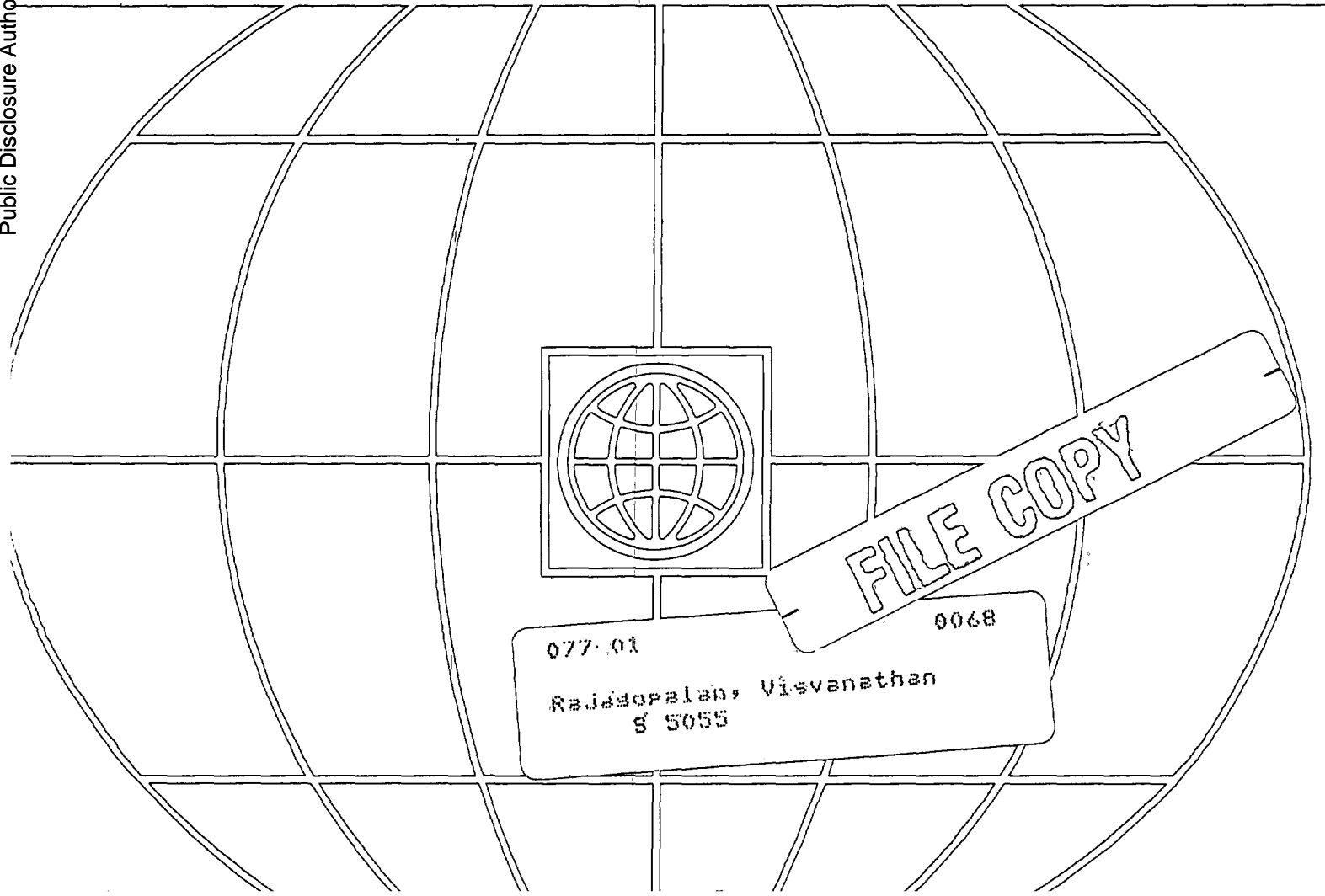


# Indonesia

## The Transmigration Program in Perspective

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A WORLD BANK COUNTRY STUDY

# **Indonesia**

## **The Transmigration Program in Perspective**

**The World Bank**  
**Washington, D.C., U.S.A.**

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PREFACE

The World Bank periodically prepares country sector reports on important economic sectors and development programs. These reports provide the basis for the Bank's dialogue with Government officials on the policies, investment priorities and financial requirements of important programs. Distribution of these documents is normally restricted to official representatives of member countries. However, where the issues are of general interest, and where the authorities of the country agree to waive normal restrictions on distribution, such documents can be made available to a wider audience. Such is the case with The Indonesian Transmigration Program in Perspective.

Between 1980 and 1986 the Indonesian Transmigration Program supported the movement of more than two million people from the densely populated "inner islands" of Java, Bali, and Lombok to the less populated "outer islands" of Sumatra, Kalimantan, Sulawesi and to a lesser extent Irian Jaya. An equal number of people are believed to have moved on their own, attracted in part by family and friends settled with government support. The transmigration program has been the largest government-sponsored voluntary resettlement scheme in the world. Because of the size of the program and because a number of settlements were opened in forest areas, the program attracted international attention, particularly from environmental groups concerned with deforestation and conservation.

In 1986 new settlement under the transmigration program came to a virtual halt as the government reassessed its priorities. This was partially in response to declining oil revenues. In addition, the lower than expected agricultural production during the initial development period convinced the Government of the need for additional investments in existing sites to increase incomes and create the conditions for sustainable economic growth and equitable development.

This report was initiated in 1985 as a review of resettlement in the third five-year plan (1979-1984). By that time, data were available which permitted an assessment of migrant incomes and economic returns to settlement models. Evidence was also available on the role of the program in employment generation, demographic change and regional development. Environmental and social issues were also reviewed. Among the conclusions emerging from the report were that economic rates of return and initial settler incomes were low and that the program was complex and difficult to implement. Spontaneous migrants were not adequately incorporated into program planning and the scale of the program heightened concern about the environmental impact and potential social problems. Yet, the study also found that economic and social prospects for settlers were superior to those in Java, and transmigration appeared to have contributed significantly to employment generation and regional development.

In light of this analysis, the review, which was written prior to recent resource constraints in Indonesia, recommended that (a) the rate of new settlement should be slowed and the major emphasis should be placed on the

consolidation and improvement of existing sites; (b) new settlements should be based on more productive farming systems; (c) institutions responsible for planning and carrying out the program should be strengthened; (d) increased attention should be given to accommodating spontaneous migrants on productive holdings; and (e) higher priority should be given to social and environmental concerns. These recommendations were accepted by the Government.

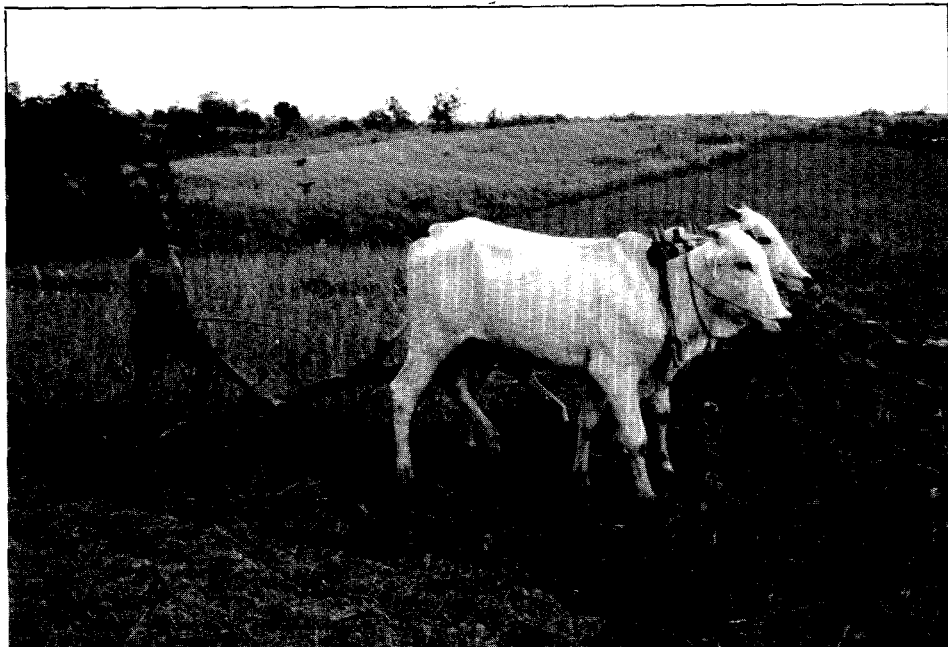
Different groups will have very different views on the merits and demerits of transmigration, but during the preparation of this report, it became evident that many misconceptions exist in public discussion of the transmigration program. The Government felt that the report provides at least partial answers to some questions and, for this reason, agreed in mid-1986 to release the document for general distribution.

The World Bank would like to express its thanks to His Excellency, Mr. Martono, the former Minister of Transmigration, who provided the full support of his institution for this review; to Dr. Sayuti Hasibuan, Deputy for Manpower and Population Affairs in BAPPENAS, who provided guidance to the review team; and to Messrs. Soedjino Hardjosoetowo and Djoko Hartono who have worked especially closely with Bank teams. Thanks are also due to Mr. Soegito Sastromidjojo, in the Central Bureau of Statistics, who carried out the income survey. It is not possible to thank individually all of the officials and individuals who provided information, help and support, and without whose assistance this report would not have been possible.





A recently established transmigrant village in Jambi Province, Sumatra.



Work in the fields in a transmigrant settlement.

### CURRENCY EQUIVALENTS

US\$1.00	=	Rupiah (Rp) 1,650 /a
Rp 1 million	=	US\$606

### GOVERNMENT OF INDONESIA FISCAL YEAR

April 1 - March 31

### WEIGHTS AND MEASURES

1 kilometer (km)	=	0.62 miles (mi)
1 square kilometer (km <sup>2</sup> )	=	100 ha = 0.39 mi <sup>2</sup>
1 hectare (1 ha)	=	2.47 acres (ac)
1 kilogram (kg)	=	2.2 pounds (lb)
1 metric ton (9t)	=	2,206 pounds

### ACRONYMS, ABBREVIATIONS AND LOCAL TERMS

AARD	-	Agency for Agricultural Research and Development
Bangda	-	Directorate General of Regional Development
BAPPEDAs	-	Provincial Planning Agencies
BPS	-	Central Bureau of Statistics
CRIA	-	Center for Research in Agriculture
DGE	-	Directorate General of Estates
DGFC	-	Directorate General of Food Crops
FAO	-	Food and Agriculture Organization
Gabah	-	Unmilled rice
GOI	-	Government of Indonesia
HH	-	Household
IFAD	-	International Fund for Agricultural Development
Inner Islands	-	Java, Madura, Bali and Lombok
JMT	-	Junior Minister for Transmigration
Kabupaten	-	District
Kecamatan	-	Subdistrict
IUCN	-	International Union for Conservation of Nature and Natural Resources
MOA	-	Ministry of Agriculture
MOF	-	Ministry of Forestry
MOT	-	Ministry of Transmigration

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/a After September 12, 1986. All analysis in this document is based on an exchange rate of Rp 1,100, the prevailing exchange rate when the report written.

NTB	-	Nusa Tenggara Barat
NTT	-	Nusa Tenggara Timur
ODA	-	Overseas Development Authority (UK)
OSG	-	Office of the Secretary General (in MOT)
Outer Islands	-	Sumatra, Kalimantan, Sulawesi, Irian Jaya and a number of small islands
PIR	-	Domestically financed estate projects
PMU	-	Project Management Unit, provides inputs and labor compensation to farmers
PRPTE	-	Government-financed tree crop development program
PTP	-	Publicly owned estate
Repelita	-	Five-year development plan (Repelita I, 1969-74; Repelita II, 1974-79; Repelita III, 1979-84; and Repelita IV, 1984-89)
SCDP	-	Smallholder Coconut Development Project
Siap	-	Budgetary carry-over
Sisipan	-	Fill-in transmigration program near already settled sites
SRDP	-	Smallholder Rubber Development Project
Susenas	-	National Socio-Economic Survey
Swakarsa	-	Directorate for Self-initiated Movement
TSP	-	Trisodium phosphate fertilizer
UNDP	-	United Nations Development Programme
WWF	-	World Wildlife Fund



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This report was written by Gloria Davis and Helen Garrison. Background papers were prepared by George Baldwin, Ray Byron, Mike Douglass, Geoffrey Fox, Anthony Whitten and Ken Woodward. Jean-Pierre Baudelaire, Fateh Chaudhri and Manuel Zenick also contributed to the work.

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MAPS

Sumatra	IBRD 19537
Kalimantan and Java	IBRD 19538
Sulawesi and Maluku Islands	IBRD 19565
Irian Jaya	IBRD 19566



## EXECUTIVE SUMMARY

### A. Background

#### Introduction

1. Transmigration is a multifaceted economic and social program, which has had a significant impact on employment, migrant welfare, and regional development in Indonesia.
2. In response to the inequitable distribution of land and labor, resettlement programs were begun in Indonesia in 1905. Since 1979, however, the scale of the transmigration program has significantly increased. In the second five-year plan (1974-1979) about 52,000 families were moved, while in the third five-year plan (1979-1984) about 366,000 families (1.5 million people) were resettled under the sponsored program. Of these, about 300,000 families were moved from the overcrowded islands of Java, Madura, Bali and Lombok, while 65,000 were resettled within the receiving provinces. Government also identified 170,000 families that moved without assistance, although the actual number is believed to be much larger. Of the sponsored migrants, 62% went to Sumatra, 19% to Kalimantan and 14% to Sulawesi. About 16,600 families, 5% of the total, were settled in Irian Jaya.
3. The fact that transmigrants move voluntarily to pioneer settlements involving considerable hardship, attests to the economic pressures on poor farmers in Java and Bali and to the opportunities they perceive in the outer islands. The fact that farmers settled under the sponsored program were, on the whole, moved in a safe and orderly way is commendable. However, the scale and rate of acceleration of the program in Repelita III have also given rise to a number of problems in need of attention. This report is intended to evaluate the transmigration program and make recommendations for future development.

#### The Country

4. The Republic of Indonesia, with a population of about 168 million in 1986, is the fifth most populous nation in the world. Over 100 million people live on Java, an island with about 7% of the nation's land. With population densities in Java at 774 people/km<sup>2</sup> (roughly the same as Bangladesh), agricultural holdings are small and incomes are low. In a 1984 survey by the Central Bureau of Statistics (BPS), average household incomes in rural Java were about US\$730 and about 40% of the population fell below a poverty line estimated at US\$540 per family per year.<sup>1/</sup> Other islands have more land (although generally of lower fertility), less dense populations (about 33 people/km<sup>2</sup>) and a major portion of the country's nonagricultural resources, particularly oil and timber. For these reasons, households in the main trans-

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<sup>1/</sup> Based on an exchange rate of Rp 1100/US\$1.00, the prevailing rate when this report was written.

migration receiving areas (Sumatra, Kalimantan and Sulawesi) are more prosperous and incomes average about US\$1,000/family/year. Key demographic data are provided in Table 1.

5. The significance of these demographic facts cannot be overstated. Nearly two thirds of Java's farm families have less than one half hectare of agricultural land, a subsistence size plot, and in spite of an active and successful family planning program which has reduced the growth rate to 1.8% p.a., population pressure has led to densely crowded conditions in lowland rice producing areas. Farmers have moved onto steep slopes and into forest reserves where cultivation and erosion have caused environmental degradation, siltation of reservoirs and canals, and downstream flooding. Urbanization in Java's major cities is occurring at a rate of 4% per year, more than twice the rate of population growth, and major investments in urban infrastructure and services are required to serve an estimated 1.6 million new urban residents each year.

Table 1: BASIC DEMOGRAPHIC DATA

Province/Island	Est. 1986 population (million)	Area ( <sup>'</sup> 000 km <sup>2</sup> )	Population density (People/km <sup>2</sup> )	% Farm households with	
				Less than 0.5 ha	Over 2.0 ha
<u>The Inner Islands</u>					
Java/Madura	102.2	132	774	63%	4%
Bali/West Nusa Tenggara	5.8	26	226	46%	10%
<u>Total</u>	<u>108.0</u>	<u>158</u>	<u>685</u>	<u>62%</u>	<u>5%</u>
<u>The Outer Islands</u>					
Sumatra	33.0	474	72	27%	23%
Kalimantan	8.0	540	15	19%	39%
Sulawesi /a	13.5	264	51	25%	40%
Other eastern islands /b	4.1	60	68	-	-
Irian Jaya	1.4	422	3	-	-
<u>Total</u>	<u>60.0</u>	<u>1,760</u>	<u>34</u>	<u>26%</u>	<u>30%</u>
<u>GRAND TOTAL</u>	<u>168.0</u>	<u>1,918</u>	<u>88</u>	<u>-</u>	<u>-</u>

/a Includes the Moluccas.

/b Other eastern islands which have not been transmigration receiving areas.

Source: Statistical Yearbook of Indonesia, 1984. Land holding data are extracted from the 1983 Agricultural Census.



Intensively cultivated area in upland Java. Hills in the background show the trees remaining from a reforestation program.



Aerial view of recently established transmigrant community in Central Sulawesi.

## Development Objectives and the Role of Transmigration

6. Employment creation and poverty alleviation are among Indonesia's key development objectives and they have been addressed through a broad spectrum of programs. Major investments have been made in irrigation, fertilizer production, agricultural research and smallholder tree crop development, and the mechanization of agriculture has been discouraged on employment grounds. Government has invested in labor-intensive rural works programs, village improvement, education and health, and the Indonesian family planning program has made solid and impressive progress in promoting fertility declines by raising contraceptive prevalence. Government has encouraged the growth of small-scale industries, but the growth of export industries has lagged due to strong competition from other developing countries, import restrictions in developed countries, and a complex policy and regulatory environment.

7. Resettlement has also played a role in Indonesia's efforts to cope with population growth, reduce deforestation in the inner islands, create productive employment and stimulate regional development. Resettlement from Java began in 1905. By 1980 about one million people had been resettled, and about two million people were in the outer islands as the result of sponsored transmigration and associated population growth. Government's interest in moving people has been reciprocated by a desire on the part of poor people to move. Transmigration is voluntary, and in recent years the number of people registering for the program has exceeded the number who could be moved. Farming households choose to resettle to meet their subsistence needs and to provide opportunities to their children.

### The Settlement Program

8. Definitions. Transmigration refers to the movement of people from overcrowded areas of the inner islands to less developed areas of the outer islands. Sponsored transmigrants receive government support and move to selected sites. Spontaneous transmigrants receive little or no government support and move to areas of their own choosing, generally to be near families or friends. Government sponsorship is an important element in transmigration because traditional land tenure arrangements in the outer islands make it difficult for individual migrants to secure legal rights to land. In addition, by selecting and supporting migrants, transmigration authorities have been able to target critical areas in Java and Bali for recruitment and ensure that even the poorest farmers can move if they wish to.

9. Resettlement under the official transmigration program has been based almost entirely on smallholder agriculture. (Parallel programs to transfer manpower to the outer islands as industrial or estate laborers have not been a part of the official transmigration program). However, different farming systems have been emphasized at different stages in the development of Indonesia's resettlement effort.

- (a) Irrigated Schemes. Under the Dutch, most resettlement occurred on new large-scale irrigation schemes in the outer islands. Between 1950 and 1970 government investment in new irrigation was limited, due to financial constraints, but most sponsored settlers were moved

to areas intended eventually for irrigation. Some of these settlements have since received irrigation works.

- (b) Swamp Reclamation Schemes. Swamps were first opened for rice production and settlement in the 1930s. In these areas, in theory, tidal action pushes fresh water up the rivers and canals and onto low-lying land, making regular inundation of rice fields possible. In practice, most recently opened areas depend on banded rainfed rice production.
- (c) Rainfed Schemes. In the second five-year plan (1974-79) an agricultural package (including planting materials, fertilizer, credit and extension) was developed to support rainfed agriculture on the less fertile soils of the outer islands. This package allowed settlement in slightly undulating areas unsuited to irrigation and permitted an expansion of areas suitable for settlement. To differentiate these schemes from irrigation and swamp sites in low-lying areas, they are typically called upland schemes, even though areas selected for food crops must have slopes under 8%.
- (d) Cash Crop Schemes. Under the Nucleus Estate and Smallholder (NES) program begun in 1978, estate managerial capacity has been harnessed for the establishment of cash crops for local smallholders and transmigrants. Most NES schemes have been based on tree crops (oil palm, rubber and coconut), although sugar and cotton have also been produced. Most settlers on these schemes also receive a small plot for subsistence food production. Recently, there has been a growing interest in using project management units (PMUs) to help new and existing transmigrants establish tree crops and other cash crops on their land.

10. The Settlement Process. Transmigrants are recruited in rural areas of Java, Madura, Bali and Lombok. They must be married, of good character and have previous farming experience. Typically, poor households encourage one married son or daughter to transmigrate, and if successful, other relatives follow. Sponsored migrants are moved by plane or bus and on arrival they receive a small house on 0.25 ha of village land and 0.75 to 1.0 ha of cleared land outside the settled area. Additional land (averaging 1.0 to 2.0 ha) is reserved for future development. Public facilities including schools and clinics are located in the village center. Subsistence supplies are provided for one year while the land is being tilled and crops are being established. If crops fail, the provision of supplies can be extended. Settlements are expected to be self-sufficient at the end of five years.

11. In addition to the food crop package, most settlers on rainfed schemes are provided with planting materials for minor tree crops (coffee, cloves) and small livestock (chickens, goats). In the early years of settlement, farmers usually confine their agricultural activities to their cleared land (1.0 - 1.25 ha) since the reserve land is not allocated and labor is limited. Where reserve land is directly behind the houselot or cattle are introduced, more land is cultivated and farms are more diversified. In general, however, improving or expanding the area under production requires

the introduction of financial and technical support at a later stage and this is called second-stage development.

#### The Repelita III Transmigration Program (1979-84)

12. Program Formulation. Pressed by increasing environmental degradation on Java and growing employment concerns, and encouraged by an improved financial situation, Government significantly expanded the transmigration program in Repelita III and targets for this period were set at 500,000 families. With these high targets, the central issues in the design of the Repelita III transmigration program concerned the farm model used, program scale, and investment levels.

13. Government officials recognized that it was technically possible to resettle smallholders on tree crop schemes that provided relatively high incomes and rates of return. However, they also believed that such programs would be costly, would slow the settlement process, and would create income disparities between beneficiaries and nonbeneficiaries. For these reasons, and consistent with Government's view that transmigration had to be carried out on a relatively large scale to realize program objectives, it was agreed that settlement would be based initially on schemes supported by rainfed food crops. This model was adopted because Indonesia was, at that time, the world's largest importer of rice, and because annual crops were the quickest to establish, they promoted early self-sufficiency, and they cost less than other models. Tree crops were to be introduced at a second-stage. In order to speed settlement, sites were selected and cleared on a plan-as-you-proceed basis, and to give a quick start to migrants, land clearing was mechanized and 1.0 to 1.25 ha of land per family were cleared.

14. To reach its targets, Government also made a number of changes in the implementation of the transmigration program. Most important, a number of major activities were taken from the Directorate General of Transmigration (DGT) and given to agencies normally responsible for each sector. The Ministry of Public Works undertook site selection and land preparation, the DGT carried out transmigrant selection and resettlement, agencies within the Ministry of Agriculture provided agricultural inputs, and the Ministries of Health and Education were responsible for activities in their sectors. Mechanisms were also established to promote interagency coordination. In response to the favorable resource position at the time, funding of the program was increased and ceased to be a major constraint.

15. Achievements. Although there were implementation problems arising from high targets, sponsored settlement was increased from 52,000 families in Repelita II to 366,000 families in Repelita III. Of these, about 22,000 were local families who elected to join transmigration settlements, and 42,000 were spontaneous migrant families who had settled in watershed and forestry areas in Lampung province and were resettled within the province (see Table 2). About 80% of all families were settled in rainfed sites based mainly on food crop production, 18% in swamp reclamation areas, and 2% on tree crop schemes. The total cost of the program was Rp 1.6 trillion (US\$2.3 billion), of which about US\$107 million (5%) was disbursed by the World Bank.



Table 2: SPONSORED TRANSMIGRATION PROGRAM, 1950-84

Year	Five-year plan	Total families moved	Local families /a	Resettled families /b	Total families settled	Total people
1950-54		21,037	0	1,280	22,317	87,000
1955-59		32,114	0	128	32,242	134,000
1960-64		26,456	0	0	26,456	111,000
1965-69		21,633	0	0	21,633	92,000
1969-74	(Repelita I)	39,436	0	75	39,511	240,000
1974-79	(Repelita II)	44,484	7,600	0	52,084	465,000
	<u>Subtotal</u>	<u>185,160</u>	<u>7,600</u>	<u>1,483</u>	<u>194,243</u>	<u>828,000</u>
1979-84	(Repelita III)	301,279	22,284	42,414	365,977/c	1,492,000
	<u>Total</u>	<u>486,439</u>	<u>29,974</u>	<u>43,897</u>	<u>560,220</u>	<u>2,320,000</u>

/a Indigenous families settled in transmigration sites.

/b Resettlement of sponsored or spontaneous migrants within the province.

/c In addition, 170,000 families were identified that moved spontaneously.

Source: Official Summary of Repelita III Transmigration Program 1985, Ministry of Transmigration.

16. Program Development. In the course of Repelita III a number of adjustments were made in the implementation of the transmigration program:

- (a) site selection and evaluation were improved by the introduction of detailed planning and the involvement of the forestry agency and provincial governments in the selection process;
- (b) limitations on the food crop farm model were gradually acknowledged, and efforts were initiated to improve food crop production and to shift partly to tree crop schemes;
- (c) the importance of spontaneous migration was recognized and a Directorate was formed to promote unassisted migration, although no formal program was carried out in Repelita III; and
- (d) after five years of experimentation with multisectoral implementation, a new Ministry of Transmigration (MOT) was formed in March 1983 in response to difficulties of coordination.

17. Serious implementation problems also persisted. While the location of sites improved, detailed plans were not always available, land clearing was often of poor quality, road construction and maintenance standards were low,

and the supervision of contractors uneven. In the course of Repelita III, land for settlement based mainly on food crop development became increasingly difficult to find, and land for large-scale settlements in Sumatra was virtually exhausted. The provision of agricultural supporting services, including input supply, extension and credit, was inadequate; and no progress was made on programs to introduce tree crops to existing settlements. Perhaps most important, institutional arrangements for coordination, planning, budgeting, and monitoring and evaluation remained weak.

#### The Repelita IV Transmigration Program (1984-1989)

18. Concerned with the possibility of growing unemployment in Java, the Government called for the settlement of 750,000 families in Repelita IV. Of these, some 400,000 families were to be settled under fully sponsored programs and the rest were to move without assistance. Between April 1984, when Repelita IV began, and June 1986, about 154,000 families were moved on the sponsored program, and about 150,000 families were identified who had moved without financial assistance.

19. In January 1986 the Government made significant reductions in all development budgets in response to declining oil revenues. The overall development budget for the FY86/87 was cut by 22% and the budget for transmigration was initially cut by 56% of the previous year's budget. In May 1986, the MOT budget was further reduced to 38% of the FY85/86 figure. In response, MOT reduced its FY86/87 settlement targets from over 100,000 fully sponsored families to 36,000 families. To meet the annual target, it was assumed that the balance of movement would be from unassisted migrants.

#### B. Evaluation of the Transmigration Program to Date

##### Demographic Impact

20. Sponsored Migration. From 1950 to 1984, the Indonesian Government moved about one half million families to the outer islands. (The distribution of migrants by island is shown in Table 3.) Prior to Repelita III, the major islands received about the same proportion of transmigrants as their share of the total population. Approximately 65% of all transmigrants were sent to Sumatra, slightly more than Sumatra's 55% share of the outer island population, while Kalimantan and Sulawesi received approximately the same share of transmigrants as their share in the outer island population. Since 1980, Kalimantan and Irian Jaya have received a somewhat greater share of transmigrants as the proportion of transmigrants moving to the more crowded provinces of Sumatra and Sulawesi has declined. Kalimantan increased its share from 14% in the 1970s to 22% in the 1980s, and Irian Jaya increased from 1% to 4% during the same period. Between 1950 and 1984 about 19,000 families settled in Irian Jaya, about 3% of the total moved.

21. Spontaneous Migration. There is no direct record of spontaneous movement, but the 1980 census indicated that there were about 3.6 million people born in Java and living in the outer islands. About 1.1 million people from the outer islands were living in Java. This suggests an out-migration to in-migration ratio of about 3 to 1. The census also indicated that 868,000

people had moved from Java to rural areas in the outer islands during the 1975-80 period, while the number of sponsored migrants was about 250,000, a ratio of 2.5 spontaneous migrants to 1 sponsored. Causality cannot be inferred directly from these figures, but there is a strong association between the provinces to which sponsored migrants have been sent in the past and those to which spontaneous migrants later move. In total, some 7.3 million people in the outer islands in 1980 spoke an inner island language (Javanese, Sundanese, Madurese or Balinese), including about 6.7 million in rural areas, or 16% of the rural outer islands' population. Of these, perhaps 30% were sponsored migrants and their descendents.

Table 3: SPONSORED TRANSMIGRANT FAMILIES SETTLED SINCE 1950

	Sumatra	Kalimantan	Sulawesi/a	Irian Jaya	Total
1950/54	20,400	1,400	500	-	22,300
1955/59	28,900	2,600	700	-	32,200
1960/64	21,000	4,500	1,000	-	26,500
1965/69	16,500	2,100	2,700	300	21,600
1970/74	22,000	6,000	11,400	100	39,500
1975/79	33,000	11,000	9,000	2,000	55,000
1980/84	227,100	70,600	51,700	16,600	366,000
Total	<u>368,900</u>	<u>99,200</u>	<u>77,000</u>	<u>19,000</u>	<u>563,100</u>
Percent	65%	18%	14%	3%	100%

/a Includes the Moluccas and other small eastern islands.

Source: MOT documents.

22. Impact on the Inner Islands. Although sponsored migration in Repelita III moved only 1.5% of the total inner island population and 15% of the incremental population, the cumulative effect of movement at these rates is significant. If sponsored transmigration were maintained at the high Repelita III levels through the year 2000 <sup>2/</sup> and were accompanied by spontaneous migration at a rate of about 2 spontaneous migrants to 1 sponsored migrant, the population of Java in the year 2020 would be 21.5 million people (13%) less than without the program and transmigration would have absorbed 24% of the incremental labor force. If settlement levels are reduced to 200,000 families in Repelita IV and V, decline to 100,000 families in Repelita VI, and the previous assumptions were made about spontaneous migration, by the year 2020 the population of Java would be 9% less than without the program and the

2/ About 300,000 families moved in Repelita IV and V declining to about 200,000 families in Repelita VI.

incremental labor force would be 19% less. Sponsored migration alone at lower levels would reduce the population by 3-4% and absorb 7-8% of the incremental labor force.

### Employment Generation

23. About 500,000-600,000 permanent jobs were created by the Repelita III transmigration program, at a roughly estimated cost of US\$3,000 to US\$4,000 per job in rainfed food crop schemes, and US\$3,500 to US\$4,500 per job in tree crop settlements. This is higher than the cost of employment creation in services, but considerably less than the cost of employment creation in industry, estimated at US\$10,000-20,000 per job. These figures do not take into account the employment generated indirectly by transmigration investment. Reliable data on the temporary work generated by the development of transmigration sites are not available, but it is clear that the employment impact of the program was very large. Employment generated in Repelita III by land clearing in transmigration sites is estimated at 18 million work days, or the equivalent of 63,000 years of full-time work. Assuming that local people or migrants worked on transmigration projects to supplement agricultural incomes and that they averaged no more than 100 days of work/year, 240,000 workers would have benefited from employment generated through land clearing alone. Of public investment programs, only labor-intensive rural works projects and tree crop development generated more temporary employment in Repelita III. Even more employment could have been generated by transmigration if more labor-intensive methods of land clearing and road construction had been used.

### Migrant Welfare

24. About a dozen studies have been completed in the last five years which contain information on migrant yields and incomes. One of the most comprehensive is an income survey that was undertaken by the Central Bureau of Statistics (BPS) and the Ministry of Transmigration with financial assistance from the Bank. This survey was carried out in February 1985 and covered 2,200 households in 22 Repelita II and III transmigration sites. The survey covered 12 sites based on rainfed food crops, 7 tidal sites and 2 tree crop sites, and it included both successful areas and several on a list of critical sites. About 46,000 families lived in villages covered by the survey, roughly 10% of all migrants moved in Repelita II and III. For comparative purposes, BPS also analyzed a sample of rural households covered in the 1984 National Socio-Economic Survey (Susenas). This sample covered 17,000 rural households in Java and 2,800 rural households in receiving provinces.

Table 4: COMPARISON OF TRANSMIGRANT AND NONTRANSMIGRANT INCOMES

	Survey date	Monthly household income (Rp) /a	% with monthly incomes below Rp		Annual household income (US\$) /a
			30,000 /b	50,000 /c	
Transmigration sites	1985	58,300	20	50	636
Rural sending areas	1984	67,200	15	43	733
Rural receiving areas	1984	90,750	4	24	990

/a All 1984 values have been updated to early 1985 Rp or US\$.

/b Rp 30,000 (US\$27) is the monthly subsistence level for a family of five.

/c Rp 50,000 (US\$45) is the family poverty line, estimated at Rp 10,000/capita/month.

Source: Sending and receiving areas, 1984 Susenas; transmigration areas, BPS Transmigration Income Survey, 1985.

25. Despite some problems in interpreting the BPS survey data (for example, possible understatement of home garden production used for home consumption and differences in the standard of living between the inner and outer islands), several points are clear. As Table 4 indicates, average migrant incomes in this sample are somewhat lower than the average income of families in rural Java, and significantly lower than the income of families in rural areas of receiving provinces. If corrected for an underreporting of subsistence production, incomes are about the same as Java, but lower than those in the outer islands. About 20% of households sampled in the BPS survey in transmigration sites were at or below subsistence levels in 1985, compared to 15% on Java and 4% in receiving provinces. Low incomes in transmigrant sites are not surprising since migrants were poor prior to movement, families are young, and some have been on site only a short time. Monthly incomes in BPS and MOT surveys for migrants who had been in upland communities for five years averaged Rp 75,000/household, which is slightly higher than the Java average, although incomes in older upland communities were low (see Table 5).

**Table 5: INCOME, INCOME DISTRIBUTION, AND RICE PRODUCTION  
BY REPELITA AND FARM MODEL**

Arrival period and farm model	Sample size	Average monthly household income (Rp)	Percent of households below		Annual household rice production (kg)/c
			Subsistence level /a	Poverty line /b	
<u>Repelita II</u>					
Tidal	99	77,697	11	27	1,760
Upland	341	52,825	33	57	470 /e
Upland with tree crops	100	66,595 /d	13	42	- /f
Subtotal	<u>540</u>	<u>59,934</u>	<u>24</u>	<u>49</u>	<u>760 /g</u>
<u>Repelita III</u>					
Tidal	501	39,791	38	73	710
Upland	977	65,801	10	36	770 /e
Upland with tree crops	120	63,923 /d	12	35	- /f
Subtotal	<u>1,598</u>	<u>57,505</u>	<u>19</u>	<u>48</u>	<u>750 /g</u>

/a Subsistence level is defined as Rp 30,000/household/month.

/b Poverty level is defined as Rp 50,000/household/month.

