). It was shown in the Phase I Evaluation Report that average length of slippage in settlement was around one and a half years, but data on realisation of settlement targets per province for these years is not easily obtainable. These families were moved under the programmes of Umum, Umum Pasang Surut, Spontan, Sosial and Banpres (1973/74 only), but the figures of Table 3.1 do not include the unknown numbers of wholly unsponsored migrant families who settled in these provinces in these ten years.

Lampung was the largest recipient province in Repelita I, Sumsel in Repelita II and Sumsel in the two Repelitas combined. With Jambi the third largest, the orientation of the transmigration programme was primarily North-East towards Sumatra (taking 59% of total families), as opposed to North towards Kalimantan (17%) or North-West towards Sulawesi (23%).

The impact of the transfer of some 129,000 families or 580,000 persons (at the average of 4.5 persons per family recorded in Repelitas I and II) on the local population, and on the local population growth, can be seen in Table 3.2. Allowing for the population growth of transmigrant families since settlement to 1980 (at the 2.5% p.a. rate of growth recorded in these 18 provinces 1971/1980), it can be seen that new transmigrants accounted for 1.4% of total population in these provinces in 1980 and for 5.8% of the total population growth since 1971 (the last Census before that of 1980).

The effects of the transmigration were greatest overall in the otherwise sparsely populated provinces of Jambi, Sulteng, Bengkulu and Sultera, but the comparative effects of the transmigration on population growth were more markedin the Sulawesi provinces. Rates of growth of the local Sulawesi population were lower than those in Sumatra due to the historically high rate of emigration of the Sulawesi people. In Kalimantan, it was only in Kalsel that the effects of the new transmigration were high in relation to population growth.

The socio-cultural impact of the Repelitas I-II transmigration on those provinces where the ratio of new transmigrants to native population growth is of the order of 10-20% is marked, and much sensitivity has to be displayed towards meeting the aspirations of the native provincial peoples. The socio-cultural effects become more marked with the movement of wholly unsponsored migrants. In the case of Lampung, it has been estimated that over one half of the total provincial population was born outside the province. Of such migration, sponsored transmigration forms only a small part. Between 1971 and 1980 the population of Lampung grew by 5.77% or by 1,848,000

people. Allowing a natural rate of growth of 2.3% p.a. (Indonesian average 1971-1980) for the 1971 resident population of Lampung, it can be estimated that sponsored transmigration accounted for 95,000 or less than 8% of total net migration of 1,220,000 to Lampung in this period. The balance were mainly migrants unsponsored by any Government programme, but attracted to Lampung by the ease of transportation (the Merak ferry) and the possibility of better earnings than at their villages of origin.

The eventual impact on Lampung is widely known and has been well documented. In an interview with Asia Busines (July 1982), Junior Minister Martono himself referred to the perils of unchecked unsponsored migration and the subsequent exportation of poverty from Java to Lampung. One corollary of such uncontrolled migration has been the resettlement programmes of Repelita III which aim to move families from the now overcrowded regencies of South and Central Lampung to the still afforested areas in the North of the province.

One other province, Kaltim, experienced high rates of unsponsored migration in the 1970's. Public transmigration accounted for just 30,000 out of some 317,000 migrants, the balance attracted by buoyant economic conditions in the province, especially in the timber and oil sectors. In other provinces, high rates of growth of population were sometimes linked with high levels of public transmigration, e.g. Jambi, Bengkulu, Sulteng. The possibility of the spreading of the Lampung example to Sumsel and beyond is one which requires strict control over size of land holdings and registration of migrants. There is a limit, however, in the extent to which freedom of mobility can be restricted, and it could be argued that the very large transmigration programme to Sumsel in Repelita III (282,000 persons in the first three years) could precede mass migration on a Lampung scale.

The effects of the Repelitas I-II transmigration on population and population growth in the provinces of origin were small. The population of Java, Bali and NTB rose from 80.41 million in 1971 to 96.46 million in 1980. The absence of public transmigration would have raised that population by 0.65 million, less than 1% of total population, and just 4% of the total growth in population in that period. On the assumption that the native population of Java, Bali and NTB would have experienced a natural rate of growth of population of the same 2.3% p.a., total out-migration from these islands 1971-1980 might have been around 2.21 million persons. The transmigration programme accounted for some 29% of the total net outflow from the provinces of origin, the balance being unsponsored net migration (to Lampung, to Kaltim and to many other provinces). While the transmigration on Repelitas I and II had negligible effect on population expansion in Java, Bali and NTB (at best equivalent to a postponement by a few weeks of the population that would have resulted from the natural rate of growth), the relatively high proportion of sponsored to total out-migrants suggests that the people of these islands needed Government assistance and finance in order to move at all.

3.1.2 Repelita III

The population impact of the first three years of the Repelita III transmigration programme has been more pronounced than during Repelitas I-II. Some 225,000 families were targeted to be settled in the three years 1979/80 - 1981/82, in comparison with 129,000 families in the ten years 1969/70 - 1978/79. It can be seen (Table 3.3) that these 1,015,000 persons (at 4.5 persons per family) represented some 1.9% of the total population on the 17 recipient provinces, and 14.2% of the estimated natural growth in the resident population (i.e. natives plus pre-1980 migrants) of these provinces. An average of 1.5 years slippage (see Phase I Study) has again been allowed for.

The population impact of Repelita III transmigration has been most emphatic in the provinces of Sumsel, Riau, Kalteng, Sulteng, Jambi, Bengkulu, Kalsel, Kaltim and Irian Jaya, in all of which provinces new transmigrants have accounted for around or over one third of population growth over these three years.

The population impact of the first three years of Repelita III transmigration on the areas of origin has remained small in relation to the total growth in population in these provinces. The population of Java, Bali and NTB in 1980 was 96.46 million and can be projected to have grown at a natural rate of growth of 2.3% to some 103.27 million in 1983, an increase of some 6.81 million people. Transmigration in the three years can therefore be seen to be equivalent to 1.0% of total population in these provinces, or 14.9% of the growth in population in that period. Thus the forward surge of population growth in Java, Bali and NTB has effectively been postponed by the equivalent of some 23 weeks over a period of three years as a result of the transmigration programme of Repelita III. Expressed in another way, the 1979/80 - 1981/82 transmigration programme will have resulted in the population of Java, Bali and NTB in May 1984 being no larger than the population that would have existed in December 1983 in the absence of transmigration. Prospects for achieving the population redistribution objectives of transmigration seem limited when viewed from this perspective.

3.2 Land Development

The settlement of 129,000 families under the transmigration programmes of Repelitas I and II entailed the clearing of lands which were formerly primary or secondary forest, alang-alang, inland or tidal swamp. It was found in the DPDT Development Surveys of settlement units to be handed over to local governmentin 1980/81 and 1981/82 that the average areas of land provided to transmigrant families was 2.6 and 2.5 ha. per family respectively. An average of 2.5 ha. implies the distribution of some 3,200 square kilometers of land to the Repelitas I and II transmigrants, equivalent to 0.2% of the total land area of the recipient provinces (Table 3.4). Only in Sumsel, Sultera, Kalsel, Kaltim, Bengkulu, Jambi and Lampung, in ascending order, did land allocation to transmigration exceed 0.5% of total land area, and in Lampung reached 1.4%. Such proportions pay no heed to factors such as land type, land slope and land use.

Similarly the DPDT Development Surveys identified average areas of land cleared and under production as 1.54 ha/KK in 1980/81 and 1.92 ha/KK in 1981/82. At an assumed average of 1.75 ha/KK for all Repelita I and II settlements, Table 3.3 shows land worked at around 2,300 square kilometers, some 3% of the total land area farmed on landholdings other than estates at the time of the 1973 Agricultural Census. Jambi and Kaltim show the greatest proportionate effect of Repelitas I and II transmigration on provincial farmland worked at over 11%, followed by Sultera, Bengkulu and Sulteng (all over 7%). The effect of transmigration on land development in certain provinces is therefore quite considerable in relation to the extent of land already developed for agriculture by the indigenous farmers.

The transmigration programme of 1979/80 - 1981/82, once implemented fully, and with 1.25 ha/KK of land cleared by PLPT and put under production, will result in the opening up from forest, grassland or swamp of some 280,000 hectares of land, or 2,800 square kilometers. This is the equivalent of 3.8% of total land area farmed in the 17 recipient provinces at the time of the 1973 Agricultural Census (Table 3.4). Using combined data from Tables 3.3 and 3.4, it can be seen that the proportions of (1973) land area farmed as a result of the transmigration of 1979/80 - 1981/82 are highest in Kaltim (12%), Sumsel (11%), Kalsel (8%) and Riau and Jambi (7%). These are high proportions, for this extensification of farming was carried out in a planned time-frame (slippage) of just 3 years.

3.3 Infrastructure

3.3.1 Roads and Ports

PLPT have estimated, based partially on data from Repelitas I and II, that each transmigration settlement requires on average 12 km of gravel (occasionally asphalted, e.g. Batumarta, Way Abung) access road per SPT (2000 KK), 0.0175 km of main village roads per KK and 0.0350 km of village roads per KK. Due to the often

smaller size of settlements in Repelitas I and II and to their often remote locations, an average of 6 km access road/UPT (500 KK) can be taken, along with 26.25 km of main and village roads/UPT in order to estimate the infrastructural impact of transmigration in Repelitas I and II.

On these assumptions, Table 3.4 shows that the transmigration programme led to the construction of some 1,600 km of gravel (or asphalt) roads plus some 6,800 km of earth roads, respectively 4% and 16% of total asphalt/gravel and earth roads in these 18 provinces. Among the provinces, the figures indicate high (around 10%) proportions in Lampung, Sulteng and Jambi for asphalt or gravel roads, though the assumptions used and the accuracy of the provincial data should prevent any hasty conclusions. Indeed the proportions of earth roads shown in Table 3.4 to be attributable to transmigration (92% in Lampung, 80% in Jambi etc.) raise some questions as to how comprehensive the provincial totals for earth roads are. Nevertheless, road construction for transmigration settlement can have a relatively large impact on some recipient provinces.

What the figures do not reveal is the contribution of transmigration to the building of new roads in these provinces in the 1970's. High proportions of all new roads in certain provinces (e.g. Jambi, Lampung, Sultera, Bengkulu) were for the purposes of opening up lands for transmigration. The extent to which construction of new roads to serve existing towns and villages, and the rehabilitation of older roads in these provinces, was deferred in favour of transmigration road investment is impossible to determine. Travelling from the severely degraded main Baturaja-Martapura road to the embanked, cambered asphalt highways of the Batumarta transmigration settlement suggests that there may be some trade-off in the phasing of infrastructural development.

The extent to which transmigration projects have led directly or indirectly to the upgrading of local roads can not be evidenced in these figures. Such projects as the Luwu and Sultera area development projects have placed great emphasis on the upgrading of provincial infrastructure, and it could be argued that transmigration has been the spur needed to enable such projects to take off. Such area development projects can serve to minimise the potential friction at the often comparatively high standards of transmigration infrastructure (particularly during Repelita III) vis-a-vis the existing provincial rural infrastructure.

Similarly transmigration can lead to the construction of new or rehabilitation/extension of old jetties, whether directly or indirectly, and even airports (e.g. Sintang in Kalbar). Again, there can be a sharp contrast between infrastructure for transmigration and for the local population. One example is the new concrete ferry jetty at Tulang Bawang transmigration settlement and the equivalent sawdust ramp at the historical capital of Menggala over the river.

In Table 2 of the Phase I Evaluation Study the PLPT targets and construction of roads in 1980/81 and 1981/82 are shown. 1979/80 data, pre-computerisation, was not available, but grossing up on a per family target basis, the first three years of Repelita III were targeted to realise the construction of some 1,200 km. of access road, 2,400 km. of main village road and 6,400 km. of village road. The investment in asphalt/gravel access roads represents some 2.8% of the total asphalt/gravel road network in the 18 recipient provinces (1980 data), while the 8,800 km. of village roads are equivalent to some 20.8% of the total length of earth roads in these provinces. Even allowing for data inaccuracies, the infrastructural impact of Repelita III transmigration is substantial in terms of the existing infrastructure of certain recipient provinces. Maximum impact is concentrated in those provinces noted in Section 3.2 above as incurring the greatest impact on land development.

3.3.2 Irrigation Works

In contrast to the early colonisation programmes initiated by the Dutch authorities and to the pra-Pelita transmigration programmes, those of Repelitas I and II were not conditional upon the provision of irrigated lands. Many of the settlements took place on either tidal swampland or on non-irrigable uplands. In Repelita I it was official policy to convert dryland to wetland wherever possible, but finance for such was seldom made available to transmigration and usually no definite commitment made to the transmigrants.

Irrigation has since permeated many of the Repelita I and II transmigration projects. Technical irrigation works, constructed by DGWRD (often with foreign technical assistance and finance), have taken place at Way Abung and Way Seputih in Lampung, Belitang (initially colonisation, subsequently spontaneous transmigration) in Sumsel, Sitiung in Sumbar (where the land has been mechanically flattened and water pumped up 25 metres from the river source), at the Bone-Bone and Kalaena sites in Sumsel under Project Luwu, at numerous sites in Sultera either under the area development project or by DGWRD alone and at Dumoga in Sulut.

At nearly all of these areas, technical irrigation projects might not have beeen forthcoming in the absence of transmigration. Transmigration has therefore been the spur to the more productive utilisation of formerly underutilised areas. In the case of e.g. Wawotobi in Sultera and Luwu in Sulsel or Belitang in Sumsel, the local inhabitants stand to benefit as much as or more from the investment in irrigated lands stimulated by transmigration.

Some transmigration areas have been settled under the assurance of eventual irrigation, which has yet to materialise. The Way Hitam settlements, in the proximity of Belitang, have not yet been irrigated despite settlement commencing in 1972. These settlements remain at bare subsistence level.

The existence of self-help or partially local Government supported non-technical irrigation schemes can be seen in many settlements in Sulawesi. Such schemes seldom can guarantee two wetland harvests per year, but they will have succeeded in their aims if they can maintain complete water cover for the wet season alone (thus ensuring at least one substantive harvest). Such schemes may sometimes attain a second good harvest depending on rainfall in the dry season being sufficient to top up the water source. Good examples of such schemes can be found at Sukamaju in Sulsel (WFP assisted, one harvest), Amoito (one harvest) and Rambu-Rambu (two harvests) in Sultera, and Mopuya (one and a half harvests) in Sulut.

3.3.3 Social Infrastructure

The provision of school, clinic, cooperative, administrative and community buildings at all transmigration sites, together with the requisite numbers and capability of people to fill the buildings, can lead to an upgrading in the social and community facilities available to transmigrants, compared with those prevailing in their villages of origin, if suitably qualified personnel can be recruited to fill the positions created by the infrastructural investment. Such new facilities may be superior to those at neighbouring local villages in the areas of settlement. In recognition of this potential disparity, a significant component of the Sultera area development project is the upgrading of the social and community facilities of the local villages to those standards at transmigrant settlements.

3.4 Primary Production: Food Crops

The agricultural impact of the Repelitas I and II transmigration programmes, in terms of the cultivation and production of food crops, is not easy to assess in detail, due to difficulties of data assimilation. An attempt is made in Table 3.5 to assess the impact in outline, by using model data per family, grossing up per province and comparing with actual recorded provincial totals. The model data on hectares cultivated and yields per family for padi and maize have been put together taking data from selected publications of DPDT (particularly the 1980/81 Development Survey) and DGFCA, as well as from site specific data collected on field trips by members of the JMT Evaluation Team.

Of the final key parameter values taken for Table 3.5 average cultivation of padi and maize is taken as 1.00 and 0.33 ha/KK, which compares with the DPDT Development Survey's 0.80 and 0.30 ha/KK. The latter is rather low due to the inclusion of many Way Abung units, leading to an average of 0.48 ha/KK of cassava cultivated. The DGFCA Survey of 1978/79 and 1979/80 transmigration sites found only 0.40 and 0.15 ha/KK planting of padi and maize by 1982. Yields are here taken as 1.25 tons/ha padi and 1.00 tons/ha for maize, in line with the DPDT Development Survey; and are considered realistic of yields encountered in Sumatra at the better of the older dryland transmigration settlement. Due to the incidence of technical and non-technical irrigation schemes in Sulawesi, yields there are estimated to have reached by 1982 an average of 2.00 tons/ha for padi, but are taken as the same as 1.00 tons/ha for the usually dryland maize.

On these assumptions, the Repelitas I and II transmigration programmes resulted by 1982 in some 129,000 ha. and 184,000 tons of padi and in 43,000 ha and tons of maize. Padi cultivation/production from Repelitas I and II transmigration is equivalent to 3.5% / 1.9% respectively of total cultivation/production in all 18 provinces of settlement, or equivalent to 1.4% / 0.6% of the repective totals for all Indonesia in 1980. Equivalent proportions for maize are 6.6% / 5.3% for the 18 provinces, and 1.6% / 1.1% for all Indonesia.

While the total provincial or national agricultural impact of Repelitas I and II transmigration may seem small, in certain provinces that need not be the case. Padi production by transmigrants in Sultang (12%) and Sultera (29%) is high in relation to total provincial production. In Sumatra and Kalimantan proportions are lower, with only Jambi's output (5%) of any significance. The data for maize production, however, shows a few surprises, with transmigrants in Jambi and Sumsel seemingly producing more than the total provincial output !. Allowing for model data overestimates or perhaps errors of omission in the provincial data, the data shows that Repelitas I-II transmigration made a significant contribution to production of maize, and indeed cassava, groundnut, soyabean, and fruits and vegetables, in a few provinces, but the programmes' contribution to the total agricultural production of all 18 provinces (and especially in all Indonesia with Java included) has been very small.

To estimate the initial impact of the Repelita III transmigration programme on agricultural production in the 17 recipient provinces, it can initially be assumed (generously) that the average yield of padi in the first one or two years of settlement is 1.50 tons/ha and that the average settler manages to harvest 1.00 ha. of padi. The 225,000 families can therefore be assumed to have produced some 280,000 tons of padi per year in their first years of settlements, equivalent to 2.9% of total production in the 18 provinces or 0.9% of total production in Indonesia (1980 data from Table 3.4).

Individual provincial impact, on the above assumptions, will be highest in Riau (13%), Sumsel and Kaltim (9%), Sulteng and Sultera (8%) and Kalteng (7%). These figures, using data from Tables 3.3 and 3.5, show a significant impact on the padi production of these provinces in just a three year period. Agricultural impact in these 6 provinces will be further augmented with the output of maize and other palawija crops.

3.5 Primary Production: Tree Crops

Data on the planting of tree crops at Repelitas I and II transmigration sites is less easily obtainable than for food crops. An unpublished "Buku Data" by DPDT is the source for Table 3.6, though little reliability is attached to the data. Most of the tree crops, the coconut, coffee, clove, as well as fruit trees, are planted in the transmigrants' houselots, with the aim of bringing in additional cash income. Seedlings are usually provided to the transmigrants in the early months of settlement. Table 3.6 shows that there is significant planting of such tree crops at the settlements, production from which will in time make some impact on total provincial production.

But the provision of tree crops on an estate basis to transmigration is more occasional, and generally associated with a foreign financed project. The IBRD Trans I project provided one hectare of rubber, planted in blocks, to each family in the Way Abung and Batumarta settlements, while the IBRD NES III project provided two ha/KK rubber, planted in strips, to the settlers of Rimbo Bujang as well as to a larger number of local families. At all these sites, there has been professional investment and management from a PTP. The IBRD Trans II project in Jambi provided no finance for tree crop establishment, but made provision in settlement design for the planting of Lahan Usaha II with tree crops at a later date. No such foreign financed tree crop projects, nor indeed Government financed tree crop projects, have taken place in Sulawesi or in Kalimantan at Repelitas I and II settlements.

Pematang Panggang, planned by FAO and implemented by DGT, was Government's first venture into the provision of tree crops for transmigrants. Settlers were provided with one half of a hectare of rubber in 1975, but planted not in blocks nor strips but on dispersed half a hectare lots on the settlers' 5 ha holdings. The subsequent poor management of the rubber and the frequent reversion to alang-alang have been useful lessons for the future. Plans are currently

being formed for the further extension of tree crops to Repelitas I and II sites, for example, 1 ha/KK of coconut to Tulang Bawang, 2 ha/KK rubber to Singkut and rehabilitation of Pematang Panggang rubber. Some Repelita III sites (e.g. rubber for Kota Besar, cocoa for Pamenang) are being settled on the understanding of tree crop investment at a later stage.

3.6 Primary Production: Livestock and Fisheries

The provision of livestock to transmigration settlements has been sporadic over the years, and the difference in ownership of livestock per family in settlements can be great. In general, the more prosperous the settlement, the more likely are the settlers to buy livestock. Table 3.6 provides some further sketchy data on livetock, and shows that Repelitas I and II sites possessed approximately 1.5% of the 18 provinces' cattle. At 25,000 heads enumerated, that represents an average of around 1 head per 5 families - Government's stated minimum target for transmigrant livestock ownership.

But the variation within that average is immense, from for example the 1:100 ratio in Singkut, to 1:25 in Rimbo Bujang, to 1:2 in Sitiung, to 1:1 in Batumarta/Way Abung (IBRD project specifications), to 2:1 in Sukamaju and Amoito in Sulawesi. The need for cattle to raise both the area cultivated and the productivity of the land in transmigration settlements is widely recognised, but there are constraints on scheduling of finance and implementation in achieving the target distribution of livestock.

The data on poultry in Table 2.5 is also likely to be highly approximate, but the overall average of 4.5 chickens per family compares with the averge of around 3 for all families in the 18 provinces of settlement (i.e. including urban families). According to the data in Table 3.6, transmigrant chickens accounted for around 10% of provincial totals in Jambi, Kaltim and Sultera. Poultry husbandry, and its importance in providing an inexpensive source of protein to the settlers, is a practice which most settlers have learnt from their areas of origin.

3.7 Secondary and Tertiary Production

The extent to which the Repelitas I and II transmigration settlements have moved from primary into secondary or tertiary production has been limited. Examples of the development of employment creating agro-industries have been few, Way Abung's cassava processing plants being the only major example. The main sectors of off-site secondary production in which settlers are engaged are in timber (either logging or sawmilling) and construction (roads, land clearing for adjacent settlements, some building). Supporting forms of secondary production are in the manufacturing of roof tiles, craftsmanship of many kinds (carpenters to tailors), tahu and tempe manufacture, and other small and domestic manufacturing.

Tertiary production, or the output from employment in the service sectors, is generally proportional to the well-being of the settlement's agricultural economy. Indeed the nature of the market activity can serve as a useful indicator of the degree of progress of a settlement. The existence of gold or cassette shops, hair salons and Padang restaurants at markets in, for example, Upang Delta, Way Abung, Rimbo Bujang, Sukamaju or Nopuya implies a circulation of cash in excess of that required for mere subsistence. The minimal incidence of such tertiary production, e.g. at Pematang Panggang or Way Hitam, and the existence only of trading outlets for essentials, usually implies a low level of settlement development. Exceptions to these rules can be at e.g. Amoito, which is close to a main town and the market there is accordingly not as developed as it would otherwise be, or at Singkut,. where the bustling market is a reflection more of the business generated by the Trans-Sumatra Highway traffic.

3.8 Sectoral Employment

The transmigration programme of Repelitas I and II have had a direct effect on employment of the transmigrants themselves, raising the productivity of the settlers from under-utilisation at the areas of origin (with a resultant low opportunity cost) to over-utilisation at the areas of settlement. For the settler generally has so much work to do from his day of arrival that he will not have time to complete it. Indeed in the early days of settlement there is likely to be a labour constraint on the amount of land which can be opened up and farmed, as well as on the productivity per hectare of land farmed. The availability of the labour of his wife will influence a settler's development of his land in early years, and this availability will depend largely on the ages of their children upon arrival. The wife will generally be able to farm at least the houselot.

The Repelitas I and II transmigration programmes led directly to the creation of some 129,000 new agricultural jobs, with the prospects of full-time work readily available for 129,000 wives once released from the burden of child-care, plus for at least a further 65,000 offspring (the DPDT Development Survey of 1981/82 found an average labour force of 2.5 persons per household after four years of settlemennt). The impact of such employment creation upon the regions of origin and settlement will be proportionately similar to the population impact discussed above in Section 3.1.

The employment creation is very largely in the agricultural sector, but also in those secondary and tertiary sectors discussed in Section 3.7. Many transmigrants may well, in the first one or two years, derive more income from off-farm employment than from farming. The DPDT Development Surveys of 1980/81 and 1981/82 found that 75%/85% of total income was derived from farming after 6/4 years settlement respectively, suggesting development of off-farm employment over time.

Finally, the impact of transmigration upon the employment and incomes of local residents can be substantial. Aside from the initial temporary construction employment in land clearing/building, the arrival of the transmigrants should lead to employment creation and greater business activity for the local residents, particularly in the trade, transportation and service sectors. It is a feature of transmigration in Sumatra, however, that such business opportunities are often snapped up not by the local residents but by spontaneous Minang, Batak and Palembang migrants. On a national, economic plane, such employment/income multiplier effects are of great benefit.

3.9 Development Expenditure

It can be concluded from the above analysis that the regional development impact of the Repelitas I and II transmigration programmes, in terms of population, land development, infrastructure, production and employment, was in general small, and significant only in a few provinces of greatest settlement (e.g. Jambi). In many provinces and for many years, however, the proportion of the total Central Government development budget allocated to transmigration was in excess of 20%.

The data of Table 3.7 refer only to expenditure by DGT, and exclude expenditure by e.g. Agraria or Agriculture on transmigration. Expenditure by other agencies was not proportionately high prior to Presidential Decree No. 26/78, but the subsequent incorporation of the Department of Public Works and other agencies into the programme reduced DGT's proportionate domination of transmigration expenditure. Table 3.8, taken from the IBRD transmigration sector review, includes all expenditure by other agencies on transmigration for 1978/79.

The increased scale of the programme in 1978/79 can be evidenced by the proportions of the Central Government development budget allocated to all agencies concerned for the transmigration programme in that year. The Central Government's emphasis on transmigration as a means of development in Jambi was over 50%. In no less than 13 provinces was over 20% of the total Central Government provincial development budget allocated to transmigration. In Sultera, Sulteng, Kaltim, Kalsel, Lampung and Sumsel, over one third went to transmigration.

The magnified scale of the Repelita III transmigration programme, which in the first three years alone aimed for the settlement of almost 100,000 families more than the total settled in the previous decade, has been reflected in the development budget allocated to the sub-sector. The table below ranks the data of Table 3.9 in terms of the proportion of the Central Government development budget allocated to transmigration in each of the recipient provinces.

Table 7.3

Proportion of Total Central Government Development Budget 1979/80-1981/82 Allocated to Transmigration Sub-Sector (those over 25%)

		%
1.	Sumsel	67
2.	Sultera	57
3.	Kalteng	50
4.	Jambi	44
5.	Kaltim	44
6.	Kalsel	41
7.	Irian Jaya	41
8.	Kalbar	40
9.	Sulteng	38
10.	Riau	37
11.	Bengkulu	31
12.	Maluku	26

Transmigration as a sub-sector was therefore a prime mover of economic development in the above provinces in Repelita III, and most emphatically so in Sumsel, Sultera and Kalteng. As such, the economic viability of transmigration assumes critical relevance.

The extent to which there is a regional opportunity cost in such development expenditure on transmigration is difficult to determine. The primary beneficiaries of transmigration expenditure are the peoples of Java, Bali and NTB, as opposed to the peoples in the region of settlement. Had the investment not been channelled into transmigration, then it can not be necessarily claimed that the expenditure would otherwise have been directed towards other development projects in the regions of settlement, the primary beneficiaries of which would then have been the local people in those regions. The investment may rather have been channelled into alternate means of employment/income creation in the regions of origin.

Nevertheless, the regions of settlement remain in need of further investment, particularly in infrastructure and in agriculture. It has been already observed in Section 3.3 that there can be a big difference between the infrastructure provided to transmigrant settlements, and that for local communities. The latter infrastructure can sometimes be so poor (e.g. that in the region of Pematang Panggang) as to present a constraint on transmigrant settlement development itself. Transmigration should optimally succeed and not precede regional infrastructural development.

Central Government expenditure on transmigration (i.e. on the agricultural sector with transmigrants as the primary beneficiaries), can be compared in each province with that on agriculture and irrigation, with local farmers as the primary beneficiaries (Table 3.8.). In the provinces of Aceh, Riau, Jambi, Bengkulu, Sumsel, Lampung, all Kalimantan, all Sulawesi except Sulut, and Maluku the development budgets of 1978/79 for transmigration were at similar levels to or in excess of those for agriculture.

The above figures do not take into account the recurrent expenditure implications of transmigration. Development costs are not the only costs of transmigration. After investment, settlements need to be manned in administration, health, education, police, etc. buildings need to be maintained, road drains need to be kept clear, bridges will need to be rebuilt after flooding, agricultural services must be provided, and so on. The recurrent costs will tend to fall largely on provincial government budgets, which need to be boosted to cater for such annual expenditure. Transmigration does not represent a free gift to a province; projects require servicing. If the project is successful developmentally and contributes substantially to regional agriculture and to the regional economy, the provincial government will be keen and ready to provide the necessary services. If surpluses fail to materialise and a subsistence economy persists, the settlement will represent a drain on the provincial government's resources, and gradually a state of public service decay (of roads, bridges, buildings, personnel appointed to the settlement) many come into effect.

Table 3.1

REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79

FAMILIES SETTLED BY TARGET YEARS

PROVINCE	1969/70	1970/71	1971/72	1972/73	1973/74	REPELITA I	1974/75	1975/76	1976/77	1977/78	1978/79	REPELITA II	REPELITAS I & II	
													KK	%
ACEH	-	-	-	-	-	-	-	300	500	-	1,400	2,200	2,200	1.7
SUMUT	-	-	-	-	200	200	500	-	-	-	-	500	700	0.1
RIAU	200	-	150	-	150	500	200	-	-	500	2,500	3,200	3,700	2.4
SUMBAR	-	-	-	-	450	450	500	-	2,250	1,200	1,000	4,950	5,400	4.2
JAMBI	362	288	400	700	700	2,450	1,150	1,000	3,000	5,650	2,850	13,650	16,100	12.5
BENGKULU	-	100	-	800	750	1,650	600	500	500	1,300	2,000	4,900	6,550	5.1
SUMSEL	931	1,023	800	3,150	2,650	8,554	3,000	1,000	700	2,709?	6,550	13,959	22,513	17.4
LAMPUNG	1,000	517	650	2,350	7,962?	12,479	1,000	1,000	500	2,000	2,000	6,500	18,979	14.7
KALBAR	102	200	150	300	200	952	300	500	300	1,000	2,000	4,100	5,052	3.9
KALTENG	98	105	300	600	150	1,253	200	-	500	-	500	1,200	2,453	1.9
KALSEL	140	150	400	300	1,200	2,190	300	1,000	1,000	2,000	2,000	6,300	8,490	6.6
KALTIM	200	400	175	400	1,300	2,475	500	-	500	2,500	-	3,500	5,975	4.6
SULUT	-	60	-	100	1,000	1,160	400	-	550	-	-	950	2,110	1.6
SULTENG	150	779	509	1,014	1,400	3,852	500	1,000	1,500	2,800	2,000	7,800	11,652	9.0
SULSEL	750	541	200	800	2,650	4,941	1,100	-	1,000	1,200	500	3,800	8,741	6.8
SULTERA	-	225	437	600	1,450	2,712	550	1,700	1,000	-	1,200	4,450	7,162	5.5
MALUKU	-	50	-	100	200	350	200	-	-	-	-	200	550	-
IRIAN JAYA	-	-	-	100	-	100	-	100	110	90	500	800	900	0.1
T O T A L	3,933	4,438	4,171	11,314	22,412	46,268	11,000	8,100	13,910	22,949	27,000	82,959	129,227	100.0

Table 3.2 REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79

POPULATION IMPACT ON REGIONS OF SETTLEMENT

('000 PERSONS)

PROVINCE (1)	PROVINCIAL POPULATION			TRANSMIGRANT POPULATION		TRANSMIGRANT RATIO (%)	
	Census 1980 (2)	Growth since 1971 (3)	Rate of Growth (% p.a) (4)	Settled Repelitas I+II (5)	Estimated at 1980 * (6)	To Total Population (6 ÷ 2) (7)	To Growth in Population (6 ÷ 3) (8)
ACEH	2,611	602	2.93	10	11	0.4	1.8
SUMUT	8,361	1,739	2.60	3	3	-	0.2
RIAU	2,169	517	3.11	17	19	0.9	3.7
SUMBAR	3,407	614	2.21	24	27	0.8	4.4
JAMBI	1,446	440	4.07	72	81	5.6	18.4
BENGKULU	768	249	4.39	29	32	4.2	12.9
SUMSEL	4,630	1,189	3.32	101	113	2.4	9.5
LAMPUNG	4,625	1,848	5.77	85	95	2.1	5.1
KALBAR	2,486	466	2.31	23	26	1.1	5.6
KALTENG	954	252	3.43	11	12	1.3	4.8
KALSEL	2,065	366	2.16	38	43	2.1	11.7
KALTIM	1,218	484	5.73	27	30	2.5	6.2
SULUT	2,115	396	2.31	10	11	0.5	2.8
SULTENG	1,290	376	3.86	52	58	4.5	15.4
SULSEL	6,062	881	1.74	39	44	0.7	5.0
SULTERA	942	228	3.09	32	36	3.8	15.8
MALUKU	1,411	321	2.88	3	3	0.2	1.3
IRIAN JAYA	1,174	251	2.67	4	5	0.4	2.0
T O T A L	45,248	11,219	2.48	580	649	1.4	5.8

* weighted average of settlement by year at 2.5% per annum, equivalent to 12% increase since settlement.

Table 3.3

REGIONAL DEVELOPMENT IMPACT OF REPELITA III TRANSMIGRATION, 1979/80 - 1981/82

POPULATION EFFECT ON REGIONS OF SETTLEMENT

PROVINCE (1)	PROVINCIAL POPULATION CENSUS 1980 (2)	ESTIMATED NO MIGRATION POPULATION 1983 AT 2.5% p.a. (3)	ESTIMATED NATURAL INCREASE IN THREE YEARS (4)	TRANSMIGRANT POPULATION SETTLED FIRST THREE YEARS REPELITA III * (5) 000 persons	ESTIMATED TOTAL POPULATION 1983 (3 + 5) (6)	ESTIMATED TOTAL INCREASE IN THREE YEARS (4 + 5) (7)	NEW TRANSMIGRANT RATIO	
							TO TOTAL POPULATION (5 ÷ 6) (8)	TO GROWTH IN POPULATION (5 ÷ 7) (9)
ACEH	2,611	2,812	201	25	2,837	226	0.9	11.1
SUMUT	8,361	9,004	643	14	9,018	657	0.2	2.1
RIAU	2,169	2,336	167	128	2,464	295	5.2	43.4
SUMBAR	3,407	3,669	262	14	3,683	276	0.4	5.1
JAMBI	1,446	1,557	111	57	1,614	168	3.5	33.9
BENGKULU	768	827	59	29	856	88	3.4	33.0
SUMSEL	4,630	4,986	356	282	5,268	638	5.4	44.2
LAMPUNG	4,625	4,981	356	45	5,026	401	0.9	11.2
KALBAR	2,486	2,677	191	52	2,729	243	1.9	21.4
KALTENG	954	1,027	73	56	1,083	129	5.2	43.4
KALSEL	2,065	2,224	159	77	2,301	236	3.3	32.6
KALTIM	1,218	1,312	94	41	1,353	135	3.0	30.4
SULUT	2,115	2,278	163	45	2,323	208	1.9	21.6
SULTENG	1,290	1,389	99	58	1,447	157	4.0	36.9
SULSEL	6,062	6,528	466	12	6,540	478	0.2	2.5
SULTERA	942	1,014	72	14	1,028	86	1.4	16.3
MALUKU	1,411	1,519	108	23	1,542	131	1.5	17.6
IRIAN JAYA	1,174	1,264	90	43	1,307	133	3.4	32.3
TOTAL	45,248	51,404	6,156	1,015	52,419	7,171	1.9	14.2

* Assume 1½ years slippage in realisation, 4.5 persons per family.

Table 3.4

REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79
ESTIMATED INFRASTRUCTURAL IMPACT

PROVINCE (1)	ASPHALT/GRAVEL ROADS (km)		EARTH ROADS (km)		LAND DEVELOPMENT (SQ. KM)				
	Province 1980 (2)	Transmigration at 6 km/UPT (3)	Province 1980 (incl. unspec) (4)	Transmigration at 26.25km/UPT (5)	Total Land Area (6)	Land Area Farmed 1973 (7)	Transmigration land distributed at 2.5Ha/KK (8)	Transmigration Land Work at 1.75 Ha/KK (9)	Transmigration Land Worked as % Province (10)
ACEH	2,915	26	3,547	116	55,392	3,737	55	38	1.0
SUMUT	7,131	8	4,469	37	70,787	8,055	18	12	0.1
RIAU	991	44	3,277	194	94,562	5,072	92	65	1.3
SUMBAR	3,809	65	1,521	284	49,778	3,448	135	94	2.7
JAMBI	2,756	193	1,056	845	44,924	2,413	402	282	11.7
BENGKULU	1,828	79	728	344	21,168	1,538	164	115	7.5
SUMSEL	5,034	270	3,285	1,182	103,688	7,031	563	394	5.6
LAMPUNG	2,291	228	1,082	996	33,307	6,733	474	332	4.9
KALBAR	1,114	61	2,612	265	146,780	9,820	126	88	0.9
KALTENG	334	29	1,921	129	152,600	5,241	61	43	0.8
KALSEL	1,843	102	1,505	446	37,660	2,695	212	149	5.5
KALTIM	909	72	841	314	202,440	925	149	105	11.4
SULUT	1,937	25	1,464	111	19,023	3,518	53	37	1.1
SULTENG	1,538	140	3,260	612	69,726	2,832	291	204	7.2
SULSEL	4,335	105	6,158	459	72,781	7,375	219	153	2.1
SULTERA	1,309	86	3,321	376	27,686	1,511	179	125	8.3
MALUKU	1,284	7	1,230	29	74,505	2,600	14	10	0.4
IRIAN JAYA	864	11	2,048	47	421,981	..	22	16	..
TOTAL	42,222	1,551	42,325	6,786	1,698,788	74,544	3,229	2,262	3.0

* 1. Road Construction estimates from PLPT Repelita III models.
2. Land Distribution and Clearance estimates from DPDT Surveys 1980/81 and 1981/82

Table 3.5

REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79
ESTIMATED AGRICULTURAL IMPACT; FOOD-CROPS (1980 Data)

PROVINCE	P A D I						M A I Z E					
	CULTIVATION* (000 Ha)		PRODUCTION (000 Tons)		YIELD (Tons/Ha)		CULTIVATION* (000 Ha)		PRODUCTION (000 Tons)		YIELD (Tons/Ha)	
	Province	Transmi-gration	Province	Transmi-gration	Province All/Dryland	Transmigr. (high ass)	Province	Transmi-gration	Province	Transmi-gration	Province	Transmi-gration
ACEH	226.3	2.2	679,0	2.8	3.00/1,43	1,25	3.1	0.7	2.8	0.7	0.91	1.00
SUMUT	523.2	0.7	1,480,7	0,9	2.78/1.59	1,25	38.5	0.2	52.3	0.2	1.36	1.00
RIAU	134.6	3.7	276,0	4,6	2,05/1,31	1,25	6,4	1,2	6,9	1,2	1,08	1.00
SUMBAR	289.5	5,4	1,012.1	6,8	3.50/1.50	1,25	4,9	1,8	6,3	1,8	1.28	1.00
JAMBI	147.0	16.1	388.1	20,1	2,64/1,06	1,25	1.6	5.4	1.9(?)	5.4	1.22	1.00
BENGKULU	70.0	6.6	179.4	8,2	1,56/1,40	1,25	2,1	2,2	2.5	2,2	1,20	1.00
SUMSEL	359.0	22.5	890.2	28,1	2,48/1,60	1,25	7,2	7.5	7.3(?)	7.5	1.02	1.00
LAMPUNG	272.1	19.0	702,9	23,8	2,58/1,51	1,25	50,2	6,3	65.3	6.3	1.30	1.00
KALBAR	304.1	5.1	580,8	6,4	1,91/1,14	1,25	7,3	1.7	5.6	1,7	0.77	1.00
KALTENG	123,6	2,5	212,0	3,1	1,71/1,29	1,25	3.3	0,8	2.7	0.8	0.82	1.00
KALSEL	289.6	8,5	688.7	10,6	2,38/1,29	1,25	4,2	2,8	3,8	2.8	0.90	1.00
KALTIM	78,2	6.0	131,8	7,5	1.68/1,38	1,25	3,0	2.0	2,6	2.0	0.86	1.00
SULUT	98.1	2.1	264,2	4,2	2,69/1,48	2,00	56.7	0,7	78,8	0.7	1,39	1.00
SULTENG	101,2	11,7	200,2	23,4	1,98/1,22	2,00	29,3	3.9	32,2	3.9	1,10	1.00
SULSEL	607,8	8,7	1,829,7	17,4	3,01/1,32	2,00	351,5	2,9	457,0	2.9	1.30	1.00
SULTERA	31,7	7,2	49,6	14,4	1,56/1,26	2,00	49,1	2,4	61.9	2,4	1.26	1.00
MALUKU	22,5	0,6	16,5	0,8	0,74/0,70	1,25	17,6	0,2	17,6	0.2	1.00	1.00
IRIAN JAYA	1,0	0,9	1,6	1,1	1,61/1/19	1,25	2,2	0,3	2,2	0.3	1.00	1.00
TOTAL	3,679.8	129,2	9,583,5	184,2	2,60/1,30	1,43	657,3	43,1	809,7	43.1	1.23	1.00
TOTAL INDONESIA (JAVA)	9,018.3 (4,778.0)		29,734.0 (18,536.9)		3.33/1.43(3.88/1.63)		2,766.9(1,811.8)		4,012.1(2,826.4)		1.45(1.56)	

* Cultivation of padi/maize taken as 1 ha/KK and 0.33 ha/KK respectively.

Table 3.6

REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79
ESTIMATED AGRICULTURAL IMPACT; TREE CROPS AND LIVESTOCK

000 No.

PROVINCE	COCONUT		COFFEE		CLOVE		RUBBER		CATTLE		CHICKENS	
	PROVINCE	TRANSMI-GRATION	PROVINCE	TRANSMI-GRATION	PROVINCE	TRANSMI-GRATION	PROVINCE	TRANSMI-GRATION	PROVINCE	TRANSMI-GRATION	PROVINCE	TRANSMI-GRATION
ACEH		-		-		-		-	170.6	0.2	2,578.6	3.1
SUMUT		2		-		-		-	149.6	0.1	5,369.4	1.7
RIAU		49		143		79		-	11.0	1.9	1,744.3	21.6
SUMBAR		33		38		-		-	160.6	0.1	2,832.8	6.7
JAMBI		195		1002		97		15	18.4	3.8	702.7	62.6
BENGKULU		53		198		218		-	15.0	0.4	612.4	14.0
SUMSEL		177		7		36		-	89.6	2.0	2,039.0	66.8
LAMPUNG		74		-		81		-	76.6	2.9	2,316.6	90.8
KALBAR		4		-		1		-	58.9	0.1	2,001.2	16.2
KALTENG		33		62		5		-	14.0	-	488.3	22.7
KALSEL		130		25		126		-	25.8	3.8	1,397.4	49.0
KALTIM		58		175		30		-	6.4	-	321.0	54.7
SULUT		23		22		4		-	159.9	1.6	1,211.9	15.0
SULTENG		76		64		22		-	114.1	4.5	767.2	15.1
SULSEL		153		62		62		-	543.5	3.5	4,927.3	86.3
SULTERA		129		139		32		-	..	1.8	687.1	52.0
MALUKU		5		-		1		-	14.9	1.3	867.5	8.6
IRIAN JAYA		9		3		1		-	..	0.7	453.2	21.4
TOTAL		1,203		1,884		794		15	1,628.9	24.8	31,317.8	578.0

NB: Data from DGT's draft "Buku Data Proyek Pemukiman Transmigrasi s/d Desember 1979".

Table 3.7. REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79
CENTRAL GOVERNMENT DEVELOPMENT BUDGET ON TRANSMIGRATION (DGT ONLY) REPELITA II

	1974/75		1975/76		1976/77		1977/78		1978/79		REPELITA II	
PROVINCE	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total
ACEH	-	-	243	3	605	6	-	-	1,861	12	2,709	..
SUMUT	92	..	232	1	-	-	-	-	1,390	3	1,714	..
RIAU	56	..	26	-	484	5	311	3	4,231	24	5,108	..
SUMBAR	78	..	282	2	884	7	1,201	7	3,026	10	5,471	..
JAMBI	402	..	786	13	2,475	29	3,290	29	7,300	37	14,253	..
BENGKULU	127	..	249	7	734	12	1,141	20	3,390	24	5,641	..
SUMSEL	1,336	..	1,165	7	3,534	21	1,506	8	6,293	22	13,834	..
LAMPUNG	458	..	2,244	23	-	-	1,213	9	3,250	15	7,165	..
KALBAR	80	..	258	3	1,179	10	584	5	3,738	21	5,839	..
KALTENG	37	..	-	-	318	8	-	-	1,151	17	1,506	..
KALSEL	62	..	426	5	1,258	12	1,223	9	5,535	28	8,504	..
KALTIM	127	..	231	3	849	10	1,499	14	4,158	25	6,864	..
SULUT	70	..	202	3	500	5	367	2	395	2	1,534	..
SULTENG	-	-	-	-	1,187	16	1,768	17	3,709	24	6,664	..
SULSEL	339	..	99	1	2,027	11	534	2	1,454	5	4,453	..
SULTERA	199	..	837	18	1,265	22	-	-	3,135	24	5,436	..
MALUKU	38	..	225	6	-	-	-	-	964	11	1,127	..
IRIAN JAYA	-	-	-	-	-	-	1,141	20	592	9	1,733	..
TOTAL	3,501	..	7,505	5	17,299	10	15,778	7	55,572	16	99,655	11*

SOURCE: BAPPENAS NB. DATA REFER ONLY TO DGT BUDGET * EXCLUDING 1974/75

Table 3.8.

REGIONAL DEVELOPMENT IMPACT OF REPELITAS I AND II TRANSMIGRATION, 1969/70 - 1978/79

CENTRAL GOVERNMENT DEVELOPMENT EXPENDITURE 1978/79 (IN %)

PROVINCE	AGRICULTURE AND IRRIGATION	TRANSMIGRATION AND MANPOWER	ELECTRICITY	COMMUNICATIONS (AND TOURISM)	SOCIAL	INDUSTRY, MINING, TRADE, CROPS, DEFENCE, OTHER	TOTAL
ACEH	15,8	16,8	7,9	41,2	12,6	5,7	100.0
SUMUT	24,2	4,0	14,3	39,6	11,0	6,9	100.0
RIAU	27.7	29,1	-	23,3	11,7	8,2	100.0
SUMBAR	21,3	14,5	10,5	29,7	17,2	6,8	100.0
JAMBI	17,5	51,7	-	17,5	8,9	4,4	100.0
BENGKULU	29,8	30,1	-	26,3	10,0	3,8	100.0
SUMSEL	23,1	32,6	4,8	23,8	10,6	5,1	100.0
LAMPUNG	36,8	34,4	-	16,0	7.5	3,5	100.0
KALBAR	21,2	26,7	2,9	25,9	14,4	8.9	100.0
KALTENG	16.1	26,8	-	18.6	22.3	16.2	100.0
KALSEL	19,6	39,1	5,2	14,8	14,4	6,9	100.0
KALTIM	9,6	39,7	-	27,5	13,1	10.1	100.0
SULUT	30,7	5,3	12,3	28,4	16,9	6,4	100.0
SULTENG	26,5	40,1	-	15,5	12,8	5.1	100.0
SULSEL	8,9	21,7	-	4,7	28,2	23,6	100.0
SULTERA	27,8	41,0	-	11,8	13,5	5,9	100.0
MALUKU	11,2	26,5	10,7	24,4	18,0	9,2	100.0
IRIAN JAYA	..	..	..	..	..	..	..
JAVA (excluding Jakarta)	39.4	1.4	13.9	16.5	18.8	10.0	100.0

Table 3.9.

REGIONAL DEVELOPMENT IMPACT OF REPELITA III TRANSMIGRATION, 1979/80 - 1981/82
CENTRAL GOVERNMENT DEVELOPMENT BUDGET ON TRANSMIGRATION

PROVINCE	1979/80		1980/81		1981/82		1979/80 - 1981/82	
	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total	Rp. Million	% of Prov. Total
ACEH	84	- (-)	6,197	13 (21)	8,912	14 (20)	15,193	11 (17)
SUMUT	416	1 (2)	1,592	2 (3)	4,651	5 (7)	6,659	3 (5)
RIAU	13,443	43 (74)	22,270	14 (23)	27,243	41 (58)	62,956	24 (37)
SUMBAR	534	2 (3)	2,858	3 (5)	1,755	3 (4)	5,147	3 (5)
JAMBI	7,887	33 (56)	14,956	41 (67)	5,884	15 (21)	28,367	29 (44)
BENGKULU	3,599	24 (41)	3,510	13 (21)	9,396	23 (32)	16,505	20 (31)
SUMSEL	17,856	36 (62)	36,542	43 (70)	60,088	49 (69)	114,486	44 (67)
LAMPUNG	220	2 (3)	346	1 (2)	9,750	18 (25)	10,316	9 (14)
KALBAR	3,953	18 (31)	8,611	26 (43)	16,534	29 (41)	29,098	26 (40)
KALTENG	1,627	16 (27)	5,666	26 (43)	15,472	42 (59)	22,765	33 (50)
KALSEL	9,109	27 (46)	14,295	30 (49)	15,626	25 (35)	39,030	27 (41)
KALTIM	3,795	21 (36)	8,802	30 (49)	13,700	32 (45)	26,297	29 (44)
SULUT	404	2 (3)	2,715	9 (15)	4,146	10 (14)	7,265	8 (38)
SULTENG	3,400	20 (34)	6,024	24 (39)	11,198	27 (38)	20,622	25 (38)
SULSEL	436	1 (2)	2,252	4 (7)	3,990	5 (7)	6,678	4 (6)
SULTERA	..	.. (..)	9,384	32 (52)	15,371	41 (58)	(24,755)	37 (57)
MALUKU	2,425	17 (29)	3,899	17 (28)	5,310	17 (24)	11,634	17 (26)
IRIAN JAYA	3,504	23 (39)	..	..(..)	13,164	28 (39)	16,668	27 (41)
TOTAL	72,692	17 (29)	149,559	18 (30)	242,190	24 (34)	464,441	20 (31)
		(x 1,71)		(x 1,64)		(x 1,42)		(x 1,53)

NB. THIS DATA HAS BEEN PROVIDED DIRECTLY FROM BAPPENAS. THE TRANSMIGRATION DEVELOPMENT BUDGET WAS TAKEN FROM BAPPENAS' SATUAN 3 RECORDS, BUT THERE SEEMS TO BE A LARGE UNDER-RECORDING OF BUDGET. JMT DATA FOR 1979/80 - 1981/82 GIVE TOTAL SECTOR BUDGET OF RP. 137, 326 AND 370 THOUSAND MILLION RESPECTIVELY, COMPARED WITH BAPPENAS' RP. 80, 199 and 262. THE PROPORTIONS PER PROVINCE IN THIS TABLE COULD THEREFORE BE GROSSED UP BY 71%, 64% and 41% TO GET THE FULL PROVINCIAL IMPACT (see figure in brackets)

Chapter IV DEVELOPMENT CONSTRAINTS

Introduction

The transmigration programmes of Repelitas I to III have led to a generally limited impact on regional development (Chapter III)t This Chapter seeks to identify key constraints retarding development at transmigration settlements.

Much of the research for this Chapter was undertaken during a succession of field trips to Sumatra (June 1982), Sulawesi (August 1982) and Kalimantan (September 1982) by members of the JMT Evaluation Team. The objectives of the trips were to visit a selection of transmigration settlements, from Repelitas I and II, on dry and wet lands, with wide-ranging diversity of inputs, with domestic and foreign finance/technical assistance, employing different farming systems in variable agro-environmental conditions, and with the purpose of assessing:

i. the regional development, especially economic, impact of the Repelitas I and II transmigration programmes, the inter-relationship of the settlements in the regional context and their contribution to regional agricultural production;

ii. the development prospects of Repelita III settlements, settled under large scale, crash planned, public works programmes, in relation to the development progress of earlier settlements;

iii. pertinent and key development constraints;

iv. the potential for regional development planning with transmigration as one component of many.

Twelve transmigration sites in Central Sumatra were visited, six in Sulawesi and two in Kalimantan. A check list of data and questions was applied at all sites under the general headings of agro-environmental, agro-inputs, agro-economic, other economic, administrative/organisational, socio-cultural and high target development constraints. The statistical and qualitative findings from the first two field trips are sketched in Tables 4.1 and 4.2, and pertinent development constraints are discussed in the paragraphs below. Resultant conclusions will be presented in the form of recommendations for further development in Chapter VII. Most of the discussion in the balance of this and the next Chapters will be in relation to the development constraints on food-cropped dry uplands, and options for the amelioration of the economic conditions therein. There remain .pa development constraints on tree cropped lands, on irrigated lands and on tidal swamp lands, many of which will be discussed. But it is the situation on food-cropped dry uplands that will receive most analysis and attention, in view of the limited economic and settler welfare progress to date and since settlement on such lands accounted for three quarters of total settlement in Repelitas I, II and III.