/c Total production of unmilled rice averaged over all households. About 15% of all families do not produce rice, so yields are higher for those growing crops.

/d These figures show little or no income from major tree crops, which are just coming into production if migrants were settled in Repelita II, or are being established if migrants arrived in Repelita III.

/e Rice producing households produced 570 kg rice per family in Repelita II settlements, and 925 kg rice per family for Repelita III settlements.

/f Not calculated. Many farmers work only for wages and sample sizes are small.

/g Average in upland and tidal sites only.

Source: BPS Transmigration Income Survey, 1985.

26. The fact that transmigrant incomes are somewhat lower than average incomes in Java does not mean that individual families are no better off than they were before they moved. Virtually all migrants are drawn from the poorest part of the population in Java, but in transmigration areas 50% are above the poverty line. In addition, transmigrants have assets such as land, a house and possibly livestock, they generally have the means to meet subsistence requirements, and they have reduced expenses for basic needs such as housing. Most transmigrants confirm income improvement. About two thirds of all respondents in the BPS survey said their incomes were better than they were before they moved, 17% said they were about the same, and 16% said they were worse.

27. The BPS survey also indicates that incomes in transmigration sites vary significantly by farm model and period of settlement. As shown in Table 5, one third of families on older sites based mainly on food crops are below subsistence levels and 38% of those in new swamp reclamation areas are below this point, while the number is only 10-13% in other sites. If farmers in older upland sites have low incomes due to low soil fertility coupled with declining off-farm work, and if migrants on new upland sites follow this pattern, future incomes would be very low. Government argues that improved site selection and improved farming systems will help recent settlers to sustain or improve yields, but in order to evaluate this premise, better time series data are required. Since the poorest people in the survey are recent settlers in swamp reclamation areas, these data point to an urgent need to address production problems in recent tidal sites.

28. Several other important conclusions emerged from recent BPS and MOT studies:

- (a) Off-farm Work. A substantial proportion of income in migrant communities is derived from off-farm work. The proportion of total family income from off-farm work ranges from 40% to 80% in recent studies and is about 50% in the BPS survey. Several explanations are possible. Farmers may be neglecting agricultural production because of the wide availability of work generated in part by site development, or the potential for agricultural production may be limited either by poor services or poor soils or the absence of cash crops. In either case, these data indicate that many transmigrants currently find off-farm work more remunerative than full-time agriculture.
- (b) Income Levels Over Time. A breakdown of family incomes in upland areas indicates that incomes are highest for settlers who have been on-site for 5 or 6 years and lower for settlers who have been on site more than six years. However, these data are difficult to interpret as they are not from the same sites. It is therefore difficult to tell whether new sites, which are larger (permitting income differentiation) and better selected, can maintain their incomes over time or whether incomes will decline as wage work associated with site development decreases. The lack of conclusive data on this subject argues strongly for improved long-term monitoring of incomes and production on transmigration sites.
- (c) Sustainability. BPS data indicate that most communities grow over time, but that there is a turnover rate of about 10% of migrants leaving sites in the first five years. While this number is higher than official figures, it is not surprising or unusual in a program of this scale. There is no evidence of large scale abandonment in transmigration sites and those who leave are generally replaced by spontaneous migrants.
- (d) Expenditures. Data on migrant expenditures suggest that migrant families consume more rice, corn, and cassava, animal protein and vegetables than do other families in either the inner or outer islands. This seems plausible since most migrants have the ability

to meet their subsistence needs from home production. On nonfood expenditures, the situation is reversed. Javanese spend nearly twice as much on fuel and 2.5 times as much for housing as transmigrants since fuelwood is readily available and houses have been donated by the government. They also spend more for household items, durable goods, taxes, medical expenses and schooling, but migrants spend more on transport. If confirmed by further analysis, these data indicate that migrants, while poor, are on average meeting their subsistence food needs as well as rural Javanese or rural residents of the outer islands.

### Economic Analysis

29. Economic analysis is useful as one element in evaluating program performance and it is particularly important at a time of resource constraints as a means of choosing between future investment options. To evaluate the economic impact of transmigration, an analysis was carried out on observed production in upland and tidal sites, and on projected production in new tree crop sites. Rainfed schemes based mainly on food crops have a low rate of return to agricultural production using standard economic assumptions. This ranges from negative in the case of the low-input, low-output upland models to 4% in the case of upland sites with good market access. When benefits from off-farm income are included in the economic analysis, upland schemes based on food crops have rates of return ranging from 3% to 6% for the most commonly observed farming patterns, and up to 9% for sustained input models which can be replicated only in sites well suited to food crop cultivation. Although projected production is higher in tidal sites than upland sites, rates of return are about the same (3%-5%) because of the higher initial investment cost in swamp reclamation.

30. Economic rates of return based on observed production in food crop sites are lower than those projected in World Bank appraisal reports for transmigration projects. This is mainly because average realized crop yields have been lower than projected and world rice prices have dropped significantly since 1981 (an almost 50% decline in real terms from the 1976-81 average to the 1985-86 average). A model has been developed that illustrates the potential of food crop schemes if agricultural services are in place, marketing is improved and the use of inputs is not constrained. This model has a rate of return of about 11% and is based on yields similar to those in early Bank appraisal reports; however, production at the levels projected in this model has only been observed under research conditions. Production increasing investments (such as the introduction of cattle) in existing sites where previous investments are treated as sunk costs, have economic rates of return up to 25%.

31. Economic rates of return were also estimated for new settlement with tree crops under a range of assumptions regarding management standards, expected production levels and investment costs. Nucleus Estate and Small-holder (NES) schemes for rubber and oil palm have rates of return which are higher than the assumed opportunity cost of capital (10%). Project Management Units (PMUs) have not been used as a vehicle to provide tree crops to transmigrants to date. However, if they were used to provide rubber to new



settlers, and if settlement costs were limited to NES levels, the economic rate of return to this model would also be acceptable. As second-stage development on already existing sites, PMU schemes have rates of return of 16-18%. Smallholder net income at full development is projected to be twice as high on tree crop schemes as on food crop schemes.

32. Therefore, from the point of view of settler welfare and economic returns, an argument can be made that future transmigration development should be directed at: (a) second-stage development on existing sites and (b) new settlement on NES/PIR schemes and PMU schemes. Use of these models would lead to higher settler incomes, higher economic rates of return than the food crop model, and would permit cost recovery in some cases through credit schemes. However, the use of these models would also entail higher initial investment costs and necessitate low levels of sponsored settlement because of limitations on financial and institutional capacity.

### Regional Development Considerations

33. Transmigration on the scale achieved in Repelita III had a significant impact on the regions to which migrants were sent. Sponsored migrants equaled slightly more than 40% of the total population in 2 out of 66 receiving districts (kabupaten) and in 7 others they were more than 20%. These nine districts received about 47% of all those settled. In three provinces in southern Sumatra and one in Sulawesi, migrants cultivated between 10% and 20% of all agricultural land, and they farmed an average of 4% of the land in all receiving provinces. Repelita III transmigrants are estimated to produce about 240,000 tons of rice, about 2% of outer island production. Overall, migrants who moved since 1950 are estimated to produce about 2 million tons of unmilled rice annually, or about 33% of incremental rice production in the outer islands since 1950 and about 5% of Indonesia's total rice harvest.

34. The most significant impact of transmigration in the regions was on infrastructure. Access and main roads constructed during site development equaled 14% of all roads maintained by outer island districts in 1985. The ratio was highest in East Kalimantan where roads constructed under the Repelita III transmigration program were almost equivalent to the total provincial road network. In two other provinces they accounted for about half. In 9 of 66 receiving districts, transmigration doubled road infrastructure. Many of these transmigration roads are poorly maintained and place a heavy burden on district public works offices when transferred to the provinces. Government has recently arranged for surveys and increased funds for maintenance, but institutional capacity is limited, and transfer procedures need to be further improved.

35. Transmigration has also led to an expansion of other services in the outer islands, particularly extension, agricultural input supply, education and health services. Consequently, careful planning and budgeting are necessary to ensure that adequate staff are employed during the settlement period, and effective handover of transmigration sites from MOT to the provinces will entail further planning for the number of people to be transferred (extension workers, teachers, health clinic personnel), incremental budget provisions for their salaries, and arrangements for incorporating them into district or provincial services.

36. Large-scale transmigration has had a significant impact on town and urban development. Towns in transmigration regions have experienced a boom in activity as a result of transmigration-related construction and the search for off-farm work by local people and by sponsored and spontaneous transmigrants. Many of these towns are growing at rates that will potentially double their populations in ten years. For smaller towns that have no formal urban status and depend mainly on central budgets, rapid increases in road traffic and accelerated growth may be difficult to accommodate under current planning arrangements. Cities may also find it difficult to keep pace with accelerated growth, and the capacity to deliver urban services is particularly low in large coastal cities and small frontier towns in the outer islands. Therefore, the growing demands for services in these areas must be taken into account in future development planning.

37. In 1985/86, the transmigration program provided one third to one half the total provincial development budget in eight of 17 receiving provinces. Only in four receiving provinces with very limited migration did the share of transmigration fall below 10%. While budget figures are not equivalent to expenditures, there can be little doubt that this spending has caused high levels of demand for labor in construction, secondary industries, and services, and has laid the groundwork for future regional development. However, if nonagricultural work should decline with proposed budget cuts, the potential exists for increased competition for employment and stagnating or falling wages in the regions. To avoid this, it is critical that reasonable levels of government expenditure be maintained in the outer islands in an effort to generate sustainable growth, particularly where the labor force has been greatly increased in Repelita III. The best way of doing this is to emphasize second-stage development and to support infrastructure maintenance.

#### Social and Environmental Concerns

38. Social Issues. The most sensitive issues in transmigration center on social and environmental concerns. In general, past transmigration programs have brought enough benefits to the regions in terms of labor, public investment, infrastructure and services to receive a generally positive reception. Therefore, the main social concern has centered on the fairness with which land is acquired. In the early years of Repelita III, rapid land clearing without adequate planning led to conflicts between transmigrant interests and those of the local people, mostly over compensation for productive trees. As planning improved and the role of regional planning agencies in mediating land claims increased, these conflicts declined. In Repelita IV, the responsibility for land acquisition was returned to the provincial Governors, and in most cases where land is contested it is not pursued by MOT. For this reason, among others, there is now little scope for further large-scale land settlement in Sumatra without financial compensation for land. As land constraints grow, the possibility of providing such compensation will have to be taken under consideration.

39. Concern also exists that isolated people who are unaware of their rights may be persuaded to relinquish land against their best interests. Government has introduced measures to take account of such people in the planning process, to determine their views on benefits and/or compensation,

and to provide benefits including parallel development where desired. Local level mechanisms for discussing land claims are also being developed. However, successful implementation of these measures will require close supervision by the Government.

40. To improve the social soundness of the transmigration program the Directorate for Social and Cultural Development within the Ministry of Transmigration should be strengthened. This Directorate, staffed with adequately trained technical specialists, could help resolve land disputes, develop parallel programs for local people and ensure fair treatment of isolated or ethnically distinct peoples. The monitoring unit in the Ministry of Population and the Environment (MPE) and the planning bodies of the local governments (Bappedas) should also assume an increased role in determining benefits for local people. The monitoring unit in MPE has been provided with funds for technical support to the transmigration program, but it has been slow to hire consultants, and further efforts to strengthen this unit are required. The Bappedas should be encouraged to give close attention to problems of land alienation, particularly in areas where there are isolated or ethnically distinct peoples.

41. Environmental Issues. Transmigration has had a positive impact on the environment in Java by reducing demographic pressures on critical lands, thereby permitting reforestation and reducing erosion. But most environmental concern has been focussed on the outer islands where settlement has reduced land under forest cover and placed pressure on conservation areas and on wildlife habitats.

42. Indonesia's forests are a major economic resource as well as an important and valuable reservoir of tropical flora and fauna. The total area of forest in Indonesia is estimated at nearly 144 million ha of which 122 million ha, two thirds of the country, is under closed canopy forest. Of the 144 million ha forest area, three quarters is in production (commercial) forest, protected or conservation areas, and about one quarter is earmarked for conversion. Much of the conversion forest is already deforested, or along streams and roads where settlement and clearing has already occurred. Between 30-50% of the land cleared for sponsored migrants in Repelita III was forested, and Table 6 summarizes the relationship between land allocated for sponsored transmigration during Repelita III and the proportion of conversion forest and forested land cleared on major islands. Less than 1% of the forested area was used for sponsored settlement on any island and less than 5% of total conversion forest was cleared. Land opened by spontaneous migration would roughly double these figures.

43. To mitigate the adverse environmental impact of sponsored settlement, preference should be given to the development of grasslands wherever possible, mechanisms should be developed to provide adequate compensation to local people for underutilized, unforested land, and the capacity of the Ministry for Population and the Environment and the environmental studies centers in provincial universities to assess and monitor environmental impact should be strengthened. To reduce problems associated with increasing spontaneous movement, it will be necessary to incorporate spontaneous migrants into planned settlements and to develop mechanisms for land purchase and land registration which permit spontaneous migrants to acquire suitable land.



Critically eroded areas such as this in Central Java are major sending areas for transmigration.

44. In a country with Indonesia's population density and level of development, the pressure to place land suitable for agriculture into production is so large that it is unlikely that all forested land can be maintained under forest cover. However, with a vigorous program to protect those areas needed for production, protection and conservation purposes, about 57% of Indonesia's surface would remain under forest cover, about 7% less than the amount now under closed canopy forest. To realize these objectives, ecologically important areas would have to be identified and protected from encroachment, and buffer zones established between settled and protected areas. Such a program would require an increase in funds and increased attention to appropriate institutional development. Financial and technical support for a major effort to protect forest areas could be mobilized from bilateral donors, multilateral lenders and environmental groups, and should be encouraged by the Government.

45. Irian Jaya. Early government projections calling for an increase in settlement in Irian Jaya from about 16,000 families in Repelita III to 140,000 families in Repelita IV caused alarm among both social scientists and environmentalists. These targets were not realistic and have been reduced. The

Table 6: LAND ALLOCATED FOR SPONSORED MIGRATION IN REPELITA III COMPARED TO FORESTED LAND

Province	Forest as a % of provincial land	Transmigration land as a % of all forest <u>/a</u>	Transmigration land as a % of conversion forest <u>/a</u>
Sumatra	54%	0.7%	4.3%
Kalimantan	67%	0.2%	0.8%
Sulawesi	57%	0.3%	2.1%
Irian Jaya	70%	0.0%	1.2%

/a Assumes 50% of cleared land on all islands was forested. Does not include spontaneous migration.

Source: FAO/World Bank Cooperative Program, Forestry Project Working Paper, 1985.

budget for FY86/87 calls for settlement of only 3,000 families in Irian Jaya and, on this basis, the Bank now estimates that only about 15,000 to 20,000 families will be settled in the province in Repelita IV. Nevertheless, since the people in Irian Jaya are racially and culturally distinct, the management of any settlement there will require special sensitivity.

46. The majority of Irianese live in the densely settled highlands and there are no plans for transmigration to those areas, but new settlement is contemplated on the north coast, on the western coast and in the south around Merauke. Steps have been taken to ensure that consultants involved in the site selection process take account of the local people, identify the areas needed by them to sustain their traditional livelihood, and assess their attitudes toward settlement, and toward culturally appropriate parallel benefits or compensation. However, the process of acculturation is a long one and for this reason, slow, well-planned settlement coupled with programs to benefit local people and respect their cultural identity must be encouraged. To avoid social disruption, the provincial government should be sensitized to the rights of isolated and unassimilated people, site selection procedures should be carefully supervised, and settlement in Irian Jaya should not be accelerated beyond current low levels.

### C. Factors Affecting Future Settlement

#### Agricultural Prospects

47. Food Crop Farming Systems. In Repelita III about 290,000 families were settled in sites based on rainfed food crop agriculture, nearly 80% of all those settled. Rice production in these sites is low (500-1,000 kg/family) and the evidence suggests that farmers are producing mainly to meet the community's subsistence needs. The reasons for this are clear:

- (a) agroecological conditions in transmigration sites are not well suited to food crop production and overcoming soil limitations is both costly and time consuming;
- (b) market prospects for food crops in most sites are limited; and
- (c) research, extension, input supply and credit mechanisms remain weak. This is due in part to the problem of getting experienced staff in pioneer areas and to the inherent difficulties of coordination in remote sites.

48. Steps should be taken to increase production and reduce marketing constraints: for example, semi-mechanized land clearing should be encouraged both to reduce soil damage and increase employment; more emphasis should be given to the incorporation of organic material into the soil; houselots and fields should be placed as close together as possible to reduce labor constraints and provide protection from pests; and farming systems should be diversified (poultry, livestock and fish ponds should be encouraged). The fact that many of these steps have been recommended by the Ministry of Agriculture (MOA), but not yet adopted by MOT, points to the need for stronger coordination between the two. In general, however, the inherent limitations of the soils in transmigration sites, the high cost of producing food crops under adverse conditions, and the deteriorating market prospects for food crops such as rice, argue against the assumption that income growth in existing sites will come mainly from surplus food production.

49. Swamp Reclamation Sites. In Repelita III, about 67,000 families were settled in swamp reclamation sites, 18% of the total moved. Settlement in these areas has a number of attractive features: good soils in swampy areas have a high organic content and can produce relatively good yields even without fertilizers; the flat cultivated areas eliminate erosion problems and permit bunding to hold water on the land for wetland rice; the timber on swamp sites has less commercial value than that on upland sites; and since swampy areas are largely uninhabited before they are drained, they are relatively free of land claims.

50. There are also serious problems in swamp sites. Some areas have difficult soils which may retard or prevent the growth of crops, water management intended to prevent overdrainage and saline intrusion is a complex undertaking, and environmentalists are concerned about the unforeseen consequences of draining coastal swamps. Recently, farmers settled in tidally reclaimed areas have also experienced severe problems with rats and insect pests.

Whereas farmers surveyed by BPS in tidally influenced areas settled in Repelita II were producing an average of 1,700 kg of unmilled rice annually, farmers in Repelita III sites reported an average of 700 kg of paddy per family and the lowest average incomes in the income survey. This is due to low production and limited opportunities for off-farm work. Potential transmigrants are aware of these problems and there were some difficulties in recruiting settlers for tidal sites in Repelita IV.

51. Despite current problems in swamp reclamation areas, most technical specialists agree that tidal areas have good prospects for growing rice and for diversification into other crops. To realize that potential, however, a concerted effort is required to address the problems of these sites. Critical components are as follows:

- (a) improvements in agro-hydrological surveys;
- (b) judicious drainage and use of proper land development techniques;
- (c) review of soil properties after clearing in order to provide recommendations for on-farm management;
- (d) return to the linear settlement model in which fields adjoin the houselot;
- (e) provision of adequate agricultural support services based on appropriate agricultural research;
- (f) development of an intensive pest management strategy;
- (g) increased attention to problems of potable water by MOT and to malaria control by the Department of Health; and
- (h) concentration of management in one entity to improve the interactive process of planning and implementation which is particularly important in swamp reclamation sites.

Settlement in tidal areas is only justified if current problems leading to low production and low incomes can be overcome. Government officials have recognized this problem and targets were reduced in 1985, even before resource constraints affected the program as a whole.

52. Tree Crop Development. The introduction of cash crops such as sugar, cotton, cashews, spices, coffee and cocoa on appropriate soils is to be encouraged. However, some of these commodities face technical and marketing constraints and for this reason the best prospects for income increases in transmigration settlements are from the major tree crops (oil palm, rubber and coconut). Agricultural incomes on tree crop schemes are projected to be about US\$1,500/family 10 years after settlement, compared to about US\$700/family on upland schemes, and only tree crop projects offer scope for cost recovery.

53. Government has recognized the advantages of tree crops and taken a number of steps to promote tree crops for transmigrants, but only about 7,400

transmigrant families were settled on NES/PIR projects in Repelita III (about 2% of the total moved). Low rates of settlement in Repelita III were due mainly to institutional and manpower constraints. Since then levels of settlement have been accelerated and a total of 32,000 families were settled on tree crop schemes as of June 1986, and an additional 56,000 ha of trees were ready to be transferred to transmigrants.

54. Measures needed to increase institutional capacity in the tree crop sector are set out in a recent Bank study on the prospects for Indonesia's major tree crops (Report 5318-IND, April 15, 1985). Other recommendations relevant to transmigration are as follows.

- (a) New tree crop development should, other things being equal, take place as close as possible to existing infrastructure, rather than in remote areas, and for financial and environmental reasons priority should be given to the development of grasslands. To obtain grasslands for tree crops, both local people and transmigrants must be included in tree crop schemes.
- (b) Second-stage development, which involves the introduction of tree crops on existing sites, has the highest rates of return and the lowest financial costs of all transmigration models and should be strongly encouraged.
- (c) Opportunity also exists for expanding tree crop development in the private sector. To stimulate private investment, private sector investors should be relieved of the obligation to finance small-holder development from their own borrowing.

55. There are several mechanisms for establishing tree crops on transmigration sites including project management units (PMUs), formed within the Directorate General of Estates (DGE) to assist farmers in establishing tree crops on their own land. PMUs provide planting material, fertilizer, extension and incentive payments for major tasks (land clearing), and the cost of these inputs is covered through credit. These mechanisms show particular promise for assisting existing transmigrants to improve their production systems and Government is now considering a large-scale program to produce planting material for transmigrant communities. One problem encountered in planning these programs is that farmers have too little reserve land for 1.5 to 2.0 ha of tree crops, the minimum area needed to provide adequate incomes and repayment. To avoid this problem in the future, Government must ensure that transmigrants are allotted at least 3.0 ha on arrival, not 2.0 ha as currently planned.

56. An analysis of overall implementation capacity in the tree crop sector indicates that there will be a serious trade-off between the quality and scale of the program. In order to maximize migrant welfare and stimulate economic development, Government should shift to more productive farming systems and this will limit future program scale. Recently, tree crop commodity prices have fallen to very low levels and this is a matter of serious concern. Bank commodity projections predict a return to prices which would make tree crops economically and financially attractive. However, should prices remain



low, Government will be faced with very difficult choices. Since few new sites are well suited for food crops, if tree crops are not an option, then tidally-influenced sites would have the best prospects for settlement. Any future settlement program relying mainly on tidal sites would necessarily be based on a mixture of food crops and tree crops because of soil conditions.

### Land Availability

57. Land availability is a serious constraint to future settlement. Sumatra may be divided into those provinces which are already fully settled (Aceh, North Sumatra, West Sumatra, Bengkulu, and Lampung) and those less fertile areas on the coastal lowlands (Riau, Jambi and South Sumatra) where limited prospects remain for large-scale settlement. Continued large-scale settlement in West Kalimantan is possible only if indigenous smallholders agree to make areas of low productivity rubber available or relinquish land under shifting cultivation. Settlement potential in Central and East Kalimantan is limited by forestry constraints. For example, three quarters of the area in Central Kalimantan that is suitable for agriculture is in production forest. In Irian Jaya the pace of settlement will be limited by social and environmental considerations. Land is not an immediate constraint in swamp reclamation areas, but continued settlement requires that problems mentioned earlier be overcome.

58. Province-by-province projections suggest that the maximum number of families which could be settled in large sites on reasonable agricultural land in the absence of financial constraints would be about 300,000 families in both Repelita IV and V, declining in Repelita VI. However, this "high scenario" could be achieved only if the tree crop program were accelerated, and if Government were prepared to reclassify some areas of production forest and to bear the cost of settlement in increasingly remote sites. These options are not likely to be possible and may not be desirable.

59. Uncertainties about land availability need to be resolved for rational planning to occur for any future settlement program. For this reason, ongoing Phase I evaluations of upland and tidal areas should be continued. These studies combined with natural resource inventories already under way should permit the completion of master plans on a province-by-province basis by the end of Repelita IV. This, in turn, could provide the basis for national master plan for transmigration for Repelita V. Preparation of this plan should be given priority by Government.

### The Prospects for Spontaneous Movement

60. The main constraint to spontaneous movement is the inability to find land free of claims and obtain legal rights to it. This is due in part to systems of land tenure, governed by adat, or traditional law. Under adat, the community may allocate the right to cultivate, but this does not necessarily guarantee security of tenure. Outsiders using community land may be subject to ongoing requests from the local people for compensation or even expropriation of the land if its value improves. For this reason the most important function of Government in the transmigration process is the provision of land which is free of alternative claims.

61. A second constraint to obtaining land is the difficulty and high cost of land registration. It is possible to legally transfer land, but this takes cadastral surveys, legal checks and a long series of administrative procedures which are difficult and costly to arrange. The Directorate General of Agraria is also required to give priority in land registration to development projects, cadastral surveys in towns and urban areas, and land used for commercial purposes. Consequently, there is no land registration program at the present time which is affordable and responsive to the needs of rural smallholders.

62. A third constraint is the difficulty of finding capital for land purchase. There are many areas in the outer islands where land of moderate fertility is available at a "fair price," generally about US\$40-60/ha. However, migrants seldom have this amount of money and Government does not pay cash compensation for land, since it believes that land is a national resource to be managed for the common good. This means that better land is seldom relinquished for transmigration. A long-term MOT objective should be to promote rural credit for land purchase through the banking system for those who wish to purchase land on their own. In the short run, consideration should be given to a fund within the MOT which could be used for land purchase by associations in which members mutually guarantee repayment. This has been done in a number of countries with reasonable success.

63. The amount and direction of spontaneous movement in Repelita IV will also depend on a number of other factors. First, it will depend on the state of the economy and the pattern of government investment. Second, it will depend on the rate of sponsored settlement. Since spontaneous migrants often follow relatives or friends, few inner island residents will move spontaneously to pioneer areas, and the vast majority of spontaneous migrants will continue to go to already settled areas such as Sumatra. As much of the available land in Sumatra is already occupied, strong government encouragement to move in the absence of improved systems of land acquisition and strong measures for environmental protection could have negative consequences.

#### Financial Constraints

64. During Repelita III, finances were not a limiting factor in transmigration development. Budgets for transmigration generally exceeded expenditures, and between 1981/82 and 1984/85 funds expended as a percent of funds budgeted, declined. Costs were lower than originally anticipated because Government moved only about two thirds of the families targeted on the sponsored program. Since fewer families were moved than originally intended, by the end of Repelita III the MOT had growing budget carryovers.

65. The situation in Repelita IV is quite different. In January 1986, austerity measures were announced which reduced the MOT budget from Rp 501 billion (US\$452 million) in FY85/86 to Rp 323 billion (US\$293 million) in FY86/87. Then in May 1986 it was announced that the portion going to MOT would be only Rp 208 billion, about 58% of FY 84/85 expenditures (the last year for which these data are available).

66. Under these austerity conditions, MOT has set the following priorities for financing:

- (a) fulfillment of MOT's commitment to existing migrants and maintenance and upgrading of existing sites;
- (b) completion of contracts already signed and completion of settlement in areas already cleared;
- (c) provision of funds for externally-assisted projects (these are expected to settle about 5,000 families in the next two years); and
- (d) institutional development including improvement in coordination, monitoring and evaluation, training and studies.

#### Institutional Considerations

67. Coordination. Since the Repelita III transmigration program was carried out by several agencies, various mechanisms were established to promote interagency coordination. Among these was the appointment of a Junior Minister for Transmigration (JMT) who reported directly to the President. After the two main implementing agencies were combined in 1983 to form the Ministry of Transmigration, a new Presidential Decree was issued giving the MOT responsibility for coordination. Nevertheless, interagency coordination has remained weak.

68. To improve policy-based planning and integrated project implementation, coordinating bodies must be strengthened and there must be clear agreement between the various ministries on policy objectives and their means of execution. To facilitate interagency coordination the Secretariat in the Ministry of Transmigration (MOT) at the central level should be strengthened and similar Secretariats should be formed at the provincial and district levels to convene existing transmigration coordinating bodies and to provide support services to them. Mechanisms are also required to improve on-site coordination.

69. Planning and Budgeting. In the past, the Repelita III transmigration program experienced serious problems in planning and budgeting. This was due in part to (a) the large number of agencies involved and the lack of authority or resources in the Office of the Junior Minister for Transmigration (JMT) to reconcile agency plans; (b) the difficulty of programming the long sequence of activities involved in settlement; and (c) a budgeting system that permitted expenditures over three years and thus created little need for careful planning. With the elimination of budget carryovers in FY86/87, improved planning and budgeting have become critical to successful implementation of the transmigration program. Some positive steps in this direction have already been taken. The responsibility for transmigration planning and budgeting is now in the Office of the Secretary General in the MOT, and this office has adequate authority to carry out the task. However, because most of the staff involved are new and the task is extremely complex, the Office could benefit from technical support.

70. Monitoring and Evaluation. One of the weakest links in transmigration to date has been monitoring and evaluation. In Repelita III the Bank and the United Nations Development Programme (UNDP) provided technical support to the Office of the JMT for monitoring project implementation, financial status and impact. This included an early warning system intended to detect and react to problems on site. Because of limitations in JMT staff and resources, this system was never effective and has been abandoned. Monitoring and evaluation functions are now in the Office of the Secretary General and steps to develop a responsive monitoring system are urgently required. The UNDP is providing assistance for special studies, and a consultancy under the Bank-supported Transmigration IV project also is designed to develop monitoring and information systems for the MOT. However, greater priority needs to be given by the MOT to the development of a simple monitoring system.

71. The Changing Role of the MOT. Twenty years from now, settlement following the current sequence of steps in the transmigration program will be limited. Instead, a broad spectrum of interagency programs and policy initiatives will be required to foster labor migration and promote regional development. To move from the current highly logistical operation to one centering on policy formulation and facilitation will not be easy. To achieve these objectives, it will be important to identify the agency within MOT intended to provide guidance and policy direction, to give that agency appropriate authority, and to strengthen it. At the moment, it appears that this role would best be filled by the Office of the Secretary General (OSG). If so, a concerted effort is needed to define the function of the OSG, to attract the most skilled manpower to it, and to give it adequate authority to integrate the work of the other agencies.

#### D. Summary of Major Recommendations

72. In order to sustain and improve migrant incomes and to capture the full economic benefits of manpower and infrastructure which are already in place, the main thrust of the transmigration program over the next few years should be on the maintenance and development of existing sites. Road maintenance will be a matter of high priority and attention should be given to upgrading existing production systems. To provide an appropriate administrative system for this development and to facilitate the transition between Ministry of Transmigration (MOT) authority and provincial control, the report recommends a bridging period under MOT authority for sites which are not self-sufficient at the end of five years. To ensure adequate financial and managerial resources for maintenance and upgrading, new settlement must necessarily be slowed. Government has recognized this point and deferred new planning and settlement.

73. With respect to the scale of future settlement and the types of productive systems used, the report recommends that:

- (a) fill-in programs which make use of existing infrastructure should be encouraged using sustainable production systems. Such programs can be carried out with lower costs if settlers are recruited among spontaneous migrants in receiving areas. However, the benefit package for farmers recruited in Java and moved to areas where they have no family support should not be significantly reduced;

- (b) future settlements based on food crops should be limited to areas where soils are good and marketing prospects are strong, or where plans for second-stage development are firmly in place; and a concerted effort should be made to address the production and management problems encountered in tidal sites which appear to have the best potential for food crop production;
- (c) new settlement with cash crops should be encouraged. This could be based on any commodity with reasonable marketing potential, but in most cases such settlement will be based on tree crops such as rubber, coconut and oil palm, which are well adapted to the soils of the outer islands, and for which mechanisms for establishment already exist;
- (d) new settlement with tree crops, Nucleus Estate and Smallholder schemes should be supported, and a major initiative is required to strengthen tree crop project management units (PMUs) and use them for tree crop establishment in conjunction with new settlement and second-stage development. Steps should also be taken to facilitate private sector investment in smallholder tree crop establishment; and
- (e) as the industrial (tree crop or cash crop) model involves cost recovery through credit, it is imperative that the size of the family unit can support loan repayment and family requirements. This will entail a unit of at least 2.5 ha in most cases, and the current limitation of 2 ha per family (including both houselot and food crop area) is unlikely to be sufficient in most cases and should be reconsidered. There will also be a need to re-examine and, if necessary, redesign site plans originally based on the standard settlement model where cash crops are to be introduced.

74. To enhance the quality of new settlement mechanisms must be developed within the MOT to review management issues on a regular basis and to improve policy formulation and interagency coordination. Action plans should also be developed to overcome the most serious problems encountered in implementation. These should focus on settlement design (including selection of farm model, farm layout and incorporation of spontaneous migrants), physical development (land clearing, road construction and maintenance, and contractor supervision), the provision of agricultural supporting services, and program planning and coordination (planning, budgeting, monitoring and evaluation). Steps are also required to establish a system for assuring the orderly transfer of settlement to the provincial governments.

75. Increased attention is also needed to spontaneous migration. In the past decade, spontaneous movement is presumed to have occurred at rates one to two times as great as sponsored settlement. This rate of movement occurred in response to (a) employment opportunities generated by government investment and to (b) sponsored settlement in the outer islands. In FY86/87 Government hopes to facilitate the movement of substantial numbers of spontaneous migrants; however, it is not certain that Government can or should encourage

high levels of spontaneous movement if investment in the outer islands slows and employment opportunities decline, or if there are no new provisions for finding adequate land. A detailed review of spontaneous transmigration is warranted to more clearly define policies and realistic programs.

76. To improve the welfare of those who are already moving without assistance and to minimize environmental problems, steps are required to:

- (a) adapt the planning process to take account of future spontaneous migrants; and
- (b) develop procedures for land registration in the outer islands and provide credit for land purchase, particularly in those areas where sponsored migrants have already settled (Sumatra).

These actions should be given priority by GOI.

77. Finally, to protect both the environment and the rights of local people, attention is needed to environmental and social concerns. On the environmental side, the use of secondary forest and grasslands should be maximized and full account should be taken of the analysis of forest resources carried out during site selection. This includes a delineation of buffer zones to protect ecologically important areas. In addition, priority should be given to identifying and gazettement environmentally important areas and protecting them from encroachment, and to developing clear policies on the preservation of production forest. The capacity for environmental assessment in regional universities should also be strengthened. On the social side, measures introduced in the recent Transmigration V project to take account of the needs and desires of ethnically distinct and unassimilated people should be rigorously implemented; and to ensure that local people, particularly those in Irian Jaya, have an opportunity to adjust to and benefit from development, settlement in such areas should be carried out on a gradual basis and not be rapidly accelerated.

78. Current price projections for oil are pessimistic from the producer point of view and suggest that the strategy proposed above will have to be maintained in the immediate future due to financial constraints. Even if the resource position improved, however, the general recommendations included in this report would not change significantly. Government should emphasize labor-intensive second-stage development to sustain incomes and encourage spontaneous movement to existing sites, and it should develop programs including increased access to credit to support land purchase, land registration and farm development, in order to facilitate the flow of labor to areas of economic opportunity. At the same time it should consolidate and improve new settlements in order to stimulate regional development.

## I. OVERVIEW

### A. Background

#### General

1.01 Indonesia, the fifth most populous nation in the world, had an estimated population of 168 million in 1986. Of this number, over 100 million people lived on Java, an island with about 7% of the nation's land. Population densities in Java averaged 774 people/km<sup>2</sup> compared to 33 people/km<sup>2</sup> in the outer islands, and Java population densities were about equal to those in Bangladesh.