4.1 Agro-environmental Conditions

4.1.1. Repelitas I and II

It is the experience of land settlement projects world-wide that the land settlement is usually as successful as the land is good. Indonesia's transmigration programme 1969/70 - 1978/79 is no exception to this rule. Repelitas I and II transmigration projets have generally been developmentally successful only where soils have been fertile, slopes gentle or flat, rainfall comparatively dependable and river sources abundant for some irrigation.

But the wide open spaces available for transmigration in Indonesia are seldom, almost by definition, on lands of good quality, for otherwise it is probable that they would have been settled and populated long ago by e.g. the Bugis, Batak, Minang as well as Javanese peoples. There are some exceptions to this rule, particularly where there have previously been social, cultural or military reasons to deter settlement on sparsely populated lands of good quality (Luwu in Sulsel being an example of undoubted development potential constrained by such factors for so long). Or, again, land settlement may have been deterred due to isolation, non-accessibility and the high initial investment costs of infrastructure. But in general it can be claimed that the better lands in Indonesia have been exploited for decades, and that it is those lands of lower quality to which the transmigrant will be transported.

The uplands of Central Sumatra can here be defined as those non-swamp lands South of Sumatra Utara and East of the Bukit Barisan mountain range. This region received more than half the numbers of Repelitas I and II transmigrants. The fact that Central Sumatra has soils of poor quality has never been a secret. The poverty of the soils under alang-alang and the fragility of the tropical rain forest ecosystem are well known and understood, and explain the traditional shifting cultivation pattern of agriculture of native Sumatra (and Kalimantan) farmers. But this is not the place for a full technical analysis of Central Sumatra's agro-environmental conditions. There is already much technical literature on the subject, and for a concise, direct technical appraisal (plus an extensive bibliography) the reader is referred to Thomas' 'The Maintenance of Soil Productivity on Transmigration Sites in Central Sumatra'*.

In brief, the soils of Central Sumatra are marginal soils for cultivation, varying in the red/yellow podzolic spectrum from poor to terrible. They have high acidity, quickly develop high toxicity and low nutrient content. They are unsuited to food cropping in that they require heavy applicationos of mineral fertilizer and lime to maintain soil productivity. In the physical, social and

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* Land Resources Development Centre (Overseas Development Administration of the British Government), 1981

economic situation of Central Sumatra, it is difficult to supply and pay for such large quantities of inputs, and there can be little guarantee that yields will be sufficient to recoup such costs. The balance of soil nutrients is so delicate that it is further unlikely that the application of lime and fertilisers, even given supplies and credit, could be supervised sufficiently closely to maintain that balance. The penalty for non-application of inputs is the vicious circle of declining yields, to the extent that continued cultivation may no longer repay the labour involved nor be able to support the family, and the degraded lands will become invaded by alang-alang. Soil restoration prospects thereafter will be costly and by no means certain.

From an agronomic viewpoint, the soils of Central Sumatra are ideally suited to tree crops, and rubber in particular. Their deep stable structures are ideal for root growth, and their nutrient deficiency has comparatively little effect on low-demanding rubber (the vegetative cover providing much of the necessary nutrients). Rubber further poses little threat to the environment, arresting soil degradation and erosion and weed infestation irrespective of whether the crop is nurtured or neglected. The protective canopy of the rubber will be not dissimilar to that provided by the original delicately balanced tropical rain forest.

Climatic conditions in Central Sumatra are hot and humid, intensely so, year around, and are hence trying on exposed soils. Rainfall is high but sporadic and erratic, with a pronounced dry season from June to September. Exposed soils will be susceptible to severe erosion during heavy rains, particularly if on steeper slopes. Slopes vary from flat (e.g. Way Abung naturally, or Sitiung bulldozed), to gently rolling (Batumarta, Pematang Panggang) and steeper slopes (the Jambi Trans-Sumatra Highway sites). Potential for irrigation outside flatter Lampung is limited by slope and uncertain off-season water sources.

The agro-environmental conditions of Sulawesi, the second largest island of settlement in Repelitas I and II, are in general less hostile to agricultural development Soils in Sulut and Sulsel are fertile, and can be on par with those of Java and Bali. Soils in Sulteng and Sultera are less fertile, but are generally better watered than in Sumatra. With the selection in these two provinces in Repelitas I and II of comparatively flat areas for transmigration settlement, the relative ease of some form of irrigation for these sites can partially compensate for any poverty of soil fertility. With the combination of good soils and irrigable lands in certain sites in Sulut and Sulsel, land settlement can be most successful (e.g. Luwu, Mopuya/Mopugad). Soil and water conservation problems have been less prominent in Sulawesi to date, though there have been severe drainage problem in certain flat swampy sites in Luwu.

Agro-environmental conditions in Kalimantan, upland from the vast areas of swampland along the river watersheds of West and South Kalimantan, are similar to those prevalent in Central Sumatra. In general, however, the soils tend to beof lower natural fertility.

Furthermore, unlike most of Central Sumatra, there are extensive areas of podzol soils of extremely low fertility, and upon which no food crop production is feasible, in Central Kalimantan. Transmigration settlement to date has generally managed to stay clear of such areas, though unexpected pockets have sometimes been encountered (e.g. in Sintang A).

4.1.2 Repelita III

The orientation of the Repelitas I and II transmigration programmes towards settlement mainly on the low fertility uplands of Central Sumatra and Kalimantan continued through to the greatly magnified programme of Repelita III. At the same time, the tidal swamp development programme was also greatly enlarged. The table below compares the targetted programmes of Repelitas I and II with the first three years of Repelita III.

	1969/70-1978/79		1979/80-1981/82	
	'000KK	%	'000KK	%
Dryland	96	74	169	75
Tidal Swamp	33	26	56	25
TOTAL	129	100	225	100

There is no evidence to suggest that agro-environmental conditions at settlements in the Repelita III programme are any worse or any better than those at Repelitas I and II settlements. It is not necessarily the case that the better lands available were opened up for Repelitas I and II transmigration, or that new settlement lands get progressively worse each year.

What may however be concluded is that the crash planning/crash settlement approach, under the PAYP (Plan As You Proceed) scheme (see Phase I Evaluation Study), has led to some opening up of lands of agro-environmental conditions exceptionally inappropriate to food crop agriculture. At Pasar Pangaraian in Riau, at Sintang in Kalbar and at other sites, some settlement units have been constructed on lands of minimal fertility. Under TKTD's 'normal planning process', taking over three years pre-settlement, such settlement would have been avoided. But it could be argued that the inevitable failure of one or two settlement units may be a small price to pay for the greatly accelerated pace of implementation accorded by the PAYP process.

4.2 Land Development Models

4.2.1 Repelitas I and II

Despite the conclusive agronomic unsuitability of Central Sumatra for continuous arable cropping, some 59% of the Repelitas I and II transmigration programmes was directed towards Central Sumatra. The emphasis was primarily geared to food cropping, and only seldom with the inclusion of any supplementary tree crops. Yet throughout the 1970's there was keen debate on the wisdom of non-irrigated food crop models in Central Sumatra. By the mid-1970's, it seemed as if the tree crop lobby was gaining ground, particularly amongst the foreign financiers. The IBRD built a 1 ha/KK tree crop component into its Transmigration I projects at Way Abung and Batumatra, and also financed a 2 ha/KK rubber component under NES III at Rimbo Bujang. The FAO, in the pioneering planning of the first large scale upland transmigration project, advised the incorporation of tree crops into the development of Pematang Panggang.

But towards the end of Repelita II, the pendulum seemed to swing back towards food cropping, as a result primarily of three factors:

i. a large and growing national rice deficit, particularly after the widespread harvest destruction of 1977;

ii. the demonstration by LP3 that sustainable food crop models could be applied on Central Sumatra soils given improved cropping systems, high fertiliser usage and better pest control.

iii. the expansion by PT Pusri and the subsequent greater availability of domestically produced urea fertilizer.

As a result, the huge Repelita III transmigration programme was drawn up with the emphasis squarely on food crop production. The IBRD gave the programme its full backing with the financing, not only of physical planning studies to serve a large proportion of the programme, but also of a project designed to serve as a model for the whole Repelita III transmigration programme. Transmigration II aimed to settle 30,000 families on Jambi uplands on the basis of employing a rainfed food crop model. The eventual introduction of tree crops was assumed as a secondary consideration, and finance for such deferred in order to keep unit costs down.

It is to be a major conclusion of this evaluation study that the foremost constraint on the economic development of the Repelitas I and II transmigration programme has been the very land development model chosen. The lack of agricultural progress has been primarily a result of the forced application of a farming system on agro-environmental conditions largely unfavourable to such a system. The three factors mentioned above as largely influencing the return swing in favour of food crops have turned out to be economically fallacious, as follows:

i. there is no economic necessity for a nation to be self-sufficient in rice or grain production; if the result of such a policy is to intensify production of rice on wet or even dry land ideally suited to rice production, then such a policy may be economically beneficial; but if the result, as has often happened with transmigration, is to introduce cultivation of rice through an extensification programme to lands largely unsuitable for rice cultivation, then such a policy will entail very high opportunity costs; economically would be wiser to cultivate that land in full recognition of its natural resources and agro-environmental conditions, market the output and purchase perhaps twice, perhaps five times the quantity of rice that could otherwise have been produced by that land; (this argument does not take into account any political reasons for striving for national self-sufficiency);

ii. the food crop models developed by LP3 have turned out, despite their technical feasibility, to be practically inapplicable without indefinite supplies of free inputs by Government; in the inhospitable agro-environmental conditions of Central Sumatra and Kalimantan, the probabilities of actually realising the incremental yields needed to pay off the high cash inputs and to justify the high labour inputs required by the LP3 models are just too low for the simple farmers to place his family's very livelihood at stake;

iii. the fertiliser is now available, but at an unacceptable cost to the farmer given the above probabilities, and at an opportunity cost to the economy.

It will be seen in more detail in Section 4.4 how the food crop farm model has been unable to be applied economically in Central Sumatra and in Kalimantan. But the model has had some success in Sulawesi, where agro-environmental conditions are in general more favourable to continuous food cropping. Yields from padi cultivation in Sulawesi (Table 4.2) are in general much higher than those of Central Sumatra. With such yields, the economics of Sulawesi settlement come to approximate those of Model Four Irrigation to be found in Chapter V. Indeed the Model Four assumed yield of 5 tons/ha has been achieved in certain Sulawesi settlements before investment in technical irrigation, after some self-help, low-key, Government-assisted, non-technical irrigation schemes (e.g. Rambu-Rambu in Sultera, Mopuya in Sulut).

The influence of irrigation has perhaps been most emphatic in Sultera. At the time of the ADB project appraisal report for the SESTAD project in 1978, the picture of transmigration in Sultera was as bleak as the situation at so many Central Sumatra sites today. Yields averaged a mere 0.5 tons/ha padi gogo, and sites were characterised by inextensive cultivation of the land (0.7 ha/KK only) and high dependence on off-farm employment. As a result of a vigorous local Government/DGWRD/partly USAID programme of smaller scale irrigation works, and followed by the present upgrading of 17 transmigrant villages under SESTAD (besides the large irrigation/new

transmigration component), the situation of transmigrants in Repelitas I and II settlements in Sultera has been transformed. Irrigation has thus been the investment injection needed to raise Sultera settlement to surplus status, beyond subsistence. Where irrigation, whether technical or non-technical, has been applied to the lusher soils of Sulut and Sulsel, settlements have prospered greatly.

The equivalent investment injection on slopey, non-irrigable lands in Central Sumatra and Kalimantan is in tree crops. The economics of tree crop development will be demonstrated favourably in Chapter V. The incidence of ideal agro-environmental conditions for many tree crops, and especially rubber, has been pointed out in Section 4.1. But it is the visibly healthy nature of the rubber blocks and strips of Way Abung, Batumarta and Rimbo Bujang that gives the final proof. Such appropriate land use can convince the farmers that comparative prosperity awaits just around the corner, and can act as an incentive for the settlers to pull themselves beyond subsistence even before (as at all three above mentioned settlements) the rubber trees come into maturity.

4.2.2 Repelita III

The land development model employed by TKTD in Repelita III has been inflexible in the extreme. The 3.5 ha/KK food crop based farm model has been imposed on all upland settlements handled by TKTD and DGT (smaller units), i.e. exluding DG Estates' and P4S' programmes, irrespective of agro-environmental conditions pertaining in the region. The inflexibility has been deliberate, in that it has been designed to enable maximum transfer of population within given financial limits. More flexibility entails greater planning costs (and time) and often larger investment costs (especially if the flexibility implies tree crops or irrigation), hence lower settlement targets within a particular financial ceiling.

Most Repelita III sites are still receiving free fertilizer/pesticide input packages, and it is too early to be able to conduct ex-post economic analyses of settlement. It is doubtful, however, that the three year free input package will offer any more than a temporary palliative on the basic economic unviability of food crop upland settlement. Repelitas I and II sites generally had just a few months free input package before being left to the pressures of the vicious circle of low yields/lower inputs. It is perhaps too early to say so conclusively, but the combination especially of:

i. declining natural soil fertility;
ii. incidence of pests and predators;
iii. high costs of high volumes of required inputs, and
iv. unpredictability of climate, especially rainfall,

will be likely to affect the Repelita III settlements in Central Sumatra and Kalimantan once the three year free input package terminatesjust as remorselessly as these factors affected many such Repelitas I-II settlements.

The SFSE (Screening, Feasibility Study and Engineering)

Studies of Repelita III were commissioned by TKTD and financed under IBRD Trans II on the basis of identifying settlement areas suitable for food crop models. Some of the sites examined by the consultants were concluded to be unsuitable for food crops, but well suited to tree crops. In some cases these sites have been referred to DG Estates, in other cases settlement implementation plans have proceeded on the basis of food crop models regardless of suitability.

Repelita III has however seen a greater incorporation of DG Estates into the transmigration programme. The Nucleus Estate and Smallholder schemes (NES) introduced by DG Estates in the 1970's (and generally part-financed by IBRD) have sometimes incorporated transmigrant settlers as well as local resident smallholders, e.g. at Rimbo Bujang. During Repelita III, DG Estates has introduced a special NES scheme to serve not primarily existing smallholders but new transmigrant settlers. This PIR Khusus scheme was first introduced in the 1981/82 programme, and was greatly enlarged in the 1982/83 programme to serve some 19,175 KK. DG Estates assumes responsibility for all aspects of the PIR Khusus scheme, including planning and land clearing, other than DGT's actual transfer of transmigrants.

The PIR Khusus programme has good potential for development for two fundamental reasons (below), but it also suffers the disadvantages, to the policy makers, of high settlement costs per family (hence smaller settler targets within limited finances) and lengthy planning and implementation schedules. On economic grounds, such disadvantages are heavily outweighed by the two main advantages, namely:

I. tree crop development, professionally implemented and managed by a PNP/PTP as in the PIR Khusus scheme, can represent an optimal land use of the vast areas of marginal lands in Central Sumatra and Kalimantan, and can yield satisfactory economic rates of return (see Model Three in Chapter V), and

II. the PIR Khusus scheme is planned and implemented from conception to realisation by agricultural professionals within the agency which will bear the prime responsibility for the successful development of settlements.

This last point emphasises one critical development constraint in the Repelita III transmigration programme to date, namely that the planning of the majority of transmigration projects (i.e. on drylands with food crops) has not been undertaken by agricultural professionals. Rather has the bulk the of programme been planned (TKTD) and implemented (PLPT) effectively as an infrastructural programme by an infrastructural agency, the Department of Public Works. Despite the fact that land settlement projects are de facto agricultural projects and stand or fall by the agricultural development thatis generated, the primary appropriate agricultural agency, DGFCA, has been involved neither in the planning nor in the implementation of this land settlement programme. DGFCA has become involved only at the post-settlement stage, by which time its role can only be to make a best attempt to put into effect a land development

model pre-determined by DPU. At this post-settlement stage, DPU withdraws and needs to bear no lasting responsibility for the settlement it has planned and implemented.

The involvement of DGFCA in planning transmigration projects could lead to some modifications in the farm models (and settlement designs) employed. Their involvement in implementation could lead to the minimisation of the land degradation caused by heavy mechanical clearing, or to the avoidance of the soil and water erosion caused by crude non-contoured road construction. DGFCA's involvement may not, however, lead to any such developmentally appropriate changes if they remain subject to pressures to meet high population transfer targets.

In the Phase I Evaluation Study, it was found that the pace of settlement in Repelita III had been impressively speeded up, at what consequences to the quality of settlement and development had to await the findings of this Phase II Study. The Phase I Study was especially concerned in view of the very high drop-out rate (in excess of 50%) experienced in the planning process undertaken by the SFSE (Screening, Feasibility Study and Engineering) consultants, and the absence of such detailed planning in the PAYP process. But this Phase II Study has revealed that whatever mistakes may have been occasioned and development constraints created by crash planning/crash settlement processes, they are only minor in relation to the fundamental development constraint on dry uplands of agro-environmental conditions inappropriate to inflexibly planned food crop farming models, to be found in the Repelitas I-II and the Repelita III transmigration programmes alike.

4.3 Land Entitlement, Settlement Design and Land Under Production

Tables 4.1 - 4.2 give a revealing comparison between transmigration in Sumatra and in Sulawesi in terms of land entitlement per family. With settlement in Sulawesi fixed by policy at 2 ha/KK and in Sumatra varying from 2 to 5 ha/KK, the difference can be seen as that between confidence and uncertainty. It is the policy of the Sulawesi provincial Governments that irrigation works will, at some stage, be constructed at all transmigration settlements. Hence it is considered that a 2 ha/KK model should suffice to give a satisfactory income to the settler, a consideration to be backed up in the economic analysis of 1.25 ha/KK in Chapter V.

The optimum land entitlement/KK in Sumatra or in Kalimantan has not been so straight forward to determine, not since the irrigation-only models of the Dutch colonisation and pra-Pelita transmigration programmes were extended to drylands in Repelita I. Land entitlement has now, in Repelita III, been fixed at 3.5 ha/KK, comprising 0.25 ha houselot, 1.00 ha. of cleared farmland I and 2.25 ha of uncleared farmland II. The farmland II can either be used for tree crops, should such a second stage project materialise, or for extended food cropping with the progressive growth in family size over the years (an initial family of five persons could rapidly become a number of families totalling - including spouses of children - in

excess of 50 persons by Year 20).

In the mid-70's, a number of transmigration projects were executed with a land entitlement of 5 ha/KK, e.g. Pematang Panggang, Batumarta, Singkut, Rimbo Bujang and Tulang Bawang. It was considered at the time that at least one ha/KK, preferably 2 ha/KK, would be devoted to tree crops, with the balance of 3 ha/KK, once cleared of forest or alang-alang, offering the farmer the possibilities of mixed farming systems of food crops, pasture and legumes in rotation - though with the larger proportion of rotate land under year-round cover. There has been little evidence so far of such land management, and generally the maximum achievable proportion of the 3 ha/KK is put under continuous food cropping, with inevitable consequences of soil, fertiliser and water erosion and declining yields. At the least successful settlements, e.g. Pematang Panggang, the large land entitlement has at least enabled the farmers to start a limited form of shifting cultivation in order to raise enough production for subsistence alone.

Land entitlement in Kalimantan Barat is set at 2 ha/KK, implying the degree of intensive irrigated farming aimed at in Sulawesi, despite agro-environmental conditions being more similar to those of Central Sumatra and seemingly requiring a more extensive (preferably tree crop) system of farming. 2 ha/KK of food crops in Kalimantan offer minimal prospects for an advance beyond subsistence.

Settlement design is uniformly nuclear in Sulawesi and Kalimantan and a mix of linear, semi-linear and nuclear in Sumatra. The nuclear design would seem to be appropriate to the more intensive agriculture in Sulawesi, and the large farmland blocks offer clear advantages for eventual consolidation into service areas under irrigation. In Sumatra and Kalimantan, the advantages of the nuclear design include:

i. more concentrated land clearing blocks;
ii. greater economy of road network;
iii. greater economy for future utility services (i.e. rural water supplies, even rural electricity);
iv. greater social/community cohesion (as in Java or Bali);
v. greater proximity to social services.

The advantages of the linear design lie essentially in the proximity of the farmer to his farmlands. Other things being equal, he will therefore open up more land and cultivate it / supervise it more intensively (and with less predator destruction). Rimbo Bujang, with 3 ha/KK of land under food production within 3 years of settlement (and a further 2 ha/KK rubber since) is the exemplar justification of the linear model when extensive farming is the aim (viz the concept of the farmstead on rainfed uplands in temperate countries). One modification to the Rimbo Bujang model could be the removal of each 2 ha/KK strip to communal rubber blocks, easier for the PTP to manage. But food cropping land should preferably be adjacent to the farmstead, and the resultant inconvenience/expense of bicycle/bemo to the market/school can be considered minor and, other things being equal, then more affordable given more extensive yet also

more intensive farming. The final argument in favour of the linear settlement model should be the fact that this has been the model employed for centuries by the native villages of Sumatra and even in Sulawesi (Bugis villages are especially elongated), though perhaps not amongst the long-house dwelling, shifting cultivating Dayak communities of Kalimantan.

In Repelita III, the inflexibility of the TKTD farm development model has been paralelled in the inflexibility of TKTD's settlement design. The nuclear design settlement has been imposed without exception on all Repelita III sites, despite the arguments above. It is not certain to what extent agricultural development considerations have given way to social (togetherness), cultural (the 'dukuh'/hamlet design in Java) and infrastructural (economy of roads and utility servicing) considerations within TKTD, but the clear outcome has been the planning in TKTD of nuclear designed settlements for the whole programme.

There was no correlation observed during the field trips between land entitlement and land actually under production. Land under food crop production tended typically to be 1.25 - 1.50 ha/KK in Sumatra and Kalimantan, and at or near the full 2 ha/KK in Sulawesi. In Sulawesi the question was not so much the extent of the land under production, but how it was under production (i.e. with or without some form or irrigation). In Sumatra it was evident that production from farmland II had barely commenced. Exceptions were at Rimbo Bujang (appropriate settlement design) and Batumarta (PMU bulldozers and tractors). Major constraints on the development of further land were identified as:

i. shortage of labour;
ii. shortage of equipment, tools;
iii. distance from homestead;
iv. shortage of animal power;
v. pessimism re incremental return (high risk with high inputs, irregular supply of inputs, pests and predators);
vi. comparative attraction/security of cash-earning off-farm labour.

All these constraints bar one are direct corollaries from the poor returns to labour from the food crop model in the unfavourable agro-environmental conditions of Central Sumatra and Kalimantan. If the incremental returns were good (as in Sulawesi), these constraints would start to materialise at 2 ha/KK or beyond. The distance from homestead constraint is one which can only be removed by modifying the rigidly uniform nuclear settlement design, a design which can lend every assistance to the direct transfer of subsistence living from Java/Bali to Sumatra/Kalimantan.

4.4 Agro-Inputs

4.4.1 Fertiliser

A major cause of the low productivity of settlements in Central Sumatra is the relatively low application of lime and fertiliser packages (commonly urea and triple super phosphate). The rationale behind such low fertiliser inputs is simple, namely the low probability of actually realising a sufficiently attractive incremental yield through incremental high cost inputs. On Java, the settler has been accustomed to much higher probabilities (though far from 100%, vis the brown planthopper devastation of 1974). But on the low fertility, erratically rainfed, erodible, managerially difficult, pest and weed prone, predator infested, dry uplands of Central Sumatra, the soils and farming systems entirely unfamiliar to the transmigrants, that probability is prohibitively low.

Fertiliser usage was found to be high only where:

i. soils were relatively good and responsive to high inputs of fertiliser, and where slopes and preferably irrigated water cover were conducive to high retention of and response to fertiliser (such examples could be found mainly in Sulawesi);

ii. extension and research facilities were in evident strength, particularly through demonstration plots on farmlands belonging to the settlers themselves (e.g. Batumarta);

iii. other sources of income encouraged the settlers to take the heavy risks involved in purchasing the inputs (e.g. Sitiung, where settlers got off to a good start with their compensation money for lands innundated by the Wonogiri Dam Project);

iv. the fertiliser was provided free as part of the current three year input package of Repelita III.

Elsewhere the settlers were found to be ensnared in the vicious circle of declining yields/fewer inputs. Such a circle can generally only be broken through by substantial reinvestment, preferably in a development model more suitable to the particular agro-environmental conditions. The virtuous circle of high yields/continued high inputs was found in many Sulawesi settlements. Some settlers in Mopuya/Mopugad do not apply fertiliser reguarly since they consider the soils so rich ("better than back home in Bali") as to render incremental nutrient application of superfluous.

Usage of fertiliser is limited even at the IBRD financed Batumarta with its high research and extension component. The high input/high output but high risk farming model developed by LP3 (Pattern A with three harvests of rice/maize, groundnut and cassava/rice bean or cowpea) and attempted to be introduced to the Batumarta settlers has had limited success.

It has been estimated (internal IBRD working papers from the February Supervision Mission of Trans I) that the system has been fully adopted by only 3-5% of farmers, and partially by perhaps a further 15-20%. The major constraint to its adoption remains the formidably high cost of inuts, which at Rp. 150-200,000 are higher than the annual incomes the transmigrants used to earn at their areas of origin. The second major constraint, given:

i. lack of improved seed;
ii. insufficient legume in the rotation;
iii. pest and disease problems;
iv. lack of draft power for ploughing;
v. heavy weeding requirement;
vi. inadequate attention to soil conservation practices;
vii. occasional drought periods (to the extent that total loss of crop can be expected in 12 years out of 100, as well as 50% or more loss of crop in 28 years out of 100, totalling 40 years out of 100 with yield reductions of at least one half from drought alone, before all other considerations;
viii. limited labour availability;

has again been identified as the formidable uncertainty of realising the kind of output which, under research conditions, can yield Rp. 1,000,000/ha gross farm income. In practise the above factors may too frequently lead to a halving of such yields, or even to a yield of a quarter. Such yields will then be insufficient to warrant the cost of inputs (say Rp. 150,000 inputs to yield Rp. 250,000 gross income), let alone the imputed cost of the incremental labour involved. Labour can average about 500 mandays for the full Pattern A system, compared to the 160-200 mandays for the additional farming system with lower inputs of Rp. 16-60,000/ha.

The difficulties with usage of inputs being encountered in the unique example of Batumarta, with its heavy research and extension inputs by no means replicable throughout all transmigration settlements, suggest:

i. the high cost input models for dry upland food cropping have been unable so far and seem likely to remain unable in the future to convince the researchers, let alone the farmers;

ii. without high inputs, yields from food crops are going to be insufficient to raise settlements beyond subsistence;

iii. with Repelita I and II investment costs in transmigration to dry uplands already sunken, there is a <u>prima facie</u> economic case for Government continuing to provide free fertiliser inputs to such settlements either indefinitely or at least until the cominginto maturity of the tree crops which should form the <u>sine qua non</u> of dry upland transmigration.

The continued provision of free fertiliser inputs to settlements in dry uplands could however be seen as yet one more disparity between Government assistance to transmigrants and to local farmers. Yet the local farmers, with their extensive mixed farming and longer developed off-farm income opportunities, stand to gain more from a surplus producing transmigrant community than a subsistence one. Local farmers furthermore are sceptical about high input intensive farming on such lands, known to be of poor quality. Free fertilizer input continuance would represent a recognition of the formidable constraints facing food cropping on these dry uplands, but should perhaps only be seen as a temporary measure pending the redevelopment programmes to be recommended for Repelita IV (Chapter VIII and IX).

It could, however, be argued that further Government expenditure would be better, and possibly less controversially, spent on improving the supply of inputs (below), upgrading extension services (Section 4.4.5) or on extending credit provision (Section 4.5.2). But such options do not directly attack the fundamental constraint of the low probability of attaining sufficiently high yields in inappropriate agro-environmental conditions.

There are also constraints in the supply and availability of fertiliser (and also pesticide and seeds) to transmigration areas. It was found on the field trip to Sumatra that complaints as to timeliness were universal when administered under the BIMAS scheme, and less so but existent when administered by DGI Pembinaan. Difficulties of supplies and scheduling are inherently immense in the transmigration programme, with sites often isolated and with poor infrastructure/communications, and perfection is unattainable. But complaints were so universal as to imply that significant improvements should and could be made. One major problem, according to those on the supply side, is that too early distribution of fertiliser enables the farmer to sell part for cash. In order to avoid this, supplies are often arranged to be delivered late, at a time when settlers more appreciate the urgency for fertiliser application. The potential consequences of slippage under such a supply system would seem to call for a revised approach, particularly with regard to the reported frequency of slippage resulting in harmfully late application of fertiliser.

4.4.2 Pesticide and Seeds

The distribution of the critical inputs of pesticide and seeds faces similar constraints to those mentioned above for fertiliser. Some units in Sintang (Kalbar) did not receive padi seeds until after their one year subsistence package had finished (they had fertiliser, but nothing on which it could be applied).

Application of pesticide can often be viewed in a different light to that of fertiliser by the simple farmer, as a necessary as opposed to a desirable input. If advised by an agricultural extension officer that there is grave danger of crop destruction by a particular disease, the farmer is likely to have little choice but to

apply the appropriate pesticide as long as the cost is not prohibitive. Yet the amount of cash spent on pesticide inputs by the typical transmigrant is very small, some 5% only of total production costs of Rp. 29,600/KK according to the DPDT 1981/82 Development Survey - compared with 29% on seeds, 14% on fertilisers, 19% on depreciation of farming implements and 33% on labour. High costs of some insecticides can deter application, and can occasionally result in severe loss of harvest (viz the destruction of Way Abung's groudnut harvest in the mid-70's and the subsequent mass default on BIMAS).

Blast has been a serious problem at some Central Sumatra settlements, and blast-resistant seeds are necessary. Many of the local varieties used by farmers are not resistant, and yields can be severely affected. IR 36, the most commonly applied seed variety, is not blast-resistant and has now been found to be unsuitable for dry upland cultivation, more suited to irrigable valley bottom areas. The need to bulk and distribute improved varieties of seeds is one of the primary tasks of research and extension agencies.

4.4.3 Control of Predators

Of all the constraints to farming in dry upland transmigration areas, control of predators receives perhaps the least attention from Government agencies despite being recognised by the farmers themselves often as the most forbidding and hopeless constraint of all. The partial clearing of a forest area for transmigration settlement implies the destruction of the breeding and feeding ground of hosts of forest dwellers. The substitution of forest vegetation by a succession of harvests of padi, groundnuts and, especially, cassava brings a change of diet for these forest dwellers, but they have to eat the the transmigrants' harvest in order to survive. Of such predators, it is the wild pig that causes the most frequent trouble, followedby rats and monkeys, and occasionally elephants (Pematang Panggang) and tigers (Sitiung).

Almost the only control recommended to and applied by transmigrants is the further clearing of forest. But there can be no incentive in clearing one more hectare of forest in the knowledge that the harvest of that hectare will also be consumed by predators. Intended beneficiaries of the transmigration programme are the landless farmers from Java/Bali, not the wild pigs of Sumatra. Transmigrant farmers are in need of technical advice and equipment to combat a menace which can destroy on average one third and up to 100% of their harvest in those crucial early years of settlement.

Options for improving control over predators could include:

i. the provision of one or two shotguns per settlement (under the control of the Kepala Unit/Desa) sufficient numbers of e.g. metal traps or at least spears to catch the wild pigs;

ii. the provision of chemicals and/or smaller traps to

combat the rat menace, and

iii. more recognition of and research into the menace and control of predators by means of a separate agency within an appropriate research institute.

4.4.4. Farm Power

Manpower alone can develop and farm only a limited area of farmland under annual crops. On the experience of Repelitas I and II transmigration on dry uplands, that limit would seem to be around 1.25 - 1.5 hectares/KK in the first decade of settlement. This is in itself more extensive cultivation than the traditional Javanese concept of one 'bau' or 0.7 ha. being the limit of proper cultivation of padi sawah by one pair of shoulders.

The provision of draft power, (and of course mechanical power), can change that in two ways:

i. more extensive farming, with the cattle taking up the burden of ploughing, and

ii. more intensive farming, with greater labour time available for weeding and application of inputs.

It was found in the field trips that there was some correlation between the cattle ownership ratio and the averge land under production. Tables 4.1 and 4.2 show wide variance in cattle ownership, from 1 head per 100 families in Singkut to 1:25 in Rimbo Bujang, to 1:5 in Pematang Panggang, to 1:2 in Sitiung and 1:1 in the IBRD Transmigration I sites at Way Abung and Batumarta. Cattle ownership was on average much higher in Sulawesi, a ratio of two heads to one family observed at some sites. Government policy for Repelita III settlements is to provide initial supplies of livestock at a ratio of one head per five families.

A high cattle ownership ratio would seem to enable about 2 hectares of farmland to be farmed intensively. The settlers from Wonogiri in Sitiung used their compensation money to build a brick house, purchase livestock and instal the cattle into the DGI house-cum-stable. The high cattle ownership ratios in Sulawesi help to put all 2 ha of land entitlement under production. Rimbo Bujang, with the highest average land area under production (3 ha already under food crops) and a very low cattle ownership ratio, is a marked exception to the correlation. Rimbo Bujang's exceptional extensive land development is largely a feature of appropriate settlement design. Rimbo Bujang's farmland is by no means intensively cultivated.

The absence, or low ratio, of cattle ownership can therefore be regarded as a significant constraint on farm development, particularly in the early years of settlement when labour availability is tight. In only one case on the field trips was there seen to be extensive use made of tractor power on hire, and that was at Batumarta with the PMU's supply of tractors and subsidised hire charges. Also

tractor clearing and ploughing was undertaken at neighbouring smallholder lands by P.T. Kapas in Sultera on a credit basis, with the intention of costs being recouped from the proceeds of the cotton/soyabean harvest. Elsewhere tractors do not usually exist, though in some cases it is the prohibitive hire charge from private owners on nearby local farms that is the constraining factor.

4.4.5 Research and Extension

The existence of LP3 at e.g. Way Abung, Batumarta and Pematang Panggang, with their research officers (often acting more as de facto extension officers), seed farms and, in particular, demonstration farms, can have a directly beneficial impact on the agricultural awareness, application and productivity of the transmigrants. Batumarta, for example, has 50 demonstration plots, each on 1 ha of 50 transmigrants' landholdings. All inputs on those plots are provided free of charge in return for the farmers' labour. The potential is there for dissemination of farming systems and techniques entirely new to the transmigrants, and is unparralleled at other transmigration sites. (That the dissemination has not been wholly successful in terms of take-up of the high input model has already been discussed in Section 4.4.1, but the research/extension potential remains). Furthermore, there are, in addition to the presence ofLP3, 2 agricultural extension officers (PPL) per UPT and one senior agricultural extension officer (PPM) plus one livestock extension officer per 2 UPT's. The jobs of these officers are to guide those transmigrants not recipient of direct demonstration plot extension by means of farm visits, talks to farmer groups, dissemination of information, etc.

The ordinary domestically financed transmigration project on dry uplands has little of such research and extension attention. Such a project will receive one PPL/UPT. He is likely a recent graduate of an agricultural institute where the emphasis will have been mainly on sawah farming. He will further receive alone month general extension course (including one week's fieldwork) at the province of settlement followed by a one month on-the-job attachment to an experienced PPL or a PPM at the kabupaten of settlement. This young officer will be the sole source of technical knowledge to the 500 farmers in a unit. These farmers are often unfamiliar wih dryland farming techniques. They will have to rely on the young inexperienced PPL's adivce for timing of planting, application of inputs, soil conservation practices, cropping systems, potential pest problems, anything agro-technical. The PPL may have a house, a motorbike, a stencil machine, a loudspeaker, access to technical information and other basic equipment and facilities, but he too often has not. His scope for direct farming visits is limited, the possibility of seed or demonstration farming remote. With such experience and with such facilities, it will be his job to mould 500 landless agricultural workers often accustomed to wet, fertile lands into high technology farmers, using high input/high cost/high risk farming systems in order to combat the inhospitable agro-environmental conditions to be faced on these dry uplands.

His task is likely to be in vain is to imply it is not his fault that he is young, inexperienced, ill-equipped and required to spread his advice so thin. With land settlement schemes which require a radical reformulation of agricultural practices, such as dry upland transmigration, agricultural extension is one of the keys to success of settlement. With the present degree of agricultural extension inputs, the odds are weighted against successful settlement from the start.

For transmigration schemes to dry upland areas, a minimum extension input should optimally include:

i. 2 PPL's / UPT;
ii. 1 PPM / SPT;
iii. One Rural Extension Centre (REC) per general location of settlement (maximum 2 SPT's) consisting of a sufficient number of research and extension officers plus equipment to enable a balanced programme of seed and demonstation farms to be enoperated;

iv. sufficient finance, largely for the provision of inputs for demonstration farming to be carried out in each UPT, under the close immediate supervision of one of the PPL's and the general guidance of the REC.

The provision of heavy agricultural extension inputs is not always a necessity. Where settlement has taken place on some of the low, fertile, irrigable lands of Sulawesi, little extension input is needed to instruct the Balinese or Javanese settlers how to farm the sawah. Nevertheless Project Luwu has a substantial input reserved for rural extension centres, concentrating on the kind of intensive farming technique improvements that should greatly improve productivity, which is already at a level way higher than that for example on the dry uplands of Central Sumatra. The REC's in the Sultera Area Development Projet have a more urgent role since the soils of Sultera are of poorer quality and requiring of careful agricultural practices to attain satisfactory yields.

It is interesting to note that joint venture growing enterprises in Lampung, notably P.T. Mitsugoro, P.T. Pago and P.T. Dava Itoh, have made a significant if partially unintentional to the field testing of seed and demonstration. In fact so many surroundings farmers, both transmigrant and local have taken up maize cultivation that the commercial companies can no longer complete with smallholder production with its lower management, operation and maintenance costs.

4.5 Agro-Economy

4.5.1 Labour

That the supply of labour available in the transmigrant household is a development constraint, especially in the earlier years of settlement, has been mentioned above (Section 3.8) and manifests itself in two main forms:

i. extensively, with the area of land under production constrained by the limited number of man-days available, and

ii. intensively, with the care and attention given to each square metre of land constrained by the attempt to maximise land area under production.

The supply of labour is not, however, seen as a major constraint on the development of the first 1.25 ha (the farm model analysed economically in Chapter V). Typically will the husband attend to the 1 ha. of farmland I, and the wife to the 0.25 ha houselot. If the childen are of an age, they can help out both father and mother. The supply of labour is seen mainly as a constraint on the opening up, cultivation and especially weeding of farmland II in the earlier years of settlement.

The availability of labour for working the farmland becomes a greater constraint when the returns from the land are poor. In such cases it may well be that the returns from off-farm employment are more rewarding than those on-farm, and the settler may attend to his farm-work only in the hours/days left available from his off-farm employment. During field trips, it was observed that the attractions of off-farm employment were a constraint to development at for example Singkut. There the rewards from employment in logging and timber processing were such as to tempt settlers away from their land. Such has also been known frequently to have been the case at transmigration settlements in Kalimantan (especially Kaltim), where settlers have soon abandoned their fields to take up employment in the more lucrative timber sector.

In general there is no such constraint on labour availability when the land is good and the farming returns high. Though a high proportion of the settlers at Amoito (Sultera) take up employment in nearby Kendari, such jobs are considered "side-jobs" and are not permitted to interfere with the farming of their non-technically irrigated, satisfactory yielding farmlands. The bleaker picture emerges where land returns are more wretched and the scope for off-farm employment limited by isolation or non-accessibility. Such can be witnessed at some more remote sites in Kalimantan and in Sumatra, for example Pematang Panggang.

4.5.2 Credit

Once the Repelita III three year free fertiliser period is over (or for a few months only during Repelitas I and II), the responsibility for the acquisition of necessary inputs falls to the settler himself. The finance for such acquisition must come from:

i. the settler's own reserves;
ii. private borrowing;
iii. Bank Rakyat Indonesia (after an establishment period of 3 to 4 years), or
iv. not at all.

With the settler generally in possession of little in the way of reserves (effectively by definition of the criteria for selection of transmigrants) and with the scope for private borrowing minimal, the burden rests with BRI to provide the means for the acquisition of inputs. BRI's risks on its BIMAS loans are shared by Bank of Indonesia (25%) and Government (50%). BRI acquires its finance from Bank of Indonesia at the subsidised rate of 3% p.a., and on-lends to the farmer at an interest rate of 1% per month. BIMAS credit becomes repayable in full one month after harvest, or at most seven months after extension of credit.

Utilisation of BIMAS credit was found to be widespread (over one half of the farmers under the programme) at many Sulawesi settlements and at Batumarta. Elsewhere in Sumatra and in Kalimantan there were fewer users, high rates of default and occasionally, e.g. at Way Abung (where BIMAS facilities were stopped following mass default after a podborer attack on a groundnut harvest), the withdrawal of BRI.

BRI, and the BIMAS programme, is not a charitable institution. The social welfare element comes not from BRI but from Government provision of finance to BRI at 3% rate of interest. BRI, as a banking institution, makes its money by differential rates of interest charged in and charged out. But a bank's financial position is as good as the collateral on its credit and the financial viability of its borrowers' enterprises. When a bank is obliged to lend to borrowers with no collateral or assured potential for repayment, and in the knowledge that the borrowers' enterprises are likly to be unfeasible, then that Bank either folds or it is bailed out by more subsidies.

It will be shown in the next chapter that the economics and finance of food crop models on dry uplands are uncertain. The probabilities of realising sufficiently attractive yields to justify the high costs of inputs are, in general, insufficiently high. Whether the financing of those inputs comes from the farmer or from BRI makes little difference to the yield. Throughout Sumatra complaints were found to be levied against BRI, complaints of timeliness, bureaucracy, inflexibility of packages, demands for repayment after harvest loss, rejection of applications for new loans pending clearance of old loans, and so on. The complex organisation and management of BRI must have faults. But the major constraint is

that GRI is required to back schemes which are too likely to turn out to be losers.

4.5.3 Marketing

In general, marketing of the produce of the transmigration settlements of Repelitas I and II is less of a development constraint than constraints concerning production. Marketing problemS were encountered at the more remote sites in Kalimantan (e.g. Sintang), but in fact there was often little marketable surplus on sale anyway, such was the paucity of production at these sites.

The marketable surplus of padi and secondary food crops is the yardstick by which to judge the developmental progress of settlement. Where a marketable surplus of padi is in excess of 50% of total padi production, the settlement is well on the way beyond subsistence. Such high surpluses were to be found only at irrigated Sulawesi transmigration sites. At the tidal swamp sites, padi surpluses can be sufficient to generate some spin-off economic ativity, but it was only at Batumarta in Central Sumatra that a dry upland site was found to produce a significant (around 25%) padi surplus. Elsewhere padi was a seldom traded commodity, with any modest surplus usually stored as a hedge against a possibly poor harvest the next year. But in most Central Sumatra settlements, there is a notional padi deficit. Notional in that rice consumption per capita will be lower than that which would normally have been consumed given adequate output, and settlers will instead use a grain substitute (maize) or cassava for their carbo-hydrate/protein intake. An extreme case may be found in Pematang Panggang (Sumsel), where padi yields are so low (455 kilograms/hectare on average) and where settlers are forced even to sell part of that low output in order to raise cash for other essentials. Pematang Panggang families are able to eat rice for only the equivalent of two months in the year, eating corn for four months and cassava for the balance of six months, except on those fortunate plots where rain fed sawah has been developped on valley bottoms.

Marketing problems of specific crops are few, given not too remote and inaccessible the settlement, few. Cassava is an exception, and settlers may frequently be unable to sell their output during harvest months when there is a regional glut and when transport costs of the low unit value crop will be prohibitive. At settlements where cassava is one of the few surplus crops produced, marketing constraints can be serious (though in general cassava is planted as a safe, stand-by crop, not specifically as a cash crop). The marketing problem has been solved in Way Abung with the springing up of cassava processing plants, but even in Tulang Bawang, just 50 kilometres (plus a river ferry crossing) away, settlers find transport costs (about Rp. 10/kg) too high to justify sale to the factory gate (price of Rp. 12/kg). Elsewhere there was sometimes found to be seasonal problems in marketing certain crops (e.g. vegetables in Rimbo Bujang, the markets of Muara Bungo saturated during peak harvest seasons). Marketing of padi surpluses was seldom a problem, similarly groundnuts, soyabean and, in Sultera, cotton to P.T. Kapas.

Further marketing constraints may be occasioned by the sheer size of the Repelita III programme in certain areas. An example is the Sintang transmigration project 300 kilometres up the River Kapuas in Kalimantan Barat. . While this project is no more remote than many transmigration settlements, the kind of agricultural surpluses that should be produced from 14,000 KK on 28,000 hectares (excluding the 3,500 KK on PIR Khusus) of food crops could never find a market in the riverine kabupaten of Sintang (population 5000), and it might be prohibitively expensive to barge them down to Pontianak. Already the early settlers have found problems marketing their cassava. Ironically, however, it is quite probable that this marketing problem may never materialise, for soils in the area are of such low natural fertility that surpluses five to ten years hence are likely to be of theoretical interest only, unattainable in practice.

Purchasers of the marketable surplus of transmigrant production tended generally to be local entrepreneurs or spontaneous settlers, in Sumatra usually Minang, Batak and Palembang traders and in Sulawesi and Irian usually Bugis. Seldom have the transmigrants themselves set themselves up as middlemen to market surpluses. Surpluses of padi were found to be sold either to BULOG (through a cooperative if functioning) or to private entrepreneurs.

4.5.4 Infrastructure

Roads at Repelitas I and II transmigration settlements were generally found to be sufficient so as not to pose a prohibitive constraint on agricultural production and marketing, whether at the settlements or between the settlements and the kecamatan/kabupaten markets. Within settlements, the earth feeder roads to farmlands seldom have to cater for heavy vehicles, while the main settlement roads usually have such little traffic (other than bicycles) as not to warrant more than the gravel road surface currently applied (although such roads were generally only earth at Repelitas I and II sites). The main access road from settlement to key market place is the critical road, and generally such roads were either gravel or asphalt (Batumarta, Way Abung) and passable year round.

There are exceptions to the above situation, and Pematang Panggang is a classic example of isolated non-accessibility. The poor access road is actually unpassable for 4 months during the rainy season and even in the best of weather requires 3 hours to the nearest market place of Belitang for a 50 km journey. A settlement has to be provided with such minimum infrastructural investment as an all weather access road for it to have any chance of viability.

Once accessibility has been guaranteed with investment in adequate infrastructure, accessibility can only be continued with sufficient provision for maintenance. Standards of maintenance witnessed at settlements were in general extremely poor, but nowhere more wretched than at the economically successful settlements of Mopuya/Mopugad, where bridges had been reduced to just one or two planks for the vehicles to negotiate at their own risk. A combination of inadequate design, in investment followed by poor maintenance could

be seen in Way Abung and Rimbo Bujang. Heavy volumes of traffic have made the access roads severely potholed, and have resulted in heavy traffic taking detours though the main village roads, and in the process ruining them.

The pertinence of infrastructure to agricultural development lies in its impact on the costs of production and of marketing. Costs of transportation at Pematang Panggang are so high, as a result of the poor roads, as to deter production of marketable surplus, even were such technically achievable given the exceptionally poor agro-environmental conditions. Costs of transportation even at Rimbo Bujang and Way Abung will be higher than their proximity to the markets of Muara Bungo and the cassava factories respectively should suggest. Costs of transportation of agricultural produce in the Kabupaten of Luwu (Sulsel) were extremely high in the 1960's and 1970's as a result of damaged roads and destroyed bridges, resulting not so much in reduced agricultural output as in reduced farm-gate prices for the settlers.

Road design at transmigration sites can sometimes be inappropriate. Roads can be seen heading directly up steep slopes throughout Sumatra (particularly at the Jambi Trans-Sumatra Highway sites), with no attempt at contour tracing. Such poor design will have two detrimental effects. Firstly it will greatly accelerate soil erosion in the area, the roads soon being transformed into water courses in the rainy season. Secondly it will greatly add to the problems of road maintenance and, in the absence of the latter, can lead to rapid deterioration of road surface.

The other main infrastructural provision to transmigration settlements concerns water supplies. At dry upland areas, water sources are usually from wells. In the dry season, uncontrolled off-take can lead to rapid fall-off in the water table and possible saline infiltration or subsequent drying out. Again it is the unfortunate Pematang Panggang settlers who face some of the most severe drought, and they can be virtually without water for many weeks in the year. At Batumarta, the construction of simple mini-reservoirs in valley bottoms has proven successful in providing year-round water supplies, but at the opportunity cost of the sawah which otherwise would have been cultivated in such choice areas. Water supplies at tidal swamp areas are universally a problem, settlers having to rely on tidal action river water for washing and rain catchment from roofs for drinking water. The water situation at tidal swamp areas is so severe a problem as to often pose a serious health constraint on development.

4.5 Transportation

The availability of transportation was seldom found to be a major constraint to agricultural production or marketing at transmigration settlements. Where a marketable surplus was to be found, local entrepreneurs were also found to be on the spot (at the settlement markets) with ready transportation. Seldom was it found that transmigrants owned their own trucks, either individually or cooperatively. One such exception was at Upang Delta, where some settlers have invested in boats for the marketing (and public transport) route upriver to Palembang. Another exception was the ownership of five oplets by a transmigrant cooperative in Rasau Jaya (Kalbar). Public transportation facilities at settlements were seldom available (other than at Batumarta where the PMU colts duplicate as public transport). Would-be passengers usually have to rely on foot or bicycle (occasionally motorcycle) within the settlement and on the same or atop market trucks between settlement and town.

4.6 Economy

Land settlement transmigration projects in Indonesia are essentially agricultural projects in conception and in implementation. The success of a land settlement project depends largely on the subsequent agricultural development of the settlement. There are, however, examples of transmigration to Kalimantan Timur where settlers have soon abandoned agricultural activity in favour of employment in logging and timber processing, thereby alleviating labour shortages in the region and leading to financial well-being for the settlers. But the aims and objectives of such settlement were initially agricultural, and heavy investment in land clearing and agricultural inputs is no economically optimal way of balancing a labour deficit problem in the timber industry of Kaltim.

Non-agro-economic conditions at a settlement should theoretically be incidental to the main objectives of settlement, and the degree of buoyancy of non-agro-economic activity in the region should not be regarded as a significant constraint on development. In practice, this is not the case and the incidence of off-farm employment and cash income can be a major factor in determining settler welfare and economic development. This is particularly so in the early years of settlement, when the need for cash to compensate for uncertain harvests is great.

Off-farm employment in construction, in land clearing and road building for neighbouring transmigration projects and in roads maintenance are major forms of employment, and occur in each settlement to a greater or lesser degree. Off-farm employment outside these sectors, and excluding self-employed trading and small domestic manufacture, was not marked at Sulawesi settlements (Table 4.2), and was more evident in Sumatra and Kalimantan. Employment in the timber industry was noted at most sites along the Trans-Sumatra Highway, especially at Singkut where off-farm employment became a

constraint on farm productivity. Employment at neighbouring estates and in agro-industries was found only at Rimbo Bujang and Way Abung, and a crumb rubber factory is scheduled for Batumarta.

Off-farm employment in small industries and trade has been discussed above in Section 3.7. It was noticeable how the economic well-being of a settlement was generally evidenced in the degree of activity/development of its market. A further pointer of economic well-being was in the extent of spontaneous settlement at these sites. There was a good correlation between market activity and spontaneous settlement observed in Sumatra, both related closely to economic progress. Spontaneous settlement in Sulawesi was less marked than to the more successful sites of Sumatra (e.g. Batumarta, Way Abung, Rimbo Bujang), constrained in Sulawesi by a shortage of land and by the cost of transportation from Java/Bali. Where land has specifically been made available for spontaneous settlement (e.g. in Central Sulawesi), much spontaneous transmigration has taken place. Spontaneous settlement often occurs in Sumatra because the original settlers know that they are unable to open up and farm more than a fraction of their 5 ha/KK land entitlement. Thus may they permit relatives or friends to settle on a 0.25 ha houselot in return for assistance in working the farmland. But the low incidence of spontaneous settlement at most Sumatra sites cannot readily be regarded as a development constraint, rather as a reflection on the lack of development potential.

4.7 Administrative, Social and Cultural

Disputes over land tenure are the most prevalent and most serious constraints under the general headings of administrative, social and cultural. Such disputes during Repelita I and II often tended to reflect inadequate pre-settlement planning or inadequate coordination between transmigration, agrarian and local Government agencies. In some settlements, such disputes can be an insuperable obstacle to the development of farmland II areas.

In Repelita III, land tenure problems were one of the foremost constraints on the implementation of transmigration, viz the difficulty of finding sites in Jambi for the Transmigration II project. Similarly land tenure disputes can be a serious post-settlement development constraint. An associated constraint is the slippage experienced by DG Agraria in demarcating farmland. Settlers in Sintang had to wait from four to eleven months post-settlement before Agraria were able to hand over farmland I to be farmed. Agrarian constraints are related inevitably to the immense size of the Repelita III programme, and the complications thus of organization.

The constraints of management and coordination of planning and implementing the pre-settlement stages of the Repelita III transmigration programme were analysed in Sections 5.4 and 6.2 of the Phase I Evaluation Study. Management and coordination of the pembinaan (development) phase is less dependant on fine tuning between the various agencies. Only two agencies are critically involved at

the development stage, DGT and DGFCA, and the activities of these two agencies are largely independent of each other. The provision, for example, of subsistence aid by DGT need not await the provision of input packages by DGFCA, or vice versa. The other agencies involved, for example DG Estates, Livestock, Cooperatives, Education, are even more independent of one another.