1.02 The significance of these facts cannot be overstated. Java has a total of about 20 million households of which about 17 million are in rural areas. About 63% of rural households have less than one-half hectare of land (a subsistence-size plot), while only 5% have 2 hectares or more. Small-holdings in the outer islands are somewhat larger: only a quarter of all farm families in the outer islands have less than one-half hectare, while 30% have 2 hectares or more. Soil fertility in the outer islands is also generally lower than in Java, although there are many areas in Java where soils are very poor and some areas in the outer islands, particularly in Sumatra and Irian Jaya, where soils are relatively good.

1.03 With 11.6 million farm families and 6.0 million ha of land under food crops, agricultural holdings on Java are small and incomes are low. In 1984, average incomes in rural areas of Java were about US\$700/family/year and about 40% of the rural population fell below a poverty line estimated at US\$540/family/year.<sup>1/</sup> The outer islands (islands other than Java, Bali, Madura and Lombok) have more land, less dense populations, and the major portion of Indonesia's natural resources, particularly oil and forest reserves. For these reasons households in many areas in the outer islands are somewhat more prosperous, and incomes in rural areas of the main transmigrant receiving provinces (Sumatra, Kalimantan and Sulawesi) average about US\$1,000/family/year. Table 1.1 summarizes the main demographic features in sending and receiving provinces.

1.04 Faced with these disparities between land and population, Indonesia has sought to wed the underutilized labor of Java and the underutilized land of the outer islands through various programs of land settlement. These programs began in 1905, and by 1930 about 100,000 people had moved to the outer

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<sup>1/</sup> All analysis in this report is based on an exchange rate of Rp 1,100/US\$1.00, the prevailing rate when this report was written.

Table 1.1: BASIC DEMOGRAPHIC AND LAND USE DATA

Province/Island	Est. 1986 population ( <sup>1</sup> 000)	Area (km <sup>2</sup> )	Population <sub>2</sub> (people/km <sup>2</sup> )	% rural HH which are farm HH	% farm HH with less than 0.10 ha	% farm HH with less than 0.50 ha	% farm HH with more than 2.0 ha
<u>Sending Areas</u>							
Jakarta	8,164	590	13,837	0	0	0	0
West Java	31,876	46,300	688	63	18	67	5
Central Java	27,756	34,206	811	74	13	61	4
Yogyakarta	2,913	3,169	919	85	16	61	5
East Java	31,639	47,922	660	69	14	62	4
Java	<u>102,348</u>	<u>132,187</u>	<u>774</u>	<u>69</u>	<u>15</u>	<u>63</u>	<u>4</u>
Bali	2,709	5,561	487	77	9	46	10
West Nusa Tenggara	3,108	20,177	154	67	11	46	11
Bali/NTB	<u>5,817</u>	<u>25,738</u>	<u>226</u>	<u>72</u>	<u>10</u>	<u>46</u>	<u>10</u>
Total	<u>108,165</u>	<u>157,925</u>	<u>685</u>	<u>69</u>	<u>15</u>	<u>62</u>	<u>5</u>
<u>Receiving Areas</u>							
Aceh	3,078	55,392	56	77	5	33	17
North Sumatra	9,668	70,787	137	77	8	39	13
West Sumatra	3,851	49,778	77	81	6	38	8
Riau	2,583	94,562	27	79	6	17	45
Jambi	1,822	44,924	41	81	5	17	44
South Sumatra	5,587	103,688	54	80	3	14	35
Bengkulu	986	21,168	47	88	2	12	35
Lampung	6,422	33,307	193	87	3	20	22
Sumatra	<u>33,997</u>	<u>473,606</u>	<u>72</u>	<u>81</u>	<u>5</u>	<u>27</u>	<u>23</u>
West Kalimantan	2,827	146,760	19	88	2	10	37
Central Kalimantan	1,159	152,600	8	79	2	7	51
South Kalimantan	2,328	37,660	62	80	6	37	33
East Kalimantan	1,690	202,440	8	71	6	17	49
Kalimantan	<u>8,004</u>	<u>539,460</u>	<u>15</u>	<u>82</u>	<u>4</u>	<u>19</u>	<u>39</u>
North Sulawesi	2,406	19,023	126	81	6	28	38
Central Sulawesi	1,604	69,726	23	85	4	13	49
South Sulawesi	6,666	72,781	92	79	7	31	36
Southeast Sulawesi	1,122	27,686	41	85	6	19	48
Moluccas	1,659	74,505	22	88	5	15	45
Sulawesi	<u>13,457</u>	<u>263,721</u>	<u>51</u>	<u>82</u>	<u>6</u>	<u>25</u>	<u>40</u>
Irian Jaya	<u>1,364</u>	<u>421,981</u>	<u>3</u>	<u>85</u>	*	*	*
Other	<u>3,613</u>	<u>62,750</u>	<u>58</u>	*	*	*	*
Total	<u>60,435</u>	<u>1,761,518</u>	<u>33</u>	<u>81</u>	<u>6</u>	<u>26</u>	<u>30</u>

Legend: \* = Data Uncertain  
HH = Households

Note: Farm households are families that say their main work is in agriculture.

Source: Statistical Yearbook of Indonesia, 1984, and the 1983 agricultural census.



islands on land settlement schemes and about 600,000 had been relocated as estate laborers. With the decline of plantation investment in the outer islands in the 1930s, transmigration became the major vehicle for movement. By 1980 about 1 million people had been resettled through sponsored transmigration programs, and about 2 million people were in the outer islands as a joint result of sponsored transmigration and associated population growth. In the third five-year development plan (Repelita III, 1979-84), 366,000 families, nearly 1.5 million people, were settled under the sponsored program, more than twice the number settled in the preceding 75 years (Table 1.2). During this period transmigration was the largest voluntary government-sponsored settlement program in the world.

Table 1.2: SPONSORED TRANSMIGRATION, 1950-1984 /a

Year of arrival	Five-year plan (Repelita)	Total families moved	Local families /b	Families Resettled /c	Total families settled	Total people settled
1950-54	-	21,037	0	1,280	22,317	87,000
1955-59	-	32,114	0	128	32,242	134,000
1960-64	-	26,456	0	0	26,456	111,000
1965-69	-	21,633	0	0	21,633	92,000
1969-74	(I)	39,436	0	75	39,511	176,000
1974-79	(II)	44,484	7,600	0	52,084	228,000
	<u>Subtotal</u>	<u>185,160</u>	<u>7,600</u>	<u>1,483</u>	<u>194,243</u>	<u>828,000</u>
1979-84	(III)	301,279	22,284	42,414	365,977/d	1,492,000
	<u>Total</u>	<u>486,439</u>	<u>29,974</u>	<u>43,897</u>	<u>560,220</u>	<u>2,320,000</u>

/a Settlement figures vary widely in government publications. This is due mainly to the practice of counting migrants by the year in which funds were budgeted for movement rather than in the actual year the migrants were moved. To the extent possible, this report indicates actual year of movement.

/b Indigenous families settled in transmigration sites.

/c Resettlement of sponsored or spontaneous migrants within the province.

/d Government also identified about 170,000 families that moved spontaneously. This figure is not included since it is not a complete enumeration of spontaneous migrant families, and comparable figures for earlier periods are not known.

Source: Official Summary of Repelita III Transmigration Program, Ministry of Transmigration, 1985.

## Development Objectives and the Role of Transmigration

1.05 Employment creation and poverty alleviation are key development objectives in Indonesia, and the country is widely regarded as one of the more successful developing countries in translating oil revenues into equity programs. In agriculture, major investments have been made in irrigation, fertilizer production, agricultural research and smallholder tree crop development, while the mechanization of agriculture has been discouraged on employment grounds. In addition, the Government has invested in labor-intensive rural works programs, and in education, health and urban improvement, among others. Poorer regions have been given a larger share of development funds in relation to the size of their populations. The Government has also encouraged the development of small-scale industries, but the growth of export industries has lagged due to trade and commercial policies, weak commodity prices, and, to some extent, import restrictions in other countries. In 1987, however, significant steps were taken by Government to deregulate trade and stimulate export development.

1.06 To alleviate poverty and limit population growth, Indonesia also has an active family planning program. In 1970 the Government announced its intention to reduce the crude birth rate from 44 births per 1,000 population per year to 22 per 1,000 by the year 2000. By 1985 the birth rate was 33 per 1,000 and the growth rate had fallen to 1.8% p.a. in Java, and 2.3% p.a. for the country as a whole. Further declines will be harder to achieve on a voluntary basis, as poor families choose to have three or more children for many reasons, among them to provide economic security to the parents in their old age.

1.07 Despite these accomplishments, Indonesia has always found it difficult to generate adequate employment for its growing population, and for eighty years transmigration has been seen as a partial answer to the Government's objectives of limiting population growth in Java, creating productive employment, and providing some of the poorest people in the country with sufficient land to meet their subsistence needs. In recent years, the pressures for resettlement have become increasingly intense as landless farmers have moved onto ever more marginal land in Java and into poor areas in the cities. Those cultivating in upper watersheds and within legally protected forest areas have caused serious erosion, premature siltation of dams and irrigation canals, and widespread flooding, all with heavy economic and financial costs to the country. The provision of urban services has also been costly, while failure to meet the expectations of the urban poor has potentially serious social and political consequences.

1.08 The Government's interest in moving people has been reciprocated by the desire of poor farmers to move in order to improve their own lives and the prospects for their children. Applicants for transmigration are usually landless agricultural laborers with little likelihood of owning property or other assets. Their move involves the hardships of pioneer life, but offers opportunities not available in their area of origin. With the exception of small and unsuccessful efforts to relocate urban squatters in the late 1960s and early 1970s, and the infrequent use of transmigration to resettle people displaced by natural disasters, transmigration is voluntary. Transmigration

officials target specific sending areas for recruitment (e.g., critical watersheds), but in recent years applicants from most areas have exceeded the numbers who could be moved.

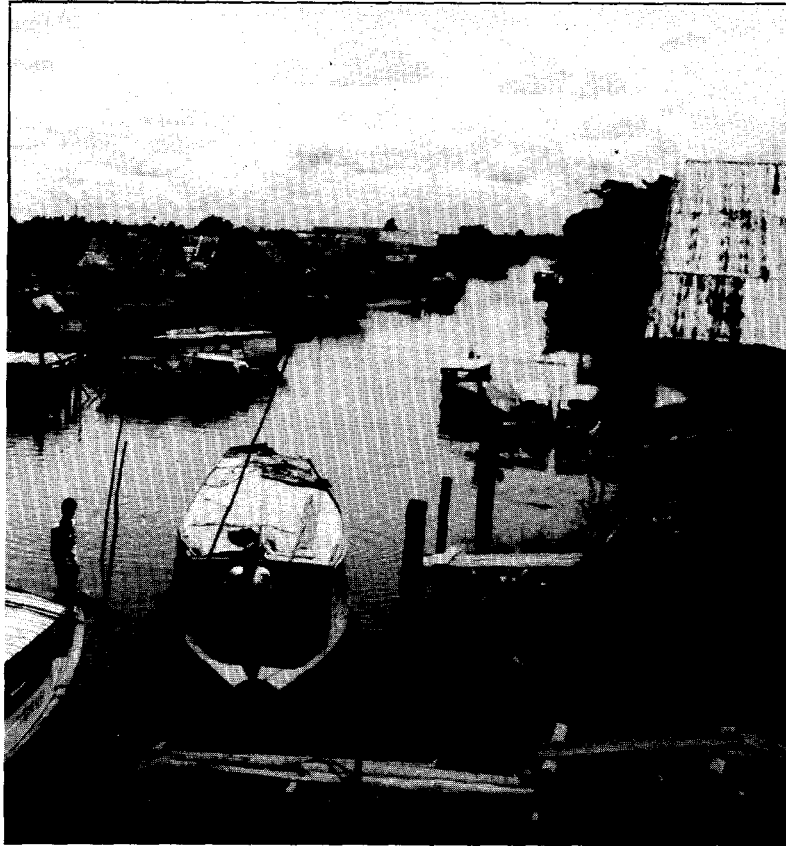
1.09 The Government has also supported transmigration as a means of stimulating regional development. There are many potentially productive areas in the outer islands with population densities so low that regional development is not economically feasible. In such areas, transmigration has been used to provide the critical mass to justify investment in infrastructure and services (such as agricultural extension and health clinics) and to provide labor and markets. Transmigration has also been encouraged as a means of reducing national food deficits by opening new lands for food crop production and by enabling new settlers to meet their subsistence needs.

1.10 Finally, transmigration has been seen by national leaders as a tool for national integration. Indonesia is a country with 13,000 islands and 300 languages linked initially by a common colonial history and prolonged struggle for independence. The ideal of cultural pluralism is recognized in the constitution and in Indonesia's motto "Unity in Diversity," and virtually all Indonesian ethnic groups preserve their mother tongue and many of their customs and traditions. However, Indonesian leaders have been both fortunate and skillful in forging a national identity based on a common national language, Indonesian (the native language of an area in Sumatra), a unified administrative system, and state philosophy which stresses equitable development. Migration of outer island residents, mainly to Javanese cities, and of inner island residents, mainly to rural areas in the outer islands, is seen by national leaders, from both Java and the other islands, as a means of promoting cultural contact and building national unity.

#### Transmigration Farm Models

1.11 Over the years, Indonesian resettlement efforts have had two major features in common. First, they have been government sponsored. Government support is necessary because many migrants are poor and cannot afford to move and establish themselves using only their own resources, and because traditional land tenure arrangements in the outer islands make it difficult for migrants to secure legal rights to land without government support. Second, virtually all programs have been based on smallholder agriculture. In most schemes, migrants have been provided with free transportation to the site, land, housing, an agricultural package, and subsistence supplies for the first year, although the farming systems introduced have varied.

1.12 Dutch efforts to resettle Javanese as smallholders and most government transmigration efforts through the early 1970s were generally premised on irrigation. In early schemes, migrants received a 0.7 ha irrigated plot, an arrangement which placed considerable pressure on the land as children matured. In later projects, farmers were given 2.0 ha of land with irrigation potential but, due to institutional and financial limitations, irrigation infrastructure was deferred to a later stage.



Main drainage canal of tidal transmigration community in South Sumatra. Several small businesses have developed along this thoroughfare.

1.13 A variation on irrigated farming was introduced in swampy areas of Kalimantan in the 1930s. In these areas, in theory, tidal action pushed fresh water back up river estuaries onto low lying land, making wet rice cultivation possible. In practice, most drained areas were used for rainfed rice. Only small numbers were settled on such schemes in the colonial period and a major settlement effort announced by the Public Works Department in 1957 was hampered by lack of funds. Not until 1967-68 was the groundwork laid for the present program, which has since opened some 670,000 ha of tidally influenced land to migrant farmers.

1.14 Most of the transmigrants moved between 1950 and 1975 were settled on one or two hectares and produced food crops and minor tree crops (coffee and cloves) under rainfed conditions. Many farmers diversified their production systems over time and a few received irrigation or block-planted tree crops (rubber or coconuts) after several years. However, it was not until the second five-year plan (1974-79) that increased fertilizer availability and national rice shortages led to the development of an agricultural package intended to support rainfed food crop production on marginal soils. This



Transmigrants in some schemes receive 1-2 hectares of rubber producing incomes of US\$1,200-US\$1,500 per year. These children are playing in a rubber area which has been in production about one year.

package included 2.0 to 5.0 ha of land, of which 1.25 ha were cleared, and free planting material and fertilizer provided for three years. Most families settled in the third five-year plan received some variant of this model.

1.15 Plantation, or estate management, was first used to support transmigration in the Nucleus Estate and Smallholder (NES) projects begun in 1978. Under the NES concept, funds were made available to expand existing estates and to increase their capacity to plant tree crops for smallholders including both local people and transmigrants. In NES projects, farmers generally received 2.0 ha of block-planted tree crops and 1.0 ha for food crops. Although costs are greater than those in standard projects, the cost of tree crop development is covered by loans to the smallholders and incomes are expected to be sufficiently high at project maturity to allow cost recovery. Recently, interest has grown in using project management units (PMUs) to help transmigrants develop tree crops on their own land.

B. The Repelita III Transmigration Program

Program Formulation

1.16 In planning Repelita III (1979-84), government officials saw transmigration as an important tool for relieving population pressures, improving the welfare of the rural poor, protecting critical lands in the inner islands, promoting regional development in the outer islands, and increasing food production. To meet these objectives, the Government proposed to settle about 500,000 families during the plan period, on some 250 sites located mainly in Sumatra, Sulawesi, and Kalimantan. Of the settlements originally proposed, 18% were in swamp reclamation areas.

1.17 A central issue in designing the Repelita III program was the farm model and investment level to be used. Government officials recognized that it was technically possible to resettle smallholders on tree crop schemes that guaranteed relatively high incomes and high rates of return. However, they also believed that such programs would be costly in both financial and managerial terms, would slow the settlement process, and would create significant income disparities between beneficiaries and the local people. For these reasons, and consistent with the view that transmigration had to be carried out on a relatively large scale to realize program objectives, the Government decided that most settlement would be based on food crop agriculture. This model was adopted because annual crops could be established quickly, they promoted early self-sufficiency, cost less than other models, and provided no undue advantages to transmigrants in relation to the local people. Where appropriate, tree crops were expected to be introduced at a later stage, but no definite planning for this was undertaken.

1.18 Several other steps were also taken to facilitate large-scale settlement. First, organizational arrangements were changed. Prior to Repelita III, the Directorate General of Transmigration (DGT) in the Department of Manpower and Transmigration was responsible for all aspects of the transmigration program. However, recognizing that institutional constraints limited the scale of resettlement, the Government undertook a major reorganization of the transmigration program prior to Repelita III. In March 1978, a Junior Minister for Transmigration was appointed to coordinate the activities of the various agencies intended to work on the program, and in August 1978 responsibility for project implementation was transferred from the DGT to the agencies normally responsible for each sector (such as Agriculture, Public Works, Health and Education). Overall, 7 Ministries and 53 Directorates General were to be involved, although only a few played major roles.

1.19 Second, funds were increased. The country's improved resource position allowed the Government to increase investment from about US\$500 per family at the beginning of Repelita II (about US\$1,000 in 1982 prices) to US\$5,000 per family in Repelita III. Apart from inflation, the difference in cost was due to needed improvements in project design (the introduction of feasibility studies, topographic mapping, detailed village design), new components (link roads, hydrological surveys, agricultural research), and improved inputs (initial land clearing, the provision of cattle and fertilizer). The Government's indicative budget for Repelita III allocated about US\$2.0 billion

for transmigration, nearly 6% of the projected development budget. \*With increased access to funds, financing ceased to be the major constraint to effective program implementation.

1.20 At the beginning of Repelita III (1979/80), the World Bank undertook a Transmigration Program Review (Report 3170-IND) to identify constraints to program development. This report projected only a moderate increase in the scale of transmigration and concentrated on ways to improve the program and eliminate institutional constraints. The review concluded that swampland settlements had good prospects, if costly infrastructure could be avoided, but that income prospects from rainfed food crops were limited in many areas and that a greater role should be given to mixed farming systems including tree crops and to second stage development among existing transmigrants. The report also recommended increased attention to site selection and evaluation, institution building and staff training, and efforts to improve the utilization of natural resources by developing grasslands and by utilizing timber from areas that were to be cleared.

### Achievements

1.21 In the first years of the Repelita III program, progress was slow due to a lack of prepared projects and inadequate interagency coordination. Later, however, significant improvements were made and the scale of movement increased dramatically (Table 1.3). In total, some 366,000 families were settled under the government-sponsored program, including about 22,000 local families and 42,000 spontaneous migrant families living in Lampung and resettled within the province. This is about twice the number projected by the World Bank. To meet the target of 500,000 families, an additional 170,000 families were identified who moved without government support, but the actual number of families moving spontaneously is believed to be much higher.<sup>2/</sup> The safe and orderly movement of nearly 1.5 million people on the sponsored program represents a commendable logistical achievement. That this many people were settled without a significant heightening of ethnic tension was also a tribute to both the Government and the Indonesian people.

1.22 Of the sponsored migrants, about 80% were settled on upland sites, 18% on sites in tidally influenced areas, and 2% on tree-crop schemes. Settlement by year and island is shown in Table 1.3; settlement by year and province is shown in Annex 1, Table 1. An evaluation of production, incomes and welfare in different sites is provided in Chapter II. The total cost of the Repelita III program was Rp 1.6 trillion (US\$2.3 billion), of which approximately US\$107 million (5%) was disbursed by the World Bank.

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2/ Figures on unassisted movement are based mainly on information provided by sending provinces. It is uncertain whether all families who registered to move from those provinces actually did move or whether most families who moved also registered. There is no doubt, however, that the number quoted understates the amount of spontaneous migration in the five-year period (see Chapter VII).

1.23 The World Bank's involvement in transmigration began in 1976 with a project (Ln 1318-IND) to settle 4,500 new families and to upgrade a community of 12,000 others. During Repelita III, the World Bank approved five additional projects, one each for large-scale settlement based mainly on food crop production, for settlement including tree crops, and for site selection and evaluation, and two projects for settlement in reclaimed tidal swamps. In total, the Bank committed US\$437.8 million to projects intended to settle about 57,000 families and benefit another 350,000 families through improved site selection and evaluation. A detailed description of Bank-assisted projects is provided in Chapter IX.

1.24 Other international and bilateral agencies also assisted the Repelita II and III transmigration program. Among the major contributors were the World Food Program (US\$66.3 million) in Sumatra, Kalimantan and Sulawesi; the Asian Development Bank (US\$34.3 million) in Southeast Sulawesi; the United States Agency for International Development (USAID) (US\$20.8) in the Lawu Project in Sulawesi; the Federal Republic of Germany (DM 86.5 million) mostly in East Kalimantan; and the Netherlands (DG 26 million) in Bengkulu. The Food and Agriculture Organization and the Office of Project Execution of the United Nations Development Programme (UNDP/FAO, UNDP/OPE), France and the United Kingdom have also provided technical assistance to the Ministry of Transmigration.

#### Program Development during Repelita III

1.25 Site Identification. The absence of suitable sites was a major constraint to the start-up of the Repelita III transmigration program, and settlement on unsuitable sites was a major impediment to agricultural development under the plan. For these reasons, the World Bank agreed in 1981 to develop a program of site selection and evaluation. The Transmigration II project (Ln 1707/Cr 919-IND) was restructured to include settlement planning, and a second loan, Transmigration III (Ln 2248-IND), provided consultant support for land identification for 300,000 families. Under guidelines established for the project, sites were to be rejected if found to have unsuitable soils, steep slopes, or competing land claims from local people, forestry, wildlife reserves, or other development projects. Only about 20,000 families had been settled on sites identified under these procedures by mid-1986, so the overall impact of this program on transmigration had not yet been fully realized at the time of this sector review. During Repelita III studies were also initiated in the Directorate General for Water Resources Development (DGWRD) to identify areas for swamp reclamation.



Table 1.3: REPELITA III SETTLEMENT, BY YEAR AND ISLAND

	1979/80	1980/81	1981/82	1982/83	1983/84	Total
<u>Sponsored migrant families</u>						
Sumatra	16,384	49,043	48,520	57,578	55,540	227,065
Kalimantan	565	11,976	17,378	17,488	23,207	70,614
Sulawesi /a	3,854	9,663	15,890	12,396	9,879	51,682
Irian Jaya	290	2,521	2,688	5,362	5,755	16,616
Subtotal	<u>21,093</u>	<u>73,203</u>	<u>84,476</u>	<u>92,824</u>	<u>94,381</u>	<u>365,977</u>
<u>Spontaneous migrant families</u>						
	1,985	3,359	8,961	32,445	122,747	169,497
Total	<u>23,078</u>	<u>76,562</u>	<u>93,437</u>	<u>125,269</u>	<u>217,128</u>	<u>535,474</u>

/a Includes the Moluccas and other small eastern islands.

Source: Figures provided by the Ministry of Transmigration.

1.26 One consequence of site selection on the scale undertaken in Repelita III was that it drew attention to land constraints and mobilized the planning efforts of other government agencies. Midway through Repelita III, the Directorate General of Forestry completed maps intended to demarcate production, protection and conservation forests (see Chapter V), estates and individuals sought to register land for agricultural development, and environmental groups mobilized to identify areas of biotic importance. To reconcile these various interests, regional consultative assemblies were strengthened, and provincial governments took an increasing role in mediating between conflicting land claims and development priorities.

1.27 These achievements were not without problems. The Directorate General of Forestry's defense of its territories, whether forested or not, prevented migrants from settling on suitable unforested land in some provinces, while permitting settlement enclaves within forested areas in others. Funds provided to the Ministry of Population and Environment to monitor transmigration were not used during the planning period, and regional governments often found themselves unable to resolve competing land claims. But although such factors caused delays and confusion, the involvement of these agencies represented an important step forward in the process of reconciling development options, stimulating comprehensive area development planning, and alerting central government officials to emerging land shortages.

1.28 Farm Model. The Repelita III transmigration program was based primarily on rainfed food crop agriculture. In support of this model, settlement was to be restricted to areas with less than 8% slope, 1.25 ha of land were cleared per household, and an agricultural package consisting of seed and fertilizer was provided to each transmigrant family for 3 years. Extension officers were also to be stationed in transmigration sites, and an expanded agricultural research program was initiated to improve farming systems on the acidic red-yellow podzolic soils common in the settlement areas. As part of this research and extension effort, trials were carried out on liming (to improve acid soils), soil conservation and weed control.

1.29 While recent studies indicate that most migrants have been able to meet their subsistence needs (see Chapter II), incomes from agriculture have been disappointing due to the low inherent fertility of the soils and the difficulties of providing timely inputs and reasonable extension in remote areas and of maintaining reasonable levels of fertilizer use once free supplies ceased. Many new tidal sites also had production problems. For these reasons, a midterm review of the Repelita III transmigration program carried out by transmigration consultants concluded that the farm model used was a major constraint to the successful implementation of the program. The review recommended allocating more money to agricultural development and shifting to more productive settlement models including irrigated food crops and tree crop development.

1.30 In recognition of these problems, a number of steps were taken during Repelita III to expand tree crop development for transmigration. Early in the plan a program was announced to settle 48,000 transmigrant families on NES schemes. Only about 8,000 families were settled on such schemes although considerably more trees had been planted than had been allocated to migrants by the end of Repelita III. Later, arrangements were made for sites identified under the transmigration program, but suitable for tree crops, to be used by the Directorate General of Estates (DGE) as tree crop schemes. However, little progress was made in developing needed programs for tree crop establishment on older sites.

1.31 Unassisted Migration. During Repelita I and II, all official migrants were, to the extent possible, intended to receive equal benefits, and a standard program was developed for this purpose. Partially assisted programs were small and differed little from the regular program; but those moving outside the official transmigration stream received little or no assistance from the Government. In Repelita III, however, several steps were taken which were intended to facilitate unassisted movement, including the formation of a Directorate for Self-Initiated (Swakarsa) Movement, the completion of several studies on partially assisted settlement, and the inclusion of unassisted migrants in official targets. Although the Directorate remained weak and most proposed programs were not implemented, changes made in Repelita III signaled the Government's interest in promoting spontaneous movement to already existing sites (see also Chapter VII).

1.32 Organizational Arrangements. Organizational arrangements are described in detail in Chapter VIII. As might be expected, with the number of agencies involved in the Repelita III program, the integration of planning and

budgeting was complex, on-site coordination proved difficult to achieve, and reporting, monitoring and evaluation were complicated. Although improvements were made in the course of the five-year plan, the persistence of serious coordination problems throughout Repelita III led directly to the formation of a new Ministry of Transmigration in Repelita IV.

1.33 Emerging Issues. Prior to Repelita III the transmigration program had been modest (10-15,000 families per year) and individual settlements were small (200-500 families per site). Under these circumstances both the social and environmental impact were relatively limited. The seven-fold expansion of the program in Repelita III, coupled with the prospects of ever-increasing targets in subsequent five year plans, however, raised concerns about the rights of local people and the impact of the program on them and about the effect of the program on forests and wildlife. These issues, which are discussed in detail in Chapter V, emerged rather late in Repelita III as the scale of the program gradually became evident, but foreshadowed what were to become important concerns about the program scale and implementation in Repelita IV.

### C. The Repelita IV Transmigration Program

#### Program Formulation

1.34 In planning for Repelita IV (1984-89), the Government recognized that adequate growth of both incomes and employment were key requirements for economic development and social stability. It also recognized that these objectives would be much harder to achieve in the late 1980s than in the previous decade when growth in both incomes and public expenditures was buoyed by rapidly increasing oil revenues. Under these circumstances, employment generation through labor-intensive investment was given high priority, and transmigration was seen as a major vehicle for job creation. Encouraged by the achievements of Repelita III, the Repelita IV plan proposed to settle 750,000 families in the outer islands. Of these, about 425,000 (60%) were to be settled under the fully sponsored program, including about 110,000 families to be settled on NES tree-crop schemes.<sup>3/</sup> The cost of this program (excluding tree crop development) was projected at Rp 2.9 trillion (US\$2.6 billion) in current terms. In recognition of problems encountered in the Repelita III program, a number of changes were made prior to Repelita IV. The first and most important was the formation of a new Ministry of Transmigration (MOT) responsible for site selection and land preparation (formerly in the Ministry of Public Works) as well as settlement and development (functions previously in the DGT). The formation of a Ministry devoted entirely to transmigration was intended both to affirm the importance of transmigration in the national development program and to improve coordination. Budgets for some functions such as the provision of education and health were given to the MOT, although the Ministries of Agriculture and Home Affairs retained control over their own funds.

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<sup>3/</sup> Different figures were issued at various times prior to Repelita IV and numbers varied widely. These figures were set as the program was about to begin.

1.35 Organizational changes were also made as a part of the Government's general effort to decentralize planning and implementation. The most important of these was to shift the procurement of goods and services from central to provincial agencies and from provincial to district levels. Other changes, begun in Repelita III, included increasing the emphasis on tree crops and unassisted movement. The gradual acceptance of tree crop models was reinforced by surplus rice production in Indonesia as a whole, and by continuing low incomes in both upland and tidal food crop sites. Proposals were developed for an accelerated oil palm development program covering 300,000 ha, and for utilizing private estates to establish tree crops for both local people and transmigrants. The interest in spontaneous migration also increased, necessitated in part by financial constraints.

1.36 In addition, Government emphasized a number of new elements in the Repelita IV program:

- (a) Farm models were to be diversified. In addition to integrated farming and tree crops, models were to be developed for livestock, fisheries, industry and mining.
- (b) Increased participation of indigenous people in settlement projects was to be encouraged. During Repelita III the number of local people in transmigrant settlements was fixed at about 10%, but in Repelita IV this was to depend on the needs and interests of the local population.
- (c) Increased attention was to be given to the development of existing sites. Second-stage development was to be encouraged and carried out in cooperation with the private sector wherever possible.

1.37 To assist the Government in preparation of the Repelita IV program, early in the plan period the World Bank appraised a second project primarily for site selection and evaluation (Transmigration V, Ln 2578-IND). This project was intended to identify sites for an additional 200,000-300,000 families and to improve procedures for taking environmental and social factors into account in site selection (see Chapter V). In addition, it provided technical support for supervision of land clearing contractors and for institutional development.

#### The Start-up of the Repelita IV Program

1.38 Between April 1984, when Repelita IV began, and June 30, 1987, about 179,000 families were settled under the fully sponsored program, 17,000 families were settled on partially assisted programs, and an additional 281,000 families were identified that had moved spontaneously (see Table 1.4 and Annex 1, Table 2). It is important to re-emphasize that registration procedures intended to count unassisted migrants in receiving provinces had not yet gone into effect, and that the total number moving may have been larger. Nevertheless, these 477,000 "official" families roughly equalled the Government's target of about 150,000 families/year including both sponsored and spontaneous settlers.

Table 1.4: SETTLEMENT FROM APRIL 1, 1984 THROUGH JUNE 30, 1987  
BY TYPE OF MIGRANT FAMILY AND ISLAND

Island	Sponsored	Partially assisted	Spontaneous /a	Total
Sumatra	99,100	8,600	183,800	291,500
Kalimantan	44,900	5,800	73,500	124,200
Sulawesi /b	25,500	2,400	18,700	46,600
Irian Jaya	9,400	50	5,100	14,550
<u>Total</u>	<u>178,900</u>	<u>16,850</u>	<u>281,100</u>	<u>476,850</u>

/a Partial enumeration based on government records.

/b Includes the Moluccas and other small eastern islands.

Source: Figures provided by the Ministry of Transmigration.

1.39 In the first three years of the plan period, however, the transmigration program encountered several major implementation problems. First, new organizational arrangements, new people in key positions in the MOT, plus the relocation of staff from the Ministry of Public Works to MOT caused predictable adjustment problems. Second, the decentralization of procurement, which entailed the introduction of new procedures at the provincial level, caused delays in the tendering of land clearing and settlement contracts. Third, production problems in tidal sites combined with financial constraints in the Ministry of Public Works led to a slowdown in the development of swamp reclamation areas. Finally, with the large number of settlements under MOT authority, funds were needed in increasing amounts for upgrading activities in existing sites. It is noteworthy that the availability of upland sites was not a major constraint to the start-up of Repelita IV.

1.40 It was also clear that the very large scale of transmigration had heightened the visibility of the program and polarized views on its merits, particularly outside of Indonesia. Some criticism directed toward the program was based on faulty information about the Government's intentions and methods of implementation, and the Government made an effort to address these through a series of meetings coupled with visits both to successful and less successful sites. Other criticism was directed at the Government from single issue interest groups, which were often unaware of the difficult trade-offs involved. Finally, still different concerns were registered by Indonesians and others, who were sympathetic to government objectives, but concerned about high targets, implementation problems and the social and environmental impact of the program.

Program Revisions as a Result of Declining Oil Revenues

1.41 In January 1986, oil prices fell and declining revenues caused Government to cut the proposed budget. The overall development budget was cut from Rp 10.7 trillion in FY85/86 to Rp 8.3 trillion in FY86/87, a reduction of 22% in nominal terms; and the transmigration sector budget was reduced from Rp 578 billion in FY85/86 to Rp 325 billion in FY86/87, a reduction of 44% in budgeted funds, and a decrease of about 10% when compared to FY84/85 expenditures. In response, the MOT reduced its FY86/87 targets for settlement on sites already under preparation from 100,000 families to 36,000 fully sponsored families (26,000 families on food-crop schemes and 10,000 on tree-crop schemes). An additional 20,000 families were targeted to receive tree crops under partially assisted programs.

1.42 In May 1986 the MOT budget was further reduced to about Rp 208 billion or about 58% of FY 84/85 expenditures (the last year for which data are available). Under these circumstances priority was given to the maintenance and upgrading of existing sites, to the completion of projects already underway, and to institutional development. All land clearing in new areas was deferred, except on externally assisted projects expected to settle no more than 3,000-5,000 families/year. With these changes, the MOT began to emphasize improvement in the quality of settlements in order to improve migrant welfare and to attract spontaneous migrants.

1.43 These revisions have significant implications for the transmigration program. Since the upgrading of existing sites is being given highest priority and no land clearing is being carried out on new sites, sponsored settlement is expected to drop in Repelita IV. The total number of sponsored and partially assisted settlers is not expected to significantly exceed the number settled by June 1987 (195,750 families). This would result in settlement levels of about 1.0 million people in Repelita IV, or about two thirds the number settled on sponsored programs in Repelita III.

1.44 To adjust to these new conditions, the Government and the Bank have reviewed the Transmigration V project and reduced funds allocated for new site selection and settlement planning. Technical assistance for the supervision of land clearing has been redirected to road maintenance. Given resource constraints, the remainder of Repelita IV is expected to be a period of (a) upgrading and consolidation on existing sites; (b) institutional development and training; (c) planning for Repelita V with more attention to second stage development, regional development and environmental considerations; and (d) policy formulation intended to promote spontaneous movement in Repelita IV and beyond.

## II. MIGRANT WELFARE

### A. A Comparison of Income in Sending and Receiving Areas

#### The Data

2.1 In the past five years a number of transmigration studies have provided information on migrant incomes and expenditures.<sup>1/</sup> Of these, the most comprehensive was a Bank-assisted income survey carried out by the Ministry of Transmigration and the Central Bureau of Statistics (BPS) in February 1985. This chapter draws heavily on the results of the BPS survey because the raw data were available to Bank staff for analysis, and the BPS survey, which was drawn from the National Social-Economic Survey (Susenas), permitted comparisons between transmigrant and nontransmigrant households.

2.2 The BPS transmigration survey was carried out in 110 villages in about 22 locations in seven major receiving provinces. In each village, 20 households were randomly selected for interviews and, in total, 2,200 households in Repelita II and III transmigration sites were covered. About 46,000 families lived in survey villages, slightly over 10% of all families moved in Repelita II and III.

2.3 The sampling framework adopted by BPS reflected the distribution of migrants by farm model, period of settlement (Repelita), and class of migrant (sponsored/spontaneous) as of December 31, 1982, when survey preparation began. Upon completion, the survey covered 12 upland and 7 tidal sites, plus two nucleus estate projects, and it included both successful and unsuccessful sites. A list of sites, dates of settlement, population and sample size is provided in Annex 2, Table 1. In order to compare the incomes of transmigrant and nontransmigrant households, BPS extracted a sample of rural households in sending and receiving provinces from the 1984 Susenas. This sample included 17,241 households in rural Java and 2,831 households in rural areas in the seven receiving provinces covered by the transmigration study.

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1/ Small-scale surveys: Marshal Khan, "An Inquiry into the Agricultural Economy in Singkut," UNDP/FAO Project INS/78/012, December 1980; Robert Stuart, "Employment in Singkut, 1983," Euroconsult, 1983; Barbara Chapman, "Diet and Production Survey of Sitiung, West Sumatra," Tropsoils Project, December 1984; Levine, et al., "Transmigrants and Tolakis in Kecamatan Tinanggea, Southeast Sulawesi," December 1982; and, Levang and Marten, "Sembamban I: Agro-economic Survey of a Transmigration Center on South Kalimantan," Indonesia-Orstom Transmigration Project, Jakarta 1984. Large-scale surveys: BPS Transmigration Income Survey, 1985; Smallholder Cattle Development Project Socioeconomic Impact Survey, 1985; and MOT survey by the Directorate for Economic Development. These studies are described in Annex 7.

2.4 As with any large-scale socioeconomic survey, there are some problems in interpreting BPS data. For example, income from agriculture is based on the farmers' estimates of the value of annual crop production (both sold and consumed); yields and incomes are then divided by twelve to get the average monthly household income from agriculture. This is deemed necessary because of the seasonality of agricultural work. In contrast, household incomes from other productive activities such as handicrafts, construction, trade and transport are recorded for three months and divided by three to get monthly income (again assuming some seasonality) while wages, pensions and rent are recorded for only one month. This may have the effect of slightly understating agricultural income which must be recalled over a longer period of time.

2.5 A second problem is that only a limited number of responses are possible on income from food crops, and respondents on the average report less than three crops. This means that only major commodities are fully recorded and incomes from home gardens are underreported. Based on BPS expenditure data, the margin of error appears to be about Rp 1,000-2,000/capita/month or about Rp 5,000-10,000/household/month.<sup>2/</sup> These problems are not serious when comparing populations within the BPS survey, but they lead to difficulties when comparing the data to other transmigrant surveys that record agricultural incomes in more detail. Despite this, the BPS income survey, when complemented by other surveys and micro level studies, provides the best information collected to date on migrant incomes, patterns of employment and welfare considerations in Repelita II and III settlements.

#### Incomes in Sending and Receiving Areas

2.6 Table 2.1 summarizes the results of the 1984 Susenas in rural areas of sending and receiving provinces and of the 1985 transmigration income survey. This sample shows average household incomes in 1984 of Rp 62,000/month in sending provinces and Rp 83,000/month in receiving provinces. If 1984 figures are updated to 1985 prices to make these figures comparable to the transmigration survey, average monthly household incomes are Rp 59,000 (US\$53) in transmigration sites, Rp 67,000 (US\$61) in sending areas, and Rp 91,000 (US\$82) in receiving areas. (All dollar figures assume the exchange rate of Rp 1,100/US\$1.00 in effect at the time this report was prepared.)

2.7 As noted, there are some problems in interpreting these data. For example, the fact that the value of home garden production is understated means that the incomes of subsistence food producers (such as transmigrants) are also understated if compared to rural residents depending on wage incomes to cover food expenses. In addition, many migrants may have been on site for only two to three years and, therefore, may not have reached stable income levels; and migrant households in general may be slightly smaller and younger than other households and have lower incomes because of this. On the other

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<sup>2/</sup> A 1983 survey in transmigration sites in Lampung estimated home garden production at Rp 51,750 annually. If updated to 1985 prices and divided by 12 this would also be about Rp 5,200/household/month.



hand, the purchasing power of households in the inner islands and the outer islands differs. In many more remote outer island areas, prices are higher than they are in Java and a higher income is required for a comparable standard of living.

Table 2.1: COMPARISON OF TRANSMIGRANT INCOMES WITH INCOMES IN SENDING AND RECEIVING PROVINCES

	Sample	Average household income (Rp/month)	Average expenditures as a % of income	Average household income in 1985 prices	
				Rp/month	US\$/year
<u>Rural Sending Areas - 1984</u>					
West Java	3,452	67,702	90	73,660	804
Central Java	3,527	53,537	85	58,248	635
D.K. Yogyakarta	1,275	66,970	83	72,863	795
East Java	4,155	58,764	84	63,935	697
Bali	1,461	77,047	78	83,827	915
NTB	1,506	56,208	83	61,154	667
<u>Total</u>	<u>15,376</u>	<u>61,738</u>	<u>85</u>	<u>67,171</u>	<u>733</u>
<u>Rural Receiving Areas - 1984</u>					
Riau	380	104,951	84	114,187	1,246
South Sumatra	883	79,305	95	85,284	941
Central Kalimantan	271	76,894	91	83,661	912
South Kalimantan	229	75,091	95	81,699	891
East Kalimantan	393	89,865	86	97,773	1,066
Central Sulawesi	195	58,407	79	63,547	693
Southeast Sulawesi	480	86,346	81	93,944	1,025
<u>Total</u>	<u>2,831</u>	<u>83,396</u>	<u>88</u>	<u>90,735</u>	<u>990</u>
<u>Transmigrants in Receiving Provinces - 1985</u>					
Riau	300	65,513	95	65,513	715
South Sumatra	981	52,888	87	52,888	577
Central Kalimantan	320	39,131	97	39,131	427
South Kalimantan	239	55,131	97	55,131	601
East Kalimantan	100	107,893	63	107,893	1,177
Central Sulawesi	100	60,231	78	60,231	657
Southeast Sulawesi	160	89,062	57	89,062	971
<u>Total</u>	<u>2,200</u>	<u>58,343</u>	<u>84</u>	<u>58,343</u>	<u>636</u>

Source: Sending and receiving areas, 1984 Susenas; transmigration areas, BPS Transmigration Income Survey, 1985.

2.8 If we were to assume that transmigrant incomes understate the value of agricultural production by Rp 10,000/month, transmigrants would have average incomes that are about the same as those in sending areas, but are still less than incomes in the outer islands. The relative success of rural families in the outer islands is due almost entirely to higher incomes from tree crops (Rp 16,000 in the outer islands vs. Rp 2,985 for those in sending areas and Rp 1,660 for transmigrants), as food crop incomes cover the same range in all groups (see Annex 2, Table 2).

2.9 The fact that adjusted average transmigrant incomes are about the same as average incomes in sending areas does not mean that individual transmigrants are no better off than they were in Java. The World Bank's poverty index for Indonesia is about Rp 10,000/capita/month or Rp 50,000/household/month. Fully 40% of rural Javanese households in the BPS survey fell below this figure in 1984. Virtually all transmigrants are drawn from these lower income households, but in transmigrant communities 50% of all families are above the poverty level. This is a significant achievement. Transmigrants also have assets that are not valued in the income survey. They own land, a house, and possibly livestock; they have the means to meet subsistence needs and they have reduced expenses for items such as housing.

2.10 These considerations are reflected in the judgement which migrants make of their own situations. As Table 2.2 indicates, when asked whether they are better off or worse off than before transmigration, about two thirds of all migrants say they are better off than they were, while 23% of Repelita II migrants and 14% of Repelita III migrants feel they are worse off. This relatively high proportion of "dissatisfied customers," in comparison with earlier studies, reflects the inclusion in this study of migrants in critical sites.

Table 2.2: TRANSMIGRANT REPORTS ON INCOMES IN TRANSMIGRATION AREAS COMPARED TO THOSE PRIOR TO TRANSMIGRATION

	Repelita II	Repelita III	Total
<u>Percent reporting that their incomes are:</u>			
Better	66	67	67
Worse	23	14	16
Just as good	10	17	15
Just as bad	1	2	2
(Sample)	(540)	(1,598)	(2,138)

Source: BPS Transmigration Income Survey, 1985. Three villages (60 people) with migrants arriving in 1984 are excluded from this sample since they have no income from agriculture yet.

Income Distribution

2.11 Data on income distribution are shown in Table 2.3. Five income benchmarks are given. At the lower end of the spectrum, Rp 20,000/month/household generally implies serious deprivation; Rp 30,000/month/household is regarded by Government as the minimum subsistence level, defined as 240 kg

Table 2.3: DISTRIBUTION OF HOUSEHOLD INCOMES AMONG  
TRANSMIGRANTS AND NONTRANSMIGRANTS

	Sample size	Monthly household incomes (% households)				
		Under Rp 20,000	Under Rp 30,000	Under Rp 50,000	Over Rp 75,000	Over Rp 100,000
<u>Sending Areas - 1984</u>						
West Java	3,452	4	10	37	31	16
Central Java	3,527	8	23	59	18	9
D.K. Yogyakarta	1,275	5	14	44	29	16
East Java	4,155	6	19	53	22	11
Bali	1,461	1	6	30	40	21
NTB	1,506	8	24	55	21	10
<u>Total</u>	<u>15,376</u>	<u>5</u>	<u>15</u>	<u>43</u>	<u>25</u>	<u>13</u>
<u>Receiving Areas - 1984</u>						
Riau	380	0	2	9	72	46
South Sumatra	883	2	5	26	42	23
Central Kalimantan	271	1	1	24	47	20
South Kalimantan	229	2	6	29	40	24
East Kalimantan	393	2	6	22	51	31
Central Sulawesi	195	2	5	44	19	8
Southeast Sulawesi	480	1	5	24	52	31
<u>Total</u>	<u>2,831</u>	<u>1</u>	<u>4</u>	<u>24</u>	<u>48</u>	<u>27</u>
<u>Transmigrants - 1985</u>						
Riau	300	4	10	34	39	16
South Sumatra	981	9	25	59	19	10
Central Kalimantan	320	11	32	68	10	3
South Kalimantan	239	1	11	46	26	10
East Kalimantan	100	1	4	12	71	49
Central Sulawesi	100	0	17	50	19	10
Southeast Sulawesi	160	2	2	21	34	13
<u>Total</u>	<u>2,200</u>	<u>6</u>	<u>20</u>	<u>50</u>	<u>26</u>	<u>13</u>

Source: BPS Transmigration Income Survey, 1985.

milled rice equivalent per capita per year,<sup>3/</sup> and Rp 50,000/month/household is about equal to the poverty level in the inner islands and in the provinces to which a majority of transmigrants are sent. At the upper end of the spectrum, Rp 75,000/month/household is a figure at which food consumption begins to decline as a percentage of total household expenditures, implying that food needs have been met. These benchmarks have been developed and used in conjunction with the Susenas data in the past, but are subject to the interpretation problems mentioned earlier.

2.12 In the sample from the 1984 Susenas, about 5% of rural households in sending areas and 1% of rural households in receiving areas fell below Rp 20,000/month, while about 6% of transmigrant incomes were below this level in 1985. Similarly, in 1984 about 15% of households in sending areas and 4% of households in receiving areas fell below Rp 30,000/month compared to 20% of migrant households. Using Rp 50,000/household/month as a cutoff point for the poverty line, 40% of inner island households, 24% of households in receiving provinces, and 50% of migrant households fell below this amount. About 25% of inner island households and 26% of transmigrant households exceeded Rp 75,000/month, compared to 48% of outer island households. About 13% of inner island and transmigrant households make more than Rp 100,000/month compared to 27% of outer island households.

2.13 In summary, both the level and distribution of transmigrant incomes closely resemble those in sending areas. According to these data, perhaps 20% of migrant households are near subsistence levels, but fully 50% are above the poverty line. This is a significant accomplishment. Migrant incomes do, however, vary considerably between receiving provinces. Those in East Kalimantan and Southeast Sulawesi appear to be doing as well or better than their local counterparts, while those in sites sampled in South Kalimantan, South Sumatra and Central Sulawesi are not doing as well. It is noteworthy that surveyed migrants in Central Kalimantan are very poor. More detailed analysis by province is not possible, as the numbers in most provinces are small. Further analysis therefore focuses on the factors affecting migrant success within the total migrant population.

#### B. Factors Determining Transmigrant Incomes

##### Farm Model and Length of Time on Site

2.14 Perhaps the most important findings in the BPS survey are related to income differences by farm model and length of time on site. As Table 2.4 indicates, the highest average monthly household incomes in transmigrant communities are in earlier (Repelita II) swamp reclamation (tidal) sites while the lowest average incomes are in recent (Repelita III) tidal sites. Recent upland sites based on rainfed food crop agriculture are doing somewhat better than older upland sites in this sample, and those with tree crops have

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<sup>3/</sup> Milled rice retailed at about Rp 300/kg in 1984/85 when the survey was done. Therefore the calculation is 240 kg/person x 300 Rp/kg x 5 people = Rp 360,000/12.

intermediate income levels and no apparent change in total income between Repelita II and Repelita III sites. The sample size for migrants with tree crops is too small to provide statistically significant results.

Table 2.4: INCOME AND INCOME DISTRIBUTION, BY FARM MODEL AND REPELITA /a

	Sample size	Family income (Rp/mo)	Income per capita per month (% sample)			
			Under Rp 6,200/b	Rp 6,200 to 10,000/c	Rp 10,000 to 20,000	Over Rp 20,000
<u>Repelita II</u>						
Tidal	99	77,697	11	16	54	19
Upland	341	52,825	33	24	30	13
Upland/trees /d	100	66,595	13	29	35	23
Subtotal	<u>540</u>	<u>59,934</u>	<u>25</u>	<u>24</u>	<u>35</u>	<u>16</u>
<u>Repelita III</u>						
Tidal	501	39,791	38	35	21	6
Upland	977	65,801	10	26	43	21
Upland/trees /d	120	63,923	12	23	42	23
Subtotal	<u>1,598</u>	<u>57,505</u>	<u>19</u>	<u>29</u>	<u>36</u>	<u>16</u>

/a Total sample of 2,138 excludes three villages of migrants who arrived mainly in 1984 (without time to establish comparable agricultural production before the survey).

/b The Government's minimum subsistence level per year, or the consumer value of 240 kg milled rice per year.

/c The World Bank's projection of the absolute poverty level.

/d Tree crops not yet in production.

Source: BPS Transmigration Income Survey, 1985.

2.15 These findings are also reflected in the proportion of migrants in different income brackets. For purposes of this analysis, it was possible to divide total family income by the number of people in each household to calculate a monthly per capita income figure. The findings are striking. As Table 2.4 indicates, more than one third of settlers in the poorest type of sites (Repelita II upland and Repelita III tidal sites) have incomes below the subsistence level, in contrast to about 10% of settlers in other types of sites. Similarly, nearly 60% of settlers in Repelita II upland sites and nearly three quarters of those in Repelita III tidal sites are below the absolute poverty level, while the number in other groups is only about one third. These figures have been reviewed with officials in the Ministries of Transmigration and Agriculture who confirm that older rainfed sites have lower

incomes than more recent ones and that a number of Repelita III tidal sites have serious production problems. Tidal sites are also heavily represented on the MOT's list of least successful sites. About 40% of sites on this list are swamp reclamation sites, even though these sites were only 18% of all those settled in Repelita III.

2.16 In order to determine whether these communities are covering their nutritional requirements, Table 2.5 shows food crop production from major subsistence crops averaged over all households in the six samples. These data show significant surplus production from Repelita II tidal sites, sufficient production in Repelita III upland sites to cover the communities' nutritional requirements, and production below the levels required for community self-sufficiency in Repelita II upland sites and Repelita III tidal sites. Sites based on tree crops do not meet their subsistence needs from food production, but from wage work that is a part of the development program.

Table 2.5: PERCENT OF COMMUNITY ENERGY REQUIREMENTS MET FROM REPORTED PRODUCTION, BY FARM MODEL AND REPELITA /a

	Sample size	Average production (kg/family)			% community energy requirements from own production
		Rice /b	Corn	Cassava	
<u>Repelita II Sites</u>					
Tidal	99	1,484	473	437	185
Upland	341	592	86	925	88
Upland with tree crops /c	100	603	38	1,076	89
<u>Repelita III Sites</u>					
Tidal	501	740	150	357	87
Upland	977	788	249	753	116
Upland with tree crops /c	120	481	118	1,233	95

/a Total sample of 2,138 excludes 3 villages of migrants arriving mainly in 1984.

/b Unmilled rice.

/c Tree crops not yet in production.

Source: BPS Transmigration Income Survey, 1985.

2.17 These data are also supported by farmers' reports on the amount of rice sold. Table 2.6 shows annual rice production, sales, and value of sales. On average, farmers in Repelita II tidal sites are the only sponsored transmigrants in the income survey who sell a significant (US\$106) amount of rice. All other farmers, on average, sell less than US\$25 of rice per year.

This indicates that while rice production is undoubtedly important for home consumption, it is not a major source of cash income for transmigrants, other than those in early tidal sites. These data also suggest that a major determinant of migrant welfare is the type of site to which the migrant is moved. Questions of sustainability will be reviewed in Section C.

Table 2.6: ANNUAL PRODUCTION AND MARKET SALES OF RICE FOR SPONSORED TRANSMIGRANTS BY FARM MODEL, 1985 /a

	Sample size	Rice /b produced ----- (kg/family) -----	Amount of rice sold /b -----	Reported value of sales (Rp'000)
<u>Repelita II</u>				
Tidal	79	1,620	790	117
Upland	291	600	110	29
Upland with trees	80	530	20	6
<u>Repelita III</u>				
Tidal	406	730	140	20
Upland	816	840	200	27
Upland with trees	95	540	90	10
<u>Overall Average</u>	<u>1,767</u>	<u>780</u>	<u>180</u>	<u>28</u>

/a Sponsored transmigrants who arrived in 1984 are omitted from this table because they would have just begun agricultural production.

/b Unmilled rice.

Source: BPS Transmigration Income Survey, 1985.

#### Sources of Household Income

2.18 BPS Survey. BPS data on sources of migrant income are summarized in Table 2.7 by Repelita and farm model. These data indicate several important points:

- (a) Incomes from food crops and agricultural production are generally low. Less than one quarter of total income is from food crops, except in older tidal sites where the amount is one third. Less than half of income in any farm model is from agriculture.

Table 2.7: SOURCE OF INCOME BY FARM MODEL AND REPELITA, BPS SURVEY  
(Average Monthly Household Income)

	Sample size	Food crops	Total agri-culture /a	Wages	Other	Govt. assist- ance	Total
<u>Values (Rp)</u>							
<u>Repelita II</u>							
Tidal	99	24,787	32,859	15,803	28,467	567	77,696
Upland	341	10,557	15,176	16,337	17,278	4,032	52,823
Upland with trees	100	7,781	32,761	9,034	20,385	4,415	66,595
Subtotal	<u>540</u>	<u>12,652</u>	<u>21,674</u>	<u>14,887</u>	<u>19,905</u>	<u>3,468</u>	<u>59,934</u>
<u>Repelita III</u>							
Tidal	501	9,954	16,214	4,619	13,898	5,060	39,791
Upland	977	15,321	23,294	14,807	17,651	10,049	65,801
Upland with trees	120	9,636	17,195	25,008	14,962	6,758	63,923
Subtotal	<u>1,598</u>	<u>13,212</u>	<u>20,616</u>	<u>13,012</u>	<u>16,844</u>	<u>7,033</u>	<u>57,505</u>
<u>Percentages (%)</u>							
<u>Repelita II</u>							
Tidal	99	32	42	20	37	1	100
Upland	341	20	29	31	33	8	100
Upland with trees	100	12	49	13	31	7	100
Subtotal	<u>540</u>	<u>21</u>	<u>36</u>	<u>25</u>	<u>33</u>	<u>6</u>	<u>100</u>
<u>Repelita III</u>							
Tidal	501	25	41	12	35	13	100
Upland	977	23	35	23	27	15	100
Upland with trees	120	15	27	39	23	11	100
Subtotal	<u>1,598</u>	<u>23</u>	<u>36</u>	<u>23</u>	<u>29</u>	<u>12</u>	<u>100</u>

/a Includes food crops.

Source: BPS Transmigration Income Survey, 1985.

(b) The two farm models with the lowest incomes, i.e., older upland and new tidal sites, both have average incomes from food crops of about Rp 10,000/month. However, farmers in recently settled tidal areas also have very low off-farm incomes, and about one third of the wage work in other food-based sites.<sup>4/</sup>

<sup>4/</sup> The reason for this is unclear. Access is a difficult problem in tidal sites, but Repelita II sites which are also in remote areas report wages which are three times as high.



- (c) The farm models with the highest total agricultural incomes, Repelita II tidal and tree crops, also have the highest incomes under "other," a category which includes handicrafts, small enterprises, trade, transport and construction. This may indicate that these communities are turning surplus agricultural production into other forms of employment, particularly in small industries and services.

2.19 The proportion of total income from off-farm work varies significantly between sites in the BPS survey (see Annex 2, Table 3) and ranges from one-third in Sei Rateh (a tidal site) and Teluk Dalam (an upland site) to more than two-thirds in 8 of the 22 locations. The relatively low incomes from agriculture in relation to previous expectations, and the high incomes from nonagricultural work, have significant implications for an understanding of the transmigration process.

2.20 Other Survey Findings. Since there is some concern that the BPS survey may underreport agricultural income, BPS data were compared with a number of other studies. For example, an IFAD-assisted project to provide cattle to transmigrants also carried out a study in February 1985, the same month as the BPS study. It differs from the BPS survey in several respects. All smallholders who were interviewed were, in theory, full-time farmers eligible to receive cattle under the livestock distribution program. Of the 1,200 families interviewed, 600 had received cattle and 600 had not. Since cattle in this project are distributed first to leading farmers, the 600 recipients are probably representative of the best farmers in transmigrant communities. A second difference is that the study covered only gross cash income and did not estimate the value of subsistence production. Even though nonagriculturalists were excluded from this study, the survey found that 42% of cash income was from off-farm work, with the percentage ranging from 30% to 75% over 21 IFAD sites and adjacent areas (Table 2.8).

2.21 Several other studies have shown equally high incomes from off-farm work. For example, SCET, the firm that supervised initial development of the Bank-assisted site at Baturaja, noted that two-thirds of family income was from off-farm activities in the initial years, particularly from wage work associated with tree crop establishment. Similar studies carried out by Euroconsult in six Repelita II settlement sites in Singkut showed 75% of cash income from off-farm work. The same survey in an adjacent World Bank-assisted site in Kubang Ujo showed 81% of cash income from off-farm work. MOT surveys, described more fully in Section C, also report more than 40% of total family income from wage work.

2.22 Even though the BPS, IFAD and Euroconsult surveys are not entirely comparable, due mainly to the difference in handling production consumed at home, the figures for off-farm work are consistently high (Table 2.8). Several possibilities exist to explain this. First, farmers may be attracted to the certainty of wage work generated by site development. Second, farmers may be experiencing declining yields due to poor soils or a lack of inputs, forcing them to find off-farm work. It is also possible that recent settlers, benefiting from improved site selection and services, will find agricultural production more remunerative and will not seek off-farm work so readily in the future.

**Table 2.8: MONTHLY HOUSEHOLD INCOMES FROM THE  
IFAD AND EUROCONSULT BPS AND MOT SURVEYS**

	Sample size	On-farm income	Off-farm income ----- (Rp) -----	Total income	Off-farm income as % of total
<u>Gross Cash Income /a</u>					
IFAD	1,200	18,000	13,000	31,000	42
Euroconsult /b	180	8,000	25,000	33,000	75
<u>Net Income /c</u>					
BPS-Repelita II /d	341	33,000	20,000	53,000	38
BPS-Repelita III /d	977	23,400	43,000	66,000	65
MOT-Development stage	389	30,000	24,000	54,000	44
MOT-Stabilization stage	413	41,000	34,000	74,000	46

/a Excludes the value of agricultural production consumed by the household.

/b Survey conducted in April 1983 in Singkut transmigrant site, Jambi Province. Off-farm income includes pensions. Singkut was settled from 1974 to 1979.

/c Includes the value of agricultural production consumed by the household. Excludes government subsidies and pensions.

/d Sponsored migrants in upland sites only.

2.23 Government officials tend to believe that transmigrants neglect their farming because of the wide availability of off-farm work generated by transmigration development, and should this source of work disappear, transmigrants would return to agriculture. Other observers believe that agricultural production is limited and that if off-farm work declines, incomes will suffer. These important issues are considered again in Chapters V and VI. Whatever the case, these data suggest that many transmigrants currently find off-farm work more remunerative than full-time agriculture. The data provide a striking contrast to the widely held picture of transmigrants as subsistence agriculturists largely isolated from the regional economy.

### C. The Sustainability of Settlements

#### Yields and Production over Time

2.24 MOT and BPS. Although many transmigration communities have persisted in the outer islands for several decades, a major question asked of transmigration is whether agricultural production can be sustained on marginal soils and, if so, at what level. To address this question, among others, the MOT Directorate of Economic Development carried out a major income survey in 1985 using MOT staff. This study included 36 upland locations and 5 tidal sites, and covered about 1,500 transmigrant families, all settled in Repelita III. For purposes of MOT analysis, families were divided into those in the

consolidation phase (1 to 1-1/2 years on site), the development period (1-1/2 to 2 years) and the stabilization period (3 to 5 years). The results bear a striking resemblance to those of the BPS survey. As Table 2.9 shows, average monthly incomes in upland sites are about the same in both studies and increase for Repelita III migrants the longer they have been on site. The MOT survey also supports the BPS survey in showing relatively low incomes from food crops (about one-third), and from agriculture in general (about one-half), and significantly lower incomes in recent tidal sites when compared with recent upland sites. MOT has concluded from the evidence of increasing food crop income in the five year period, that migrants are meeting their subsistence needs and increasing their production over time.

Table 2.9: COMPARISON OF BPS AND MOT INCOME SURVEYS

MOT stage/BPS year	Sample size		Total income		Food crop income	
			(Household income, Rp/month)			
<u>Upland Sites</u>						
Consolidation/1983	MOT 396	BPS 194	MOT 28,500	BPS 20,700	MOT 8,600	BPS 12,800
Development/1982	389	175	53,800	54,300	19,300	9,600
Stabilization/1980	413	204	74,100	75,900	25,000	24,800
<u>Tidal Sites</u>						
Consolidation/1983	98	9	12,500	28,100	3,700	3,000
Development/1982	91	133	37,000	33,500	11,700	10,700
Stabilization/1980	91	109	48,200	32,000	22,300	9,900

2.25 However while incomes from food crops in upland sites in the BPS survey are highest for settlers who have been on site for five to six years, they are lower for those who have been on site nine to ten years (Table 2.10). Farmers from this period were not covered in the MOT survey. Rice production in the BPS survey also shows a decline from 800-900 kg p.a. in the first five years to 300-400 kg p.a. in years 8 and 9. These data are difficult to interpret since they are not time series data, but a cross-section of communities settled in different years. Thus, while it is likely that older sites have lower agricultural incomes due to declining soil fertility, it may also be possible that the improved conditions in Repelita III settlements and the large scale of such settlements (which permit the growth of markets and income diversification) will allow income growth after year 5. Neither assertion can be definitely confirmed from the data at this time.

Table 2.10: AVERAGE MONTHLY FAMILY INCOME AND ANNUAL RICE PRODUCTION  
BY YEAR OF ARRIVAL, SPONSORED TRANSMIGRANTS, BPS SURVEY

Year of arrival	Upland sponsored			Tidal sponsored				
	Sample size	Total income ----- (Rp)	Food crop income -----	Unmilled rice production (kg)	Sample size	Total income ----- (Rp)	Food crop income -----	Unmilled rice production (kg)
1974	-	-	-	-	15	110,562	12,528	1,272
1975	66	44,617	9,871	337	15	61,333	26,146	2,767
1976	141	46,887	5,014	506	24	59,539	23,500	628
1977	22	59,796	7,456	2,190	9	39,574	24,293	2,500
1978	61	56,986	7,096	320	14	58,682	27,748	1,221
1979	71	64,895	20,634	1,224	14	64,361	37,977	1,964
1980	204	75,886	24,781	887	109	31,937	9,941	763
1981	286	52,833	13,380	912	159	37,645	9,817	748
1982	175	54,270	9,620	638	133	33,456	10,704	778
1983	194	20,726	12,806	931	9	28,111	3,032	323

Source: BPS Transmigration Income Survey, 1985.

2.26 Migrant Reports. One problem with the previous information is that it is not chronological, that is, it does not document changes on a single site over time. However, some information is available from the BPS survey on changes in production and area under production for the same farmer. Settlers were asked if their present rice production had declined, improved or remained about the same relative to two years ago and if their area under cultivation had increased, decreased or remained the same (Table 2.11). About 40% of settlers overall reported that their rice production was lower than two years previous, and about the same percent reported increased production. Consistent with other results presented in this chapter, settlers on older tidal sites most frequently reported production increases (62% reported an increase), while 40% of Repelita III tidal farmers experienced declining production. Over half (56%) of older upland farmers reported declining production while only 31% showed improvement. About half of all older upland farmers also reported they had less land under cultivation than they had two years previously.

2.27 In contrast with upland areas, where older sites on average have lower levels of production, reasonable production has been maintained in some tidal areas for 20 years or more without fertilizers. Recently, however, as evidenced in Tables 2.10 and 2.11, new sites have experienced serious agricultural problems. These are most likely related to site selection (i.e., location on deep peats and acid soils), inappropriate farm layout, and inadequate pest control. Technical specialists remain optimistic that these difficulties can be overcome, and these findings and their implications are discussed in Chapter V.

2.28 Thus, the data do not tell a uniform story. This may be due to the fact that farmers have good and bad years, and that some sites are improving while others deteriorate. Settlers who take land out of production may be



Transmigrant family with neighbours in front of a new house constructed with wages earned from estate development.

doing so because yields are declining and returns are low, or because off-farm work is increasing, or a combination of both. The lack of conclusive evidence on these issue argues strongly for long-term monitoring of yields and production on representative upland and tidal sites.

Table 2.11: SPONSORED TRANSMIGRANTS' CURRENT RICE PRODUCTION AND AMOUNT OF LAND IN PRODUCTION RELATIVE TO TWO YEARS PREVIOUS /a

Farm model	Sample size	% Increase	% Decrease	% No change
<u>Change in Production Relative to Two Years Previous</u>				
Repelita II				
Tidal	78	62	10	28
Upland	277	31	56	13
Upland with trees	78	44	35	21
Repelita III				
Tidal	396	36	40	24
Upland	606	44	35	21
Upland with trees	76	34	33	33
<u>Overall</u>	<u>1,511</u>	<u>40</u>	<u>39</u>	<u>21</u>
<u>Change in Land Under Production Relative to Two Years Previous</u>				
Repelita II				
Tidal	79	52	14	34
Upland	291	37	47	16
Upland with trees	80	42	39	19
Repelita III				
Tidal	397	43	10	47
Upland	622	39	10	51
Upland with trees	79	53	13	34
<u>Overall</u>	<u>1,548</u>	<u>41</u>	<u>19</u>	<u>40</u>

/a Sponsored transmigrants who arrived after 1982 were omitted from the table because two years previous to the survey they would still have been in their area of origin. This cross-tabulation on yields also omits 37 respondents who did not answer the survey question on change in production.

Source: BPS Transmigration Income Survey, 1985.

### Return Migration

2.29 One additional piece of evidence on the sustainability of settlements comes from information on the number of families who leave transmigration sites. Government estimates that return migration is about 1-2% during the five-year period when settlements are under the authority of the MOT, but these figures have been regarded with some skepticism since higher return rates are typical of large-scale voluntary programs.

Table 2.12: NUMBER OF FAMILIES IN REPELITA II AND III  
TRANSMIGRATION SITES ON ARRIVAL (A) AND IN FEBRUARY 1985 (B)

	Sponsored families			All families /a		
	Settled (A)	1985 (B)	B/A x 100	Settled (A)	1985 (B)	B/A x 100
<u>Repelita II Sites</u>						
Upland	5,483	5,676	109	6,143	6,680	109
Upland with tree crops	1,676	1,703	102	1,702	2,524	148
Tidal	1,255	1,210	96	1,390	1,453	105
Subtotal	<u>8,414</u>	<u>8,589</u>	<u>102</u>	<u>9,235</u>	<u>10,657</u>	<u>115</u>
<u>Repelita III Sites</u>						
Upland	18,265	16,912	93	21,736	21,839	100
Upland with tree crops	2,926	2,952	101	3,434	3,631	106
Tidal	10,770	10,408	97	11,761	11,962	102
Subtotal	<u>31,961</u>	<u>30,272</u>	<u>95</u>	<u>36,931</u>	<u>37,432</u>	<u>101</u>
<u>Total</u>	<u>40,375</u>	<u>38,861</u>	<u>96</u>	<u>46,166</u>	<u>48,089</u>	<u>104</u>

/a Includes sponsored, retired military and local families.

Source: BPS Transmigration Income Survey, 1985.

2.30 BPS data throw some light on this subject. In addition to income data collected by the enumerators, information was collected for each village on the number of transmigrant families on arrival and the number residing in the community at the time of the survey.<sup>5/</sup> As the last column in Table 2.12 indicates, transmigration communities on average maintain their populations and increase their number of households over time. Repelita II sites included in the survey increased an average of 15% and Repelita III sites also show stability or growth in total households. It is evident from the table's first two columns, however, that some turnover of households has occurred. Of the 93 villages where return migration occurred, 23 (26%) show a reduction in the number of sponsored migrants.

2.31 Unfortunately the manner in which the data were collected obscures the actual turnover rate among households. When the sons and daughters of transmigrants grow up and marry, the number of households increases. Some enumerators recorded the increase from the division of sponsored migrant

<sup>5/</sup> The census was conducted in 110 villages and data on return migration were collected for 93 villages covering over 40,000 households.

families under "sponsored migrants," while others included this under the category "other." The records look very different. For example, if a community began with 500 families, 50 left and 70 new families were formed, the first type of record would show a net increase of 20 sponsored families with no record of leavers, while the second type of record would show a loss of 50 households or 10%. To assess the proportion of households leaving transmigration sites, a list was prepared of only those Repelita III villages where the enumerator clearly followed the second procedure and the number of leavers was clear.<sup>6/</sup> Of the Repelita III villages 62% were in this category. These villages show an average turnover rate of 13%, 15% for upland areas, 12% for tree crop areas (consisting entirely of return migration in one government-financed estate in Batulicin) and 9% in tidal areas. Neither turnover by farm model nor by village is closely related to the number of families below the poverty line.