There is a big divide between the theory and practice of social development at many transmigration sites. The social infrastructure planned for transmigration, certainly in Repelita III, is generally at a level equivalent to that in the transmigrants' areas of origin and usually higher than that at local villages at areas of settlement (see Section 3.3.3). The problem comes in recruiting suitably qualified personnel to work at transmigration settlements. The subsequent shortage at many transmigration sites, particularly those at tidal swamp areas, of teachers (particularly higher grade), paramedics and especially doctors can represent a severe social constraint on development.

Health problems in particular can be severe at transmigration areas. Malaria can be found at many settlements, while diseases of sanitation resulting from inadequate control of limited water supplies can result particularly at tidal swamp areas. The graveyard at Upang Delta, now a thriving tidal swamp settlement, bears testimony to the cholera outbreak in the early 1970's.

Relations with local residents can generally be good, as long as there are no land tenure problems. Local entrepreneurs in particular stand to gain substantially from servicing transmigrant settlements. Resentment may however be found at the relatively high standard of amenities provided for transmigrants vis-a-vis local residents. Relations with local residents become more complex when transmigration requires the resettlement of local people. The removal of many longhouses and the incorporation of the Dayak residents into the very large transmigration settlement at Sintang, for example, represents a development with complex socio-cultural implications. It is not certain that transition from extensive shifting cultivation of large areas of these marginal lands to the intensive (at least for the first few years when inputs are free) cultivation of just 2 ha/KK would represent an improvement in the economic (or social) condition of these Dayak residents.

Table 4.1

tour of southern sumatra transmigration settlements
pertinent economic indicators of settlement development

NAME OF SETTLEMENT	PROJECT			AGRO-CONDITIONS				LAND DEVELOPMENT			LAND PRODUCTIVITY			AGRO-INPUTS								AGRO - ECONOMY									ECONOMY			
	DATES OF SETTLEMENT	DESIGN OF SETTLEMENT	LAND ENTITLEMENT / KK	FORMER LAND USE	COMPARATIVE RAINFALL	COMPARATIVE SOIL FERTILITY	COMPARATIVE TOPOGRAPHY	LAND UNDER FOOD CROPS (Ha)	LAND UNDER ESTATE CROPS (Ha)	CATTLE (KK / Ekor)	YIELD OF PADI GOGO (Ton/Ha)	MARKETABLE SURPLUS PADI	MARKETABLE SURPLUS FOOD CROPS	SUPPLY/ TIMELINESS OF INPUTS	APPLICATION OF FERTILIZER	APPLICATION OF PESTICIDES	CONTROL OF PREDATORS	USE OF ANIMAL POWER	USE OF TRACTOR POWER	EXTENSION FACILITIES	DEMONSTRATION/SEED FARMS	SOIL AND WATER CONSERVATION	LABOUR AVAILABILITY FOR LAND	UTILISATION OF CREDIT	PROXIMITY OF MARKET	GUARANTEE OF MARKET	INFRASTRUCTURAL INVESTMENT	INFRASTRUCTURAL MAINTENANCE	AVAILABILITY OF TRANSPORT	COST OF TRANSPORTATION	AVAILABILITY OF WATER	OFF-FARM EMPLOYMENT	PROPORTION OF KK SO ENGAGED	LOCAL PASAR ACTIVITY	SPONTANEOUS SETTLEMENT
Way Abung II	73-74	L	2-3	S	M	M	F	1	1	1	D	L	H	L	L	L	H	H	..	H	H	H	M	L	H	H	H	H/L	H	L	H	E,A	H	H	H
Tulang Bawang	77-80	N	5	S	M	M	F	1¼	(1) kelapa	5	C	L	L	M	H	H	L	L	L	L	L	M	H	-	L	L	H	H	L	H	H	R	L	L	L
Batumarta	76-80	L,S,N	5	S	M	M	G	1½	1 karet	1	B	M	M	M	H	H	L	H	H	H	H	M	H	H	H	H	H	H	H	L	H	R	L	H	H
Way Hitam	72-74	N	2	A	L	L	G	1½	-	8	E	L	L	L	L	L	M	L	L	L	L	L	H	L	M	L	L	L	M	L	M	R	L	L	L
Pematang Panggang	75-77	S	5	A	L	L	G	1	(½) karet	5	E	L	L	L	L	L	L	L	L	M	M	L	H	L	L	L	L	L	L	H	L	T	L	L	L
Upang Delta	70-73	N	2½	T	L	L	F	2	-	12	A	H	M	H	M	H	M	L	L	H	L	H	H	H	H	H	H	H	H	M	L	F	L	H	H
Singkut	73-74	L	4-5	P	M	M	S	2	(3) karet	100	D	L	M	L	L	L	L	L	L	L	L	L	L	M	H	H	M	M	M	L	M	T,R	H	H	H
Pamenang	79-80	N	3½	P	M	M	S	1¼	(1½) cocoa	30	D	L	M	H	H	H	M	L	L	L	L	M	M	-	H	H	M	M	H	L	L	T	M	M	M
Kubang Ujo	81-82	N	3½	P	M	M	G	1¼	-	-	-	L	H	H	H	L	L	L	M	L	M	H	-	H	H	H	H	H	L	M	R	L	L	L
Bimbo Bujang	76-78	L	5	P	H	H	S	3	2 karet	25	C	M	H	H	M	M	M	L	L	M	H	L	H	M	H	H	H	M	H	L	M	T,R	L	H	H
Sitiung	77-78	N	2	P	H	H	F	2	-	2	C	L	M	H	H	H	H	H	M	H	H	H	H	M	M	H	H	H	H	L	H	R	L	H	H
(Kota Besar)	80-81	N	3½	P	H	H	S	1¼	(2) karet	-	D	L	L	H	H	H	M	L	L	L	L	L	H	-	M	H	H	..	..	..	M	T	L	L	L

L = Linear
S = Semi-linear
N = Nucleus

P = Primary forest
S = Secondary forest
A = Alang-alang
R = Rawa
T = Pasang Surut

F = Flat
G = Gentle Slopes
S = Steeper Slopes

A= 1.75 ++
B = 1.25-1.75
C = 1.00-1.25
D = 0.75-1.00
E = 0.75 --

N.B. Unless otherwise stated,
H = High
M = Medium
L = Low

F = Farms off-site
E = Estates
A = Agro-industry
T = Timber
C = Construction
R = Land clearing/ Road building

RVE/pl
10.8.82

Table 4.2

tour of sulawesi transmigration settlement
pertinent economic indicators of settlement development

NAME OF SETTLEMENT	PROJECT			AGRO-CONDITIONS				LAND DEVELOPMENT (Ha/KK)					LAND PRODUCTIVITY			AGRO - INPUTS									AGRO - ECONOMY									ECONOMY				
	DATES OF SETTLEMENT	DESIGN OF SETTLEMENT	LAND ENTITLEMENT / KK	FORMER LAND USE	COMPARATIVE RAINFALL	COMPARATIVE SOIL FERTILITY	COMPARATIVE TOPOGRAPHY	LAND TECHNICALLY IRRIGATED	LAND TO BE SO IRRIGATED	LAND NON-TECH IRRIGATED	LAND UNDER DRY CROPS	CATTLE (KK/Ekor)	YIELD OF PADI/YEAR(Ton/Ha)	MARKETABLE SURPLUS PADI	MARKETABLE SURPLUS FOOD CROPS	SUPPLY/ TIMELINESS OF INPUTS	APPLICATION OF FERTILIZER	APPLICATION OF PESTICIDES	CONTROL OF PREDATORS	USE OF ANIMAL POWER	USE OF TRACTOR POWER	EXTENSION FACILITIES	DEMONSTRATION/SEED FARMS	SOIL AND WATER CONSERVATION	LABOUR AVAILABILITY FOR LAND	UTILIZATION OF CREDIT	PROXIMITY OF MARKET	GUARANTEE OF MARKET	INFRASTRUCTURAL INVESTM.	INFRASTRUCTURAL MAINT.	AVAILABILITY OF TRANSPORT	COST OF TRANSPORTATION	AVAILABILITY OF WATER	OFF-FARM EMPLOYMENT	PROPORTION OF KK SO ENGAGED	LOCAL PASAR ACTIVITY	SPONTANEOUS SETTLEMENT	
SULAWESI SELATAN (ANGKONA I)[1]	81	N	2	S,R	H	M	F	-	-	-	1	..	-	-	-	H	H	H	..	L	L	L	L	H	H	-	H	H	L	L	L	H	H	R	L	L	L	
(KALAENA KIRI)[1]	79	N	2	..	H	H	F	-	1¾	-	2	..	2½	L	L	H	H	H	M	L	H	H	H	H	H	H	H	H	L	M	H	L	H	R	L	L	..	
SUKAMAJU	70	N	2	P	H	H	F	-	?	½	1½	½	3½	M	H	H	H	H	H	H	L	M	H	H	H	H	H	H	L	M	H	L	H	R	L	H	H	
SULAWESI TENGGARA AMOITO	68	N	2	A	M	L	F	-	-	1¾	¼	½	2½	L	M	H	H	H	H	H	L	L	L	H	H	H	H	H	L	M	H	L	M	C,R	M	M	H	
(LANDONO)[3]	71	N	2	S,A	M	L	F	1¼	2	-	¾	1	8*	H	M	H	H	H	H	H	L	L	L	H	H	H	H	M	H	H	..	..	M	M	..	L	H	H	
(KONDA/TANEA LAMA)[3]	73	N	2	A	M	L	F	-	1	-	1	3	¾	L	L	M	L	L	M	M	L	L	L	H	M	L	H	H	L	..	..	L	M	..	M	L	L	
RAMBU-RAMBU T.	70	N	2	A	L	L	F	(1)	-	-	1	½	5*	H	L Kapas	H	H	H	M	H	L	L	L	H	H	H	M	H	H	L	H	L	L	C,R	H	M	M	
(TINANGGEA)[2]	80	N	2	A	L	L	F	-	-	-	1¼	..	2½	L	L	H	H	H	L	L	L	L	L	H	H	-	M	M	M	..	..	M	L	..	L	L	L	
SULAWESI UTARA MOPUYA	72	N	2	P	H	H	F	-	1	1	1	1	6*	H	H Kedele	H	H	H	H	H	L	L	L	H	H	H	H	H	L	L	H	L	H	C	L	H	H	
MOPUGAD	73	N	2	P	H	H	F	-	1	-	2	1	-	-	HH Kedele	H	H	H	H	H	L	L	L	H	H	H	H	H	L	M	H	L	H	C	L	H	H	
(BONGO)[2]	78	N	2	P	H	H	F	-	?	1	1	..	5*	M	M	H	H	H	M	L	L	L	L	H	H	H	M	H	M	..	..	M	H	..	L	M	L	
(MARISA)[2]	81	N	2	P	H	H	F	-	?	-	1¼	..	1½	L	L	H	H	H	M	L	L	L	L	H	H	-	M	H	M	..	..	M	H	..	L	L	L	

1 Visited but no survey
2 Secondary data by association
3 RMI/SESTAD data

* 2 harvests/year
(1½ at Mopuya)

.. = not available

N.B. Unless otherwise stated,
H = High
M = Medium
L = Low

RVE/pl
28.8.82

L = Linear
S = Semi-linear
N = Nucleus

P = Primary forest
S = Secondary forest
A = Alang-alang
R = Rawa
T = Pasang Surut

F = Flat
G = Gentle Slopes
S = Steeper Slopes

F = Farm off-site
E = Estates
A = Agro-industry
T = Timber
C = Construction
R = Land clearing/ Road building

Chapter V FORECAST ECONOMIC IMPACT

5.1 Economic Approach

Due to the multiplicity of inputs, and the difficulty of accumulating data on such inputs, and due to the irregularity and uncertainty of aggregated output data, it has not been possible to conduct an ex-post economic analysis of Government investment in the Repelita I and II transmigration programmes. Due to the early stages of development at most Repelita III sites, it is not possible to conduct an ex-post economic analysis of Repelita III transmigration, only an on-going study of the progress of economic indicators to date. What this Chapter will attempt to do is to combine data on the development of outputs from Repelitas I-II transmigration with data on the inputs to Repelita III transmigration, and so attempt to forecast the economic impact of Repelita III transmigration.

Such an analysis is based on one big assumption, namely that recent transmigration settlements will tend to follow similar patterns of growth and development as the older settlement, despite the much greater physical inputs provided by Government in Repelita III transmigration. The latter inputs have already been discussed at length in Chapter II, and outputs in Chapter III. What was shown in Chapter IV, however, was that despite more land being cleared for the transmigrants, more roads built, one year's subsistence, three years' free inputs, more livestock, extension officers, BIMAS and other inputs, the fundamental constraints concerning agro-environmental conditions, land development models and settlement design will affect Repelita III settlements as adversely as they did those of Repelitas I and II. The economic situation at a Repelita III transmigration area, a decade post settlement, is unlikely, ceteris paribus, to be dissimilar to that at a Repelita I or Repelita II area at the same stage of development.

The approach used will not be to conduct economic analyses of actual specific projects, each one of which is likely to be its own special case with differently emphasised development constraints. Rather will model types be selected for purposes of illuminating typical inputs, average outputs and general constraints. Each model will be based on facts and observations derived from a series of field trips from June to September 1982 to many such transmigration projects in Sumatra, Sulawesi and Kalimantan, by members of the JMT Evaluation Team.

The object of the forthcoming model analysis is to identify the economics involved in the transmigration programme. The regional development impact of transmigration has been seen, in Chapter III above, to have been significant in certain sectors in certain provinces. But this impact has been achieved at a price, namely the opportunity costs of investing such resources in other sectors of Government' development programme. Agricultural output in some of the provinces of settlement may have been able to have been stimulated without transmigration, and maybe at lesser cost. The

employment objectives of moving transmigrants from their areas of origin may have been able to have been met by investment directly into those areas of origin, in either the agricultural or the manufacturing sectors. There are, therefore, definite opportunity costs in the economics of transmigration. This Chapter does not consider the socio-cultural, political or strategic objectivesof transmigration.

The approach employs cost and price data taken largely from secondary sources, particularly recent IBRD appraisal documents. Valuation of tradeable inputs and outputs is in economic values, in mid-1982 prices, and the shadow wage rate of unskilled transmigrant labour is taken at the IBRD assumed level of Rp. 500 per day. The current exchange rate of Rp. 650 to US$ 1.00 will be employed as representative of the shadow exchange rate, and the standard conversion factor will be taken as unity.

5.2 Agricultural Basis of Models

The five models chosen for economic analysis are as follows:

Model One	:	Dryland with low inputs
Model Two	:	Dryland with high inputs
Model Three	:	Dryland with tree crops
Model Four	:	Irrigated land
Model Five	:	Tidal swamp.

These have been the five main models of the Repelita III transmigration programme, and of Repelitas I and II alike. In selecting values for the key parameters for these models, care has been taken not to take extreme values, but rather those considered typical or average of many cases. Table 5.1 and 5.8 work through the economic analysis, but perhaps it is the values and assumptions concerning cropping patterns and yields (Table 5.2) that require most clarification, the preceding investment costs (Table 5.1) and the subsequent values and costs of production being subject to smaller margins of variation.

The cropping patterns of Models One and Two are based on the current practice of a padi monocrop in the wet season (all 1.25 ha can be assumed), plus "palawija" cropping in the dry season of maize, cassava, groundnuts and assorted fruits and vegetables in the garden. Yields will accordingly be based on those attainable under monocropping systems, and not those lower yields per crop per hectare under intercropping systems. Thus it is assumed, for example, that, at full agricultural development, Model Two yields will reach 1.50 tons/ha for padi and 1.25 tons/ha for maize, but only if both padi and maize are monocropped. If intercropped on one hectare, output can be expected to be 0.75 tons of padi plus 0.625 tons of maize. It is not considered feasible, bearing in mind the experience of Repelitas I and II transmigration, that yields of 1.50 tons of padi plus 1.25 tons of maize can be regularly achieved from the wet season harvest of one intercropped hectare, yet such an assumption forms the basis of IBRD project appraisal reports and the means by which high economic rates of return can be derived. The Model One cropping pattern is taken as

the same as for Model Two, but applied to only 1.00 ha/KK as opposed to the 1.25 ha/KK of Model Two.

Models One and Two differ markedly in the development of yields over time. Model Two represents the high input model that is intended for all transmigrants to follow in order to combat the inherent low fertility of the soils they are to farm. With such high inputs, yields in excess of two tons/ha can be achieved, particularly in the first few years after land clearance, but are unlikely to be able to be maintained each year over a long period. A 2 tons/ha harvest in one year may well be followed, due to e.g. drought, late application of inputs, pests, predator attacks etc., by 1 ton/ha the next year. An average of 1.50 tons/ha. for the high input model is taken as reasonable estimate of what can realistically be achieved by transmigrants in the agro-environmental conditions they will be experiencing and with the provision of continued high inputs.

The yield development in Model One, however, follows a different trajectory. Despite free inputs over the first three years, the soils give little encouragement and, together with other unfavourable agro-environmental conditions (erratic rainfall, slopes, pests, predators again), give a yield only of 1.25 tons/ha. in Year 2. By Year 3 it is already becoming apparent that yields are not going to be sufficient to support high use of (to date free) inputs. In Year 4 the farmer applies about one half of the requisite level of inputs, and the yield shows a slight drop. With the successive application of less and less fertiliser on the one hand, and with the successive diminution in the level of natural nutrients in the poor soils on the other, the farmer has entered into the vicious circle of subsistence farming. At Year 5, the farmer may just be holding on to a yield at the 1 ton/ha level, the approximate level required to maintain one family with a year round supply of rice (at 120 kgms/capita rice x 5 persons @ 60% padi conversion). By Year 10 yields will have declined to around three quarters of a ton per hectare, and the farmer must have other means of supporting his family.

It should be emphasised that this Model One is by no means a bleak special case. Rather can it be evidenced at many of the Repelita I and II transmigration settlements in Central Sumatra. Bleaker cases (e.g. Pematang Panggang, Way Hitam, Rasau Jaya, Basambei) are many, where average yields fall below one half a ton of padi per hectare after only 5 years and remain there. Brighter cases, with average yields maintained at over 1.25 ton/ha padi after 7 or 8 years, on non-irrigated dry upland settlements are few.*

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* For further data on the development of yields, the reader is referred to Tables 4.1 and 4.2 of this Report, to the 1980/81 and 1981/82 DPDT Development Surveys, to further unpublished data from DPDT and to recent publications from DGFCA (e.g. Laporan Perkembangan Pertanian Tanaman Pangan Daerah Transmigrasi, March 1982).

Model Three assumes the high input Model Two food crop development, but coupled with the planting, done professionally by a PTP, of 1 ha/KK rubber. Yields are projected, as in the IBRD Trans III Staff Appraisal Report, to reach 1.45 tons/ha by full development in Year 12.

Model Four assumes that transmigrants arrive on a full technically irrigated 1.25 ha/KK of land, and that full development at Year 3 sees the attainment of 2.5 tons/ha padi per harvest, with two harvests per year. This is a deliberately modest assumption, since technically irrigated lands can yield in excess of 4 tons/ha padi per harvest, with five harvests every two years, given sufficient levels of inputs.

Finally, Model Five sees the transmigrant farmer arriving on 1.25 ha of tidal swampland. Such projects usually cater for preparation of 2.25 ha/KK, but investment costs have here been scaled down for comparability with the other models. Average yields of 2.0 tons/ha padi are assumed from the wet season harvest, such yields being in line with typical experience at tidal swampland projects. It will be assumed that transmigrants pursue a low input model to achieve such yields. This is again in line with current, indeed age-old, practice at tidal swamp areas, where the incremental benefits from fertiliser application have yet to be demonstrated to the farmers.

5.3 Micro-economic Impact

The micro-economic analysis of the five models (summarised in Table 5.9), given the adoption of assumptions and values many of which may be debatable but all of which defensible, and without detailed sensitivity analysis in order to test the relative impact of such assumptions, leads to the following general observations:

i. the low input dryland model is wholly uneconomic;
ii. the high input dryland model entails greater (by 42%) investment per family, induces greater agricultural/economic benefits, but remains uneconomic;
iii. the tree crop and irrigation models, with 83% and 94% greater investment respectively, give satisfactory returns to the economy;
iv. the tidal swamp model, with 77% greater investment, gives a reasonable economic return.

The above observations lead to two simple concusions, namely:

i. one has to spend money in order to make money, and
ii. one has to spend the above money correctly.

Thus there is a big difference between the low input dryland model, where $ 6,000 is invested per family in order to get roughly $ 2,000 back* (thereby losing $ 4,000), and the treecrop model, where a much larger $11,000 is invested in order to get $ 12,000 back (thereby gaining $ 1,000). Yet the incremental money has to be well invested, for that the high input dryland model, with $ 9,000 invested to get $ 5,000 back represents no improvement on the original low input $ 6,000 investment, since the loss still stands at $ 4,000.

Tree crop and irrigation development, and to a lesser extent tidal swamp development, attain good economic rates of return effectively because the values of key parameters in the models have been chosen on the assumption that suchs model are appropriate for such lands. Thus the peak yield of 1.45 tons/ha rubber, or the 2.5 tons/ha/harvest of irrigated padi, assume implicitly that rubber will not be planted and irrigation works not invested on unfavourable terrain and in unfavourable agro-environmental conditions.

The low and high input dryland models, however, are not based on such assumptions. Rather are they are based on observed reality and on the actual poor performance of food crops on upland dry areas in e.g. Central Sumatra. That the models emerge uneconomic implies, simply yet conclusively, that they are inappropriate models of agricultural development for such lands.

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* i.e. present value of net economic benefits discounted over 30 years at a 10% opportunity cost of capital.

Table 5.1 Investment Costs of Transmigration Models
(Mid-1982 prices)

MODELS ONE AND TWO: DRYLAND LOW AND HIGH INPUTS

A. Government 1982/83 Programme

Agency	US$ / KK
Pre-Settlement	
1. Dept. Nakertrans	20
2. DG Cipta Karya	250
3. DG Agraria	220
4. DG Bina Marga	1,840
5. DG Transmigrasi	2,390
Sub-Total	4,720
Post-Settlement	
6. Dit. Pembinaan, DGT	870
7. Dept. Pertanian	460
Sub-Total	1,330
TOTAL	6,050

Source: Satuan 3 Sub Sektor Transmigrasi Tahun 1982/83, Kantor MenMudtrans.

Major Inputs by Agency

1. Management and coordination overheads
2. Physical planning
3. Land Use planning, land demarcation, land registration
4. Land clearing, road construction
5. Recruitment and training of settlers, settlement construction, transfer of settlers.
6. Inputs form agricultural agencies concerned with food crops, BIMAS, forestry, livestock, fisheries, estates and research.
7. One year subsistence package to transmigrants, administration of settlement before hand -over to local Government.

N.B. Due to the comparatively low proportions of transmigration investment disbursed post-settlement and to the similarity between all Models in most (i.e. not operations and maintenance) post settlement investment (e.g. the one year subsistence package), all investment costs in this economic analysis will be assumed, for simplicity, to occur in year 0.

Table 5.1 (contd.)

B. IBRD Trans III Batumarta Extension, 1982

Component	US$ / KK
Settlement	
Imputed Physical Planning	250
Land Preparation	3,100
Settlement Construction	1,920
Settler Transfer and Subsistence	1,600
Sub-Total	6,870
Agriculture	
Agricultural Services	1,100
Imputed Livestock Costs	650
Sub-Total	1,750
TOTAL EXCLUDING RUBBER	8,620
Tree Crop Establishment	2,200
Sub Total	10,820
Rubber Factory	910
TOTAL	11,730

Source: Staff Appnaisal Report Trans III, May 26, 1982

Major Inputs Additional to those of Government 1982/83 Programme

Settlement

i paved access and main settlement roads

ii dams and valley bottom reservoirs

iii project management unit

Agriculture (excluding Rubber)

iv one heifer per family

v rural extension centre, with more than double the ratio of extension officers to farmers, and agricultural supplies for research and demonstration farming.

vi plant protection centre

vii farmers cooperative centre

viii soil conservation package

Table 5.1 (contd.)

MODEL THREE: TREE CROPS

Additional to Investment Costs of Models One or Two	US$/Ha
Tree Crop Establishment	2,200
Buildings, Management, Overheads @ 10%	220
Total Additional Investment	2,420

Source: IBRD Trans II Batumarta Extension, Staff Appraisal Report, May 26, 1982.

MODEL FOUR: IRRIGATION

Additional to Investment Costs of Models One or Two	US$/Ha
A, Low Case	
Small headworks, little land clearing, little land levelling, already bunded, short and fat tertiary service area	1,500
B, High Case	
Large headworks, much land clearing, levelling and bunding, long and thin tertiary service area	3,500

Source; Electroconsult Consultants to DGWRD on irrigation in transmigration areas (verbal communication)

Table 5.1 (contd.)

MODEL FIVE; TIDAL SWAMP

Additional to Invesment Costs of Models One or Two

Reclamation and Site Preparation	US$/KK*
Land Clearing (canals, base camp, creeks only, not including houselots, farm plots or public facilities	532
Earthworks	1,161
Structures	820
Equipment and Supplies	122
Physical Contingencies @ 15%	395
Cost inflation end-80 to mid-82 @ 15% p.a,	682
Total	3,712

* Each KK to receive 0,5 Ha, houselot plus 1,75 Ha, farm plot (= 1,650/Ha)

Source: IBRD Swamp Reclamation Project,
Staff Appraisal Report,
February 23, 1981

Table 5.2 Cropping Pattern and Yield Development for 1.25 Ha Farms

Years	1	2	3	4	5	10-30
HARVESTED AREA (Ha)						
Padi (wet season)	0.50	1.25	1.25	1.25	1.25	1.25
Maize	0.20	0.40	0.40	0.40	0.40	0.40
Cassava	0.15	0.30	0.30	0.30	0.30	0.30
Groundnuts	0.15	0.30	0.30	0.30	0.30	0.30
Fruits & vegetables	0.25	0.25	0.25	0.25	0.25	0.25
	1.25	2.50	2.50	2.50	2.50	2.50

Model One : 80% of above
Model Two : As above
Model Three : As above plus 1 ha rubber to harvest Year 6
Model Four : Assume 2.50 ha of padi only, no other crops
Model Five : As above.

YIELD DEVELOPMENT (Tons/Ha)

Years	1	2	3	4	5	10-30
Model One						
Padi	1.00	1.25	1.20	1.15	1.00	0.75
Maize	0.80	1.00	0.95	0.90	0.85	0.75
Cassava	7.00	8.50	8.00	7.50	7.00	6.00
Groundnuts	0.70	0.85	0.80	0.75	0.70	0.60
Model Two						
Padi	1.00	1.50	1.50	1.50	1.50	1.50
Maize	0.80	1.25	1.25	1.25	1.25	1.25
Cassava	7.00	10.00	10.00	10.00	10.00	10.00
Groundnuts	0.70	1.00	1.00	1.00	1.00	1.00

Table 5.2 (contd.)