2.32 These figures are not unexpectedly high, nor, of themselves, a cause for alarm. Not all families attracted to transmigration areas are well suited to the transmigration life and the fact that families leave and are replaced attests both to the voluntarism of the program and the pressure on spontaneous migrants to find land. On the other hand, the fact that some few sites lose substantial numbers of settlers (20%) suggests that these sites are doing less well than others and such information could be used to identify potentially serious problems in the field. It is noteworthy that even in poorer areas in the survey there have been few cases of significant abandonment of transmigration sites.

#### D. Other Survey Findings

##### Incomes and Household Characteristics

2.33 Table 2.13 summarizes BPS data on income broken down by the characteristics of migrant households. As the table shows, those few farmers who have retired from the military and elected to settle in transmigration sites have significantly higher incomes than other settlers. This appears to be due entirely to pensions (which average Rp 40,000-60,000/month) rather than to differences in agriculture or household production. Sponsored and spontaneous migrants do about equally well, although spontaneous farmers do not generally obtain the benefits given to sponsored families.

2.34 Of some significance is the fact that local settlers appear to do slightly better in transmigrant communities than transmigrants. This may be due to two factors. First, source of income. Sumatran settlers show higher incomes from trade, while local Kalimantan and Sulawesi settlers have higher government subsidies and pensions. Second, selection. There is some evidence that local families who are not doing well leave transmigration sites and return to their nearby villages. This would tend to bias the sample toward those who have better incomes.

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<sup>6/</sup> Repelita II villages were excluded as most had been handed over to the provinces and recent data are incomplete.



Table 2.13: MONTHLY HOUSEHOLD INCOME BY TYPE OF TRANSMIGRANT (Rp/month)

Type of migrant	Sample size	Total income	Agriculture	Wage income and pensions	Other /a
<u>Type of Movement</u>					
Sponsored	1,800	54,441	18,876	22,370	13,195
Spontaneous	152	56,741	23,533	27,113	16,095
Retired military	57	117,706	16,325	92,056	9,325
Local resident	186	74,045	20,581	33,270	20,194
<u>Area of Origin</u>					
Transmigrants					
Java	1,856	55,757	18,490	24,319	12,988
Bali	133	60,788	18,004	23,924	18,860
Nontransmigrants					
Sumatra	114	71,224	18,252	43,522	9,450
Kalimantan	71	77,977	21,924	27,885	28,168
Sulawesi	24	82,741	23,909	24,412	34,420
<u>Level of Education</u>					
None	435	51,357	19,141	19,529	12,687
Less than primary	798	52,649	17,561	23,167	11,921
Primary	759	61,191	19,866	27,061	14,264
Junior high school	134	81,467	14,759	39,801	26,907
High school	71	76,954	19,356	42,189	15,409
<u>Age of Household Head</u>					
<-20	21	52,046	12,009	25,766	14,271
21-25	198	52,791	16,832	22,654	13,305
26-30	397	55,044	16,847	22,519	15,678
31-35	394	56,608	18,445	26,232	11,931
35 +	1,189	60,179	19,610	26,543	14,026

/a Includes home production other than agriculture (handicrafts, etc.), transport, trade and other nonwage income.

Source: BPS Transmigration Income Survey, 1985.

2.35 Income also appears to be slightly correlated with education, although the data indicate this is due to increased wages and off-farm earnings, rather than increased agricultural production. Since village officials, teachers and the like have slightly higher incomes from wages and also have more education, this can be easily explained. Income is also very slightly related to the age of the household head, but in this case the difference is attributed to increased agricultural production. A breakdown by agricultural income shows small but continuous increases in all categories of agricultural

production including food crops, tree crops and livestock over time. This may be a function of merging upland with tidal populations, as upland sites alone do not show this effect. Increases in agricultural income with the age of the household head are also slight when measured on a per capita basis. A regression analysis run on these variables shows that only the association between retired military and total income is statistically significant.

#### Migrant Perception of Welfare by Site

2.36 The BPS survey included several qualitative questions intended to assess migrants' perceptions of their situation in transmigration areas. These data, summarized in Table 2.14, indicate that over 60% of all migrants in all categories think their incomes have improved over what they were prior to migration. Less than 15% believe their incomes are worse, except in Repelita II upland sites where 31% feel their incomes have deteriorated. About 50% of all migrants believe their incomes have improved over the past two years, but 22% report that they have declined and about the same number report incomes which are the same. On transport, the migrants provide their most negative assessment, with more than two thirds saying that transportation is worse than in the sending area and only 17% saying it is better. About 40% say their health is better and 49% say it is just as good as in Java, while only 11% say it is worse. This reflects improved access to health facilities in transmigration areas and relatively low health standards in the sending areas. Migrants in tidal areas do not say they are less healthy than at home, despite the reputation of tidal areas for having serious health problems. Those that say they have worse health are most frequent in Repelita II upland communities where incomes are very low.

2.37 Among those sites which have both low incomes and negative reports, the most conspicuous are those villages in Pematang Panggang settled in Repelita II. About 46% of farmers in these settlement areas say their incomes are worse than they were before, and 40% say incomes are declining. Fully 34% say their health is worse, more than twice as many as in any other site. Migrants in more recently settled areas of Pematang Panggang are not so negative. Only 8% say they are worse off than before, although 33% say their incomes are declining. They are also well within the range of overall responses on health, with more than 50% feeling that their health is just as good as it was before they moved.

2.38 Several features of Pematang Panggang explain this situation. The community was settled during 1974-84 and has the misfortune to be almost entirely isolated during the rainy season. Road maintenance is poor and a proposed highway which would have penetrated the area has not been constructed. Under these circumstances farmers in the survey show both low returns to agriculture and limited off-farm work (see Annex 2, Table 3). Farmers in new communities appear to have higher returns to agriculture at present, but whether production can be sustained has yet to be demonstrated. The role of infrastructure in regional development is discussed further in Chapter IV.

**Table 2.14** MIGRANT PERCEPTIONS OF CONDITIONS IN TRANSMIGRATION SITES  
(Percent of Respondents)

Site	Income now and before transmigration				Income now and two years ago				Transport here and in Java				Health here and in Java			
	Just		Just		Just		Just		Just		Just		Just			
	Better	Worse	as good	as had	Better	Worse	as good	as had	Better	Worse	as good	as had	Better	Worse	as good	as had
<b>Repelita II Sites</b>																
Tidal																
Sei Rateh	85	5	10	0	72	3	26	0	3	92	5	0	15	10	74	0
Upang Delta	88	13	0	0	13	5	80	3	25	18	58	0	53	0	48	0
Tanah Grogot	80	5	15	0	65	10	25	0	58	0	42	0	37	5	53	5
Subtotal	<u>85</u>	<u>8</u>	<u>7</u>	<u>0</u>	<u>46</u>	<u>5</u>	<u>47</u>	<u>1</u>	<u>22</u>	<u>44</u>	<u>34</u>	<u>0</u>	<u>35</u>	<u>5</u>	<u>50</u>	<u>1</u>
Upland																
Pematang Panggang	46	46	7	1	47	40	10	3	16	79	2	3	23	34	42	0
Babulu Darat/Sepaku	65	8	28	0	48	15	20	18	40	43	18	0	50	5	43	3
Malonas	88	9	2	1	87	2	10	1	21	79	0	0	67	9	24	0
Subtotal	<u>60</u>	<u>31</u>	<u>8</u>	<u>1</u>	<u>59</u>	<u>26</u>	<u>11</u>	<u>4</u>	<u>20</u>	<u>74</u>	<u>3</u>	<u>21</u>	<u>39</u>	<u>23</u>	<u>37</u>	<u>1</u>
Upland w/Trees																
Baturaja	69	13	18	0	64	22	14	0	43	42	15	0	44	7	48	0
Subtotal	<u>69</u>	<u>13</u>	<u>18</u>	<u>0</u>	<u>64</u>	<u>22</u>	<u>14</u>	<u>0</u>	<u>43</u>	<u>42</u>	<u>15</u>	<u>0</u>	<u>44</u>	<u>7</u>	<u>48</u>	<u>0</u>
<b>Repelita II Total</b>	<b><u>66</u></b>	<b><u>23</u></b>	<b><u>10</u></b>	<b><u>1</u></b>	<b><u>57</u></b>	<b><u>21</u></b>	<b><u>19</u></b>	<b><u>3</u></b>	<b><u>25</u></b>	<b><u>63</u></b>	<b><u>11</u></b>	<b><u>1</u></b>	<b><u>39</u></b>	<b><u>17</u></b>	<b><u>43</u></b>	<b><u>1</u></b>
<b>Repelita III Sites</b>																
Tidal																
Air Sugihan	84	4	13	0	66	16	17	0	15	80	5	0	54	7	39	0
Terusan Tengah	37	35	24	4	25	51	23	2	19	67	12	3	58	8	33	0
Pangkoh	53	9	23	15	27	28	24	22	5	50	40	5	17	8	73	3
Saka Lagon/Sunggal																
Muhur	70	8	13	10	48	10	10	33	5	95	0	0	55	10	35	0
Subtotal	<u>64</u>	<u>13</u>	<u>18</u>	<u>5</u>	<u>45</u>	<u>27</u>	<u>20</u>	<u>8</u>	<u>13</u>	<u>71</u>	<u>15</u>	<u>2</u>	<u>46</u>	<u>8</u>	<u>46</u>	<u>1</u>
Upland																
Belias	55	21	22	2	45	24	28	3	33	36	24	6	38	6	56	1
Teluk Kuantan	60	15	25	0	52	32	13	3	20	62	18	0	42	7	52	0
Pematang Panggang	85	8	7	1	53	33	14	1	7	89	2	2	33	9	58	1
Sunggal Waras	51	14	36	0	31	20	49	0	3	41	42	14	19	10	71	0
Batulicin	76	11	12	1	54	13	24	8	17	67	12	4	40	9	51	0
Kumai/Hanjalian	65	7	28	0	31	16	49	4	7	88	5	0	15	7	78	0
Teluk Dalam	85	10	5	0	55	35	10	0	50	40	10	0	80	0	20	0
Lahumbuti	53	30	15	2	67	8	24	8	11	72	13	4	45	11	44	0
Subtotal	<u>68</u>	<u>15</u>	<u>16</u>	<u>1</u>	<u>52</u>	<u>22</u>	<u>23</u>	<u>4</u>	<u>15</u>	<u>69</u>	<u>13</u>	<u>4</u>	<u>37</u>	<u>8</u>	<u>55</u>	<u>0</u>
Upland w/Trees																
Baturaja	74	8	19	0	68	11	19	3	25	69	6	0	50	13	38	0
Tepong Tandung	65	15	20	0	85	10	5	0	5	95	0	0	40	10	50	0
Batulicin	65	0	35	0	31	13	56	0	0	90	5	5	35	15	50	0
Subtotal	<u>71</u>	<u>8</u>	<u>22</u>	<u>0</u>	<u>66</u>	<u>11</u>	<u>22</u>	<u>2</u>	<u>25</u>	<u>69</u>	<u>6</u>	<u>0</u>	<u>46</u>	<u>13</u>	<u>42</u>	<u>0</u>
<b>Repelita III Total</b>	<b><u>67</u></b>	<b><u>14</u></b>	<b><u>17</u></b>	<b><u>2</u></b>	<b><u>51</u></b>	<b><u>23</u></b>	<b><u>22</u></b>	<b><u>5</u></b>	<b><u>15</u></b>	<b><u>69</u></b>	<b><u>13</u></b>	<b><u>3</u></b>	<b><u>40</u></b>	<b><u>9</u></b>	<b><u>51</u></b>	<b><u>0</u></b>
<b>Total</b>	<b><u>67</u></b>	<b><u>16</u></b>	<b><u>15</u></b>	<b><u>2</u></b>	<b><u>53</u></b>	<b><u>22</u></b>	<b><u>21</u></b>	<b><u>5</u></b>	<b><u>17</u></b>	<b><u>68</u></b>	<b><u>13</u></b>	<b><u>3</u></b>	<b><u>40</u></b>	<b><u>11</u></b>	<b><u>49</u></b>	<b><u>0</u></b>

### Analysis of Household Consumption

2.39 In addition to income data, the transmigration income survey included one section on household consumption based on previous Susenas questionnaires. This section covered household expenditures for food for the past week and for nonfood items for the past month. The initial data tabulation is set out in Table 2.15 and shows a serious data problem. Monthly expenditures exceed total family income by about 6% for upland and 25% for tidal areas, by 25% in Java and 5% in the outer islands, and are not consistent with the analysis of expenditures presented by BPS (see Table 2.1). These discrepancies may be due to errors in the pricing of some products. If the error introduced in this analysis is systematic across all samples, however, these preliminary findings are extremely significant.

2.40 Briefly, the data suggest that transmigrants on a per capita basis consume more rice, corn and cassava than do families in either the inner or outer islands. The ranges are well within plausible limits. Dryland migrants consume more corn and cassava than tidal migrants which is consistent with production patterns. (Soils in tidal areas are generally too acidic for corn and too wet for cassava.) Migrants also consume significantly more fish and slightly more meat and eggs than nonmigrants, but this may be inflated by the inclusion of salt fish in the subsistence package. Migrants, particularly in the uplands, are also found to consume more vegetables and fruits than do other respondents, which is plausible since all transmigrants can grow vegetables and fruits in their garden lots. It is noteworthy that the per capita cost attributed to food is about equal for transmigrants and Javanese and about three quarters of that for residents in the outer islands. Since this does not reflect an increase in quantity, it may well be a measure of the higher cost of living in nontransmigrant areas in the outer islands.

2.41 On nonfood expenditures the situation is reversed. Javanese spend nearly twice as much on fuel and 2.5 times as much for housing as transmigrants. They also spend more for household items, durable goods, taxes, medical expenses and schooling than do transmigrants, but migrants spend more on transport. The fact that medical and schooling expenses are lower in transmigration communities may reflect government subsidies through the transmigration program. That migrants in tidal areas spend less on housing, clothing, household items (such as furniture and kitchen utensils), but almost the same on food, may be attributed to their lower overall incomes and their need to meet their subsistence requirements before other expenditures can be made. Residents in receiving areas spend more than migrants or Javanese on housing, clothing, household goods and on relative luxury goods such as tobacco, alcohol and cosmetics, reflecting both the higher cost of living and higher disposable incomes in the outer islands.

2.42 These data indicate that migrants, while poor, are on average meeting their subsistence needs as well as or better than either rural Javanese or rural residents of the outer islands. And, because they have lower expenses for housing and fuel, they may even be better off than their Javanese counterparts.

Table 2.15: PER CAPITA CONSUMPTION IN TRANSMIGRANT AND NONTRANSMIGRANT HOUSEHOLDS

Item	Transmigration		Non-transmigration	
	Upland areas	Tidal areas	Outer Islands	Java
<u>Weekly</u>				
<u>Food Consumption</u>				
<u>Starch (kg/capita)</u>				
Rice	2.35	2.55	2.20	2.21
Fresh corn	0.30	0.08	0.07	0.07
Dry corn	0.06	0.03	0.01	0.01
Ground corn	0.22	0.14	0.05	0.30
Cassava	1.10	0.60	0.54	0.32
Ground cassava	0.54	0.40	0.07	0.08
Sweet potato	0.11	0.10	0.07	0.15
Other starches	0.34	0.41	0.27	0.03
<u>Protein (kg/capita)</u>				
Fish	1.54	1.34	0.80	0.54
Meat	0.13	0.04	0.06	0.03
Eggs	0.74	0.47	0.58	0.56
<u>Vegetables and Fruits (kg/capita)</u>				
Vegetables	1.95	1.70	0.37	0.40
Beans	1.32	0.80	0.06	0.12
Fruits	1.48	1.05	0.45	0.26
<u>Monthly</u>				
<u>Nonfood expenditures (Rp/capita)</u>				
Energy/fuel	696	738	1,002	1,464
Housing	355	239	1,328	908
Cloth & clothing	1,208	931	2,995	1,483
Transport	429	322	257	231
Medical expenses	189	120	377	399
Schooling	198	141	225	244
Household items	786	389	1,011	685
Durable goods	311	186	400	626
Taxes and insurance	27	40	105	123
<u>Optional Expenditures</u>				
Ceremonial expenses	572	350	419	299
Tobacco and alcohol	841	853	1,248	716
Recreation	62	55	16	24
Cosmetics	143	104	337	190
<u>Total Expenditures (Rp/capita)</u>				
Food (week)	2,220	2,036	2,875	2,110
Nonfood (month)	5,295	3,859	8,742	9,696
<u>Total Month</u>	<u>14,818</u>	<u>12,593</u>	<u>21,075</u>	<u>18,748</u>
<u>Total Year</u>	<u>66,681</u>	<u>56,668</u>	<u>94,837</u>	<u>84,366</u>
(sample size)	(1,550)	(640)	(2,755)	(6,490)

Source: BPS Transmigration Income Survey, 1985.

### E. Summary and Conclusions

2.43 Although there are problems in interpreting the BPS income survey, several points are clear. First, migrants appear to have incomes which more closely resemble those of rural populations in Java than the outer islands. This is due in part to higher incomes in the outer islands from tree crop production, as all categories of respondents have relatively low incomes from food crop agriculture and considerable off-farm work. Second, transmigrants are neither as well off as advocates of transmigration would wish nor as poor as detractors claim. About 20% of migrant families fall at or below subsistence levels and about 6% are classified as severely deprived, but 50% have incomes above the poverty level (Rp 10,000/capita/month), and about 13% have incomes over Rp 20,000/capita/month, twice the poverty line. These data are thought to be conservative as the BPS survey appears to understate the value of food produced for home consumption.

2.44 Perhaps the most important finding of the survey is that incomes and the number below the poverty level vary by farm model and period of settlement. About one third of farmers in Repelita II upland sites and 38% of farmers in Repelita III tidal sites have incomes below minimum subsistence levels, while the proportion in other types of sites is 10-13%. If farmers on older upland settlements have low incomes because of declining soil fertility coupled with declining off-farm work, and if Repelita III settlements follow the same pattern, this would be a matter for serious concern. Government argues that improved site selection and farming systems will enable recent settlers in food crop sites to sustain or improve yields and incomes, but this remains to be confirmed and must be closely monitored. Further analysis is provided in Chapter VI. The income data also point to the urgent need for attention to the problems of recently settled tidal sites.

2.45 A second significant finding is that a very large proportion of transmigrant incomes is from nonagricultural work. This figure varies from 30% to 80% in different studies cited in this report but it constitutes an important part of transmigrant incomes in all cases. This contradicts the picture of transmigrants as full-time farmers relying primarily on their own production and it leads to several important questions about future development in transmigration sites.

2.46 MOT and BPS surveys show increasing agricultural production in the first five years on upland sites. Older Repelita II sites have lower agricultural incomes in BPS surveys, but it is too early to tell whether Repelita III sites, which are larger and better selected, will face the same declines. Even in older areas, we do not find large-scale abandonment of sites and farmers have persisted for many years on subsistence agriculture and wage work.

2.47 Finally, the data on migrant expenditures suggest that transmigrants consume as much food or more than their counterparts in Java and in the outer islands, and by implication, they are equally well nourished even if their total incomes are lower than Javanese averages. They also have assets such as houses, cattle and land which make their situations more secure. For these reasons two thirds of migrants in the BPS survey say their lives have improved.

### III. ECONOMIC AND FINANCIAL ANALYSIS OF TRANSMIGRATION FARM MODELS

3.1 Economic analysis of transmigration cannot capture the unquantified costs and benefits to the transmigration program, however, it is useful as one element in evaluating the overall program and as a method in choosing between alternative transmigration investments. This is particularly important in the context of current resource constraints. Also, as the Bank had previously calculated expected economic rates of return to transmigration investments, it is useful to compare what is now known with prior expectations.

3.2 Representative transmigration farm models are evaluated in this chapter to assess the financial and economic returns to the Repelita III transmigration program and to compare returns to future settlement under different approaches. The emphasis in the first section is on the food crop model, because this model characterizes almost all transmigrant sites developed during Repelita II and III. In the second section, tree crop models are examined as full development options (tree crops are planted when the settlers arrive) and as second-stage development (as further investment in existing sites). Assumptions in the models are fully described, and sensitivity analysis of the major assumptions is included. This was judged necessary because of the uncertainty surrounding potential agricultural production and off-farm work in transmigration sites. Section D presents the summary and conclusions of this analysis.

#### A. Assumptions Used in the Economic and Financial Analysis

##### Quantified Costs

3.3 Settlement. In order to derive representative costs, the most recently approved budget estimates were used for settlement on upland and tidal sites in South Sumatra.<sup>1/</sup> Average costs for South Sumatra upland sites are estimated at Rp 5,840,000 or US\$5,300 (mid-1986 prices), and for tidal sites are estimated at Rp 8,227,000 or US\$7,154 due to the additional costs for drainage (see Table 3.1). Unless otherwise stated, all costs are presented in mid-1986 prices and an exchange rate of Rp 1,100 = US\$1 is used throughout.

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<sup>1/</sup> These budget estimates (1984/85) were revised slightly for the analysis. Project administration was included at 15% instead of 10%. Site selection, believed to have increased in real terms since 1984/85, was taken from the MOT 1986/87 budget requests. All figures are shown in mid-1986 rupiah. Drainage costs for tidal sites were provided by the Ministry of Public Works. These figures exclude the costs of schools and health centers which would also be provided in the area of origin.

Table 3.1 DEVELOPMENT COST PER FAMILY FOR FOOD CROP MODELS IN UPLAND AND TIDAL AREAS  
(1986 prices)

	Upland Food Crop Model (Rp '000) % of total		Tidal Food Crop Model (Rp '000) % of total	
<u>Site selection</u>	<u>513</u>	<u>9%</u>	<u>513</u>	<u>6%</u>
<u>Site preparation</u>				
Land clearing	733	13%	706	9%
Road construction	805	14%	740	9%
Housing	635	11%	762	9%
Public facilities	248	4%	239	3%
Drainage	N.A.	0%	1,728	21%
Subtotal	<u>2,421</u>	<u>41%</u>	<u>4,175</u>	<u>51%</u>
<u>Selection, recruitment, and subsistence</u>				
Selection	33	1%	33	0%
Relocation	1,119	19%	1,119	14%
Subsistence supplies	639	11%	959	12%
Other services: health, education, MOT services	50	1%	50	1%
Subtotal	<u>1,840</u>	<u>31%</u>	<u>2,161</u>	<u>27%</u>
<u>Agricultural development</u>				
Food crops - input package	277	5%	277	3%
Tree crops, livestock, industry and cooperatives	30	1%	28	0%
Subtotal	<u>306</u>	<u>6%</u>	<u>305</u>	<u>3%</u>
Subtotal All Activities	<u>5,080</u>	<u>87%</u>	<u>7,154</u>	<u>87%</u>
Project administration (15%)	762	13%	1,073	13%
<u>Total All Activities</u>	<u>5,841</u>	<u>100%</u>	<u>8,227</u>	<u>100%</u>
<u>Total in US\$</u>				
Relatively Accessible Site	US\$5,310		US\$7,154	
More Remote (25% more)	US\$6,638		N.A. /a	
Very Remote (50% more)	US\$7,966		N.A.	

/a Tidal sites, given their water access, are assumed to vary less in cost.



3.4 South Sumatra costs are representative of the most accessible sites. More remote sites, such as those in Kalimantan and Irian Jaya, cost significantly more to develop. For the purposes of the financial and economic analysis, upland sites are broken down into three categories: relatively accessible (e.g., areas of Sumatra), more remote (East, Central and West Kalimantan, Central Sulawesi, and the Moluccas), and very remote (Irian Jaya). Even within provinces, however, the accessibility of sites varies considerably. Future settlement will necessarily be based on increasingly remote sites, and for analytical purposes, more remote sites are assumed to cost 25% more than the relatively accessible sites, and very remote sites are assumed to cost 50% more. This applies only to upland models; tidal models, given their water access, are more uniform in cost.

3.5 Settlement with local people on upland sites is assumed to cost about US\$1,200 less than the basic model (the costs of upland settlement, less selection and relocation costs). In the economic analysis, schools and health centers are omitted from project costs, because they would be provided in Java, and the remaining investment costs are shadow-priced using the general conversion factor of 0.8 for Indonesia. Some transmigration infrastructure, such as roads and schools, benefits local people and spontaneous migrants as well as transmigrants. Since these benefits cannot be quantified, investment costs which benefit local people and spontaneous migrants have been excluded from the analysis.<sup>2/</sup>

3.6 Labor. The opportunity cost to transmigrant labor is the shadow-priced income foregone in Java, which is estimated at Rp 220,000 per year in mid-1986 rupiah.<sup>3/</sup> In the farm models, the cost of the household's labor is included at this fixed amount, and if labor requirements exceed household labor, the additional labor is costed at the daily wage rate on the outer islands (Rp 1,200/day for 1986), shadow priced. The financial cost of hired labor is the daily wage rate. The models cover a 30-year period, and labor costs are estimated to increase (in real terms) at the same rate as projected

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<sup>2/</sup> This analysis assumes that 20% of people within the site are local people, traders and other types of migrants (see Table 2.13). Therefore, about 20% of the cost of site selection, land clearing for village facilities and the village facilities; and 50% of the cost of access roads (which also benefit people outside the settlement) are deducted. This is about 10% of total investment costs.

<sup>3/</sup> Survey data show that the majority of transmigrants were landless or nearly landless in Java, with very low incomes. Their subsistence income in Java is estimated at Rp 270,000 per year (300 man-days at a wage of Rp 900/day) and this is shadow priced with a conversion factor of 0.82, to give an opportunity cost of labor at Rp 220,000 per year. The methodology used is outlined in Ghanem and Walton, "Indonesia: The Use of Shadow Prices," World Bank working paper, August 1, 1984.

per capita increases in gross domestic income.<sup>4/</sup> When second-stage development is considered, the relevant opportunity cost of labor is the shadow wage rate in the outer islands. Given that labor is a major input into the farm model, the sensitivity of the economic analysis to assumptions regarding the economic cost of labor is tested in para. 3.35.

3.7 The transmigrant family is typically young at arrival, and total family labor supply for both agricultural and off-farm activities is assumed to be about 350 days/year, the first year on site. The family labor supply is assumed to grow at 4% p.a., as the children age and other relatives join the household, until it stabilizes at about 520 days/year, 11 years after arrival.

3.8 Other Inputs. Planting material is assumed to have the same economic and financial costs. Urea, TSP (triple superphosphate), and pesticides have divergent economic and financial prices, and these are presented in Annex 3, Table 1. The opportunity costs of the soil and forest resources made available to transmigrants have not been quantified.

#### Quantified Benefits

3.9 Agricultural Benefits. Benefits in the food crop models are from a combination of rice, corn, cassava, small livestock (chickens, goats, etc.) and fruits and vegetables. The value of household production and small livestock used mainly for home consumption is valued at about Rp 110,000 in year five (para. 2.06). Peanuts are grown in all upland models and benefits from the sale of cattle offspring are included in some models. Economic and financial prices diverge for rice, corn, and peanuts, and are detailed in Annex 3, Table 1.<sup>5/</sup> Import parity prices are used for corn and peanuts. Through 1983 Indonesia was a rice importer, but it has been highly successful in expanding rice production over the last decade and in 1985 did not require imports. For the next several years, Indonesia will probably be a marginal importer/exporter. The economic price for rice from 1985 onwards is therefore measured as an average of the import and export parity price. Prior to 1985, it is taken as the import parity price. The world price for rice has fallen significantly in real terms since the latter half of the 1970s. This, in combination with the fact that Indonesia is now a marginal importer/exporter, means that the economic benefits from rice production in the transmigration food crop model are significantly lower than those projected at the beginning

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<sup>4/</sup> Annual growth in per capita gross domestic income is projected as follows: 1982-86 0%, 1987 1.3%, 1988 1.1%, 1989 2.8%, 1990 2.5%, 1991-95 3.5%, 1996-98 3.7%. All parameters from 1999 to the end of the 30-year period are constant.

<sup>5/</sup> Commodity prices are based upon January 1986 Bank price projections. The impact on the analysis of the August 1986 Bank price projections, which became available shortly before this document was finalized, is evaluated in para. 3.34.

of Repelita III.<sup>6/</sup> The impact on the economic analysis from alternative economic values for rice is discussed in para. 3.33.

3.10 Off-farm Work. Farm models used in appraisal reports for transmigration projects have thus far only analyzed agricultural income. It is evident from recent income surveys, however, that a substantial proportion of total household income is derived from off-farm work. Many farmers seem to follow the strategy of producing food crops to meet their own subsistence needs, while pursuing whatever off-farm employment opportunities exist, since these usually offer a higher return to labor than cultivation of additional food crops that must be marketed.

3.11 As a benefit to transmigration, the portion of off-farm employment that is not part of transmigration development (such as the construction of roads and houses for new sites) and is permanent is included in the farm model as an additional benefit. It is assumed that no additional costs are associated with the creation of that employment. Income from transmigration site development is not included in the analysis because the final benefit to this work (agricultural production) is already incorporated. The models that incorporate off-farm employment assume that households meet their agricultural labor requirements; and then, if excess labor exists, household members work off-farm to a maximum of about 190 days/year (i.e., the model assumes there is only a finite amount of off-farm work available). The estimate used for the maximum amount of off-farm employment is derived from recent income surveys, and is included at 20% less than the average observed from these surveys.<sup>7/</sup> The amount earned from 190 days of off-farm labor is Rp 220,000/year in 1986 (approximately the same as income foregone in Java), and grows in real terms thereafter in line with projected growth in per capita gross domestic income. In the three most common farm models, low-input tidal with severe pest problems, low-input tidal with good pest control, and low-input upland, the household is presumed to engage in the maximum amount of off-farm employment after the first few years on site. Because of the variation in employment opportunities between sites and the possible temporary nature of some types of employment, caution should be used in assessing the viability of models which rely heavily on off-farm employment to raise incomes above subsistence levels.

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<sup>6/</sup> The price for 5% broken white milled Thai rice, FOB Bangkok, averaged US\$438/t during the period 1977-81. During 1982-86 the price declined in real terms, and is projected at US\$205/t in 1986. The price is projected to increase in the long run, to US\$362/t in 1990 and US\$343 in 1995, still about 20% lower in real terms than 1977-81 prices (figures all in 1986 dollars).

<sup>7/</sup> It is assumed here that 80% of off-farm employment in the income survey is permanent and 20% is of a temporary nature. Therefore, only 80% of observed levels of earnings are included in the farm models. If more off-farm work were temporary, that is, generated by the settlement process itself, the rate of return which includes off-farm work would be lower.



Transmigrants pit-sawing timber from their own site for cash income.



Skilled transmigrants also make use of opportunities to make furniture.

3.12 In the analysis below, three rates of return are presented: the returns to agricultural activities alone, the returns incorporating off-farm employment, and the returns when spontaneous and local people are included in the analysis. This permits comparison with earlier forms of analysis. The last rate of return represents the Bank's best judgement on the economic rate of return to the model analyzed.

## B. Economic and Financial Analysis of Food Crop Farm Models

### General

3.13 Most farm models that follow are based in early years on survey data from existing upland and tidal areas. Detailed budgets for all of the farm models are presented in Annex 3, Tables 3 through 11. For reference, Figure 3.1 shows the breakdown of average income from agriculture and off-farm work for Repelita II and III upland and tidal sites from the BPS Transmigration Income Survey of 2,200 transmigrant households carried out in February 1985. This information was supplemented by a 1985 socioeconomic survey of 1,200 farmers which was carried out in connection with the IFAD-assisted Smallholder Cattle Development Project (IFAD Loan 35-ID). In addition, 14 small-scale surveys of upland sites and seven small-scale surveys of tidal sites were reviewed for information on production, areas planted, and off-farm income. (These surveys are listed in footnote 1, Chapter II.) These surveys were generally consistent with BPS findings.

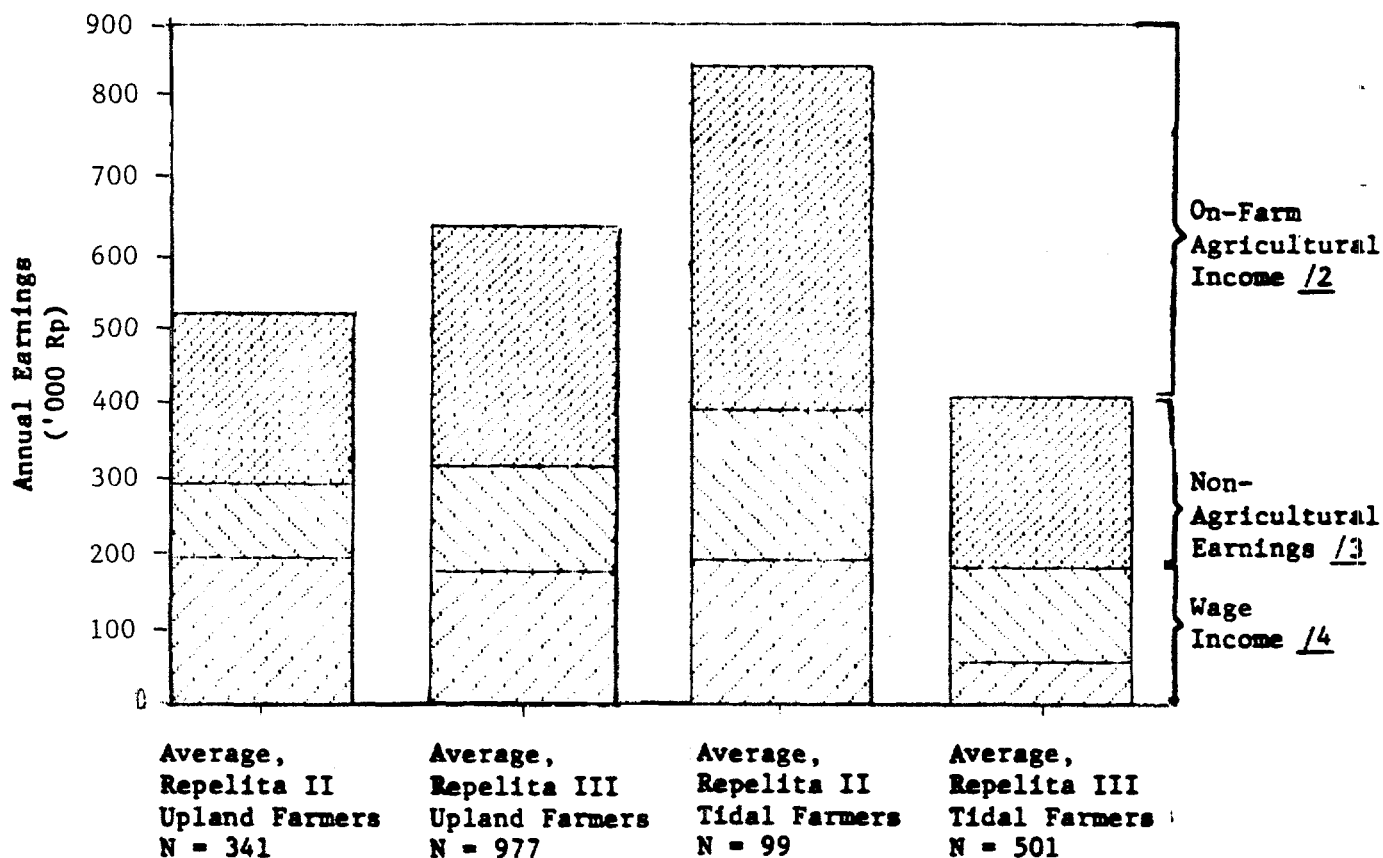
3.14 Several upland models are discussed in the following analysis. Of these, the low-input/low-output upland model is the most common and represents expected levels of income and production if no further investment were made in transmigration sites. The upland model with cow is typical of models in which some additional investment has been made, and yields and incomes under this model are found in some older settlements. The upland diversified model is typical of the small number of farmers with good market access who raise cash crops (chilies, vegetables and fruits) and who purchase part of their subsistence food from the proceeds of these crops. The upland model with sustained input reflects the yields and incomes of the best transmigrants in the best sites and it indicates the potential of the food crop farm model in areas which are well suited to food crop production. Two models are also considered which are based on yields observed with pilot farmers under research conditions in which input use (fertilizer, pesticides and labor) is not constrained by cost or risk factors and soils are sufficiently good to benefit from high fertilizer levels. Rates of return to these models are not presented in the tables, but are discussed in the text.

3.15 Although considerable diversity exists across sites in terms of agricultural production, in the most commonly observed models average input use and yields are below those projected in early Bank Staff Appraisal Reports. While yields are generally sufficient to meet the household's subsistence needs (Chapter II), for upland food crop sites, yields of rice are on average less than half of that planned; yields of both cassava and corn are below forecast levels; and peanuts are planted on less than 20% of the projected area. Overall, production of rice is about half that forecast; production of secondary food crops is about 15% to 25% of forecast levels (Annex 3,

FIGURE 3.1: SOURCES OF ANNUAL INCOME /1

BY FARM MODEL AND REPELITA

(constant 1985 Rp '000)



/1 Excludes transfer payments.

/2 Income from food crops, tree crops, livestock, includes value of own consumption.

/3 Excludes wage income and transfer payments.

/4 Agricultural or non-agricultural wage income.

Source: BPS Income Survey of Transmigration Areas, 1985.

Table 17 presents yield assumptions from Bank-financed transmigration projects for rice). Rice yields on tidal sites are also below the forecast level of 2.6 tons/ha at full production, although areas planted are roughly in line with appraisal estimates. Table 3.2 summarizes the main characteristics of the models under consideration, and Table 3.3 summarizes the agricultural production and the proportion of a young household's energy requirements met by production under the main food crop models.

#### Detailed Features of Observed Upland Farm Models

3.16 Upland Low-Input (Annex 3, Table 3). This model reflects the assumptions that no additional investment is made in existing transmigration sites and that yields and incomes remain at levels now observed in many Repelita II and III upland transmigration sites.<sup>8/</sup> The model includes a 0.25 ha houselot on which mixed subsistence crops (mainly fruits and vegetables) are grown and a 1.0 ha field under food crops. Reserve land is not in production. Rice yields are highest in the initial years, declining after free inputs stop to about 0.75 ton/ha in year 4. This pattern of intercropping results in an annual gross household production of about 750 kg unmilled rice, 100 kg corn, 1,800 kg cassava, and 20 kg of peanuts at full production. Even though production levels are low, this is greater than the subsistence needs (in energy terms) of a young family of two adults and three children (see Table 3.3). Under this model, moderate levels of fertilizers are used as long as they are part of the 3-year subsistence package, dropping thereafter to 40 kg each of urea and TSP annually. Total labor required is between 160 to 200 days per year, freeing considerable family labor for off-farm work, where such work is available.

3.17 This farm model has low financial and economic returns to agricultural production alone. Annual net household income at full production from agriculture is about Rp 290,000/year (mid-1986 prices). After meeting subsistence requirements, however, the household earns about Rp 250,000/year from off-farm work (year 10 on site). With this additional income, annual net household income rises to about Rp 540,000 in year 10 on site. The economic rate of return when benefits from off-farm income are included is positive, but low, at 3% (Table 3.4). This analysis assumes that employment opportunities are limited to about 190 days per household per year. If labor opportunities are not limited and grow in relation to the size of the family and if this employment is permanent (i.e. not generated by transmigration development) the estimated economic rate of return would be about 5% and net family income would be about Rp 725,000 in year 10.

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<sup>8/</sup> This model includes agricultural incomes and production patterns similar to those of older upland sites surveyed in the 1985 BPS Transmigration Income Survey.

Table 3.2: MAIN CHARACTERISTICS OF OBSERVED FOOD CROP MODELS /a

Model	Main Characteristics	Prevalence
<u>Upland</u>		
Low-Input	1.0 ha under food crop cultivation. Household grows rice, corn and cassava to meet own consumption needs. Labor available for off-farm employment.	Most Repelita II and many Repelita III upland sites, without additional investment.
Low-Input with cow	Similar to low-input model with the introduction of a cow. Cattle provide manure for fertilizer, draft power to speed up land preparation and cash income from the sale of offspring.	Increasingly prevalent in Sumatra and Kalimantan. Representative of sites with additional investment in agriculture.
Diversified	Farmers intensively intercrop 0.5 ha food crops and 0.5 ha cash crops including mixed fruit trees, bananas, coffee and cloves. Small amounts of labor available for off-farm employment.	Observed on a limited basis in transmigration sites with good market access.
Sustained Input	Farmers intensively cultivate rice, corn, cassava, and peanuts on 1.0 ha with a marketed surplus. Recommended levels of fertilizer are used and some family labor is available for off-farm work.	Observed among the best farmers in sites with good market access.
<u>Tidal</u>		
Low-Input with pest problems	Food crop areas have severe pest problems. Insufficient rice, corn and cassava grown to meet own consumption needs. Household is dependent upon off-farm employment.	Observed in tidal sites settled during Repelita III and believed due to design problems which can be addressed.
Low-Input with pest control	Low-input cultivation of basic food crops. Subsistence needs met. Labor available for off-farm employment.	Frequent, especially in sites settled in Repelita II.
Improved	Higher-input food crop model. Sizeable surplus to market after meeting subsistence needs. Less labor available for off-farm work.	Rarely observed, but often recommended on technical grounds.

/a All models assume an 0.25 ha houselot on which vegetables and fruits are grown for home consumption.



Table 3.3: AGRICULTURAL PRODUCTION OF MAIN FOOD CROPS BY YEAR ON SITE AS A PROPORTION OF TOTAL HOUSEHOLD ENERGY REQUIREMENT BY FARM MODEL /a

	Production (kg)	
	2	10
<u>Upland Models</u>		
<u>Low Input</u>		
Rice	540	750
Corn	90	100
Cassava	1,500	1,800
Peanuts	15	20
Milled rice equiv., calories (kg)	910	1,151
Proportion of total energy needs	1.07	1.35
<u>Low Input with Cow</u>		
Rice	600	860
Corn	105	140
Cassava	1,500	1,500
Peanuts	15	24
Milled rice equiv., calories (kg)	964	1,240
Proportion of total energy needs	1.13	1.46
<u>Diversified (Cash Crops Also Raised) /b</u>		
Rice	400	400
Corn	70	70
Cassava	1,200	1,200
Peanuts	60	90
Milled rice equiv., calories (kg)	744	768
Proportion of total energy needs	0.87	0.90
<u>Sustained Input</u>		
Rice	500	1,300
Corn	300	1,000
Cassava	1,800	2,600
Peanuts	500	800
Milled rice equiv., calories (kg)	1,581	3,291
Proportion of total energy needs	1.86	3.87
<u>Tidal Models</u>		
<u>Severe Pests</u>		
Rice	540	450
Corn	75	80
Cassava	900	1,200
Milled rice equiv., calories (kg)	700	738
Proportion of total energy needs	0.82	0.87
<u>Low Input</u>		
Rice	630	2,000
Corn	140	160
Cassava	1,200	1,200
Milled rice equiv., calories (kg)	915	1,825
Proportion of total energy needs	1.08	2.15
<u>Improved</u>		
Rice	1,225	3,840
Corn	200	450
Cassava	1,000	1,500
Milled rice equiv., calories (kg)	1,301	3,405
Proportion of total energy needs	1.53	4.00

/a Transmigrant families are assumed to be made up of two adults and three young children. Their energy requirements (calories/day) are calculated by taking daily nutrition requirements for their age group and comparing total requirements with total calories per year provided by agricultural production of rice, corn, cassava and peanuts. Energy needed by a transmigrant family/day (calories): male aged 20-39, 2,530 calories, lactating woman aged 20-39, 2,350 calories, child aged 4-6, 1,450 calories, child aged 1-3, 1,160 calories, child aged 6-12 months, 900 calories per day. Total calories per family per day equals 8,390. Total calories per family per year equals 3,062,350, equivalent to 851 kg rice, or milled rice equivalent.

Conversion:	Energy (cal/kg)	Energy in terms of milled rice equivalent
Unmilled rice	2,340	0.650
Corn	3,610	1.003
Cassava	1,095	0.304
Peanuts (unshelled)	2,938	0.816
Milled rice	3,600	1.000

/b Above list does not take account of cash crop production.

Table 3.4: ECONOMIC RATES OF RETURN UNDER DIFFERENT ECONOMIC ASSUMPTIONS AND HOUSEHOLD INCOME AT FULL DEVELOPMENT /a

	Economic rates of return			Annual net household income year 10 on site /b	
	Agricultural production alone /c (1)	Agriculture and off-farm work /c (2)	Spontaneous and locals taken into account /c (3)	Agriculture alone ----- (Rp'000) -----	Agriculture and off-farm work
<u>Upland Food Crop Models</u>					
Low input	/d	2%	3%	291	537
Low input with cow	/d	5%	6%	506	751
Diversified	2%	5%	6%	656	783
Sustained input	4%	8%	9%	506	982
<u>Tidal Food Crop Models</u>					
Severe pests	/d	/d	/d	228	474
Low input	/d	3%	4%	529	775
Improved	3%	4%	5%	870	930

/a Most accessible model (costs for Sumatra).

/b Excludes transfer payments such as pensions not generated by the model.

/c See para. 3.05. Off-farm work also included.

/d Number is negative.

3.18 Upland Low-Input with Cattle (Annex 3, Table 6). This analysis is based on the low-input model assuming 1.25 ha in production, with the addition of a cow. Government programs in Sumatra, Sulawesi and Kalimantan are providing cows to existing transmigrants with the agreement that they repay the cow by returning two offspring within a given time period. Benefits from the introduction of a cow into the farming system are that: (a) cows are used to plow, thereby reducing labor spent on land preparation; (b) manure is used to fertilize the houselot and/or field crop; and (c) cash sales from offspring supplement farm income. Yields are increased slightly over the low-input model and are 1,200 kg/ha of rice, 700 kg/ha corn, 6,000 kg/ha cassava, and 300 kg/ha peanuts at full production. Inorganic fertilizer is used on the field crops as long as free inputs are supplied (three years) and thereafter a small amount is applied to the houselot garden. Labor savings from the cow (in terms of reduced time for land preparation) of about 30 days/year are offset by 20 additional man-days/year for animal care, including forage production.

3.19 Agricultural income (Rp 510,000) in this model is about 75% higher than in the low-input model, and rises to about Rp 750,000 with off-farm work at full development. This model assumes that the farmer will pursue off-farm work instead of opening up reserve land because of higher returns. In spite

of improvements in agricultural production, rates of return to agriculture alone in this model remain low (-1% to 0%). Once off-farm income is included, the economic rate of return is about 6%. The fact that economic rates of return remain low under conditions which are relatively attractive to the farmer is a reflection of the high initial cost involved in resettlement. If a cow, or other agricultural investment, is provided to existing transmigrants as second-stage development and all transmigration investment costs are considered sunk, the incremental rate of return would be about 25%.

3.20 Upland Diversified (Annex 3, Table 4). This upland model is based on farming systems observed on the fields of progressive farmers with good market access.<sup>9/</sup> This model has production on a 0.25 ha houselot and an adjacent 1.0 ha field. In this model, farmers intensively intercrop 0.5 ha with food crops for subsistence, and peanuts are planted on 0.15 ha following the rice harvest. Under this regime, farmers produce 400 kg of rice, 70 kg of corn, 1,200 kg of cassava and 90 kg of peanuts in addition to vegetables and root crops grown in the houselot. On the remaining 0.5 ha, the family plants mixed fruit trees, mainly citrus, but also banana, coffee and cloves, maintaining reasonable levels of fertilizer and pesticides in this area (200 kg each of urea and TSP and 6 liters pesticide).

3.21 This model assumes that crops can be marketed and will produce a net annual income of about US\$550, bringing household income above the poverty level. The model has an economic rate of return of about 6% to agriculture and off-farm work. In order to achieve a 10% rate of return, sales of vegetables and fruits would have to increase from about US\$550 to US\$930 per year.<sup>10/</sup> This model requires about 400 man-days/year of labor which is roughly equivalent to available family labor for the first several years of settlement. By year 10 on site, the family labor supply has increased and approximately Rp 120,000 is added to household income from off-farm work, raising household income to about Rp 780,000/year (US\$710), above the poverty level.

3.22 Upland Sustained Input (Annex 3, Table 5). Yields and production under this model are observed among the better farmers in transmigration sites with reasonable market access and regular input supply (extension, fertilizer and credit). Rates of return generated by this model would, therefore, be possible if interventions could be made which would help all farmers, on

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9/ Adapted from Bevan, "Review of Rainfed Production on Upland Soils," Working Paper, FAO/World Bank Cooperative Programme Investment Centre, 1985.

10/ This high level of sales of fruits and vegetables (at least US\$930 per household per year) does occur occasionally, for example, in transmigration sites near Samarinda in East Kalimantan, where farmers market chilies and citrus in the provincial capital.

average, to achieve these yields. Farmers under this model cultivate the standard 1.0 ha field lot and 0.25 ha houselot; however, inputs are higher than in the low-input model, averaging 200 kg urea, 100 kg TSP, and seven liters of pesticide. With this input use, farmers produce about one ton of rice in year 5 (1.3 ton/ha, but intercropped) and 1.3 tons in year 10 (1.7 ton/ha intercropped). Households also obtain 900 kg of corn, 2,400 kg of cassava and 800 kg of peanuts in year 5, increasing slightly thereafter. This is more than sufficient to meet the families' subsistence needs, and the surplus is marketed. With one hectare under production, labor is available for off-farm work.

3.23 The rates of return to this model are still modest at 4% for agriculture alone, but for agriculture and off-farm work rise to 9% (7% and 6% in more remote sites). Household incomes are higher, averaging about Rp 670,000 in year 5 and Rp 980,000 in year 10. These incomes place farmers well above the poverty level. However, these yields and incomes are not expected on a large-scale because of lack of market access, and technical and institutional limitations described in Chapter VI.

**Table 3.5: ECONOMIC RATES OF RETURN TO AGRICULTURE AND OFF FARM WORK FOR UPLAND MODELS IF INFRASTRUCTURE COSTS INCREASE DUE TO THE REMOTENESS OF THE SITES /a**

Farm model	Base case /b	More remote	Very remote
Upland low input	3%	1%	0%
Upland with cattle	6%	4%	3%
Upland diversified	6%	4%	3%
Upland sustained input	9%	7%	6%

/a More remote sites cost 25% more to develop than the most accessible areas. Very remote sites (Irian Jaya) are assumed to cost 50% more to develop than the most accessible sites. In Repelita IV and V an increasing proportion of sites will be more remote.

/b Takes local people and spontaneous migrants into account.

#### Research-Based Upland Models

3.24 High-Input, Labor-Intensive (Annex 3, Table 7). This model is not observed except in research stations, but it is widely described in the literature and is included for comparative purposes. The model is based on the heavy use of fertilizer and other inputs as indicated by the results of research work, and requires high standards of management and good access to markets. The model analyzed adapts research recommendations made by the

Central Research Institute for Agriculture (CRIA).<sup>11/</sup> In this model, rice, corn, and cassava are intensively intercropped on 1 ha followed by peanuts and cowpeas on 1 ha. The household has a large surplus of these crops after meeting its own consumption needs and markets the rest. High-input levels are maintained, averaging about 270 kg each of urea and TSP per year, and high levels of pesticides are used, averaging 35 liters annually at full production. Labor requirements (600 man-days/year) exceed family labor supply, requiring hired labor and precluding off-farm work. Under these circumstances yields are projected at 1,500 kg/ha of rice, 1,200 kg/ha corn and 10,000 kg/ha cassava intercropped. Peanuts yield 600 kg/ha.

3.25 The net financial return from agriculture to the farmer under this model would be about Rp 540,000/year at full development, because of the high demand for labor and inputs. However, since no labor is available for off-farm work, household incomes in this model are no higher than in the low-input model when off-farm work is included. If the risks (climatic, pests) to the farmer's capital are taken into account, this helps explain why farmers opt for the low-input model. This model has the lowest economic rate of return of all models which include off-farm work and rice yields would have to increase from 1,500 kg/ha to 5,500 kg/ha in order to raise the rate of return to 10%.

3.26 High-Input with Cattle (Annex 3, Table 8). In order to explore the rate of return to food crops under optimal conditions, one model was developed that assumes the cultivation of 2.0 ha of food crop land (using draft power) and rice yields averaging 2.0 tons/ha in year 5 and 2.5 tons in year 12. By year 10 the household would produce a total of 3.8 tons of rice, 3.3 tons of corn, 6.4 tons of cassava and 2.0 tons of peanuts and have an average annual income of about US\$1,500. To obtain these yields farmers would have to use 250 kg/ha urea, 200 kg/ha TSP, 100 kg/ha KCl and also apply lime, assumed to be available from a nearby quarry. Family labor is fully used in cultivation and gathering animal feed and no off-farm work is assumed.

3.27 The rates of return to this model are high in relation to other upland models at 11% for the base case (9% for more remote and 8% for very remote areas). This model is, however, not observed in farmers' fields at the present time for reasons discussed in detail in Chapter VI. Should experience on existing farmers' fields demonstrate that household production could be maintained at these levels, the conclusions about economic rates of return generated by past experience would have to be reassessed. Until then, this model is regarded mainly as an indication of what would have to be accomplished to make the food crop model economically attractive in areas with good market access.

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<sup>11/</sup> Adapted from Bevan, "Review of Rainfed Production on Upland Soils," Working Paper, FAO/World Bank Cooperative Programme Investment Centre, 1985.

### Tidal Farm Models

3.28 All tidal models assume that the farmer is given 2.0 ha, a 0.25 ha houselot and a 1.75 field divided either into one or two plots. This is typical of the majority of Repelita II and III sites. (Bank-assisted projects provide 2.25 ha.) Inputs other than pesticides are not used in the basic tidal model as soil fertility is assumed to be sufficient to produce reasonable rice yields in the initial years.<sup>12/</sup>

3.29 Tidal Low-Input With Pest Problems (Annex 3, Table 9). This model represents a number of tidal sites settled during Repelita III that have severe pest problems and low resulting yields; it indicates production and incomes if no further investments are made and if yields remain at current levels. This is not expected to be the case. Most observers believe that yield and pest problems are due in part to the nucleated village layout and the presence of uncleared land within the settlement area in Repelita III tidal sites, and that measures can be introduced to control these problems.<sup>13/</sup> With the linear layout used in other models, the field is surrounded by other cleared areas, pests have fewer places to hide, and farmers can scare away larger predators. Some settlements in nucleated sites with severe pest problems report average yields of 500 kg rice/ha/year or less. In this model, rice yields are higher, at 750 kg/ha, but only 0.6 ha of rice is planted. Corn and cassava are grown on 0.3 ha each, intercropped, and yields are low averaging 400 kg/ha of corn and 6,000 kg/ha of cassava. Fruit, vegetables, taro and the like are grown on the houselot.

3.30 Food crop production under these conditions would be below household subsistence requirements, and rates of return are negative. (Remote sites are not included as costs for tidal settlement are virtually the same in Sumatra and Kalimantan and have not been estimated for Irian Jaya.) With this cropping pattern, only 87% of the total energy requirements of the household would be met from home production or rice, corn and cassava (Table 3.3). Household income from agriculture alone, about Rp 230,000 at full development is 25% lower than the low-input upland model. Labor requirements for on-farm are only 160 days/year, so additional income can be earned from off-farm work as

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<sup>12/</sup> At the end of Repelita III, Government began to distribute a small fertilizer package to tidal sites consisting of 100 kg urea and 50 kg TSP. A majority of sites, however, were developed without fertilizer input.

<sup>13/</sup> In nucleated sites, houses are grouped and the 1.0 ha field plot is separated from the houselot. Repelita III tidal sites were developed using a nucleated layout instead of a linear layout for several reasons. The nucleated design has the advantages of more concentrated land clearing blocks, greater economy of road networks, greater proximity to social services, and economy for future utility service. The main advantage of the linear design is proximity of the farmer to his farmlands. The farmer can open up more land and cultivate it more intensively with less destruction by predators.

long as such income opportunities exist. In the model, household income rises to about Rp 475,000/year when off-farm work is included, but at this income level the household is still below the poverty level.

3.31 Tidal Low-Input with Reasonable Pest Control (Annex 3, Table 10).

This model indicates the potential of well-designed tidal settlement without further investment. It is observed in many older tidal sites and some sites settled in Repelita III. In many Repelita II sites farmers were given up to 1.75 ha in one plot adjacent or near to the houseplot. With this farm layout, settlers have a strong incentive to clear and cultivate their entire 1.75 ha in order to control pests. Under optimal conditions, about 1.6 ha are under rice production by year 7 and corn and cassava are raised on 0.2 ha each. Yields, based on intercropping, are estimated at 1,250 kg/ha for bunded rainfed rice, 800 kg/ha corn, and 6,000 kg/ha cassava, which still reflect moderate problems of pest control. Rice production is estimated at two tons rice/household which provides a surplus.<sup>14/</sup> Corn production is estimated at 160 kg and cassava at 1,200 kg, sufficient for home consumption. Peanuts are not grown in any of the tidal models. The rate of return to agriculture alone is still negative and with off-farm work is 4%, reflecting high investment costs in relation to incremental production. (Rice yields would have to rise from 1.25 t/ha to an average of 4.2 t/ha in order to increase the rate of return to agriculture to 10%). However, financial returns to the family are about Rp 530,000 annually from agriculture at full production and labor requirements, estimated at 300 days per year, permit limited off-farm work. When off-farm work is included in the model, family income rises to Rp 775,000 per year, well above the poverty level.

3.32 Tidal with Improved Food Crops (Annex 3, Table 11).

The improved farm model is seldom observed in practice in tidal areas. It assumes 2.0 ha in production or 1.0 ha double cropped with HYV rice and assumes that farmers maintain fertilizer use at rates of 160 kg urea and 80 kg TSP/ha. It also assumes relatively high applications of pesticide (7 liters/ha) throughout the production period. Rice is planted on 1.6 ha and yields rise to 2,400 kg/ha by year 7. Corn and cassava are planted on 0.3 and 0.1 ha respectively with yields of 1,500 kg/ha and 15,000 kg/ha. Rates of return to agriculture alone in this model, at 3%, are significantly improved over those on the low-input model. Labor inputs are significantly higher than in the previous models, an extra 150 man-days per year at full development, reducing opportunities for off-farm work, but financial returns to the farmer from agricultural production are considerably improved, at Rp 870,000/year at full development (about Rp 350,000 higher than the previous model). If off-farm earnings are included, average incomes in both models are similar at full development (at about Rp 930,000 per year), and rates of return are about 5%. However, even with higher incomes many farmers are expected to choose the low-input model with pest control because it entails less risk.

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<sup>14/</sup> This model is similar to production reported by Repelita II tidal farmers in the BPS 1985 Income Survey, who were selling the most rice of any group in the Survey (an average of 0.8 tons of rice are reported to be sold annually by Repelita II tidal farmers; the average for the sample overall was 0.2 tons of rice marketed annually).

The Impact of Alternative Assumptions on the Economic Analysis

3.33 Alternative Food Crop Prices. The economic rice price used in the models is an average of import and export parity price from 1985 onwards, instead of the import parity price for rice. It could easily be argued that because of the significance of subsistence consumption of food items, economic and financial farmgate prices understate the value to the household of food produced and consumed by the household. If the food were not produced on the farm, the household would need to get supplies from another source or buy food at retail prices. In order to capture this benefit in the models, economic home consumption prices were assessed on the basis of the cost of supplying food to consumers in the sending areas (i.e., the without project case). In pricing rice and corn this way, the home consumption value is about 30% higher than if measured at farmgate prices. When the models were rerun with these higher prices for home consumption quantities, however, this was found to have virtually no impact on the rate of return. Comparison was also made using the farmgate price derived from import parity for rice instead of an average of import and export parity. This also had little impact on the rate of return.

3.34 As this report was being finalized, the August 1986 Bank commodity price projections became available. For rice, corn and peanuts, these more recent projections are lower than the January 1986 projections used for the analysis. The economic farmgate prices based on August projections are about 25% lower for rice, 5% lower for corn, and about 10% lower for peanuts over the period of analysis for the farm budgets. The economic farmgate price for urea is about 8% lower, and the price for TSP is roughly the same. The rates of return fall by 1-2% across all food crop models when these latest price projections are used.

3.35 Alternative Assumptions for the Economic Cost of Labor. One of the goals of transmigration is to move poor, generally landless underemployed households from Java to the outer islands where they can become more productive. The opportunity cost of labor in the economic model presented here is the shadow priced subsistence income of poor rural households in Java (see para. 3.06), estimated at Rp 220,000 per year for 1986. Since labor is a major input to the farm models, the sensitivity of results of the analysis to the assumption of the opportunity cost of labor was tested for the most commonly observed model, the low-input food crop model. If labor is not shadow priced, but simply equated to subsistence income foregone in Java, the rate of return remains negative for agriculture alone. If the shadow-priced subsistence income is halved, then the rate of return remains negative for agriculture benefits, and rises from 2% to 5% for agriculture and off-farm benefits. At the most extreme position, with the opportunity cost of labor in Java valued at zero, the rate of return from agriculture would rise from negative to 3%, and the rate of return from agriculture and off-farm work would be 8%. The models presented assume that labor costs as well as off-farm income increase in real terms with projected growth in per capita gross domestic income, but the results of the analysis are not sensitive to this assumption, i.e., if no growth in labor costs and off-farm income is assumed, the results would be virtually the same.



### Economic Return on the Repelita III Settlement Program

3.36 About 366,000 households were settled during Repelita III by the MOT. Only about 2% of the total were settled with the tree crop model (principally rubber). Based on the previous economic analysis by farm model, the rate of return to the Repelita III transmigration program based on food crop settlement on tidal and upland areas (98% of the families settled) was between 3% and 6% (depending on the frequency of the most representative models) if benefits from off-farm work are included. Nonquantifiable benefits such as regional development are not included in this rate of return.

#### C. Economic and Financial Analysis of Tree Crop Models

##### Tree Crop Models

3.37 Tree crops are better suited agronomically to much of the low fertility soils of Sumatra and Kalimantan than food crops. The establishment of tree crops has been promoted by the Government through externally financed Nucleus Estate and Smallholder (NES) Projects, and domestically financed projects of the same type (PIR). They are also developed by projects in which smallholder tree crops are established by Project Management Units (PMUs) under the Directorate General of Estates. Examples of PMU projects include the Bank-assisted Smallholder Rubber Development Project (SRDP, Cr 984-IND) and Smallholder Coconut Development Project (SCDP, Ln 1898-IND). The salient features of these projects are summarized in Table 3.6.

Table 3.6: MAIN CHARACTERISTICS AND PREVALENCE OF TREE CROP MODELS

<u>Model</u>	<u>Main Characteristics</u>	<u>Prevalence</u>
NES and PIR type projects	Government-owned estates (PTPs) open new land, block plant tree crops, and 80% of the area planted is later distributed in 2 ha blocks to local families and transmigrants. The cost of tree crop establishment and settler housing is covered by credit.	About 6,100 transmigrant households were settled with rubber and about 1,300 with oil palm during Repelita III.
SRDP and SCDP type projects	Externally assisted projects in which Project Management Units (PMUs) help farmers plant or replant uneconomic rubber or coconut smallholdings on their own land.	Not currently used for transmigrants.

3.38 Financial and economic analyses of these schemes were described in the World Bank report "Indonesia--The Major Tree Crops: A Sector Review"

(April 1985). The analysis that follows differs from that in the earlier report in three ways. First, commodity prices have been updated in accordance with the Bank's January 1986 commodity price projections.<sup>15/</sup> Second, the models have been adapted to include costs for relocation and settlement. Third, the assumptions in the analysis regarding the opportunity cost of labor and benefits from off-farm work have been changed from those used in the Sector Review in order to make the analysis as comparable as possible with the food crop models presented in the previous section of this chapter. Table 3.7 presents the development costs of the various tree crop models.

#### Adaptation of Costs of Models for Settlement with Transmigrants

3.39 PMU-based Models. The PMU approach has not been used to settle transmigrants thus far, so that the model included here is hypothetical. This model is presented only for rubber, but the PMU approach could also be used for coconuts. Settlers are provided with 2 ha of tree crops and a 0.5 ha houselot/garden area. Since this model has not been used to settle transmigrants, two versions of possible settlement costs are presented (Table 3.7). The first uses MOT settlement costs similar to the upland food crop model, except the land clearing and food crop input package costs are halved because the food crop area is reduced. This results in overall financial development costs per household that are somewhat higher than NES schemes. Theoretically costs could be limited to NES levels, and the second cost version is similar to NES schemes. The first version settles households with 2 ha of rubber for about US\$9,200, the second for about US\$7,900.

3.40 One PMU model is also presented for second-stage development of existing transmigrants' reserve land (1 ha) in which 0.5 ha of the already cleared food crop area is planted with tree crops along with the 1 ha reserve land. This model was analyzed because the majority of transmigrants settled on upland sites during Repelita III do not have access to more than 2 ha of land. As a minimum of 1.5 ha is required for a viable tree crop holding, this leaves a 0.5 ha houselot/garden area. In financial terms, this second-stage development is estimated to cost US\$3,046 per household. Land clearing is only necessary for the 1 ha of reserve land. Fertilizer, materials and equipment, labor, and overheads are reduced to reflect 1.5 ha of tree crops.

3.41 NES Schemes. For NES schemes, which include some social infrastructure (e.g., housing) in the basic tree crop investment, MOT's additional investment costs for selecting and moving the transmigrant household and providing some services is estimated at US\$1,360 per household (1986 prices).

#### Costs and Benefits of Tree Crop Models in the Economic Analysis

3.42 Costs. Materials and equipment, agricultural machinery, housing, roads and buildings in the economic analysis are shadow priced with the standard conversion factor of 0.8 for Indonesia. Economic prices of fertilizer,

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<sup>15/</sup> The impact of the recently available August 1986 commodity price projections is presented in para. 3.46.

**Table 3.7: FINANCIAL DEVELOPMENT COSTS FOR TREE CROP MODELS PER HOUSEHOLD /a**  
(Rp'000, 1986 prices)

Time period of initial development	NES (2 ha tree crops)			PMU planted rubber, full development, 2 ha tree crops	
	Rubber (6 yrs)	Oil palm (4 yrs)	Coco- nut (6 yrs)	Cost Alternative One /b (6 yrs)	Cost Alternative Two /b (6 yrs)
<b>Tree Crop Development Costs</b>					
Labor	1,860	1,675	1,929	1,890	1,890
Fertilizer/agrochemicals	1,046	1,176	849	1,144	1,144
Materials/equipment	827	660	937	729	729
Agricultural machinery	154	133	133	71	71
Overheads /c	560	527	557	564	564
<b>Infrastructure /d</b>					
Housing	1,162	1,162	1,162	-	1,162
Roads	942	942	848	251	942
Buildings	157	126	157	63	157
<b>Other</b>					
Cash payment to settler (NES only)	73	73	73	-	73
Other	452	452	534	193	452
Subtotal, Tree Crop Dev. (Rp'000)	<u>7,235</u>	<u>6,926</u>	<u>7,179</u>	<u>4,905</u>	<u>7,184</u>
(US\$)	<u>6,577</u>	<u>6,297</u>	<u>6,527</u>	<u>4,459</u>	<u>6,531</u>
<b>Additional Settlement Costs for Transmigration</b>					
<b>NES Projects with Transmigrants</b>					
Ancillary services	50	50	50		50
Settlement and transport	1,252	1,252	1,252		1,252
Project administration (15%)	195	195	195		195
Subtotal, Additional Settlement Costs for NES Transmigrants (Rp'000)	<u>1,497</u>	<u>1,497</u>	<u>1,497</u>		<u>1,497</u>
(US\$)	<u>1,361</u>	<u>1,361</u>	<u>1,361</u>		<u>1,361</u>
<b>Ministry of Transmigration Providing Settlement Infrastructure</b>					
Total settlement costs for food crop model, with land clearing and food crop input package halved (to reflect reduction in food crop area from 1 ha to 0.5 ha) (Rp'000)				5,262	
(US\$)				4,784	
<b>Total, Tree Crop and Transmigration Settlement Costs (Rp'000)</b>	<u>8,763</u>	<u>8,214</u>	<u>8,659</u>	<u>10,167</u>	<u>8,681</u>
(US\$)	<u>7,966</u>	<u>7,467</u>	<u>7,872</u>	<u>9,243</u>	<u>7,892</u>

/a NES and PMU schemes assumed to pay settlers a daily wage rate of Rp 1,750 per day. Labor requirements during the establishment period are a total of 1,063 days for NES rubber, 957 days for NES oil palm, 1,102 days for NES coconut, and 1,080 days for PMU rubber.

/b Cost alternative one assumes Ministry of Transmigration provides settler infrastructure at costs similar to those for upland food crop settlement, except land clearing and food crop input packages are halved. Cost alternative two assumes settlement infrastructure is provided at levels similar to NES rubber schemes. Both models are hypothetical because transmigrants, to date, have not been settled with PMU-provided tree crops.

/c 15% of the direct financial costs of field crop establishment (labor, fertilizer/agrochemicals) and materials and equipment.

/d Full cost of infrastructure. Does not take costs or benefits to spontaneous migrants and local people into account.

as in the food crop models, are some 75% higher than domestic subsidized prices. For full development of tree crops with transmigrants, the opportunity cost of household labor is the subsistence income foregone in Java, shadow priced as in the food crop model (para. 3.06). For second-stage development (tree crops planted for existing settlers), the opportunity cost of labor is the income foregone from other activities when labor is shifted from off-farm work to tree crops.

3.43 Benefits. Economic and financial price projections for rubber, oil palm, and coconuts are presented in Annex 3, Table 2. Production and input assumptions presented in Annex 3, Tables 12 to 16, are taken from the Tree Crop Sector Review. Because of better management, NES rubber schemes have higher yields than most PMU schemes. PMU-planted rubber for existing transmigrants (on 1.5 ha) is assumed to have yields 5% lower than PMU-planted rubber for new transmigrants, simply because the farm layout is not as orderly. All models include net benefits from a 0.5 ha houselot/garden area. These net benefits are derived from the upland low input food crop model. In all models, household labor supply is projected along with demand for agricultural activities. If excess labor is available, rates of return are also calculated for models including off-farm work, after labor requirements for tree crops and the garden are met using the same assumptions about off-farm work as in the food crop models (para. 3.12). Detailed assumptions about off-farm work under each model are presented in Annex 3, Tables 12 to 16. Since there are fewer spontaneous migrants in tree crops sites than in upland sites, neither costs nor benefits attributed to spontaneous migrants and locals are taken into account.