Model Three

Years	6	7	8	9	10	11	12-19	20-22	23-24	25	26	27-30
Rubber	0.45	0.80	0.90	1.00	1.20	1.30	1.45	1.20	1.10	1.00	0.90	0.80

As Model Two above for food crops.

Model Four

2.5 tons/Ha padi per harvest by Year 3 taken as minimum case for technically irrigated project.

Model Five

Yields as for Model Two above multiplied by 1.333
(e.g. 2 tons / Ha padi gogo at full development)

SOURCE

Model Three Yields from IBRD Trans III S.A.R.,
See section 5.2 for sources of other Model yields.

Table 5.3 Gross Production of food crops from 1.25 Ha. Farms in Kilograms

Years	1	2	3	4	5	10-30
Model One						
Padi	400	1,250	1,200	1,150	1,000	750
Maize	128	320	304	288	272	240
Cassava	840	2,040	1,920	1,800	1,680	1,440
Groundnuts	84	204	192	180	168	144
Model Two						
Padi	500	1,875	1,875	1,875	1,875	1,875
Maize	160	500	500	500	500	500
Cassava	1,050	3,000	3,000	3,000	3,000	3,000
Groundnuts	105	300	300	300	300	300

Model Three

As Model Two above for food crops

As Table 3.2 for rubber on one hectare,

Model Four

6,25 tons of padi per year (i.e, 2,5 tons/ha x 2 harvests x 1.25 ha),

3 tons only in first year, 4.5 tons in second year,

Model Five

As Model Two above times 1,333,

21. Environmental Impact. Since the area is in secondary forest there is no problem of timber utilization. However, erosion is a problem and the project would take steps to minimize erosion in both existing and new settlement areas.

Agricultural Production

22. The project would make food crop production possible on 1,200 ha of new land in Baturaja and it would bring 1,000 ha under rubber production. In addition, the project would maximize returns from 4,500 ha of rubber in the existing project by introducing processing facilities. Table 3 summarizes farm production at full agricultural development. Projected yields are contingent upon transmigrants receiving and using good seed, adequate fertilizer, pesticides and good extension. The average rubber yield over a 25-year period is assumed to be 1,126 kg/ha. Per ha rubber yields by year of production are summarized in Table 4.

Table 4: ASSUMED RUBBER YIELDS

Year	6	7	8	9	10	11	12-19	20-22	23-24	25	26	27-30
kg/ha	450	800	900	1000	1200	1300	1450	1200	1100	1000	900	800

Market Prospects

23. Market prospects for food crops and rubber are summarized in the main report. As incremental production in the extension area is very small in relation to demand and as markets already exist in the original settlement, no problems would arise in disposing of agricultural surpluses in the project area.

INDONESIA

TRANSMIGRATION III PROJECT

Program Development Component

1. Three subcomponents in the proposed project are devoted primarily to institution building and program development: (a) a component to improve staff training in the DGT; (b) a component to develop a program of agricultural research in support of transmigration; and (c) a technical assistance component to monitor and improve the environmental soundness of transmigration projects.

A. DGT Staff Training

Background

2. The Directorate General of Transmigration. The DGT is the largest agency within the Ministry of Manpower and Transmigration, and until 1978 it was responsible for all transmigration activities. With Presidential Decree 26/78, the major tasks of site selection and agricultural development were transferred to the Department of Public Works and the Department of Agriculture, respectively, but this did not reduce the DGT's task as targets were greatly increased and many new agencies were brought into the program. The DGT now moves nearly 5 times as many families per month as it did 4 years ago, and it coordinates the work of some 20 agencies in the field.

3. To cope with a program on this scale, DGT personnel were doubled between 1978/79 and 1981/82 and staff now number about 9,000. These staff members have responsibility for:

(a) Recruitment and Selection. The DGT recruits, registers and selects about 75,000-100,000 families/year and 10% of these transmigrants receive some training prior to their departure.

(b) Relocation and Subsistence Support. DGT staff currently coordinate the inter-island movement of up to 9,000 families (40,000 people) per month and provide monthly subsistence supplies to nearly 60,000 families in 16 provinces.

(c) Community Development and Coordination. The DGT provides administrative personnel to oversee on-site development for five years and to coordinate implementation at the project and provincial level.

Table 5.4.A. : PRICE STRUCTURES FOR AGRICULTURAL OUTPUTS (Rp. & $'000/ton in constant mid-1982 prices)

	Opera-tion	Baturaja 1982 Rp'000/ton	Baturaja 1982 US$/ton	Baturaja 1990 Rp'000/ton	Baturaja 1990 US$/ton
Rice (ton)					
Export price, Thai 5% brokens, f.o.b., Bangkok /a		312	500	370	592
Quality adjustment /b	90%	281	450	333	533
Freight and insurance	+	16	25	16	25
C.i.f. price, project area	=	297	475	349	558
Port handling, storage & losses /c	+	16	25	16	25
Transport to wholesaler /d	+	10	16	10	16
Mill to wholesaler	-	2	3	2	3
Exmill price, project area	=	321	513	373	596
Conversion to paddy	63%	202	323	235	376
Milling and cleaning costs less value of products	-	2	3	2	3
Handling transport farm to mill	-	2	3	2	3
Economic farmgate price	=	198	317	231	370
(Financial Farmgate Price)	=	135	___	158	___
Corn					
Export price, f.o.b. US Gulf port		88	140	132	211
Freight and insurance	+	28	45	28	45
Port handling	+	6	10	6	10
Transport, wharf to wholesaler	+	10	16	10	16
Transport, village to wholesaler	-	2	3	2	3
Transport, farm to village	-	2	3	2	3
Economic farmgate price	=	128	205	172	276
(Financial Farmgate Price)	=	105	___	132	___
Peanut					
Peanut shelled, f.o.b. Nigeria		350	560	438	701
Freight and insurance	+	23	37	23	37
Port handling	+	4	6	4	6
Transport, wharf to wholesaler	+	6	10	6	10
Transport, subdistrict to wholesaler	-	3	5	3	5
Transport, farm to subdistrict market	-	2	3	2	3
Farmgate price peanut shelled	=	378	605	466	746
Farmgate price peanut unshelled	80%	302	484	373	512
(Financial Farmgate Price)	=	425	___	370	___
Rubber					
RSSI, c.i.f. New York		874	1,398	1,118	1,789
SIR 20, c.i.f. New York	95%	830	1,328	1,062	1,700
Freight, insurance, brokerage and commission	-	87	139	87	139
Fob Indonesia	=	743	1,189	975	1,561
Transport to wharf, port handling and JMO marketing costs	-	18	29	18	29
Taxes /e	-	56	89	56	89
Financial price ex-factory	=	669	1,071	901	1,443
Economic price ex-factory	=	725	1,160	957	1,532
Farmer price	=	554		770	

/a Thai White 5% f.o.b. Bangkok. IBRD Projection, December 1981.
/b 90% of world price based on spot checks and regressions. See paper IBRD/AEPIA 1979.
/c Source. BULOG. The breakdown of these costs is as follows (Rp/ton):

Port costs	=	2,800
Transport to warehouse	=	2,900
Spraying & fumigation	=	400
Unloading	=	3,700
Warehouse rent	=	1,000
Total		10,800 (US$17)

Losses at unloading 0.75% and 1.0% at warehouse = 5,000 (US$8).
/d Transportation costs as given below. For Baturaja, costs are Rp 50/ton kilometer.
/e 7% of f.o.b. Indonesia price.

Table 5.4.B ; PRICE STRUCTURES FOR AGRICULTURAL INPUTS
(Rp & $'000/ton in constant mid-1982 prices)

	Baturaja			
	1982		1990	
	Rp'000/ton	US$/ton	Rp'000/ton	US$/ton
Urea /a				
World export price, f.o.b. Europe	148	236	181	290
Ex-factory price	144	230	187	299
Handling and distributing to retail level /b	20	32	20	32
Transport to farm	2	3	2	3
Economic farmgate price	166	265	209	330
(Financial Farmgate Price)/c	(70)	___	(93)	___
TSP /d				
World export price, f.o.b., US Gulf Port	125	200	148	236
Freight and insurance	31	50	31	50
Handling and distributing to retail level	21	34	21	34
Transport to farm	1	2	1	2
Economic farmgate price	178	286	201	322
(Financial Farmgate Price)	(70)	___	(93)	___

/a Indonesia has been an exporter of urea from the PUSRI plant in Palembang, mainly to ASEAN countries. In 1978 domestic demand caught up with production and Indonesia has imported urea. However the exporter position is expected to be restored in 1982 when the Bontang factory becomes operational. The 1982 price is used in the report to approximate prices in 1980-90 and is therefore based on an exporting situation and on supply to the project from Bontang. For Baturaja, the ex-factory price is at Palembang. Ex-factory prices are based on projections for bagged urea f.o.b. Europe and a transport premium to ASEAN markets of US$15/ton.

/b Palembang to Baturaja (Rp 20,000/ton).

/c Financial price based on Government subsidized price; 1990 projection based on increases in world price.

/d Indonesia is and will remain an importer of TSP mainly from Europe and North Africa. Nearly all imports and distribution of fertilizer is handled by PT PUSRI who has three main port facilities/bagging plants from which be imported in bulk to Palembang.

Table 5.5 Gross Financial Value of Production of foodcrops to 1.25 Ha Farmer

Rp. 000 at constant mid-1982 Prices

Years	1	2	3	4	5	10-30
Model One						
Padi	54	172	168	164	146	121
Maize	13	35	34	33	32	32
Cassava	10	24	23	22	20	17
Groundnuts	36	85	79	72	66	52
Total	113	316	304	291	264	222
Model Two						
Padi	68	259	262	268	274	302
Maize	17	54	56	57	58	66
Cassava	13	36	36	36	36	36
Groundnuts	45	125	123	121	118	108
Total	143	474	477	482	486	512

Model Three

As above for Model Two plus;

Years	6.	7	8	9	10	11	12-19	20-22	23-24	25	26.	27-30
Rubber	346	616	693	770	924	1001	1116	924	847	770	693	616

Model Four

Rp. 405,000 in Year 1, Rp. 620,000 in Year 2, Rp. 878,000 in Year 3 rising at 2% p.a. (with the real increase in the price of padi) to Year 10 then steady at Rp. 1,008,000 to Year 30.

Model Five

As above for Model Two times 1,333.

Table 5.6 Net Family Incomes

Rp. '000 at constant mid-1982 financial prices

Years		1	2	3	4	5	10-30
Model One							
Gross value of production	(+)	113	316	304	291	204	222
And from fruit, veg.& live-stock (@ 20% Year 5)	(+)	10	20	25	35	53	44
Costs of production	(-)	-	-	-	25	20	5
Taxes (IPEDA)	(-)	-	-	-	-	-	11
Net farm income		123	336	329	301	297	250
On-farm labour (man-days)		180	275	275	275	275	275
Off-farm labour (man-days)		20	25	30	35	40	70
Off farm income @ Rp.1000	(+)	20	25	30	35	40	70
DGT subsistence	(+)	350	50	50	-	-	-
Net family income		493	411	409	336	337	320
Model Two							
Gross value of production	(+)	143	474	477	482	486	512
And from fruit, veg & livestock (@ 20% Yr 5)	(+)	10	25	40	60	97	102
Costs of production	(-)	-	-	-	70	75	110
Taxes (IPEDA)	(-)	-	-	-	-	-	11
Net farm income		153	499	517	472	508	493
On-farm labour (man-days)		180	340	340	340	340	340
Off-farm labour (man-days)		20	20	20	20	20	20
Off-farm income @ Rp.1000	(+)	20	20	20	20	20	20
DGT subsistence	(+)	350	50	50	-	-	-
Net family income		523	569	587	492	528	513

Table 5.6 (contd.)

Model Three

As above for Model Two plus:

Years	6	7	8	9	10	11	12-19	20-22	23-24	25	26	27-30
Gross value of prod.	346	616	693	770	924	1001	1116	924	847	770	693	616
Cost of production (-)	64	64	64	64	64	64	64	64	64	64	64	64
Net income	281	552	629	706	860	937	1052	860	783	706	629	552

Years	0	1	2	3	4	5	6-30
Farmer Labour (man-days)	88	98	81	53	41	39	142

Model Four

Years		1	2	3	4	5	10-30
Gross value of production		405	620	878	896	913	1008
Costs of production, taxes, on and off farm labour same as for Model Two							
Net family income		775	690	948	846	858	907

Model Five

Gross value of production (= 1.333 x Model Two)	(+)	204	665	689	723	777	819
Costs of production	(-)	-	-	-	25	25	40
Taxes	(-)	-	-	-	-	-	11
Net farm income		204	665	689	698	752	768
Off farm income @ Rp.1000	(+)	20	20	20	20	20	20
DGT subsistence	(+)	325	25	25	-	-	-
Net family income		549	710	734	718	772	788

N.B. Farm labour data for Models Two and Three are taken directly from the IBRD Trans II S.A.R. 1982; On-farm man-days in Model One are taken as 80% of those in Model Two. Models Four and Five assume no change from Model Two.

Table 5.7 Gross Economic Value of Production of food crops per Family

	US$ in economic values at constant mid-1982 prices					
Years	1	2	3	4	5	10-30
Model One						
Padi	127	404	396	386	343	284
Maize	26	68	67	66	65	64
Cassava	15	37	35	34	31	26
Groudnuts	42	102	96	90	84	72
Total	210	611	594	576	523	451
Model Two						
Padi	158	606	619	630	643	711
Maize	33	106	110	114	119	143
Cassava	20	55	55	55	55	55
Groundnuts	52	149	149	149	149	149
Total	263	916	933	948	966	1,058

Model Three

As above for Model Two plus:

Years	6	7	8	9	10	11	12-19	20-22	23-24	25	26	27-30
Rubber	689	1226	1379	1532	1838	1992	2221	1838	1685	1532	1379	1226

Model Four

US$ 951 in Year 1, US$ 1455 in Year 2, US$ 2,061 in Year 3, rising at 2% p.a. to Year 10 then steady at $ 2,367 to Year 30.

Model Five

As above for Model Two times 1.333.

Table 5.8 A Model One (Dryland Low Inputs) Economic Analysis per Family

US$/KK in economic values at constant mid-1982 prices

YEAR	COSTS					BENEFITS			NET BENEFITS		
	Investment	Operations and Maintenance @ 1%	Production Costs (@2,3 x finan.costs)	Labour @ Rp.500 shadow wage rate	TOTAL	Food Crop Production	Fruit, veg. and livestock @ = financial prices	TOTAL	DISC @ 0%	DISC @ 10%	DISC @ 1%
0	6050	-	-	-	6050	-	-	-	(6050)	(6050)	(6050)
1	-	10	177	138	325	210	15	225	(100)	(91)	(99)
2	-	20	177	212	409	611	31	642	233	192	228
3	-	30	177	212	419	594	38	632	213	160	207
4	-	45	88	212	345	576	54	620	275	188	264
5	-	60	71	212	343	523	82	605	262	163	249
6	-	60	60	212	332	509	80	589	257	145	242
7	-	60	49	212	321	494	78	572	251	128	234
8	-	60	38	212	310	480	75	555	245	114	226
9	-	60	28	212	300	465	72	537	237	100	217
10	-	60	18	212	290	451	68	519	229	88	207
11-30	-	60	18	212	290	451	68	519	4580	683	3703
							NPV		632	(4,180)	(372)

IERR = 0.6%

Table 5.8 B. Model Two (Dryland High Inputs) Economic Analysis per Family

US$/KK in economic values at constant mid-1982 prices

YEAR	COSTS					BENEFITS			NET BENEFITS		
	Investment	Operations and Maintenance @ 1%	Production Costs (@2,3xfinancial cost)	Labour @Rp.500 shadow wage rate	TOTAL	Food Crop Production	Fruit, veg, and livestock @=fin.pr.	TOTAL	DISC @ 0%	DISC @ 10%	DISC @ 3%
0	8,620	-	-	-	8,620	-	-	-	(8,620)	(8,620)	(8,620)
1	"	15	177	138	330	263	25	378	48	44	43
2	"	25	177	262	464	916	38	954	490	405	462
3	"	40	177	262	479	933	62	995	516	388	472
4	"	60	248	262	570	948	92	1,030	460	314	408
5	"	86	265	262	613	966	149	1,115	502	312	433
6	"	86	289	262	637	984	150	1,134	497	280	416
7	"	86	313	262	661	1,002	151	1,153	492	252	400
8	"	86	338	262	686	1,020	153	1,173	487	227	384
9	"	86	363	262	711	1,039	155	1,194	483	205	370
10	"	86	389	262	737	1,058	157	1,215	478	185	356
11-30	"	86	389	262	737	1,058	157	1,215	9,560	1,426	5,134
								NPV	5,392	(4,038)	258

IERR = 3.1%

Table 5.8C. Model Three (Tree Crops) Economic Analysis per Family

US$ / KK in economic values at constant mid-1982 prices

YEAR	Net Benefits from Model Two	ADDITIONAL COSTS OF 1 HA/KK RUBBER				ADDIT. BENEFIT	NET BENEFITS		
		Investment	Maintenance and Production Costs	Labour @ Rp. 500 shadow wage rate	TOTAL	Value of rubber production	DISC @ 0%	DISC @ 10%	DISC. @ 12%
0	(8,620)	2,420	〃	〃	2,420	〃	(11,040)	(11,040)	(11,040)
1	48	〃	160	75	235	〃	(187)	(170)	(167)
2	490	〃	151	62	213	〃	277	229	221
3	516	〃	138	41	179	〃	337	253	240
4	460	〃	131	32	163	〃	297	203	189
5	502	〃	137	30	167	〃	335	208	190
6	497	〃	125	109	234	689	952	536	482
7	492	〃	125	109	234	1,226	1,484	761	671
8	487	〃	125	109	234	1,379	1,632	762	659
9	483	〃	125	109	234	1,532	1,781	755	643
10	478	〃	125	109	234	1,838	2,082	804	670
11	478	〃	125	109	234	1,992	2,236	783	642
12						2,221	2,465	786	633
13						2,221	2,465	715	564
14	((ditto to Year 30))					2,221	2,465	648	505
15						2,221	2,465	589	451
16						2,221	2,465	537	402
17						2,221	2,465	488	360
18						2,221	2,465	444	320
19						2,221	2,465	404	286
20						1,838	2,082	310	217
21						1,838	2,082	281	193
22						1,838	2,082	256	172
23						1,685	1,929	216	143
24						1,685	1,929	197	127
25						1,532	1,776	163	104
26						1,379	1,623	136	86
27						1,226	1,470	112	69
28						1,226	1,470	101	61
29						1,226	1,470	93	56
30						1,226	1,470	84	49
	IERR = 10.5%				86	NPV		644	(1,802)

Table 5.8 D Model Four (Irrigation) Economic Analysis per Family

US$ / KK in economic values at constant mid-1982 prices

YEAR	COSTS					BENEFITS	NET BENEFITS		
	Investment (Median case*)	Operations and Maintenance @ 1% Yr5	Production Costs = Model Two	Labour Costs = Model Two	TOTAL	Value of Padi production	Disc @ 0%	Disc @ 10%	Disc @ 12%
0	11,745	-	-	-	11,745	-	(11,745)	(11,745)	(11,745)
1	-	40	177	138	355	951	596	542	532
2	-	60	177	262	499	1,455	956	790	762
3	-	80	177	262	519	2,061	1,542	1,158	1,098
4	-	100	248	262	610	2,101	1,492	1,091	949
5	-	120	265	262	647	2,144	1,497	930	849
6	-	120	289	262	671	2,187	1,516	855	769
7	-	120	313	262	695	2,231	1,536	788	694
8	-	120	338	262	720	2,276	1,556	727	629
9	-	120	363	262	745	2,321	1,576	668	569
10	-	120	389	262	771	2,367	1,596	616	514
11-30	-	x 120	x389	x262	x771	x2,367	x1,596	4,762	3,427
						N.P.V.		1,182	(953)

IERR = 11.1%

* Median investment case = $2500/ha x 1,25 ha plus Model Two's $ 8,620
Low investment case @ $1500/ha would give N,P,V, of $2432 @ 10% and an IERR of 12.3%
High investment case @ $3500/ha would give N,P,V, of (-)$68 @ 10% and an IERR of 9.9%

Table 5.8 E Model Five (Tidal Swamp) Economic Analysis per Family

US$ / KK in economic values at constant mid-1982 prices

YEAR	COSTS					BENEFITS	NET BENEFITS		
	Investment	Operations and Maintenance @ 1% Year 5	Production Costs (@ 2.3x financial)	Labour Costs (= Model Two)	TOTAL	Value of Production (Model Two x 1.333)	DISC @ 0%	DISC @ 10%	DISC @ 8%
0	10,682	-	-	-	10,682	-	(10,682)	(10,682)	(10,682)
1	"	20	88	138	246	504	258	235	239
2	"	40	88	262	390	1,272	882	729	756
3	"	60	88	262	410	1,327	917	689	728
4	"	80	88	262	430	1,373	943	644	693
5	"	100	88	262	450	1,487	1,037	644	706
6	"	100	100	262	462	1,512	1,050	592	662
7	"	100	110	262	472	1,537	1,065	546	621
8	"	100	120	262	482	1,564	1,082	505	584
9	"	100	130	262	492	1,592	1,110	471	555
10	"	100	140	262	502	1,620	1,118	432	518
11-30	"	100	140	262	502	1,620	1,118	3,336	4,709
						N.P.V.		(1,859)	89

I.E.R.R = 8.1%

Table 5.9 Summary of Economic and Financial Analyses of Models

US$ / KK in economic values at constant mid-1982 prices

Key Parameters	Model One	Model Two	Model Three	Model Four	Model Five
	Dryland Low Inputs	Dryland High Inputs	Tree Crops	Irrigation	Tidal Swamp
Investment Cost	6,050	8,620	11,040	11,745	10,682
Present Value of Net Benefits*	1,870	4,582	11,684	12,927	8,823
Net Present Value*	(4,180)	(4,038)	644	1,182	(1,859)
Internal Economic Rate of Return	0.6%	3.1%	10.5%	11.1%	8.1%

* at 10% opportunity cost of capital

US$ / KK in financial values at constant mid-1982 prices

At full agricultural development of 1.25 Ha					
Gross value of annual production	409	945	1479(2662**)	1,551	1,260
Net farm annual income	385	758	1320(2376**)	1,365	1,182
Man-days on farm	275	340	268(482**)	340	340
Net return on labour ($/man-day)	1.40	2.20	4.93	4.02	3.48

** from 1.25 ha. food crop plus 1.00 ha rubber.

RVE/pl
20.9.82

5.4 Macro-economic Impact

The above micro-economic analysis of typical transmigration models has significant macro-economic implications. For, as in Repelitas I and II, the emphasis of the Repelita III transmigration programme has been largely towards the production of food crops on dry uplands. It was seen in Section 4.1 that 169,000 out of the 225,000 families targetted for settlement in the first three years of Repelita III were to be settled on drylands. The proportion targetted for tidal swamp areas was similar in Repelita III to that in Repelitas I-II combined. If it is further assumed that the same proportions of families at Repelita III settlements eventually follow tree crop and irrigation models as in Repelita I and II, the following breakdown emerges:

		Repelitas I-II Actual		Repelita III Estimate
Model	Type	000KK	%	000KK
One	Dryland Low Input	74	57	130
Two	Dryland High Input*	-	-	-
Three	Tree Crops	15	12	27
Four	Irrigation	7	5	12
Five	Tidal Swamp	33	26	56
TOTAL		129	100	225

* The dryland high input model was never followed in Repelitas I and II without the co-existence of tree crops (e.g. Batumarta, Way Abung). This can also be assumed for Repelita III.

The next step would therefore be to gross up the micro-economic results of Table 5.9 by the weighting above. But this would be to paint an overly bleak picture of transmigration Repelita III. For while the economics of Model One is by no means a special case, Model One should not be taken as representative of the average dryland settlement. Dryland settlements also occur on non-irrigable lands which have less unfavourable agro-environmental conditions than those which produce the low outputs of Model One. From available data (see Section 5.2 above), the median range of average padi output per hectare from dry upland settlements would seem to lie between 0.75 and 1.25 tons/ha. To be able to estimate the macro-economic impact of Repelita III transmigration on drylands therefore, a reasonable first approximation would be to take the investment costs of Model One

together with Model One's NPV of economic benefits scaled up by a factor of 1.333. This would be equivalent to an assumption of average yields of padi gogo of 1.00 tons/ha at full agricultural development on dry upland areas.

A first approximation of the economics of Repelita III transmigration can therefore be sketched as follows:

Table 5.11

Macro-economic impact of Repelita III transmigration programme

Economic values at constant mid-1982 prices

MODELS	Investment Costs		Present Value Net Benefits		Net Present Value	
	Average/ KK	Total	Average/ KK	Total	Average/ KK	Total
	US$	US$mn.	US$	US$mn.	US$	US$mn.
One	(6,050)	(786)	2,493	324	(2,824)	(462)
Two	(8,620)	-	4,583	-	(4,038)	-
Three	(11,040)	(298)	11,684	315	644	17
Four	(11,745)	(141)	12,927	155	1,182	14
Five	(10,682)	(598)	8,823	494	(1,859)	(104)
Total	-	(1,823)	-	1,288	-	(535)
Average per KK (US$)	(8,102)	-	5,724	-	(2,378)	-

Source: Tables 5.9 and 5.10.

As a first approximation and on the above assumptions, the first three years of the Repelita III transmigration programme can be estimated to incur to the Indonesian economy investment costs of some US$ 1.82 billion in order to reap net economic benefits (in present

values, when discounted at 10% over 30 years) of US$ 1.29 billion. Thus there will have been a net economic disinvestment of US$ 0.55 billion in order to achieve the demographic, Java environment conservation, social, political, strategic and other non-economic objectives of transmigration.

5.5 Economic Post-Script

Since the economics of Sections 5.1 to 5.4 and Tables 5.1 to 5.11 above were computed, access has been gained to the most recent IBRD commodity price forecasts published in June 1982*. These show very much more pessimistic projections of key food crop prices than those of December 1981 (reproduced in Tables 5.4 A and B), as below:

Table 5.12

Economic Farmgate Price Projections of key commodities, June 1982

US$ per Ton in Constant Mid-1982 prices

IBRD projections of	December 1981		June 1982	
Commodity	1982	1990	1982	1990
Rice	317	370	216	279
Corn	205	276	184	211
Peanut (unshelled)	484	512	383	511
Rubber	1,160	1,532	1,110	1,530

Thus the 1990 prices of the main food crops are now projected at around 25% lower than previously. Projections of rubber prices have not been revised. Taking the summary Table 5.9, the stream of net economic benefits for the food crop models now needs to be reduced by an average 20% (to allow also for lower projections of the costs of inputs) for food crops. Model Three's net economic benefits remain as before. Investment costs are not affected by the revised price forecasts. Table 5.13 now reflects the bleaker economic picture for the five transmigration models.

* see Annex 1, Table 3 of the IBRD Trans IV Staff Appraisal Report of August 5, 1982.

Table 5.13

Revised Summary of Economic Analyses

US$/KK in economic values at constant mid-1982 prices

	Model One	Model Two	Model Three	Model Four	Model Five
	Dryland Low Inputs	Dryland High Inputs	Tree Crops	Irriga-tion	Tidal Swamp
Revised Economics					
Investment Cost	6,050	8,620	11,040	11,745	10,682
Present Value of Net Benefits (discounted @10%)	1,496	3,666	11,684	10,342	7,058
N.P.V.	(4,554)	(4,954)	644	(1,403)	(3,624)
I.E.R.R.	-4%	-1%	10.5%	8%	5%
Economics of Table 5.9. by comparison					
N.P.V.	(4,180)	(4,038)	644	1,182	(1,859)
I.E.R.R.	0.6%	3.1%	10.5%	11.1%	8.1%

N.B. Revisions based on latest IBRD Commodity Price Forecasts of June 1982.

The revised commodity price forecasts from IBRD . show the sensitivity of these investment models to fluctuations in the economic prices of key outputs. Both Models One and Two, the dryland food crop models, now achieve negative economic rates of return, with the high input model amassing a negative NPV of almost US$ 5,000/KK. The average irrigation project (Model Four) slips below the opportunity cost of capital, while the tidal swamp project (Model Five) is reduced to a small economic rate of return. Only the tree crop model retains full economic viability.

On a macro-economic basis, these revised price forecasts lead to two conclusions:

i. the food crop orientated transmigration investment programme may now be incurring not low but negative economic rates of return;

ii. further investment in food crop agriculture should, on economic grounds, be undertaken only in the most favourable agro-environmental conditions; prices of grain especially are forecast to be so much cheaper on the world market up to 1990 that it should prove more economic to invest scarce resources in other forms of agriculture (e.g. tree crops) or in other sectors (e.g. manufacturing) and then purchase grain imports from the proceeds of the economically viable alternative investment.

Chapter VI SETTLER WELFARE

The return to the economy and the return to the settler from transmigration are two very different concepts, and the difference helps to explain the continued enthusiasm amongst poor landless Javanese farmers for transmigration and even the prevalenceof spontaneous settlement despite the unfavourable economics.

Table 5.6 shows that, at full agricultural development, net farm income to the family can range from Rp. 250,000 in Model One to Rp. 1,052,000 from rubber alone in Model Four (before repayment of investment costs to the PTP). Summary Table 5.8 shows net return tofarm labour of US$ 1.40, $ 2.20, $ 4.93, $ 4.02 and $ 3.48 per man-day from Models One to Five respectively. Such incomes and returns can be compared with annual incomes amongst landless farmers in Java of Rp. 120-150,000 per family and typical returns to Javanese agricultural labour at below US$ 1.00 per man-day.

The transmigrant settlers have to work hard to achieve such an increase in income. For their first few years of settlement there will seem never to be time enough to be able to do all the jobs that have to be done. This improvement in the employment and income position of transmigrants will be furthered over the years of settlement by:

i. further opening up and cultivation of lands beyond the initial 1.25 ha analysed in Models One to Five, and

ii. off-farm employment and trading activity, the scope for which is likely to be more favourable in the pioneering area of settlement than at the ultra-competitive market in the areas of origin.

While the transmigrant will generally be financially better off than he was in Java, albeit often still at a subsistence level of income, it can not be necessarily claimed that he is better off in terms of general social welfare. It was shown in Section 4.7 that there can be serious shortcomings in the social services provided to transmigration settlements. Together with the increased exposure to health risks in moving from Java to pioneer areas, this can lead to a reduction in the settler's social welfare. Furthermore the transfer from the socio-cultural familiarity of Java to the void at transmigration areas may well be considered a negative factor by the settlers.

Transmigration can sometimes lead to a transformation in the standard of living of the settler, whereby his net family income may be raised to that of the national all-sector average of Rp. 1.2 million (US$ 430 x 4.5 persons per family). But there are two qualifying elements in this scenario. Firstly, there would seem to be a marked element of fortune involved in being a transmigrant. The typical transmigrant will have little idea, when he boards the ship or aircraft, whether he will be landing at a settlement with good agro-environmental conditions or with high levels of investment or inputs. Thus may he land on a wretched patch of Central Sumatra or Kalimantan soil and find that his income after 10 years' toil is barely in excess of that which he experienced in Java. On the other hand he may land on fertile, irrigable soils in Sulawesi Utara to find a full technical irrigation project underway by Year 5, soon projecting him to a standard of living in excess of the national average. Similarly may that level be achieved within a decade should he be fortunate enough to land at a settlement scheduled for rubber, cocoa, coconut or another tree crop development.

The second element is that the transmigrant finds himself in his new environment, for better or for worse, at very little direct cost to himself. The cost is borne largely by Government, and indeed by the economy. Whatever financial value added is achieved by the transmigrant can be converted to economic prices and compared with the costs of the investment to the economy. But in financial terms to the transmigrant, no value added is required to pay back the investment. The transmigrant may attempt to maximise his income, given a trade-off with leisure-time, but he is under no such financial obligation to produce more than is necessary to feed his family plus provide a little extra cash. Thus may it be difficult to transform the often subsistence mentality of a transmigrant into that of a surplus farmer through the expenditure by Government in moving him to a new environment. Value added in excess of that generated by transmigration could perhaps be achieved by Government investment substantially below the minimum US$ 6,000 per family spent on transmigration by direct investment (or even by cash hand-out?) in the areas of origin.

Chapter VII FURTHER DEVELOPMENT OPTIONS

The opportunity for utilising the financial and manpower resources allocated to land settlement programmes to exploit fully the agricultural/developmental/economic potential of many underutilised areas of Indonesia has in general not been grasped. Causative development constraints discussed in Chapter IV may have helped to explain why the economics of Chapter V emerged in many cases so unfavourably. Chapter IV revealed one single overwhelming constraint, namely:

> the imposition of food crop land development models irrespective of agro-environmental conditions, which in terms of slope, rainfall, pests and, especially, soil fertility, may sometimes have been wholly unfavourable to the cultivation of food crops on any other than a shifting cultivation basis; such models required the settler, formerly a poor landless agricultural labourer, to farm his land as if under research and extension conditions and as if risks of crop failure were of as much consequence as they would be to salaried Department of Agriculture officials working on a research plot; with the low probabilities of realising an increase in yield sufficient to justify the high inputs/high costs/high risks of the model, the settlers have too often and too soon been ensnared in the vicious circle of subsistence farming.

But it is not necessarily too late to attempt to salvage some attempt at viability from the economic wreckage at certain settlements. While further investment five to ten years post settlement will be unlikely to improve the economic rate of return on the original investment, the facts are that such original investment costs of planning, land clearing, road building, settlement construction and settler transfer have already been incurred, and can now be regarded, in economic parlance, as sunken. That such investment was largely uneconomic now becomes of historical interest. The opportunity remains, however, for Government to reinvest in these projects with potentially very high economic rates of return on the new investment since, basically, the settlers are already in situ. Such projects, which can be termed second phase development (viz IBRD's Way Abung and Singkut projects, USAID's Luwu, ADB's Sultera and the FAO/WB CP proposed Pematang Panggang and Upang Delta) are more than rehabilitation projects. They do not set out to rehabilitate the maybe needy-of-repair status-quo, rather they aim to fundamentally change the status quo, to redevelop the settlement along different emphases. Thus a rehabilitation project may seek to upgrade the social or economic infrastructure of a settlement and improve the levels of agricultural inputs (including livestock) and services (rural extension centres), while basically maintaining the same dryland food crop model. A redevelopment project may seek to reduce the emphasis on dryland food cropping by, for example, conversion into wetland food cropping or by diversification into tree crops, livestock, fisheries, etc.

7.1 Regional Development

It is a key recommendation of this evaluation study that redevelopment projects for Repelitas I and II settlements in particular, and also for those of Repelita III should optimally be undertaken within the context of regional development. Regional development planning should be regarded virtually as the sine qua non of such redevelopment projects.

By regional development planning, the following key factors are considered essential:

i. the redevelopment approach should be multi-sectoral;

ii. the breadth of vision must be wider than just one or two transmigration settlements, it should be at least Kabupaten encompassing;

iii. there is likely to be a large infrastructural component in a redevelopment project;

iv. while there must be due attention to and investment in supporting agro-inputs (especially extension) and agro-economic services (credit, marketing, infrastructure), the primary focus of the redevelopment projects should be to develop or redevelop areas in full recognition of their natural resource and agro-environmental potential, and

v. finally, and critically, such redevelopment projects must ensure that local communities stand to gain as much as or even more from the investment than the transmigrants; only in such a way can full regional potential be realised, the already existing differential in the level of services provided to transmigrant and local communities be harmonised and the full backing of regional authorities and local peoples be mobilised.

The history to date in Indonesia of regional development projects in the context of transmigration gives rise to considerable optimism. The enthusiasm of virtually all concerned with the area development transmigration models of Luwu and Sultera is infectious. In both projects the emphasis is on optimal utilisation of land, upgraded infrastructure and widespread technical services to the people living in the region (whether natives or settlers from kolonisasi or transmigrasi). In both cases the emphasis is not on transmigration for transmigration sake. Indeed in Luwu, the new transmigration component of 700 KK is very small. The Luwu project is essentially a rehabilitation project and is one which, given not too many/severe the inevitable management and operational complexities, cannot fail to provide a boost to the regional economy. Luwu is a region of fertile, well watered lands which have been underpopulated and underexploited for historical reasons. It was also a region which saw its infrastructure devastated as a result of political turbulence in the 1960's. Luwu's economy started therefore from an artificially depressed base at the time of the advent of Proyek Luwu. The subse-

quent impact of the project, plus a number of other smaller uni-sectoral projects (the effects of which cannot be isolated), can be seen in the mushrooming of Palopo and Bone-Bone, and in the rapid rise in population (spontaneous Bugis and Toraja migration as well as transmigration), agricultural production and per capita incomes.

The Luwu project is multi sectoral and ambitious, combining large infrastructural sub-projects (trunk road, irrigation) with agricultural services sub-projects (rural extension and farmers cooperative centres). The population catchment area embraces virtually the whole kabupaten, through the road and agricultural services projects, while areas to be irrigated will reap the greatest benefits. The project is a true area development project in that it can be viewed as a Phase I of many such Proyek Luwu's over the next few Repelitas. Further phases could progressively extend irrigated areas, encompassing some Repelita III transmigration sites, introduce small agro-processing plants, rural electrification and so forth.

Similarly the South East Sulawesi Transmigratioon and Area Development Project (SESTAD) project can be viewed as the first phase of many. This project is even more multisectoral (encompassing 19 Directorate Generals in all, from irrigation to religious affairs, livestock to health), but different from Proyek Luwu in that the greatest financial emphasis is for a new technically irrigated transmigration settlement capable of holding 4,500 KK (the irrigation works should also cover 3,200 local Tolaki families). The transmigration orientation, more appropriate in such an underpopulated province, is further emphasised by the second largest financial allocation to the improvement (infrastructure, irrigation, livestock) of some 17 existing settlements. Upgrading of 70 local villages (mainly social facilities) to transmigrant village standards, improvement of Kabupaten roads, a number of agricultural service inputs and further studies for future development form the balance of the project.

The Luwu and SESTAD projects, despite their bureaucratic complications and prolonged slippage, have to be successful in comparison and with standard transmigration projects because they embrace the transmigrant and his productivity into the context of the region he will be living in. They should minimise friction with local people since the latter stand to benefit equally or even more. The multisectoral approach should ensure that constraints in the development of one sector caused by bottlenecks in another related sector are minimised. Thus should roads, irrigation, extension, credit, marketing, etc. all proceed at a similar pace to provide that essential push to get the settlers and locals beyond subsistence. The SESTAD case is clearer even than in Luwu, for already the bleak pre-project picture of subsistence farming has been left behind.

There remains tremendous scope for the replication of Proyek Luwu's and SESTAD's throughout Indonesia. The FAO/IBRD plans for Pematang Panggang 2nd Phase Development should fall into the category of regionally-development-planned transmigration redevelopment. The

steady progress of the Trans Sumatra Highway suggests the possibility of a Jambi TSH area development project and with the focus surely on tree crop establishment (so evidently successful at e.g. Rimbo Bujang).

But two major constraints to regional development projects will be finance, for such projects are likely to be costly per family (but with subsequently high economic rates of return), and organisation. These projects entail a complex network of management and coordination, and they take a long time to be fully implemented (5 years from planning to completion may be considered speedy). Any attempts, however, to speed up redevelopment projects for transmigration settlements through unisectoral approaches could run the risks of losing some of the major benefits of the multisectoral regional approach, perhaps the most important of which being the full participation of both local and transmigrant communities. Nevertheless, the sections below suggest certain uni-sectoral options which may provide the key to redevelopment of certain transmigration settlements, but preferably within a regional development context.

7.2 Tree Crop Development

The agro-environmental potential for the development of tree crops, and rubber in particular, in Central Sumatra and Kalimantan has been discussed at length in Sections 4.1 and 4.2 above. The costs and benefits, in financial and economic values, of rubber cultivation have been found to be much more favourable, given appropriate agro-environmental conditions, than for food crops, given the inappropriate conditions found at many settlement locations in Central Sumatra and Kalimantan. Tree crop establishment projects are strongly to be recommended at many such transmigration settlements. Tree crop development should not be restricted to one crop, but should be diversified. Apart from rubber, potential exists at these sites for coconut, oil palm, coffee, fruit trees (and other perennial, non-tree crops, e.g. bananas, sugarcane).

There are two major constraints to the widespread extension of tree crops to Central Sumatra sites. The first concerns the organisational and managerial limitations of the PNP/PTP's, under whose control and responsibility all such projects should be undertaken (when left to the settlers to manage in for example Pematang Panggang, the trees have not prospered). The PTP's managerial capabilities must not be overextended. Rather should tree crop redevelopment projects be phased into the scheduled development plans of PTP's.

The second major constraint concerns the marketing and the prices fetched by the product, especially rubber. The current worldwide economic recession has led to Indonesian estates experiencing some difficulties in the marketing of their rubber output, particularly with the concomitant fall in the real price of oil/synthetic substitutes for rubber. Longer term prospects however remain good on the demand side, with the eventual pull-out of recession and the likely up-swing in the price of rubber substitutes. On the supply side, available data on rubber areas, replantings and new plantings point to a decline in total rubber production in both Indonesia and, the world's largest exporter, Malaysia, and suggest a strong future market for rubber.

7.3 Irrigation

The impact of various degrees of technical to wholly self-built non-technical irrigation works on transmigration sites throughout Sulawesi has been considerable. Nowhere can this be seen more than in Sultera, where soil fertility is generally low and comparable to that found in Central Sumatra. Yet the advent of irrigation works has often led to the development of settlements to levels not just beyond subsistence, but to good living standards for the settlers and satisfactory economic rates of return on the investment.

The potential for irrigation in Sulawesi is generally greater than in Sumatra or in Kalimantan. Sulawesi's mountainous backbone and extensive flat plains watered by numerous rivers can be contrasted with Central Sumatra's and Central Kalimantan's hilly uplands leading

Eastwards/Southwards respectively to swamp. A study is currently underway for DG Water Resources Development on investigating the potential for irrigation at Repelitas I and II transmigration sites. Potential for irrigation in Sumatra has been found to be limited outside Lampung (Way Abung, way Seputih), where even there the soils experience high infiltration rates. The degree of clay in the soil structure is insufficient further North, where the soils tend to soak up the water and render irrigation workS less feasible even on relatively flat ground. Exceptionoal areas may be found, with some irrigation potential, especially where there are riverine alluvial deposits. Conditions in Kalimantan are in general similarly unfavourable, but the study has identified good potential for irrigated transmigration settlement on the North coast of Irian Jaya. For Repelita I and II settlements, the study's most optimistic findings are concentrated in Sulawesi.

Irrigation works can however be made available in adverse agro-environmental conditions, but at a cost. The hills of Sitiung were bulldozed flat pre-settlement and technical irrigation works installed despite the need to raise water some 25 metres from the river source below. The economics of the Sitiung project are unlikely to emerge favourably, but possibly no worse than for the usual dryland low input food crop model. The Sitiung project will at least make a good contribution to Sumatra Barat's production of rice, albeit at a high opportunity cost.

Finally, the study for DGWRD has noted the potentially excellent economic prospects to be gained from a very basic piece of irrigation engineering, namely bunding. Without the heavy expense of headworks, canals, drainage systems etc., simple bunding and levelling can cost between $100-$600/ha. (depending on the extent of levelling to be done) in comparison with typically $3,000 - $4,000/ha. for full technical irrigation works. Bunding alone can not provide the 2 x 2.5 tons/ha yearly output of padi that a technical irrigation project should exceed, but it can nevertheless result in a significant increase in yields in relation to the small costs of investment.

Bunding has three important effects, namely greater:

i. retention of rainwater;
ii. control of soil erosion, and
iii. retention and more gradual infiltration of fertiliser.

A bunded field can, at times during the rainy season, resemble a sawah field. During the dry season, a bunded field will at least retain moisture longer after rain than if non-bunded. given the very low yields on most Central Sumatra dry upland sites, the simple process of bunding could have a significant effect. By way of an indicative example, let us suppose bunding raises average yield by just 100 kilograms of padi (say from 1.0to1.1 tons/ha). At an economic farmgate price of, say US$ 150/ton (Table 5.4) that is equivalent to an incremental net (no additional inputs) benefit of $ 15/ha/year = $ 141 in present value at a 10% rate of discount over 30 years. If the bunding only cost $ 100 (no levelling), the investment has a good net present value and a high economic rate of return. It is antici-

pated that bunding could lead to incremental yields in excess of 100 kilograms/hectare, and it is recommended that consideration be given towards Government financed bunding projects.

7.4 Pasture and Livestock

There is a reasonable correlation, it was observed on field trips (see Tables 4.1 and 4.2), between the standard of living experienced in a settlement and the ownership of cattle (Section 4.4.4). Such a correlation represents both cause and effect. The existence of one or two cows per family can greatly improve both the extent and the productivity of the land farmed, while good returns from farming may be reinvested inthe purchase of livestock. Present targets of one head of cattle per five transmigrant families would seem to be insufficient, and redevelopment projects should aim to include a livestock component (as with the Sultera project) to raise the ratio to one to one.

Consideration in redevelopment projects should further be given to the production of livestock for meat, and not just as a power input to the production of food crops. The cultivation of lands with an appropriate pasture crop has the following advantages:

i. maintenance of soil cover hence reduction of erosion;
ii. greater retention of soil fertility;
iii. greater yields from food cropping with rotation.

Soil fertility will further be enhanced from the manure of the livestock. It is probable that a cut and carry method of feeding would be more appropriate to delicate agro-environmental conditions.

Redevelopment projects based on the production of livestock would come up against a constraint similar to that for tree crops. Livestock projects need to be professionally implemented and monitored. Investment costs can come to US$ 650/head of cattle, and management costs thereafter must be sustained in order to preserve the investment. Given sufficient finance, major constraints are likely to be the supply of suitable livestock and the supply of suitably qualified manpower to service transmigration areas, in view of the already extended capacity of DG Livestock.

7.5 Agricultural Services

Should some of the above redevelopment projects be introduced in regions such as Central Sumatra, then there willhave been a shift in emphasis away from dryland food crop agriculture and towards tree crops, wetland food crops and pasture for livestock. But such projects will take time to be implemented, and then to come into full effect. Even then there will still be a desire on the part of the settler to cultivate food crops on part of his land. It should be the aim of redevelopment projects in areas where agro-environmental conditions are non-conducive to food cropping to minimise those areas under food production. Once minimised, it is likely that food crop produc-

tivity will be improved due to:

i. greater intensity of cultivation, and

ii. greater availability of cash from diversified agriculture for the purchase of necessary inputs.

Until such a time that food cropping at transmigration sites on inappropriate lands be scaled down, there remains a serious need for a greater intensity of agricultural services to settlements. Developmental constraints associated with insufficient inputs of research and extension have been described in Section 4.5.5, along with recommendations on the minimum required levels of inputs.

But the manpower, and to date financial, resources of the DGFCA are unable to cope with such a requirement. The magnitude of the Repelita III and the provisional Repelita IV transmigration programme targets are such that DGFCA is sorely pressed to provide even the minimum level of extension inputs currently provided, let alone provide more such inputs for redevelopment projects for Repelitas I and II settlements. DGFCA's transmigration budget of Rp. 19 billion in 1982/83 compares with DGT's budget for development (pembinaan) alone of Rp. 70 billion and a total programme budget of Rp. 492 billion. Agricultural extension would appear therefore to be considered, in financial terms, a comparatively minor part of the transmigration programme.

It is illuminating to compare expenditure per family on agricultural services under the Government general transmigration programme and under an IBRD financed project, as can be seen in Table 7.1. Apart from immediately obvious differences in the degree of attention to tree crops and livestock, it can be seen that the IBRD Batumarta Extension Project aims at spending some US$ 1100/KK on miscellaneous agricultural services (research, extension, etc.) compared with the $ 322/KK spent on the general programme (excluding that on tree crops and livestock). Thus Batumarta gets over triple the agricultural services attention of the average transmigration project and even so (Section 4.2) has only been slightly successful in inducing farmers to apply high input food crop farming systems.

Finance, however, would be less of a constraint than manpower in extending Batumarta equivalent research and extension inputs across the whole transmigration programme. DGFCA has found it extremely difficult to recruit or transfer agricultural extension officers with any relevant experience, especially in the context of a continuously expanding transmigration programme. This situation implies that further large scale transmigration programmes will proceed in the knowledge that manpower resources are insufficient to be able to represent other than a determining constraint on the realisation of agricultural development. A policy option which could be derived from such a situation would be the regulation of the size of the programme to levels conducive with the capabilities of agricultural agencies to service the settlements, preferably with appropriate choice of farm development models.

It was observed in Section 4.4.1 that there is an economic case, given the necessary continuation of food cropping on inhospitable dry uplands for sometime to come, for the continued provision by Government of free inputs of fertiliser and pesticide to such settlements either indefinitely or until the coming into maturity of the tree crops to be planted.

Table 7.1

	Government 1982/83 Programme		IBRD Batumarta Extension 1982	
	US$/KK	%	US$/KK	%
Pre-Settlement	4,720	78	6,620*	63
DGT Pembinaan	870	14	..	..
	5,590	92	6,620	63
Food Crops	239	4	..	..
BIMAS	28	-	..	..
Forestry	15	-	..	..
Livestock (IBRD imputed)	108	2	-650	6
Fisheries	10	-	..	..
Estates	30	-	2,200**	21
LPT/LP3	30	1	..	..
Misc. Agricultural Services	-	-	1,100	10
Total Agricultural Services	460	8	10,570	37
TOTAL	6,050	100	10,570	100

* excluding physical planning
** excluding rubber factory

7.6 Agro-industries

The encouragement of agro-industrial development is usually undertaken to serve two purposes, namely marketing and value-added. But the provision of a ready market and the retained value-added from domestic processing vis-a-vis raw product exporting can only be considered once production constraints independent of marketing have been removed. It has been shown in this evaluation study that development constraints (in relation to food cropping) have tended, in Central Sumatra and Kalimantan, to revolve more around production than marketing. Investment in rice mills or cassava plants, for example, in Pematang Panggang would do little to solve the basic agricultural production problem encountered there.

Agro-industrial potential exists where agricultural surpluses do or can be made to occur. Much regional value added has been stimulated in Central Lampung by the numerous cassava factories there, as well as providing a guaranteed, if inevitably low-priced, market for all cassava produced. But the agro-industrial potential further North in Central Sumatra can only be regarded as minimal with regard to the processing of food crops, since sufficient surpluses do not exist and have few prospects of occuring. Agro-industrial potential in Central Sumatra, as well as in Kalimantan, must lie firmly with the processing of the output of tree crops, e.g. rubber plants, coconut oil factories, palm oil refineries.

The surpluses of grain produced in some transmigration settlements in Sulawesi offer some scope for agro-industries, and grain mills are indeed to be found there in relative abundance. There might be some scope for the development of soyabean processing plants in North Sulawesi. At present the output from the high yielding settlements near Dumoga is shipped raw to the plants of Surabaya. But if the main market for the Dumoga soyabeans is to be Java, as opposed to, say, South Sulawesi or Maluku, then the processing and bottling are more economically located in Surabaya.

The potential for cash crop farm models at transmigration settlements is, in general, as good as the land has potential. Soyabean monocropping works in Mopugad, but so too would most crops, such are the favourable agro-environmental conditions. The Balinese of Mopugad have proved that transmigrants do not need to plant padi in order to prosper. Rather can rice be purchased from the proceeds of a good cash crop.

The cash crop model in Sulawesi Tenggara, however, has run into trouble. The nucleus estate near Punggaluku has provided mechanical land preparation, fertiliser and pesticides on credit to the small farmers and transmigrant settlers in the region, but a combination of erratic rainfall and pests has resulted in inadequate harvests for three successive years. Many farmers have now become heavily in debt to the company, and will be unlikely to choose to continue their association once a reasonable harvest enables debts to be cleared. Again, the agro-industry can only be as successful as the ability to produce the inputs required by the industry.

Chapter VIII DEVELOPMENT POLICY OPTIONS

The further development options outlined in Chapter VII for many Repelitas I and II settlements apply with equal relevance to many of the settlements of Repelita III. Future transmigration projects, those for example of Repelita IV, should economically be designed so as not to require costly redevelopment projects at a later date. Economically optimal development policy options can here be grouped under the headings of rehabilitation/redevelopment of existing settlements, planning/financing of new settlements and, taking both together, future scale of programme. The options will be presented concisely, since supporting arguments have already been examined in the relevant chapters and sections above (noted throughout in brackets).

8.1 Rehabilitation/Redevelopment of Existing Settlements

8.1.1 Rehabilitation

1. Extension of free input packages (fertiliser, pesticide and seeds) to all Repelitas I-III settlements using food crop models on dry uplands (4.4.1), either indefinitely or until the coming into maturity of tree crops (or irrigation) to be planted under redevelopment projects.

2. The continuatioon of food crop models on dry uplands, inevitable for some time to come and pending redevelopment projects, should be accompanied by the systematic removal of the development constraints pertaining to agro-inputs, in particular:

i. guns, spears, traps or chemicals for an assault on predators (4.4.3);

ii. the raising of the livestock ownership ratio to one head of cattle per family (4.4.4, 7.4);

iii. the upgrading in quantity and quality of agricultural extension services (4.4.5, 7.5) to include demonstration farming and soil/water conservation techniques;

iv. the widespread introduction of bunding (7.3).

3. Rehabilitation, especially at many Repelita I and II settlements, of the economic (roads, bridges, water supplies) infrastructure (4.6, 7.1), especially access roads to the major markets.

8.1.2 Redevelopment

1. Redevelopment projects should be undertaken only within the context of regional development, with the local peoples of the region standing to benefit as much as or more than the transmigrants (7.1).