3.44 Rates of Return to NES Schemes. NES rubber and oil palm schemes are economically attractive as full transmigration development schemes, with rates of return of 13% each (Table 3.8 and Annex 3, Tables 12-14). NES coconut schemes do not look as attractive. If tree crop development costs increase by 25%, rates of return fall from 13% to 11% for NES rubber schemes, from 9% to 7% for NES coconut schemes, and from 13% to 11% for NES oil palm schemes. With benefits from off-farm work, rates of return are slightly higher, 15% for NES rubber and oil palm and 11% for coconut.

Table 3.8: ECONOMIC RATES OF RETURN TO NES TREE CROP MODELS:  
NEW SETTLEMENT WITH 2 HECTARES OF TREE CROPS PER HOUSEHOLD  
(1986 constant Rp '000)

Farm model	Rate of return on tree crops	NPV (10%)	Rate of return on tree crops and off-farm work	NPV (10%)
NES Rubber	13%	2,418	15%	4,086
NES Oil Palm	13%	2,067	15%	3,585
NES Coconut (Hybrid)	9%	-875	11%	856

Source: Annex 3, Tables 12, 13 and 14.

**Table 3.9: ECONOMIC RATES OF RETURN TO PMU-BASED TREE CROP MODELS:  
NEW SETTLEMENT AND SECOND-STAGE DEVELOPMENT  
WITH TREE CROP AND FOOD CROP BENEFITS  
(1986 constant Rp'000)**

	<u>Tree Crops</u>		<u>Tree Crops and Off-Farm Work</u>	
	Economic rate of return	NPV (10%)	Economic rate of return	NPV (10%)
<u>Full Development</u>				
2 ha rubber				
Cost alternative 1 /a	9%	-671	11%	419
Cost alternative 2 /a	11%	773	13%	2,275
<u>Second-Stage Development</u>				
1.5 ha rubber	16%	2,214	15%/b	1,795/b

/a Cost alternative 1 assumes the Ministry of Transmigration provides settler infrastructure at costs similar to those for upland food crop settlement, except land clearing for food crops and the input package are halved. Cost alternative 2 assumes settlement infrastructure is provided at levels similar to NES rubber schemes.

/b If off-farm work is available and transmigrants are given tree crops as second-stage development, benefits lost from shifting their labor into tree crops slightly reduces the rate of return.

Source: Annex 3, Tables 15 and 16.

3.45 Rates of Return to PMU-based Schemes. As second-stage development, the PMU-based rubber model has a rate of return of 16% (Table 3.9 and Annex 3, Table 16). At full development, the return is 9% under Cost Alternative One, and 11% under Cost Alternative Two (Annex 3, Table 15).

3.46 Impact of Changing Commodity Prices. Long-term price projections for tropical tree crop commodities are low. Prices for tropical tree crops declined in 1985 and are projected to continue to decline in real terms. However, Indonesia has an advantage in labor availability and domestic demand (for coconut and oil palm). Because of the sensitivity of results to price projections, rates of return were recalculated with prices 25% higher and 25% lower than the World Bank's January 1986 price projections for tree crop development. Results are tabulated in Table 3.10. NES rubber and oil palm are marginally economically attractive as full development schemes with a 25% fall in projected prices. The PMU second-stage development model continues to have a return above 10% even if prices fall by 25% in real terms. As this report was being finalized, the August 1986 Bank commodity price projections became available. Palm oil and rubber economic farmgate prices are about 15% lower in these more recent projections than the January 1986 price projections for the time period that the economic analysis covers. Copra prices are about

30% lower than the January 1986 prices. Rates of return using these prices are presented in Table 3.10.

Table 3.10: ECONOMIC RATES OF RETURN OF TREE CROP FARM MODELS WITH ALTERNATIVE TREE CROP COMMODITY PRICES /a

	Base case (%)	Commodity prices 25% higher (%)	Commodity prices 25% lower (%)	August 1986 commodity price projections (%)
<u>New Settlement (2 ha tree crops, 0.5 ha garden/houselot)</u>				
NES coconuts	9	13	5	5
NES rubber	13	16	10	12
NES oil palm	13	16	9	10
PMU planted rubber				
Cost alternative 1	9	11	6	8
Cost alternative 2	11	14	7	10
<u>Second-stage Development (1.5 ha rubber, 0.5 ha garden)</u>				
PMU planted rubber	16	20	12	14

/a Excluding impact of off-farm work. Based on January 1986 Bank commodity price projections unless otherwise indicated.

#### D. Summary and Conclusions

3.47 Most transmigration settlements to date have been developed with food crops. Seven observed food crop models and two research-based models have been described in this chapter, covering upland and tidal sites. In all seven observed food crop models, economic rates of return were estimated based upon agriculture alone and upon agriculture and off-farm income. In all models, rates of return from agriculture were low and varied from negative for the most commonly occurring low-input models, to positive (4%), for upland sites with good market access and sustained use of inputs. Most transmigrants seek off-farm work to supplement agricultural production, and off-farm work makes an important contribution to settler incomes. When benefits from off-farm income are included in the economic analysis, rates of return to agriculture and off-farm income average 3-6% for the most commonly observed low input/low output upland and tidal models. If the production achieved by the best farmers with good market access were earned by all farmers on average the rates of return to agriculture and off-farm income would average 9%. This is not expected for reasons outlined in Chapter VI.

3.48 Many research models for food crop production in transmigration sites rely on a high-input strategy to keep yields above a subsistence level over time. However, in practice most settlers adopt a low-input/low-output food crop model, since input supply is irregular, credit is scarce, markets

are inaccessible, and crop failures may occur every few years. The economic analysis also indicates that labor-intensive, high-input agricultural production is not financially attractive when compared to off-farm work.

3.49 Economic rates of return estimated here for models based mainly on food crops are lower than those projected in World Bank appraisals of transmigration projects. This is mainly because average realized crop yields have been lower than projected, and rice prices have decreased significantly since 1981 (a drop of almost 50% in real terms from the 1976-81 average to the 1985-86 average).

3.50 An economic analysis was also undertaken for several tree crop farm models. Tree crops formed only a small part of the transmigration program through Repelita III, but were increasingly important in Repelita IV. The Government's financial cost to settle a transmigrant household with tree crops varies from US\$7,470 to US\$9,240 (mid-1986 prices) depending upon the commodity and institution involved. This is 40% to 80% higher than the upland food crop model. Tree crops can also be added as second stage development on already existing sites, at a cost of about US\$3,050 per household for PMU-planted rubber on 1.5 ha. With this additional investment, tree crop models have higher economic rates of return and higher settler incomes than the food crop models.

3.51 From an economic point of view, NES rubber and NES oil palm schemes have the highest rate of return of the new settlement options at 13% each. As second-stage development to already existing sites, PMU-planted rubber has a higher rate of return of 16%.

3.52 The net incomes of tree crop smallholders at full development are projected to be about twice as high as those of food crop transmigrants, even when off-farm income is included in food crop settlers' income. Smallholders with tree crops also have the potential to supplement income with some off-farm work. From the point of view of settler welfare and economic returns, a strong argument can be made that transmigration development be based on: (a) second-stage development of existing sites with tree crops, livestock, fish ponds or other forms of development; or (b) new settlement on NES- or PMU-based schemes. This leads to higher settler incomes and higher economic rates of return than the food crop model, but necessarily entails a much reduced program compared to the scale of Repelita III, because of limitations in institutional capacity in the estate sector. The rate of return to second stage development is the highest, and remains economically attractive even with commodity price declines of 25% in real terms. The implications of this analysis are reflected in the changes in program direction adopted by MOT.

3.53 The economic models discussed in this chapter do not include other complex costs and benefits that are difficult to quantify, but are nonetheless essential to consider. Some of these costs include environmental degradation in the receiving province, and possible depressed wage rates in the outer islands. Benefits include broader regional development from roads, temporary and permanent employment generation for the local population as well as transmigrants, and alleviation of population pressure (and its environmental impact) in the sending areas. These issues are discussed further in Chapters IV and V.





#### IV. THE IMPACT OF TRANSMIGRATION

##### A. Employment Generation

4.1 Without migration, the labor force of Java and Bali would increase by about one million people per year over the next few years. Therefore, finding adequate employment for new job seekers is among the most important challenges facing the GOI. In the past decade, the Government has generated employment by expanding areas under production and intensifying production on cultivated land, by supporting large-scale, labor-intensive rural works programs and by encouraging resettlement. With resource constraints, the growth of temporary employment through rural works programs is expected to slow while the need for employment creation will be increasingly critical. For this reason, it is important to understand the amount, type and cost of employment generated by transmigration during Repelita III. The following section provides a methodology for assessing the amount of employment resulting from transmigration in Repelita III, and it evaluates the role of the program in employment generation.

##### Definitions

4.2 Transmigration settlement generates both temporary and permanent employment. Temporary employment is produced in the development phase of a transmigration site, but is not sustained over time. Most of this employment is from land clearing and the construction of roads and houses. Permanent employment continues after the development phase and includes sustainable jobs in agriculture and services in the transmigration sites. Indirect permanent jobs are also generated in transportation, marketing, social services, and the supply of inputs to transmigrants. Local residents benefit from the transmigration program through indirect employment, particularly in trade and transport; and spontaneous migrants who move to an area for the opportunities created by transmigration investment also benefit from indirect employment.

##### Assumptions Used in Calculating Temporary Employment

4.3 The development phase of transmigration creates a large demand for labor to clear land, construct houses, buildings and roads, build drainage systems, and plant tree crops. Labor inputs for land clearing, which is one of the major employment activities, are shown in Table 4.1 and described below.

- (a) Tidal Sites. In tidal sites, land clearing is generally done with chain saws and manual labor, since the soil cannot support heavy machinery. Construction of the main drainage works is capital-intensive, while the construction of tertiary canals by the transmigrants is labor-intensive. In South Sumatra, where many transmigration tidal sites are located, contractors often mobilize labor from West Java for land clearing and construction.



Wage laborers involved in clean up following mechanical land clearing.

Table 4.1: LABOR INPUTS FOR LAND CLEARING BY FARM MODEL

Farm model	Man-days/ha	ha/household	Man-years/household <u>/a</u>
Tidal sites	80	1.5	0.42
Upland food crops			
Mechanical	30 to 35 <u>/b</u>	1.5	0.16 to 0.18
Semi-mechanical	60 to 70 <u>/b</u>	1.5	0.32 to 0.37
Tree crops	65 <u>/c</u>	2.0	0.45

/a Assuming one man-year equals 286 man-days.

/b Varies depending upon the type of vegetation prior to clearing (secondary forest, grassland, etc.).

/c Average of labor required for secondary forest, bush/grassland and grassland.

- (b) Upland Food Crop Sites. Semi-mechanical methods (using chain saws and hand labor) were generally used to clear upland transmigration sites until the beginning of Repelita III when the program shifted mainly to the use of mechanical methods. However, both agronomic and employment considerations argue strongly for semi-mechanical land clearing. Aside from preservation of the topsoil, the major advantage to semi-mechanical methods is employment generation. While mechanical methods use 30 to 35 man-days/ha, semi-mechanical methods use about twice this much, or about 250 more man-years per site (assuming 1,500 households per site).
- (c) Tree Crops. Labor demand from the development phase of tree crop schemes for transmigrants is the heaviest of all the farm models discussed. Not only must land be cleared for both food crops and tree crops, but roads and houses must be constructed, a cover crop planted, and tree crops established and maintained. Land clearing is generally done using semi-mechanized methods, because the area does not need to be completely cleared and semi-mechanical clearing is cheaper.

Assuming that the nonquantified labor inputs for roads, houses and buildings are roughly comparable across farm models, tree crop investment generates the most labor during the development period. Tidal sites are next, with semi-mechanized land clearing in upland food crop sites close behind. Mechanical land clearing on upland sites has considerably less employment impact.

#### Assumptions Used in Calculating Permanent Employment

4.4 Permanent Agricultural Employment. Permanent employment consists of both direct and indirect employment generated by transmigration. Labor requirements for food crop agriculture are estimated in Chapter III (see Annex 3, Tables 3 to 11). In the most commonly occurring Repelita III development model, the low-input, upland model, farm labor requirements stabilize at 160 days/year, the amount necessary to meet subsistence needs. Thereafter, the household is assumed to pursue more remunerative off-farm employment. Assuming full employment is 286 days of work per person per year, then 0.6 agricultural jobs are generated from settling one household under the upland model. Tidal sites follow roughly the same pattern, although, on average, settlers spend most of their time on agriculture on these sites. As Table 4.2 indicates, of the three tree crop commodities, rubber requires the largest labor input (0.94 man-years per household per year), followed by oil palm (0.64 man-years) and hybrid coconut (0.58 man-years). Thus oil palm and coconut employ the settler at about the same level as food crop models, roughly 0.6 man-years/year.

**Table 4.2: TREE CROP LABOR REQUIREMENTS FOR LAND CLEARING, DEVELOPMENT, AND MAINTENANCE AND HARVESTING /a**

	Commodity		
	Rubber	Oil palm	Hybrid coconuts
Development phase /c			
Development period	6 man-years	4 man-years	6 man-years
Land clearing /b	65 man-days/ha	65 man-days/ha	65 man-days/ha
Tree crop establishment	479 man-days/ha	426 man-days/ha	447 man-days/ha
Total, man-years per household /c	3.8 man-years	3.4 man-years	3.6 man-years
Maintenance and harvesting /c	0.94 man-years per household	0.64 man-years per household	0.58 man-years per household

/a Excludes settlement infrastructure.

/b Average for secondary forest, bush/grassland and grassland.

/c Two hectares per household, 286 man-days per man-year.

Source: "Indonesia - The Major Tree Crops: A Sector Review," April 15, 1985.

4.5 Permanent Off-Farm Employment. It is more difficult to calculate how much off-farm work is permanent and not related to the settlement process. As in rural Java, productive activities in transmigration sites are highly diversified. In rural areas of Indonesia, in general, nonagricultural economic activities made up at least 33% of employment in 1980.<sup>1/</sup> Among the most important sources of employment generation in rural areas in Java are timber milling, plywood industries, rice mills, brick and tile making, cottage industries, food processing, weaving and the production of clothing.<sup>2/</sup> Survey data indicate that these types of activities are also important sources of employment for transmigrants. Some of this employment is related to felling, cutting, sawing and selling timber from uncleared lands; and if a site is part of an ongoing transmigration development, settlers may also do construction work on transmigration houses, roads and other buildings. Small-scale surveys also report many other activities, with most generated within the settlement itself: carpentry, forging, brick and roof tile production, food processing

1/ BPS, 1980 Census. This may underrecord nonagricultural employment as many of those recorded as employed in agriculture also engaged in non-agricultural activities.

2/ Gavin W. Jones, "Links between Urbanization and Sectoral Shifts in Employment in Java," Bulletin of Indonesian Economic Studies, Vol. XX, No. 3, December 1984.

(tempe and tahu), wickerwork, saw mills, retail shops, market activities and small businesses. Although one would expect the service sector to expand as migrant welfare increases or with the length of time on site, the 1985 BPS Transmigration Income Survey does not show a correlation between agricultural success and the amount of off-farm work, nor does there appear to be a significant relationship between wages and length of time on site. This may be due to the interaction of a number of complex factors which hide such associations.

4.6 Figure 3.1 in Chapter III shows the average earnings overall and by farm model from the three sources: wages, nonagricultural activities, and on-farm agriculture, and the implied days worked for wage income. These data are summarized in Table 4.3. The data are shown only for tidal and upland food crop sites; tree crops were omitted because of their smaller sample sizes. For the sample overall, settlers work about 130 days per year (0.46 man-years) for wage income, assuming they earn Rp 1,200 per day. This ranged from 46 days of wage labor per year for Repelita III tidal settlers, to 163 days of wage labor per year for Repelita II upland settlers. One might hypothesize that wage opportunities would decline over time if highly dependent on ongoing transmigration development; however, Repelita II and Repelita III upland sites do not differ significantly in the amount of wage income. Repelita II tidal sites have higher wage incomes than Repelita III tidal sites, but this may be because a high proportion (30% of respondents) were located in remote Central Kalimantan (see also Chapter II).

#### The Amount and Cost of Employment Generated by Transmigration

4.7 If household members work, on average, 130 days per year (0.46 man-years) for wage income and if they also earn almost as much from other more informal nonagricultural activities, off-farm work would provide households with between 0.7 to 1 man-year of employment per household per year. Adding this to the earlier rough estimate of 0.6 man-years of work in agriculture, transmigration is assumed to generate about 1.3 to 1.6 jobs per household from both on-farm and off-farm activities. This would mean that the transmigration program generated an estimated 500,000 to 600,000 full-employment, permanent jobs during Repelita III. This figure excludes employment generated indirectly by transmigration for local residents and spontaneous migrants. Data on temporary employment suggest that about 18 million days or 63,000 years of full-time employment were generated by land clearing alone.

4.8 At a cost of US\$5,310 <sup>3/</sup> per household for the upland food crop model, transmigration would generate employment at about US\$3,300 to US\$4,100 per permanent job. For tidal sites, with settlement costs of US\$7,150 per household, this would be about US\$4,500 to US\$5,500 per job created. Less information is available about the off-farm work of tree crop settlers, but assuming they have roughly the same off-farm employment, then it would cost about US\$3,600 to US\$4,200 to create a job in tree crops. (These estimates

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<sup>3/</sup> 1986 US dollars, base case. More remote site development is estimated to cost 25% to 50% more.

are so rough that no significant differences in job creation costs between models can be inferred.) This analysis does not take into account permanent work found by spontaneous migrants who move at a lower cost. The cost of transmigration-related job creation is considerably lower than the cost of job creation in the industrial sector (estimated at US\$10,000-US\$20,000/job), but more than the cost of job creation in service industries.

Table 4.3: HOUSEHOLD ANNUAL WAGES, ON-FARM AND NONAGRICULTURAL EARNINGS, AND DAYS WORKED OFF-FARM BY FOOD CROP FARM MODEL (Rp'000 1985)

	Sample size	Wages/a (1)	Nonagri-cultural earnings (2)	Total (1)+(2)	On-farm income (3)	Total income /b (1)+(2)+(3)
----- Rp'000 -----						
<u>Income</u>						
Tidal Sites						
Rep. II	99	190	200	390	460	849
Rep. III	501	55	124	179	228	407
Average	600	78	136	214	266	480
Upland sites						
Rep. II	341	196	98	294	225	519
Rep. III	977	178	141	319	319	638
Average	1,318	182	130	312	295	607
Average /c	1,918	156	128	284	295	579
-- Days Worked Off-Farm --						
<u>Implied Labor Days /d</u>						
Tidal Sites						
Rep. II		158	167	325		
Rep. III		46	103	149		
Average		65	114	178		
Upland sites						
Rep. II		163	82	245		
Rep. III		148	117	266		
Average		152	108	260		
Average, Total		130	107	237		

/a All wages from both agricultural and nonagricultural activities.

/b Excludes transfer payments such as money sent from relatives, pensions and government assistance.

/c Excludes 60 respondents settled just prior to the survey date.

/d Days of labor implied at a daily wage rate of Rp 1,200.

Source: BPS Transmigration Income Survey, 1985.

4.9 Interpretation of these figures must be qualified for several reasons:

- (a) we cannot be absolutely certain how much off-farm employment is dependent upon short-term transmigration program development expenditures (e.g., construction of settlers' houses) and might not therefore be sustained;
- (b) both the quality and quantity of work are important. Low value-added jobs contribute little to productivity and income levels, while better jobs with better incomes indirectly generate growth and further employment;
- (c) to calculate net employment generated, some account must be made of the jobs foregone when a family is moved from Java.

In spite of these caveats, there can be no doubt that transmigration was a major vehicle for employment generation in Repelita III; and no Government investment program other than tree crop development is believed to have generated more self-sustaining, full-time employment in the third five-year plan.

4.10 Future Prospects. In most receiving provinces, government expenditures associated with transmigration have been greatly reduced in Repelita IV. In many of these provinces, sources of economic growth and labor absorption exogenous to the transmigration program are also sluggish, given the current weak commodity prices for exports from the outer islands. If nonagricultural work also declines because of reductions in transmigration expenditures, migrants will go farther afield searching for work. Under these circumstances the potential exists for increased competition for employment and downward pressure on wages in the receiving provinces. To avoid this scenario it is critical that reasonable levels of government expenditure be maintained in areas where the labor force has been greatly increased from transmigration in Repelita III. The best ways of doing this are to support infrastructure maintenance, to invest in second-stage development in existing transmigration areas, and to use labor-intensive forms of development.

## B. Demographic Impact

### The Impact of Sponsored Migration

4.11 The distribution of transmigrants relative to the distribution of people in the outer islands is shown in Annex 4, Table 1. It is noteworthy that over Repelita I and II (1969-79), the major islands received about the same proportion of transmigrants as their share of the total population. Approximately 60% of all transmigrants were sent to Sumatra, slightly more than Sumatra's 55% share of the outer island population, and Kalimantan and Sulawesi received approximately the same share of transmigrants as their share in the outer island population. This is apparently related more to accessibility, carrying capacity, and the availability of infrastructure and services than to conscious design. Since 1980, Kalimantan and Irian Jaya have received a somewhat greater share of transmigrants than before. Kalimantan, which

accounted for 14% of all transmigrants in the 1970s, increased its share to 22% during the Repelita III and early Repelita IV period, while Irian Jaya increased its share from 1% in the 1970s to 4% of transmigrants in the 1980s.

4.12 Table 4.4 shows the number of sponsored transmigrants in relation to provincial populations as of 1980 and 1985. Although the number of transmigrants more than doubled during Repelita III in 9 of 18 receiving provinces, the share of sponsored transmigrants in provincial populations was no higher than 12% in any province, and in most cases it was under 8%. The highest proportions of sponsored migrants were found in southern Sumatra, in the sparsely populated province of Central Kalimantan, and the smaller provinces of Central and Southeast Sulawesi. The more densely populated provinces of North Sumatra and South Sulawesi show low proportions of recent migrants, but they were major receiving areas in the prewar period. The eastern islands have not been a prime target for transmigration. By 1985, about 20,000 transmigrant families had been settled in Irian Jaya, a province of about 1.3 million, and about 200 families had been settled in East Timor.

4.13 At the district (kabupaten) level the effect of transmigration is more apparent. Annex 4, Table 2 shows the number of sponsored transmigrants settling in outer island kabupaten from approximately 1970 to mid-1985, and at this level the impact is striking. Two kabupaten in Lampung and South Sumatra each absorbed more than 200,000 sponsored transmigrants, and together they accounted for one quarter of all the transmigrants moved in Repelita III. In each of seven other kabupaten, more than 45,000 transmigrants arrived within the five-year period. These 9 out of 66 receiving kabupaten absorbed 53% of all transmigrants. Almost three-quarters of all transmigrants were accommodated in 20 kabupaten. Sponsored transmigrants equaled slightly more than 40% of the total population in two kabupaten in 1985 (one each in South Sumatra and South Kalimantan) and in seven others they equaled more than 20% of the population. With such high concentrations of migrants, the impact of transmigration on people, production and administrative services is significant in these districts.

#### The Impact of Spontaneous Movement

4.14 It is difficult to estimate the rate of spontaneous migration in Indonesia since these migrants did not register in the past, but the 1980 census contained two types of questions which touched upon the scale of spontaneous movement: the first was on previous residence, the second on mother tongue. The data on prior residence (Annex 4, Table 3) indicate that in 1980 there were about 3.6 million people born in Java but living in the outer islands, while there were about 1.1 million people living in Java, but born elsewhere. This suggests a lifetime out-migration rate from Java over three times as great as the rate of in-migration. In the five years preceding 1980, about 1.1 million people moved out of Java and about 420,000 moved in, for an out-migration ratio of 2.6 to 1. Of those moving out of Java, 868,000 (80%) moved to rural areas, while the number of transmigrants in this period was less than 250,000. This means that for each family moved by the transmigration program from 1975 to 1979, at least 2.5 others moved to rural areas in the outer islands in other ways. Causality cannot be inferred directly from these data, but there is a strong association between the provinces to which



sponsored migrants have been sent in the past and those to which spontaneous migrants later move. This is particularly true of rural migrants who find it difficult to identify and secure land without the help of family and friends who have previously moved (see Chapter VII).

Table 4.4: SPONSORED TRANSMIGRANTS AS PERCENT OF RECEIVING PROVINCE POPULATIONS

Province	Number of sponsored transmigrants ('000)		Sponsored transmigrants as % of provincial population/a		Sponsored transmigrants as % of population increase	
	1971-80/b	1980-85/c	1980	1985/d	1971-80	1980-85
Aceh	9.6	61.0	0	2	2	6
N. Sumatra	1.8	37.1	0	0	0	3
W. Sumatra	34.8	23.2	1	2	6	6
Riau	29.3	177.9	1	8	6	52
Jambi	96.0	107.8	7	12	22	35
Bengkulu	41.7	61.1	5	11	17	34
S. Sumatra	141.3	379.0	3	10	12	48
Lampung	133.3	188.2	3	5	7	13
<u>Sumatra</u>	<u>487.8</u>	<u>1,035.3</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>21</u>
W. Kalimantan	23.7	131.9	1	6	5	46
C. Kalimantan	9.4	109.8	1	11	4	65
S. Kalimantan	41.0	91.4	2	6	11	41
E. Kalimantan	29.6	55.5	2	5	6	14
<u>Kalimantan</u>	<u>103.7</u>	<u>388.6</u>	<u>2</u>	<u>6</u>	<u>7</u>	<u>37</u>
N. Sulawesi	11.2	18.8	1	1	3	8
C. Sulawesi	51.5	75.5	4	8	14	29
S. Sulawesi	36.5	25.0	1	1	4	5
S.E. Sulawesi	37.9	92.1	4	12	17	62
<u>Sulawesi</u>	<u>137.1</u>	<u>211.4</u>	<u>1</u>	<u>3</u>	<u>7</u>	<u>19</u>
Maluku	4.3	35.1	0	2	1	17
Irian Jaya	10.6	75.6	1	6	4	48
Other/e	n.a.	7.9	n.a.	n.a.	n.a.	2
<u>Total</u>	<u>743.5</u>	<u>1,753.9</u>	<u>1</u>	<u>4</u>	<u>7</u>	<u>25</u>

/a Source for data on provincial population -- BPS, Statistik Indonesia 1984, Table 3.1.2; data on households from 1983 Agricultural Census.

/b P. Gardner, Provincial Population Projections (Jakarta: UNCHS/GOI/NUDS Project, 1985), Table 4.

/c Transmigration Department, Daftar Proyek Transmigrasi Yang Dibina Tahun 1985/86 (to August 1985).

/d 1980 figures include migrants moved from 1971-80 and 1985 figures include migrants moved from 1971-85.

/e Nusa Tenggara Barat (NTB), Nusa Tenggara Timur (NTT) and East Timor.

4.15 Data on place of birth do not convey the full impact of transmigration, however, as the children of migrants born in the outer islands cannot be distinguished from the local population in such records. For this reason the 1980 census asked what language was used in the home. These data, summarized in Table 4.5, indicate that there were 7.3 million people in the outer islands in 1980 who spoke an inner island language (Javanese, Sundanese, Madurese or Balinese). Of these, about 5.2 million (70%) lived in Lampung and North Sumatra, areas receiving transmigrants and plantation labor prior to 1940. Although the data on early movement and return migration are not precise, it is unlikely that more than 2.0 million of the 6.7 million migrants to rural areas are the descendants of transmigrants and plantation laborers. The other 4.7 million people are spontaneous migrants, their descendants, or those moving in the civil service or for other work. This again suggests that total spontaneous movement has occurred at a rate of about 2.4 to 1 over the past 50 years.

4.16 If we eliminate Lampung and North Sumatra from the analysis, to exclude the "pull" influence of those moved in the colonial period, transmigrants moved to other provinces between 1950 and 1979 plus their descendants would have numbered about one million in the 1980 census, had no one returned to Java. The 1980 census, however, records nearly 2.2 million inner island language speakers in these other provinces, of whom 1.9 million are in rural areas. This suggests a "pulling power" of at least one family for each family moved in the last 30 years. This number is significantly lower than the figures which include Lampung and North Sumatra since (a) Lampung is the most accessible area to Java and has attracted the vast majority of spontaneous migrants; and (b) the majority of sponsored migrants to other areas have moved in the last decade and have had less time to attract others.

Table 4.5: SPONTANEOUS MIGRATION AS MEASURED BY LANGUAGE SPOKEN AT HOME /a

Province	Individuals moved as sponsored migrants from 1950-78 (1)	Projected population in 1980 from sponsored migration during 1950-78 from natural increase (2)	Inner island language speakers enumerated in 1980 census, total (3)	Inner island language speakers enumerated in 1980 census, rural (4)	Rural excess (spontaneous migrants) (4)-(2) (5)	Ratio of rural spontaneous migrants (5)/(1) (6)	Percent of inner island language speakers in outer islands due to sponsored migration /b		Total provincial population, 1980		Percent of rural population from sponsored migration (%) (2)/(9) (11)	Percent in rural areas speaking inner island language (%) (4)/(9) (12)
							Rural only (%) (2)/(4) (7)	Total (%) (2)/(3) (8)	Rural only (9)	Total (10)		
Aceh	9,600	10,900	175,300	156,200	145,300	15.0	7	6	2,377,000	2,610,500	0	7
N. Sumatra	15,600	26,400	1,767,700	1,668,600	1,642,100	104.6	2	1	6,223,500	8,350,900	0	27
Riau	16,500	22,700	189,500	148,200	125,400	7.6	15	12	1,575,600	3,406,100	1	9
W. Sumatra	35,900	48,200	56,100	52,700	4,400	0.1	92	86	2,973,000	2,163,800	2	2
Jambi	70,700	82,700	255,300	236,200	153,400	2.2	35	32	1,261,600	1,444,400	7	19
Bengkulu	30,600	37,200	134,900	132,200	94,900	3.1	28	28	695,500	767,900	5	19
S. Sumatra	262,400	430,100	635,000	585,700	155,600	0.6	73	68	3,360,700	4,627,700	13	17
Lampung	222,700	350,400	3,400,800	3,163,100	2,812,600	12.6	11	10	4,047,300	4,624,200	9	78
Subtotal Sumatra	664,500	1,009,000	6,615,000	6,143,100	5,134,100	7.7	16	15	22,514,500	27,995,900	4	27
W. Kalimantan	32,600	43,200	197,600	153,400	110,200	3.4	28	22	2,067,900	2,484,900	2	7
C. Kalimantan	14,500	20,000	62,900	35,900	15,900	1.1	56	32	855,900	954,100	2	4
S. Kalimantan	50,100	70,200	115,700	97,300	27,000	0.5	72	61	1,622,300	2,063,200	4	6
E. Kalimantan	41,200	59,300	126,200	62,200	2,900	0.1	95	47	729,300	1,214,600	8	9
Subtotal Kalimantan	138,600	192,800	502,500	348,900	156,100	1.1	55	38	5,275,500	6,716,900	4	7
N. Sulawesi	17,700	25,500	31,000	29,900	4,300	0.2	85	82	1,760,200	2,114,800	1	2
C. Sulawesi	42,200	54,900	53,600	51,100	(3,800)	-0.1	107	102	4,963,400	6,059,500	1	1
S. Sulawesi	55,400	68,300	71,600	70,900	2,500	0.0	96	95	1,169,000	1,284,500	6	6
S.E. Sulawesi	31,600	39,400	46,000	45,100	5,600	0.2	87	86	853,500	941,400	5	5
Subtotal Sulawesi /c	147,100	188,200	202,200	197,000	8,700	0.1	96	93	8,746,300	10,400,300	2	2
East Nusa Tenggara	2,100	2,400	3,200	700	(1,600)	-0.8	324	74	2,531,500	2,736,900	0	0
Maluku	4,200	7,100	16,300	15,900	8,700	2.1	45	44	1,255,500	1,408,400	1	1
Irian Jaya	4,800	6,600	4,400	800	(5,800)	-1.2	799	150	869,900	1,107,200	1	0
Total	961,400	1,406,300	7,343,700	6,706,600	5,300,300	5.5	21	19	41,193,400	50,365,900	3	16
Excluding N. Sumatra, Lampung, & Irian Jaya /d	718,100	1,022,700	2,170,700	1,874,100	851,300	1.2	55	47	30,052,600	36,283,400	3	6

/a Inner island language speakers include those speaking Javanese, Sundanese, Madurese and Balinese.

/b Including offspring of sponsored migrants.

/c In Sulawesi, many spontaneous migrants have registered as sponsored.

/d Excluding North Sumatra and Lampung because of large migrant communities settled there prior to World War II. Excluding Irian Jaya because of apparently sizeable census undercounts.

Source: 1980 Indonesian census and MOT records.

4.17 Thus, while the proportion of migrants in Indonesia is small (over 95% of all Indonesians were on the island of their birth in 1980), the mobile people in the population have had a large impact on the provinces to which they move. Overall, in 1980, inner island speakers made up 27% of the rural population of Sumatra, 7% of Kalimantan and 2% of Sulawesi. In rural areas, about 78% of the people in Lampung spoke an inner island language, 27% in North Sumatra, 19% in Jambi and Bengkulu, and 17% in South Sumatra.

#### Demographic Impact of the Program through the Year 2020

4.18 Sponsored transmigration in Repelita III represented an estimated movement of about 2% of the combined population of the provinces of Java and Bali and about 15% of the incremental population increase between 1980-85. However, these figures understate the impact of the transmigration program, since they cover a very short period and do not take into account the cumulative impact of moving young couples with the highest fertility levels. They also exclude the effect of spontaneous migrants who follow sponsored settlers.

4.19 In order to assess the longer-range demographic impact of transmigration, Bank staff developed two scenarios based on alternative assumptions about the level of sponsored migration between 1980-2000.<sup>4/</sup> Both scenarios were developed prior to the cessation of land clearing for new settlement in 1986. The high scenario projected Repelita III levels of movement (300,000 families) in each of the third, fourth and fifth five-year plans, declining to about 240,000 families in Repelita VI. This would entail the movement of about 3.3 million people through the year 2000. These figures represent the maximum level that could be achieved under the sponsored program if land availability issues were resolved, implementation capacity in the tree crop subsector were significantly improved (see Chapters VI and VII) and financial resources were available. The intermediate scenario assumes that settlement will fall to 200,000 families in Repelita IV and V and taper off to 100,000 families in Repelita VI, ending thereafter. This would entail the sponsored movement of about 1.9 million people through the year 2000. In both scenarios population projections were run on sponsored settlement alone and with two levels of spontaneous movement: the first would result in 88 spontaneous migrants over 20 years for every 100 moved on the sponsored program; the second would result in 181 spontaneous migrants for each 100 moved. This is thought to represent a reasonable range of spontaneous movement where sponsored settlement levels are high.

4.20 The results of this exercise are summarized in Table 4.6. In the absence of any redistribution, the population of the inner islands is expected to reach intermediate 170 million by the year 2020 compared to 107 million today. Under the intermediate scenario for sponsored migration, and with high but historically observed levels of spontaneous migration, the population of Java would be reduced by 15 million (9%) of what it would otherwise be in the

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<sup>4/</sup> Assumptions of projected fertility and mortality rates for the inner and outer islands, labor force participation rates, and spontaneous migration are detailed in Annex 8.

year 2020, and transmigration would absorb 19% of the incremental labor force of Java. With the lower ratio of spontaneous migration, transmigration would still absorb 12% of the incremental labor force and the population of Java would be reduced by 10 million.