2. Redevelopment projects on food cropped dry uplands should set out to fundamentally reassess the status quo and seek to redevelop settlements using land development models appropriate to particular agro-environmental and agro-economic conditions. Consideration should be given to the following land development models in particular:

i. tree crops, especially rubber and coconut (7.2);

ii. irrigation, with professional and some financial assistance for non-technical schemes as well as for major technical schemes (7.3);

iii. pasture for livestock (7.4).

3. Within the regional development context, redevelopment projects could include large components of infrastructural investment, with the possible construction of new access routes to reflect changing economic centres of gravity (7.1).

4. Redevelopment projects would further include consideration of credit, marketing and agro-industrial possibilities (7.6).

8.2 Planning/Financing of New Settlement

1. Future planning of transmigration settlements should be undertaken:

i. in a regional development context (7.1);

ii. with the full involvement of relevant and ultimately responsible agricultural agencies and in close collaboration the provincial Governments* (4.2);

---

* Following discussions initiated in the Office of the Junior Minister upon receipt of the IBRD Trans III Staff Appraisal Report in July 1982, it now seems probable that DGFCA will henceforth play a greater role in the planning of food crop upland transmigration projects. DGFCA should be given every assistance in this endeavour, and it is to be hoped that the advice of professional agriculturalists will thereby by determinant in these matters of agricultural development.

iii. with complete flexibility of land development model options, with the aim of selecting those which are agro-environmentally and agro-economically optimal to the region of settlement (4.2);

iv. with a revised emphasis from maximum population transfer to maximum regional/economic development.

2. Future financing of new transmigration settlements should:

i. enable the above planning to be carried out methodically;

ii. achieve greater economies in the currently land clearing and settlement stages;

iii. ensure continued operations and maintenance of settlement infrastructure;

iv. be weighted more heavily to the post-settlement stage; in particular to the relevant agricultural agencies;

v. enable a very large expansion in the capability of especially DG Estates and DG Livestock (and possibly DG Water Resources) to implement optimally planned new settlement as well as redevelopment projects.

8.3 Balance of Programme

The above development policy options on rehabilitation/redevelopment of old and on planning/finance of new settlements have significant implications for the optimal balance and scale of the transmigration programme. For these options run directly into the formidable constraint of the implementation and management capacity of DG Estates in particular. Repelita III has proceeded irrespective of very definite limitations in DGFCA in terms of planning and then manning food crop transmigration settlements. In the case of food crops, the transmigrants have been able to make the most of their own experience and generally to survive. The economics of settlement have accordingly given way to the contrary objectives of pace of settlement. But with tree crop development, it is not advisable for transmigrants to proceed without the guidance and management of professionals from DG Estates.

There is also the increasingly formidable constraint of the availability of land. Land has been found to be increasingly difficult to find in Sumatra and Sulawesi, even for tree crop development models. Indeed Sumatra has already been declared to be closed to sponsored transmigration after Repelita III. Land

availability in Kalimantan is constrained by the prevalence of soils wholly unsuitable for agricultural settlement. Only in Irian Jaya would it seem that there remains land both suitable and available to accommodate significant numbers of transmigrants, and even so such numbers may be reckoned in the tens not hundreds of thousands of families.

These two constraints, and the options of Section 8.1 and 8.2 concerning redevelopment/rehabilitation and planning/financing, would imply a scale of the sponsored transmigration programme for Repelita IV substantiallly lower than that of Repelita III. There would remain some scope for the encouragement of spontaneous transmigration to the choicer sites of Sumatra and Kalimantan, and local resettlement in Sulawesi. But the overall balance of the programme would, on grounds of economic viability, be weighted towards rehabilitation/redevelopment projects.

There exists the possibility that redevelopment projects themselves can create openings for new transmigrant settlement. Some of the 5 ha/KK settlements in Sumatra, once redeveloped with tree crops, could hold double the existing number of transmigrant families. The 5 ha/KK food crop model could be replaced by, for example, 2 ha/KK tree crops plus 0.5 ha/KK houselot/food crops - i.e. to a model similar to that of PIR Khusus projects. There remains scope for further new settlement even at the 3.5 ha/KK sites in Sumatra. One SPT of 2,000 KK presently farming or intending to farm 7,000 hectares of food crops could, at 2.5 ha/KK of the tree crop model, accommodate a further 800 KK. One would suspect little opposition to such redevelopment/new settlement schemes at these settlements. It is unlikely that today's settlers on 5 ha/KK of the infertile soils of e.g. Pematang Panggang would object to exchanging their bare subsistence livelihood for 2 ha/KK of more lucrative and agro-environmentally appropriate tree crops.

The economically optimal balance of a Repelita IV transmigration programme would appear to be as follows:

i. Sponsored transmigration: with regional and agricultural planning, and with flexibility in the selection of economically optimal land development models, this programme would continue albeit at a greatly reduced pace of settlement given the two major constraints above; the major region of settlement would be Irian Jaya, since Sulawesi, Sumatra and Kalimantan face growing limitations on land availability;

ii. Spontaneous transmigration: this programme would be stepped up in Sumatra, but under the strictest control to attempt to prevent replication of the Lampung example; redevelopment projects could enable settlement of new spontaneous transmigrants, through the reduction in the land entitlement of existing settlers (but with the concomitant increase in the productivity of land through the introduction of tree crops) - see footnote above; future land settlement projects in Sulawesi would economically concentrate on the provision

of infrastructure alone, and enable spontaneous Bugis (as well as from Java/Bali) migrants to move in (hence utilising the known mobility and historic net out-migration of the Sulawesi peoples);

iii. Rehabilitation/Redevelopment: this programme would be addressed to a high proportion of the 629,000 families settled in Repelitas I-III; due to the constraints within DC Estates and to the timescale of optimal planning, such a programme might have to be spread over a period of ten years, into Repelita V; with the prospects of very high economic rates of return (given the already sunken investment costs of settlement), this programme would attempt to realise the huge potential created by 15 years of large scale land settlement programmes in terms of the exploitation of Indonesia's regional natural resources.

RVE/pl
9.11.82

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

1. Agencies

ADB	Asian Development Bank
BAKOPTRANS	Ministerial Coordinating Body for Transmigration
BAPPENAS	National Planning Agency
BINA MARGA	DG Highways, DPU
CIPTA KARYA	DG Building, DPU
DGA, Dalam Negeri	DG Agrarian Affairs, Department of Home Affairs
DGE	DG Estates, DP
DGFC	DG Food Crops, DP
DGT	DG Transmigration, DMT
DGWRD	Directorate General Water Resources Development, DPU
Dep. KEUANGAN	Department of Finance
DMT	Department of Manpower and Transmigration
DP	Department of Agriculture
DPDT	Directorate of Development (Pembinaan), DGT
DPU	Department of Public Works
FELDA	Federal Land Development Authority of Malaysia
FAO	Food and Agriculture Organisation
IBRD	World Bank
JMT	Junior Minister for Transmigration
LAKPINTRANS	Directorate of Implementation and Transfer, DGT
LPT	Soils Research Institute, DP
LP3	Agricultural Research Institute, DP
LITBANG DEPTAN	Research and Development Unit, DGFC
ODM	Ministry of Overseas Development (now ODA)
PEMDA	Provincial Government
P 4 S	Directorate of Tidal Swamp Development, Bina Marga
PLPT	Directorate of Land Clearing, Bina Marga
SATDALTRANS	Directoral Control Unit for Transmigration
TKTD	Directorate of Town & Regional Planning, Cipta Karya
UNDP/OPE	United Nations Development Programme/ Office of Project Execution
USAID	United States Agency for International Development
WFP	World Food Programme

2. Other Abbreviations/Acronyms

c.f.	Compared with
DIP	Project Financial Package
KK	Head of Family
KBLB	Large Unit of Wet Land
KBLK	Large Unit of Dry Land
KKLK	Small Unit of Dry Land
Keppres	Presidential Decree
NES/PIR	Nucleus Estate and Smallholder Schemes

PAYP	Plan As You Proceed
SFSE	Screening, Feasibility Study and Engineering
Pimpro	Project Leader
REPELITA	Five Year Development Plan
LU I/II	Farmland I/II
UPT	Settlement Unit of 500 families
SPT	Settlement Area of 2000 families
BRI	Peoples' Bank of Indonesia
BIMAS	BRI Credit package for agro-inputs
REC	Rural Extension Centre
FCC	Farmers Cooperative Centre
PMU	Project Management Unit
PPL	Agricultural Extension Officer
PPM	Senior " " "
PTP	Public Estates Corporations
PNP	
NPV	Net Present Value
IERR	Internal Economic Rate of Return
SESTAD	South East Sulawesi Transmigration and Area Development

Appendix A
Summary of WordStar Commands

SUMMARY OF EDITING COMMANDS

Commands for Cursor Motion, Scrolling, and Searching

Commands on this page are displayed as they appear on the keyboard.

	Scroll Down ^W One Line		Up ^E One Line		Up ^R One Screen		
Left ^A One Word		Left ^S One Character		Right ^D One Character		Right ^F One Word	
	Scroll Up ^Z One Line		Down ^X One Line		Down ^C One Screen		

	Scroll Down ^Q^W Continuously		Top of ^Q^E Text Area		Beginning ^Q^R of File		
Replace ^Q^A Text		Left Side ^Q^S of Screen		Right Side ^Q^D of Screen		Find ^Q^F Text	
	Scroll Up ^Q^Z Continuously		Bottom of ^Q^X Text Area		End ^Q^C of File		

Cursor to ^Q0-9 Place Marker						Cursor to Position ^Q^P Before Last Command	
			Cursor to ^Q^K End of Block				
Cursor to ^Q^V Start of Last Find or Source of Last Block		Cursor to ^Q^B Beginning of Block					

Basic Commands for Entering Text

^V	Insertion ON/OFF	^I	Tab
RETURN	End Paragraph	^O^I	Set Variable Tab
^N	Insert Hard RETURN	^O^N	Clear Variable Tab
^Px	Enter Control Character	^O^F	Set Margins and Tabs from any line in the file

Deletion Commands

DEL	Delete Character Left	^G	Delete Character Right
		^T	Delete Word Right
^Q DEL	Delete to Beginning of Line	^Q^Y	Delete to End of Line

^Y Delete the Entire Line

^K^Y Delete a Block

Commands for Saving and Abandoning

^K^S	Save File and Resume	^K^D	Save File—Done
^K^X	Save File and Exit	^K^Q	Abandon File

Onscreen Commands

^O^C Center a Line

^O^L	Set Left Margin	^O^R	Set Right Margin

^O^X Release Margins

^O^G	Paragraph Tab	^O^S	Set Line Spacing

^B Re-Form Paragraph

Formatting Toggles

^O^W	WordWrap ON/OFF	^O^H	Hyphen-Help ON/OFF
^O^T	Ruler Line ON/OFF	^O^E	Soft Hyphen ON/OFF
^O^J	Justification ON/OFF	^O^D	Print Display ON/OFF
^O^V	Variable Tabs ON/OFF	^O^P	Page Break Display ON/OFF

Place Marker Commands

^K0-9	Set/hide a Place Marker	^Q0-9	Move to a Place Marker

Find and Replace Commands

^Q^F	Find Text	^Q^A	Find and Replace
^L	Find or Replace again	^Q^V	Restore Cursor to last Find/Replace

Parameters:

n	Find n times	B	Backward Search
U	Ignore Upper/Lower Case	G	Global Search (Replace)
W	Whole Word Search	N	Automatic Replace

Special Find Characters:

^A	Match any character	^Ox	Match any other than x
^S	Match any special character	^N	Match "RETURN, line feed"

Block Commands

^K^B	Mark Beginning of Block	^K^K	Mark End of Block
^K^V	Move a Block	^K^C	Copy a Block
^K^Y	Delete a Block	^K^H	Hide a Block
^Q^B	Move to Block Beginning	^Q^K	Move to End of Block

^Q^V Move to Block Source

Additional File Commands

^K^W	Write Block to File	^K^R	Read a File into Text
^K^O	Copy a File	^K^E	Rename a File
^K^J	Delete a File	^K^L	Change Logged Disk
^K^F	Directory ON/OFF	^K^P	Print a File

The Help Commands

^J^H	Display and Set the Help Level	^J^S	Status Line
^J^B	Paragraph Re-Form (CTRL B)	^J^R	Ruler Line
^J^P	Place Markers	^J^F	Explanations of Flags
^J^D	Ordinary Dot Commands	^J^V	Moving Text
^J^M	Margins and Tabs		

Miscellaneous Commands

^QQ	Repeat a Function	^U	Interrupt

SUMMARY OF PRINTING COMMANDS

Press ^P before typing one of these print control keys.

Print Control Toggles

^S	Underscore	^X	Strikeout	^H	Strikeover
^B	Boldface	^V	Subscript	^O	Non-Break Space
^D	Double-Strike	^T	Superscript	^Y	Ribbon Color

Other Print Controls

^C	Stop Print	^A	Alternate Pitch	^F	Phantom Space
^K	Right-Left	^N	Standard Pitch	^G	Phantom Rubout
^L	Form Feed	^J	Line Feed	^M	Overprint Next Line

Ordinary Dot Commands

Table A-1. Summary of Dot Commands

Command	Function	Units	Default
.LH	Line Height	1/48 inch	8 = 6 lines to the inch
.PL	Paper Length	lines	66 default lines = 11 inches
.MT	Margin at Top	lines	3 default lines = 1/2 inch
.MB	Margin at Bottom	lines	8 default lines = 1 1/3 inch
.HM	Heading Margin	lines	2 default lines = 1/3 inch
.FM	Footing Margin (page # margin)	lines	2 default lines = 1/3 inch
.PC	Page # Column	columns	1/2 default right margin
.PO	Page Offset	columns	8 default columns = 4/5 inch
.PA	new Page		
.CP	Conditional Page	lines	
.HE	Heading		blank
.FO	Footing		page number at .PC column
.OP	Omit Page #'s		
.PN	Page Number		1
.CW	Character Width	1/120 inch	12 for standard pitch, 10 for alternate pitch
.SR	Subscript Roll	1/48 inch	3
.UJ	Microjustify	OFF(0)ON(1)	ON (1)
.BP	Bidirect. Print	OFF(0)ON(1)	ON (1)
.IG	Comment (also ..)		

Table A-2
Character Pitch

Pitch (characters per inch)	Dot Command	
5	.CW 24	
6	.CW 20	
7	.CW 17	
8	.CW 15	
10	.CW 12	Default
12	.CW 10	
15	.CW 8	
20	.CW 6	
24	.CW 5	
30	.CW 4	

Table A-3
Line Heights

Lines per inch	Dot Command	
2.0	.LH 24	
2.4	.LH 20	
2.6	.LH 18	
3.0	.LH 16	
4.0	.LH 12	
4.8	.LH 10	
5.3	.LH 9	
6.0	.LH 8	Default
6.8	.LH 7	
8.0	.LH 6	
9.6	.LH 5	

SUMMARY OF MAILMERGE COMMANDS

This section briefly summarizes variables, data files, and the MailMerge dot commands. Refer to the text (Sections 9-12) for introductory explanations and additional detail.

Variables

A MailMerge variable is a symbolic name for a data item (text) which may be different in each of several letters or other documents printed by MailMerge from the same document file.

A Variable name consists of a letter followed by 0 to 39 additional letters, digits, and/or (hard) -'s. The variable name (without &'s) is used in dot commands that establish the variable's value.

Examples:
NAME
ADDRESS1
DATE-TODAY

A Variable reference, or place where the variable's current value is to be inserted, consists of an &, the variable's name, and another &. Spaces are allowed between the &'s and the variable name, but (hard) spaces are not allowed within the name. Soft spaces and soft carriage returns are ignored between the &'s and the variable name, and after a soft hyphen (which is also ignored) within the variable name.

Examples:
&NAME&
&ADDRESS1&
& DATE-TODAY &
&ADDRESS5/O&

/O in a variable reference causes that LINE to be omitted from the printout if the variable is null and the rest of the line is blank.

Variable values (the data to be inserted at references to the variable) may be 0 to 200 characters long. A variable may be given a value in three ways:

From a data file (via .DF and .RV)

Keyed in by the operator during MailMerge (via .AV)

Set within the document or an invoking document (with .SV)

A variable must be given a value before it is used. References to undefined (no value yet given) variables are printed. &'s not enclosing valid, defined variable names are printed, permitting normal use of & in text.

Data Files

A data file used with MailMerge to supply names and addresses when printing form letters or other documents consists of data items (variable values; fields) separated by commas, with a carriage return after the last item of the group of items to be used in one letter (or other document).

There must always be the same number of items on a line (record), with commas present to "hold places" for any items which are omitted.

To include a comma, or leading or trailing blanks, in an item, enclose the item, or at least the comma or blanks, in quotes(").

Data files may be prepared with WordStar (use the N command) or DataStar.

For DataStar compatibility, any data file line containing FF hex or 7F hex in the first byte is ignored.

Example: three valid lines (records) of a data file:

```
NORCAL Computers,1500 Highland Avenue, "Alameda, California", 94501, Mr. Smith
TRIAD, 1829 Santa Clara Road, "Malad City, Idaho", 83251, John
Wolcott Associates, 16 Rue Diesal, "Casteau, Belgium", APO 09055, Mr. Baudoin
```

(Carriage returns may be used as an alternative to commas between items. Such use improves screen readability when the data file is created with WordStar, but use of carriage returns is discouraged because it reduces MailMerge's tendency to get "back in sync" after an omitted data item or comma, and because it prevents processing the data file with SuperSort to select records or place them in alphabetical or Zip Code order.)

Form Letter Using Data File

```
.OP                          omit page numbers
.DF datafilename
.RV variable1, variable2, variable3, . . .  (must match data file)

    text of letter, using &variable&'s as desired

.PA                          start next letter on new page
```

Form Letter Using Operator Data Entry

```
.OP                          omit page numbers
.CS                          clear screen (optional)
.AV "prompt", variable1
.AV "prompt", variable2
 . . .                       (one .AV for each variable)

    text of letter, using &variable&'s as desired

.PA                          start next letter on new page
.FI nameofthisfile           (if automatic repeat desired)
```

"Document" to Print/Check Data File

```
.DF datafilename
.RV variable1, variable2, variable3, . . .

.CP n                          n=# variables
&variable1&
&variable2&
&variable3&
 . . .
```

Two Useful Command Files

Operator Entry of Data Once at Beginning of Form Letter Run

```
.AV "Today's date", date
.FI letterfile                 letterfile is a document in one of the
..                             forms shown above, using &date& where
                               today's date should print.
```

Operator Entry of Data File Name

```
.AV LETTERFILENAME
.AV DATAFILENAME
.FI &LETTERFILENAME&           letter file whose name operator enters
..                             is a document in data file form shown
                               above, but containing
                               .DF &DATAFILENAME&
```

MailMerge Dot Commands

MailMerge also does the regular print dot commands (Section 7). In the following tables (A-4 and A-5), brackets enclose optional parameters.

Table A-4. MailMerge Dot Commands

Command	Function
.DF filename [CHANGE]	**Data File:** Specifies data file to be used. CHANGE, if given, requests diskette change.
.RV variable1, variable2,...	**Read Variables:** Gives names and order of variables to be read from data file. List of one or more variable names must correspond in number and order to data items in data file.
.RP [n]	**Repeat:** If n given, document is processed n times. If n omitted, document is processed until data file exhausted. The function of .RP with no n is included in .DF; command is needed only if a different (inserted) document is to be repeated.
.SV variable, value	**Set Variable** within document: named variable is set to value on rest of line.

Table A-4. MailMerge Dot Commands (Continued)

Command	Function
.AV ["prompt"], variable, [length]	**Ask Operator for Variable Value:** Prompts on screen and allows operator to enter data. "prompt" optional prompt text, in quotes. If omitted, variable name used. variable identifies variable for which operator will enter data. length optional maximum length
.DM [message]	**Display Message:** Displays message (rest of line) on screen. Leaves blank line if message omitted.
.CS [message]	**Clear Screen** and display optional message.
.FI filename [CHANGE]	**File Insert:** Specified file is inserted in printout at position of .FI command. File will be inserted multiple times (processed repeatedly) if it contains .DF/.RV or .RP.

The commands after .PF in Table A-5 are effective only if .PF ON has been given, or if a variable reference has already been seen in the current paragraph. For each, DIS is the default and means "match the input".

Table A-5. MailMerge Dot Commands for Print-Time Line-Forming

Command	Function
.PF ON/OFF/DIS	**Print-Time Line-Forming** ON or OFF or DIScretionary. DIScretionary (default) means form lines from variable reference to end of paragraph only.
.RM n/DIS	**Right Margin** 1 to 240 or DIScretionary.
.LM n/DIS	**Left Margin** 1 to 240 or DIScretionary.
.LS n/DIS	**Line Spacing** 1 to 9 or DIScretionary.
.OJ ON/OFF/DIS	**Output Justification** ON or OFF or DIScretionary.
.IJ ON/OFF/DIS	**Interpret Input as Justified** ON or OFF or DIScretionary: affects method of determining right margin if .RM DIS is in effect, and determines output justification if .OJ DIS is in effect.

This page intentionally left blank.

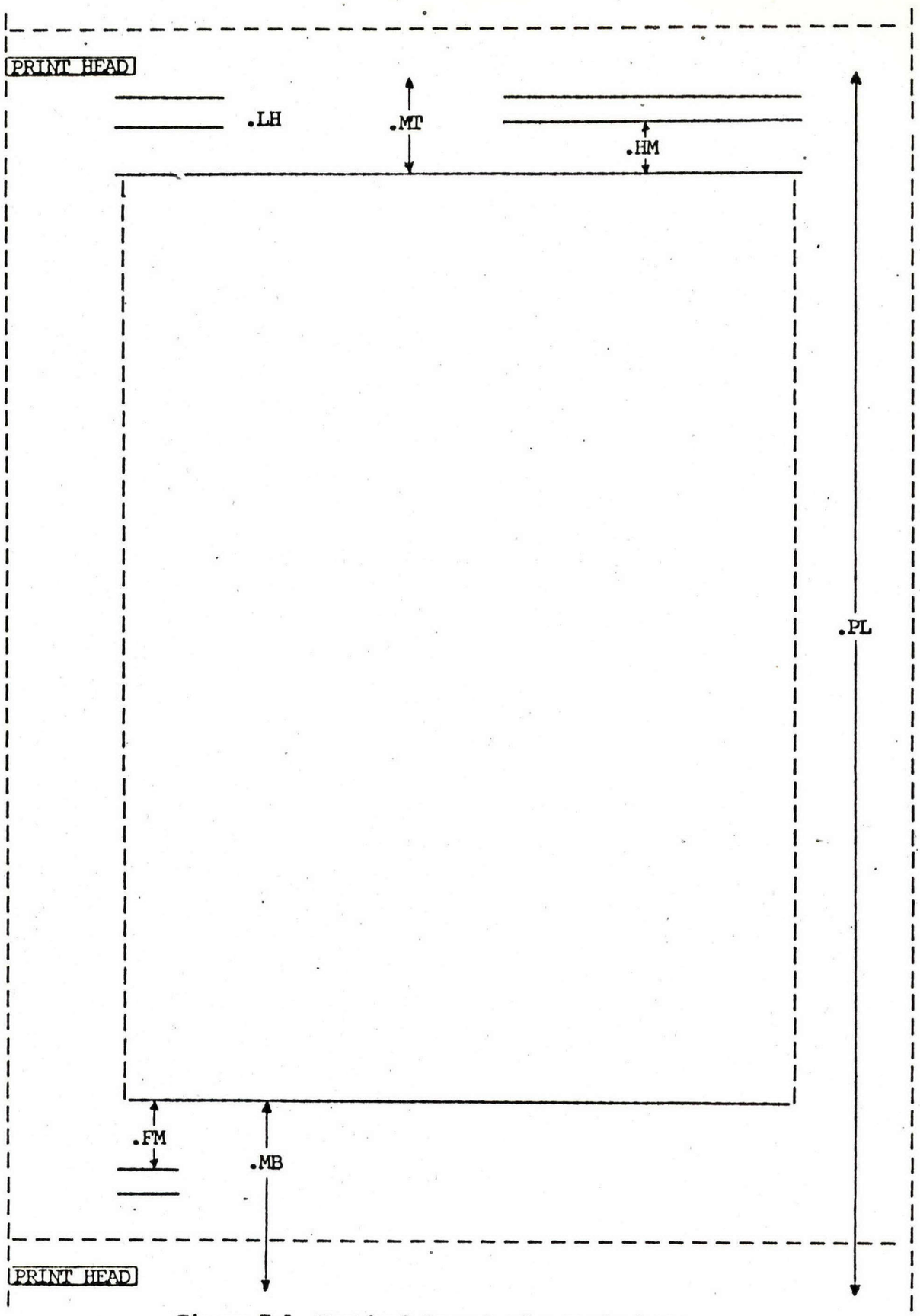

Figure 7-1. Vertical Layout of a Typical Page

Table 7-5. Line Heights

Dot Command	Lines per Inch	Dot Command	Lines per Inch	Dot Command	Lines per Inch
.LH 1	48.0	.LH 6	8.0	.LH 12	4.0
.LH 2	24.0	.LH 7	6.8	.LH 16	3.0
.LH 3	16.0	.LH 8	6.0	.LH 18	2.6
.LH 4	12.0	.LH 9	5.3	.LH 20	2.4
.LH 5	9.6	.LH 10	4.8	.LH 24	2.0

The .LH command provides an alternative or supplement to the single, double, triple spacing that can be applied via the ^OS command (Section 4) to text as lines are formed. If .LH is used when printing on a printer incapable of incremental spacing, page breaks are nevertheless determined as though the command took effect.

Note that all subsequent commands taking a number of lines as an argument will be interpreted in terms of the new line height. Previously set values (top margin, paper length, etc.) will remain the same in inches.

CHANGING LINE HEIGHT
ON A DAISY WHEEL PRINTER

On Daisy wheel printers, the line height may be specified in 48ths of an inch with the .LH command. For example, to print 8 lines per inch instead of the usual 6, use the command:

```
.LH 6
```

When the line height is changed on a daisy wheel printer, previously specified margins and paper length are not effected. They remain the same in inches, regardless of the line size. However, subsequent .PL, .MT, .MB, .HM, and .FM commands are interpreted (converted to inches) in terms of the new line height.

Thus, if you use the .LH command, carefully consider the order in which .LH and other vertical format commands are given. For example, .LH 6 followed by .MT 4 yields a 1/2 inch top margin (4 lines of 6/48 each), whereas .MT 4 followed by .LH 6 yields a top margin of 2/3 inch, because the .MT command, appearing first, is interpreted using the default line height of 8/48 of an inch.

The print function will handle as many changes of line height as you wish, but for dynamic page break display to work, you must set the line height only at the beginning of the file.

Hint: To achieve varying line heights without interfering with dynamic pagination, set the line height to 4 (one-half of normal) at the beginning of the file, then use double-spaced text for close-spaced printout, and triple or quadruple spaced text for wider line spacing. The ^OS command, (Section 4), can be used to cause automatic double, triple, etc. spacing as text is entered or reformed.