**Table 4.6: DEMOGRAPHIC IMPACT OF TRANSMIGRATION  
UNDER ALTERNATIVE SCENARIOS  
( '000 people)**

	Population year 2020	Difference with and without migration year 2020	Population in 2020 as a proportion of population without migration	Annual population growth rate 1980-2020 ----- (%)	Change in incremental labor force -----
<b>No Migration</b>					
Inner islands	169,136	-	-	1.4	-
Outer islands	106,753	-	-	1.9	-
<b>High Levels of Sponsored Settlement /a</b>					
<b>Inner Islands</b>					
Sponsored only	161,526	-7,610	0.96	1.3	-8
Low spontaneous	155,361	-13,775	0.92	1.2	-16
High spontaneous	147,594	-21,542	0.87	1.1	-24
<b>Outer Islands</b>					
Sponsored only	115,006	8,253	1.08	2.1	10
Low spontaneous	121,453	14,700	1.14	2.2	22
High spontaneous	129,455	22,702	1.21	2.4	34
<b>Intermediate Levels of Sponsored Settlement /b</b>					
<b>Inner Islands</b>					
Sponsored only	163,857	-5,279	0.97	1.3	-7
Low spontaneous	159,566	-9,570	0.94	1.3	-12
High spontaneous	154,032	-15,104	0.91	1.2	-19
<b>Outer Islands</b>					
Sponsored only	112,530	5,777	1.05	2.0	10
Low spontaneous	117,043	10,290	1.10	2.1	18
High spontaneous	122,764	16,011	1.15	2.4	27

/a Assumes sponsored movement of 300,000 families in Repelita IV and V, falling to 240,000 families in Repelita VI.

/b Assumes sponsored transmigration levels of 200,000 families in Repelita IV and V, falling to 100,000 in Repelita VI.

Note: Low spontaneous means that each mover attracts 0.5 people; high spontaneous, each mover attracts 0.75 people within ten years. Assumptions of projected fertility and mortality rates for the inner and outer islands, labor force participation rates, and spontaneous migration are detailed in Annex 8.

4.21 These figures highlight two important points. First, intermediate rates of sponsored and spontaneous migration sustained through the year 2000 (with a reduction in Repelita VI) would have a significant impact on population growth and labor absorption in Java. A transmigration program at these level would have a flattening effect on the growth rate of Java, reducing it from an average of 1.7% to 1.4% p.a. over the period 1980 to 2000. Second, this level of movement would also have a significant impact on the outer islands, increasing the growth rate from 2.3% to 2.8% per year. By extension, the impact of transmigration on regional development to date is critical to an evaluation of the future program. If change brought about by transmigration can be managed to create employment and benefit the outer island peoples without jeopardizing their institutions and resources, this would be a strong argument for program support.

### C. Impact on the Regions

4.22 The acceleration of the transmigration program during Repelita III (1979/80-1983/84) and the very large numbers of people moved to the outer islands during this period changed the view that transmigration could only make a marginal contribution to regional development. During Repelita III the estimated movement of between 1.5 to 2 million people not only added substantially to local populations in receiving areas, but also brought unprecedented increases in land clearing, road construction, public services, and financial resources. In addition, recent studies showing that many transmigrants are regularly involved in agricultural wage work and nonagricultural employment outside transmigration sites indicate that transmigrants are potentially filling, and perhaps generating, local demands for production and employment in receiving provinces. This section discusses the impact of transmigration on regional resources--people, land, production, infrastructure, and institutions--in order to evaluate the nonquantified costs and benefits of transmigration, and to assess the role of transmigration in regional development. The impact of transmigration on local people and the environment is described in Chapter V.

### Transmigration Expenditures in the Receiving Provinces

4.23 Since Repelita III, transmigration has accounted for a large share of the development budgets of many receiving provinces. Table 4.7 shows the distribution of the transmigration development budget across provinces. The share of transmigration in provincial development budgets was large throughout Repelita III. As the table shows, the 1985/86 transmigration budget in 14 of 18 receiving provinces exceeded the total transmigration budget for the respective provinces during 1979 to 1982. While some increase is due to depreciation of the rupiah, the transmigration budget also increased in real terms through FY85/86, and represented an increasing share of the total development budget in most outer island provinces.

4.24 Although budgets are not equivalent to expenditures, the contribution of the transmigration program to the provincial budgets is striking. In 8 of the 17 provinces shown in Table 4.7, the FY85/86 transmigration budget provided from one third to almost one half of the total

provincial development budget.<sup>5/</sup> In only four provinces, all with very low numbers of transmigrants, did the proportions fall below 10%. In five outer island provinces (South Sumatra, Bengkulu, Lampung, South Kalimantan and Maluku), transmigration contributed 20% to 30% of the FY85/86 development budget, in four (Riau, Jambi, Central Sulawesi and Southeast Sulawesi) it contributed 30% to 40% and in four other provinces with relatively small populations (West, Central and East Kalimantan and Irian Jaya) it contributed 40% to 50%.

4.25 It is important to recognize that these expenditures are incremental to other provincial expenditures, that is, in addition to what would otherwise be allocated on a per capita or area basis. For this reason, such expenditures generate considerable employment, both for local people and transmigrants, and are undoubtedly a leading source of growth in many provinces. Everywhere, small towns near transmigration sites appear to be growing at very high rates, attracting both local people and spontaneous migrants to off-farm work. In fact, much of the increase in public resource expenditures in the outer islands can be justified only because of the exceptionally rapid population increases stemming in part from transmigration. At the same time, as noted in the previous section, concern exists that a rapid curtailing of expenditures in these provinces, either because transmigration moves to other provinces or because of continuing resource constraints, could make these provinces vulnerable to increased unemployment.

#### Land Development

4.26 Table 4.8 shows the distribution of land made available for sponsored transmigrants in the receiving provinces according to official MOT statistics. Consistent with settlement patterns in general, Sumatra accounts for almost 64% of household and farm land allocated under the transmigration program, Kalimantan 20%, and Irian Jaya 2%.<sup>6/</sup> Of more interest is the relationship between transmigrant land and total land in use in the provinces. In three provinces in Sumatra (South Sumatra, Bengkulu and Lampung) and in Southeast Sulawesi, the amount of land allocated to sponsored transmigrants is over 10% of provincial land used for agriculture. In most cases, however, transmigrants make up a larger proportion of farm households than of agricultural landholdings, presumably due to the extensive agricultural practices used by local smallholders in the outer islands. These figures do not take into account land obtained for agricultural purposes by spontaneous migrants.

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<sup>5/</sup> The development budget includes all line agency expenditures financed through the central government, except for routine expenditures and special presidential programs (INPRES).

<sup>6/</sup> The discrepancy between land available for sponsored transmigration (8,287 km<sup>2</sup>) and that allocated (6,901 km<sup>2</sup>) and in use (4,910 km<sup>2</sup>) is apparently due to the practice of allocating 1.25 ha and retaining much of the land for future development.

Table 4.7: TRANSMIGRATION DEVELOPMENT BUDGETS IN RECEIVING PROVINCES, 1979-82 AND 1985/86 /a

Province	Transmigration development budget		Distribution among receiving provinces /d		Transmigration as % total development budget in province	
	1979-82/b	1985/86/c	1979-82	1985/86	1979-82/b	1985/86/c
	--- (Rp billion) ---		----- (%) -----		----- (%) -----	
Aceh	15,193	16,017	3.3	2.6	11.0	15.0
N. Sumatra	6,659	17,460	1.4	2.8	3.0	8.5
W. Sumatra	5,147	9,016	1.1	1.5	3.0	6.6
Riau	62,956	49,397	13.6	8.1	24.0	35.8
Jambi	28,367	30,275	6.1	4.9	29.0	37.5
S. Sumatra	114,486	60,966	24.7	9.9	44.0	29.8
Bengkulu	16,505	14,472	3.6	2.4	20.0	24.1
Lampung	10,316	30,068	2.2	4.9	9.0	25.7
W. Kalimantan	29,098	61,781	6.3	10.1	26.0	44.4
C. Kalimantan	22,765	49,084	4.9	8.0	33.0	48.0
S. Kalimantan	39,030	26,695	8.4	4.4	27.0	24.1
E. Kalimantan	26,297	60,046	5.7	9.8	29.0	42.9
N. Sulawesi	7,265	7,519	1.6	1.2	8.0	8.9
C. Sulawesi	20,622	27,111	4.4	4.4	25.0	33.9
S. Sulawesi	6,678	15,582	1.4	2.5	4.0	9.7
S.E. Sulawesi	24,755	26,280	5.3	4.3	37.0	35.7
Maluku	11,634	23,804	2.5	3.9	17.0	25.4
Irian Jaya	16,668	87,699	3.6	14.3	27.0	45.7
<u>Total</u>	<u>464,441</u>	<u>613,272</u>	<u>100.0</u>	<u>100.0</u>	<u>20.0</u>	<u>16.5</u>

/a Recently high carry-overs in transmigration budgets mean that budget figures are higher than actual expenditures (see Chapter VII).

/b Source: UNDP/OPE, Transmigration Program Second Phase Evaluation (Jakarta, 1982), Table 3.9. Figures are totals for three budget years and do not apparently include carry-overs (siap) from previous years.

/c Source: Ministry of Finance, Laporan 1985/86 dari SDPD Bandung. Figures include siap from 1982/83 to 1984/85.

/d Figures do not include amounts allocated to Jakarta or sending provinces.



Table 4.8: SPONSORED TRANSMIGRANT LAND BY PROVINCE, 1985

Province	Provincial agricultural land (km <sup>2</sup> )/a	Transmigrant land (km <sup>2</sup> )/b			Allocated (2) as a % of provincial agricultural land	Sponsored transmigrants as a % of farm households
		Avail-able (1)	Allo-cated (2)	Total in use (3)		
Aceh	10,965	269	173	106	1.6	3.4
N. Sumatra	13,725	148	127	98	0.9	0.7
W. Sumatra	7,713	116	90	90	1.2	1.5
Riau	7,101	801	679	312	9.6	14.1
Jambi	6,626	525	376	330	5.7	11.3
S. Sumatra	10,622	1,740	1,711	1,681	16.1	10.1
Bengkulu	1,527	272	230	168	15.0	15.3
Lampung	7,774	1,018	1,001	563	12.9	7.3
<u>Sumatra</u>	<u>66,053</u>	<u>4,889</u>	<u>4,387</u>	<u>3,348</u>	<u>6.6</u>	<u>6.3</u>
W. Kalimantan	6,831	586	250	109	3.7	7.7
C. Kalimantan	6,479	514	479	265	7.4	17.0
S. Kalimantan	6,223	465	373	253	6.0	7.3
E. Kalimantan	4,841	303	256	197	5.3	13.1
<u>Kalimantan</u>	<u>24,374</u>	<u>1,868</u>	<u>1,358</u>	<u>824</u>	<u>5.6</u>	<u>9.6</u>
N. Sulawesi	3,549	80	66	48	1.9	1.4
C. Sulawesi	63,001	380	300	201	0.5	9.1
S. Sulawesi	15,308	120	115	87	0.7	0.7
S.E. Sulawesi	3,363	387	364	277	10.8	10.8
<u>Sulawesi</u>	<u>85,221</u>	<u>967</u>	<u>845</u>	<u>613</u>	<u>1.0</u>	<u>3.3</u>
Maluku	n.a.	175	149	15	n.a.	4.6
Nusa Tenggara Barat	3,717	45	25	23	0.7	0.4
Irian Jaya	n.a.	337	131	85	n.a.	0.3
E. Timor	n.a.	6	6	2	n.a.	10.3
<u>Total</u>	<u>179,365</u>	<u>8,287</u>	<u>6,901</u>	<u>4,910</u>	<u>3.8</u>	<u>5.8</u>

/a Includes land used for house compounds, gardens, shifting cultivation, and sawah in 1981; excludes pastures, uncultivated swamp, ponds, forested land or unutilized land. BPS, Statistik Indonesia 1984.

/b Land allocated to sponsored migrants moved in Repelita III. Transmigrant land includes only house and field land. Source: Dir. Jen Pengerahan dan Pembinaan, Buku Data Usaha Tani 1985.

### The Contribution of Transmigration to Regional Agricultural Production

4.27 The contribution of transmigration to regional agricultural production is difficult to assess for several reasons. First, it may take several years for migrants to establish themselves and for production, particularly of tree crops, to stabilize. Second, many transmigrant agricultural systems are upgraded over the years, through the addition of irrigation or tree crops, but there is no way to distinguish the contribution of transmigrants from that of the local population in provincial statistics. Finally, provincial data themselves are rather unreliable, particularly for secondary food crops and tree crops. For this last reason, the following analysis will focus on rice production.

4.28 Table 4.9, which summarizes the recent impact of the Repelita III transmigration program on regional rice production, assumes (a) that 80% of all sponsored migrants produce rice with an average yield of 700 kg/family, (b) that one spontaneous family has already settled in each province (other than the Moluccas and Irian Jaya) for each sponsored family, and (c) that spontaneous families produce rice at the same level as sponsored. Using these assumptions, which are believed to approximate the actual situation, the incremental increase in rice production in the outer islands from Repelita III transmigration is estimated at about 240,000 tons per year, about 10% of the increase recorded in the outer islands over the past four years and about 3% of total incremental rice production in Indonesia. These figures, while not insignificant, do not point to Repelita III transmigration as a major factor in recent gains in rice production. This is not surprising in view of the relatively low productivity of food crop sites.

4.29 Transmigration has, however, made a significant contribution to incremental rice production in some provinces. In five provinces, recent transmigrants contributed an estimated 20-30% of incremental rice production: Bengkulu (19%), Jambi (23%), West Kalimantan (25%), South Sumatra (27%) and Riau (30%). In two provinces, their contribution is above 40% (South Kalimantan (45%) and Southeast Sulawesi (49%)); while in two sparsely populated provinces lacking traditional irrigated rice, it constitutes a major portion of the increase: (Central Kalimantan (81%) and Central Sulawesi (96%)). In East Kalimantan and Irian Jaya, the very small numbers involved make analysis difficult, but it appears likely that transmigrants may account for the entire incremental production in these provinces. It should be understood that due to the highly unreliable nature of the figures used, this analysis is meant only as a rough approximation of the contribution of recent transmigrants to rice production.

4.30 When all transmigrants are considered, the impact of the transmigration program on rice production is more impressive. For example, in Lampung where 70% of all residents are of inner island descent, it is reasonable to assume that at least 70% of all incremental production in the last five years

Table 4.9: THE CONTRIBUTION OF REPELITA III TRANSMIGRATION TO INCREMENTAL RICE PRODUCTION BY PROVINCE, 1980-1984

Province	Transmigrant families 1979/80- 1982/83	1984 Incremental production /a		1980 Provincial production (`000)	1984 Provincial production	Incremental Provincial production	Transmigrant contribution	
		Sponsored (A)	Spons + Spont (B)				(%) (A)	(B)
Aceh	9,625	5.4	10.8	666	876	210	3	5
N. Sumatra	3,534	2.0	4.0	1,595	1,952	357	0	1
W. Sumatra	3,993	2.2	4.5	1,051	1,311	260	1	2
Riau	19,554	11.0	21.9	244	317	73	15	30
Jambi	11,361	6.4	12.7	389	444	55	12	23
S. Sumatra	66,616	37.3	74.6	872	1,147	275	14	27
Bengkulu	8,917	5.0	10.0	174	228	54	9	19
Lampung	6,316	3.5	7.1	686	1,030	334	1	2
<u>Sumatra</u>	<u>129,916</u>	<u>72.8</u>	<u>145.5</u>	<u>5,678</u>	<u>7,305</u>	<u>1,627</u>	<u>4</u>	<u>9</u>
W. Kalimantan	13,297	7.4	14.9	547	606	59	13	25
C. Kalimantan	10,197	5.7	11.4	206	220	14	41	81
S. Kalimantan	15,114	8.5	16.9	735	773	38	22	45
E. Kalimantan	6,759	3.8	7.6	138	144	6	63	-/b
<u>Kalimantan</u>	<u>45,367</u>	<u>25.4</u>	<u>50.8</u>	<u>1,626</u>	<u>1,743</u>	<u>117</u>	<u>22</u>	<u>43</u>
N. Sulawesi	2,991	1.7	3.3	200	291	91	2	4
C. Sulawesi	11,905	6.7	13.3	228	242	14	48	96
S. Sulawesi	2,763	1.5	3.1	1,799	2,406	607	0	0
SE. Sulawesi	13,880	7.8	15.5	59	91	32	24	49
<u>Sulawesi</u>	<u>31,540</u>	<u>17.7</u>	<u>35.3</u>	<u>2,286</u>	<u>3,030</u>	<u>744</u>	<u>-</u>	<u>-</u>
Maluku	5,712	3.2	-	25	22	-3	-	-
Irian Jaya	9,775	5.5	-	3	4.4	1.4	-/b	-
<u>Maluku &amp; I.J.</u>	<u>15,487</u>	<u>8.7</u>	<u>-</u>	<u>28</u>	<u>24.4</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>Total Outer Islands</u>	<u>222,310</u>	<u>125</u>	<u>240</u>	<u>9,618</u>	<u>12,102</u>	<u>2,485</u>	<u>5</u>	<u>10</u>
<u>Total Inner Islands</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>20,032</u>	<u>25,392</u>	<u>5,360</u>	<u>-</u>	<u>-</u>
<u>Total Indonesia</u>	<u>222,310</u>	<u>125</u>	<u>240</u>	<u>29,650</u>	<u>37,494</u>	<u>7,845</u>	<u>2</u>	<u>3</u>

/a Assumptions:

(A) Assumes 80% of all families produce rice at 700 kg/family or 560 kg/family average over all transmigrants.

(B) Assumes ratio of one spontaneous family/sponsored family and production at above rates.

/b Error.

(estimated at 334,000 tons) is related to transmigration.<sup>7/</sup> Assuming that inner island language speakers in the outer islands in 1980 produced the same proportion of rice as their share in the local population, transmigrants would be responsible for the production of 1.8 million tons of unmilled rice (gabah) or 15% of outer island production. By the same reasoning, transmigrants would be responsible for the production of some 2 million tons of unmilled rice in 1985,<sup>8/</sup> about 17% of outer island production and 5% of Indonesia's total rice production. Other Bank studies of the contribution of transmigrants to rice production in the outer islands have also estimated about 2 million tons. This is a small but significant contribution to the increase of about 20 million tons in the country's annual production over the last 20 years.

### Infrastructure

4.31 One of the most important factors promoting regional development and contributing to the integration of transmigrant activities and the regional economy is the construction and maintenance of roads. An extensive, reliable transportation network is essential to the marketing of agricultural commodities, and to finding off-farm employment and maintaining household incomes. Data are not available for the total number and length of roads built under the auspices of transmigration since Repelita I, but since a majority of migrants were sent to the outer islands in Repelita III, the figures in Table 4.10 are highly indicative of the overall distribution of roads. As the table shows, between 1981 and 1985 about 4,200 km of new access roads, 7,700 km of new main roads and 14,000 km of village roads were constructed under the transmigration program, increasing provincial totals by an average of 20%. This is a significant achievement, and it lays the groundwork for economic development in many areas where it would not have been possible before.

4.32 Table 4.10 also shows the impact of transmigration roads on the road stocks in specific provinces. Because most roads constructed under the transmigration program will eventually become the responsibility of the district (kabupaten) governments, the ratio between transmigration roads and district roads is most important, and indicates the additional burden that will have to be assumed by the districts. Comparing the length of access and main transmigration roads to the length of district roads indicates that the ratio is highest in East Kalimantan where transmigration roads constructed between 1981/82 and 1984/85 were almost equivalent in length to the local district road network. Lampung and West Kalimantan had about half as many transmigration roads as local roads, and in Riau, Jambi, South Sumatra, Central Kalimantan, and Irian Jaya transmigration roads account for 21-28% of local roads.

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<sup>7/</sup> While transmigrants have lower yields than local people due to their location on more marginal soils, virtually all transmigrants grow rice while many local people, particularly in Sumatra, concentrate on cash crops.

<sup>8/</sup> About 1,800,000 tons (15% of total outer island production) plus 240,000 tons from Repelita III migrants.

Table 4.10: TRANSMIGRATION ROAD CONSTRUCTION IN RELATION TO LOCAL INFRASTRUCTURE

Province	Provincial Road Network			Repelita III Transmigration roads /a			Total Repelita III Transmigration roads		Repelita III Transmigration roads as % of local roads			% Total transmigration roads per province
	Total (1)	National/provincial (2)	Kabupaten (3)	Access (4)	Main (5)	Village (6)	(4+5) (4+5)	(4+5+6) (4+5+6)	(4+5) as a % of (3)	(4+5+6) as a % of (3)	(4+5+6) as a % of (1)	
----- (km) -----												
Aceh	9,982	2,906	7,076	118	218	404	336	740	5	10	7	3
North Sumatra	15,132	5,188	9,944	121	223	414	344	758	3	8	5	3
West Sumatra	8,632	2,772	5,860	52	96	178	148	326	3	6	4	1
Riau	7,262	2,344	4,918	364	670	1,240	1,034	2,274	21	46	31	9
Jambi	4,580	2,047	2,533	233	430	796	663	1,459	26	58	32	6
South Sumatra	9,692	3,891	5,801	568	1,051	1,946	1,619	3,565	28	61	37	14
Bengkulu	3,527	1,031	2,496	108	200	370	308	678	12	27	19	3
Lampung	4,596	2,007	2,589	480	884	1,637	1,364	3,001	53	116	65	11
<u>Sumatra</u>	<u>63,403</u>	<u>22,186</u>	<u>41,217</u>	<u>2,044</u>	<u>3,772</u>	<u>6,985</u>	<u>5,816</u>	<u>12,801</u>	<u>14</u>	<u>31</u>	<u>20</u>	<u>49</u>
West Kalimantan	4,182	1,812	2,370	398	737	1,365	1,135	2,500	48	105	60	10
Central Kalimantan	4,355	722	3,633	353	653	1,210	1,006	2,216	28	61	51	8
South Kalimantan	4,119	1,177	2,942	150	277	514	427	941	15	32	23	4
East Kalimantan	3,338	2,550	788	269	497	921	766	1,687	97	214	51	6
<u>Kalimantan</u>	<u>15,994</u>	<u>6,261</u>	<u>9,733</u>	<u>1,170</u>	<u>2,164</u>	<u>4,010</u>	<u>3,334</u>	<u>7,344</u>	<u>34</u>	<u>75</u>	<u>46</u>	<u>28</u>
North Sulawesi	5,627	1,645	3,982	55	101	188	156	344	4	9	6	1
Central Sulawesi	6,309	2,800	3,509	186	344	637	530	1,167	15	33	18	4
South Sulawesi	17,807	3,394	14,413	70	130	240	200	440	1	3	2	2
Southeast Sulawesi	5,012	1,305	3,707	162	299	554	461	1,015	12	27	20	4
<u>Sulawesi</u>	<u>34,755</u>	<u>9,144</u>	<u>25,611</u>	<u>473</u>	<u>874</u>	<u>1,619</u>	<u>1,347</u>	<u>2,966</u>	<u>5</u>	<u>12</u>	<u>9</u>	<u>11</u>
Eastern Islands	10,293	4,465	5,828	129	238	441	367	808	6	14	8	3
Irian Jaya	5,194	643	4,551	361	668	1,227	1,029	2,256	23	50	43	9
<u>E.I and Irian Jaya</u>	<u>15,487</u>	<u>5,108</u>	<u>10,379</u>	<u>490</u>	<u>906</u>	<u>1,668</u>	<u>1,396</u>	<u>3,064</u>	<u>13</u>	<u>30</u>	<u>20</u>	<u>12</u>
<u>Total</u>	<u>129,639</u>	<u>42,699</u>	<u>86,940</u>	<u>4,177</u>	<u>7,716</u>	<u>14,282</u>	<u>11,893</u>	<u>26,175</u>	<u>14</u>	<u>30</u>	<u>20</u>	<u>100</u>

/a Access road at 8.8 m/household; main road at 16.2 m/household; village road at 30 m/household.

Source: Directorate PLP, 1985.

4.33 The road network established due to the Repelita III program is expected to at least double the infrastructure stocks of the two districts where new transmigrants are equivalent to 40% of the 1980 population and in the seven other districts where they number 20% or more of the 1980 population. The large proportion of transmigration roads in some districts and provinces indicates the need for close coordination between transmigration and provincial public works offices in the design, maintenance and transfer of these roads, and this is emerging as a major issue in Repelita IV.

4.34 The problem has several dimensions. First, transmigration roads were initially designed to low standards and constructed by land clearing contractors who in many cases had little experience in road construction or maintenance. Second, funds were not provided for maintenance while roads were under MOT authority during Repelita III. Thus, when sites are to be transferred to the provinces, roads are already in very poor condition and their rehabilitation overwhelms the limited financial and technical resources of the district public works offices. To compound the problem, district public works offices, which are generally weak, are particularly weak in those relatively underpopulated districts where transmigration occurs. This argues for an ancillary program to develop public works services in those transmigration receiving districts where the maintenance task will be most demanding and the capacity most limited.

4.35 Another element of this problem is related to the absorption of roads into the provincial and national road networks. National and provincial public works offices have a numbering system for roads under their authority, and funds for maintenance are allocated according to the length and condition of numbered roads. However, there is no automatic system for incorporating transmigration roads into the programs of the relevant public works offices and a lag of several years in incorporating them is not uncommon. The Ministry of Public Works has recently begun an inventory of all transmigration roads constructed in Repelita III, but arrangements have yet to be made for ongoing review and registration prior to transfer.

4.36 A separate problem is that incorporation of some new settlements into regional markets will require an extension of the national road network. For example, in South Sumatra where nearly 400,000 people were settled in the early 1980s, major investments in new access routes and/or a realignment of existing roads will be required to realize the economic potential of new sites, but new construction will be difficult to undertake because of the high capital investment required.<sup>9/</sup> This suggests that transmigration

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<sup>9/</sup> The proposed road from Tanjung Karang in Lampung to Palembang is a case in point. This road would pass through an area where some 350,000 transmigrants are settled, provide access to sites such as Pematang Panggang which are almost entirely isolated, and provide a direct link between Java and Palembang (the major city in Sumatra). Both the economic impact and traffic potential of this road are unquestionable, but construction has not yet been initiated, mainly because of resource constraints.

planning must take a longer perspective and that the full costs of integrating transmigrant communities into the regions must be taken into account in the planning process. More specifically, a mechanism is now urgently required for identifying major road investments needed to support the regional development programs initiated by transmigration and for scheduling new investments. This will be difficult to support in light of budget constraints.

#### The Impact of Transmigration on Regional Services

4.37 Roads are only one example of the expansion of rural infrastructure and institutions in response to transmigration. Other services which have been greatly expanded include extension, agricultural supply, education and health. During Repelita III, each of the line agencies responsible for these services held their own budgets, and planning and coordination were difficult (see Chapter VIII). In Repelita IV, the budgets for some activities were given to the MOT. Under these arrangements, the coordination of implementation during the development period is expected to improve, but problems in the transfer of such services to the provinces are expected to increase. Therefore, effective hand-over must entail early planning for the number of people to be transferred (extension workers, teachers, health clinic personnel), adequate budget provisions for their salaries, and arrangements for incorporating them into district or provincial services. Problems will also be exacerbated as the number of Repelita III sites to be transferred expands.

4.38 Large-scale transmigrant activities also have a major impact on urban development in their vicinity. Towns, even small ones, in transmigration regions often experience a boom in activity either as a spin-off from construction, the relocation of civil servants and their consumption expenditures, or the search for "informal sector" work by the transmigrants themselves. Many of these towns are growing at rates which, if they continue, will double their populations every ten years. For smaller towns which have no formal urban status and depend exclusively on central government budgetary allocations, rapid increases in road traffic and accelerated growth are difficult to accommodate under current planning arrangements and will continue to be so unless special measures are taken which recognize the impact of transmigration. Indonesian cities also find it difficult to keep pace with accelerated growth, particularly where the capacity is already low as in the large coastal cities and the small frontier towns in the outer islands.<sup>10/</sup>

4.39 The point to be made is a simple one. Transmigration on the scale achieved in Repelita III is placing large demands on regional services and budgets in Repelita IV. These demands are so great that special arrangements including revised planning and budgeting procedures at the central level and accelerated institutional development at the local level are required. The Government has recognized this point, and is now using its limited resources

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<sup>10/</sup> In the outer islands, only about 30% of the larger urban centers have access to clean water supplies, less than 30% have access to sanitation facilities, and only 25% have any kind of formal garbage collection service.

for maintenance of existing sites, while cutting new development expenditures.

#### D. Summary and Conclusions

4.40 This chapter illustrates the impact which the transmigration program has had on employment generation, demographic trends in the inner and outer islands and on regional development. Data analysis indicates that the transmigration program generated an estimated 500,000 to 600,000 permanent jobs in Repelita III. This is more permanent, self-sustaining employment than in any other government investment sector, other than tree crop development. The cost of creating a permanent job in transmigration is estimated at about US\$4,000, which is higher than the cost of jobs in service sectors, but lower than the cost of creating employment in industry (estimated at US\$10,000- \$20,000 per job). This cost does not take into account benefits derived from temporary employment and spontaneous transmigration.

4.41 At the settlement levels achieved in Repelita III, transmigration absorbed about 12-15% of the incremental labor force in Java and Bali. If transmigration were sustained at half the levels achieved in Repelita III through the year 2000, and accompanied by spontaneous migration at historically observed levels, it would by the year 2020 have reduced the population of Java by 10% and absorbed about 20% of the incremental labor force. Even with lower rates of spontaneous transmigration, the program would reduce the population by 6% and absorb about 12% of new laborers.

4.42 The data also show that sponsored transmigrants settled during the Repelita III period were equal to as much as 40% of the 1980 population of some kabupaten; that farm land opened for transmigrants was equal to 10% or more of the estimated total area of agricultural land in four provinces; and that rice production by Repelita III migrants, while small in total, was significant in some receiving provinces. Road construction resulting from transmigration was estimated to have almost doubled the length of roads in one province and to have increased the stock of roads by as much as 50% in seven provinces and by 20% overall in receiving provinces. Other services which have been greatly expanded in response to transmigration are health, education and extension.

4.43 These data indicate the very significant impact which transmigration has had on both the inner and the outer islands. They also suggest that the expansion of population, regional infrastructure, and services on this scale require adequate arrangements for the transfer of roads and administrative functions to the provinces and the reallocation of funds from the center to the periphery to increase needed services. Investments should also be channeled to past receiving provinces to maintain employment levels in these areas. This may be difficult in the face of increasing resource constraints.



## V. SOCIAL AND ENVIRONMENTAL CONSIDERATIONS

### A. The Impact of Transmigration on Local People

#### People of the Outer Islands

5.01 There were about 60 million people in the outer islands in 1986; slightly over half (34 million) lived in Sumatra, about 12 million lived in Sulawesi, 8 million in Kalimantan and 6 million in the remaining eastern islands (see Table 1.1). Of these, about 1.5 million are regarded as isolated peoples, groups which for geographic, historic, or cultural reasons are not fully integrated into the national administrative system. Transmigrants have, in the past, had only limited contact with such people, who are generally located in remote or inhospitable areas with limited agricultural potential.

5.02 Outer island people belong to a very large number of ethnic groups whose traditions, social organization and agricultural practices range from the well developed kingdoms of densely settled, wet rice agriculturalists; through settled groups mainly dependent on estate crops (rubber and coconut); to smaller, more dispersed groups, depending partly on shifting cultivation for their subsistence. While most "isolated" people live in areas with marginal soils, and therefore practice some form of shifting cultivation, not all do; and isolated people in the highlands of Irian Jaya, for example, have complex sedentary farming systems and high population densities.

5.03 In the past, transmigration programs have brought enough benefits to the regions in terms of infrastructure, employment, markets and labor to be generally welcome, and the provinces themselves have sponsored or assisted resettlement from Java and Bali, in addition to that supported by the central government. As noted in the income survey, outer island residents have higher incomes than transmigrants, on average, and with few exceptions they have more political power in the receiving areas. Therefore, while interpersonal and even interethnic conflicts do arise, they have been relatively rare, and no large-scale movement of people in modern times has been associated with less communal tension. In spite of this record, there are several areas where the social soundness of the program must be carefully monitored, for example, in land acquisition, in the provision of benefits to transmigrants and to local people in the development area, and in the treatment of ethnically distinct peoples. The following section discusses these points and makes recommendations for improving the social soundness of the transmigration program.

#### Land Acquisition for Transmigration

5.04 Basic Agrarian Law. Among the most frequent questions about the transmigration program are those centering on the procedures for land acquisition. The Basic Agrarian Law of 1960 reflects a view of the nation set out in the constitution and reiterated in the state philosophy (Pancasila). This philosophy holds that the state has the right to use land resources to benefit the people as a whole. The law recognizes and protects customary land rights, unless they conflict with national interests, and it supports land registration both to provide security of tenure and to indicate land without claims that can be reallocated for development purposes.

5.05 The agrarian law recognizes traditional (adat) law. In most areas of Indonesia where adat law is followed, the community recognizes the right of the smallholder to cultivate in a given area and to be compensated if trees or plants are damaged. Ordinarily, however, the individual does not own the land itself or have rights to it other than those accorded by community consent. Alienation of land must also occur with community consent and under these circumstances problems related to dividing compensation and competing land claims are common (below). Critics of transmigration have also voiced concern that agrarian law does not recognize the rights of shifting cultivators to land which has been cleared in the past but is not currently under production. While this is true of both national and traditional law, provisions in the basic agrarian law mandate Government to act in the best interests of the people, and local governments can, and frequently do, prevent the expropriation of land claimed by local inhabitants, even if it is not under permanent cultivation.

5.06 Compensation. The Government does not pay cash compensation for land relinquished for transmigration purposes, although it does provide cash compensation for tree crops in areas to be used for settlement. There are a number of reasons for this. The Government argues that compensation for land would both raise the price to local smallholders and make development programs less replicable; it feels that local people should be prepared to relinquish unutilized land for programs that will contribute to local and national development; and it acknowledges that it would be difficult to ensure fair distribution of cash compensation for land where individual land claims are not clear. This policy has been possible in the past because adequate land has been made available on a voluntary basis. There is now little scope for additional large-scale settlement in Sumatra without mechanisms for land purchase, and as land increases in value elsewhere (due partly to settlement) this compensation policy will have to be re-examined (see Chapter VII).

5.07 Land Disputes. Disputes over land and compensation take several common forms. In Sumatra, where adat law generally recognizes the right of the group to all land not under the authority of other local groups (i.e., whether cultivated or not), land cannot be acquired without the consent of the community, and most disputes are over compensation for productive trees or crops. The Government has standards for payment (depending on the age and productivity of trees) which are generally regarded to be fair, but disputes may arise over the number and type of trees, and there has been a tendency, of late, for local people to plant crops in areas being cleared, specifically for the purpose of obtaining cash compensation. Local groups also argue among themselves about the appropriate distribution of compensation. It is important to note that such disputes occur even where transmigration is

welcome.<sup>1/</sup> Land disputes frequently delay settlement because provinces mediate land claims and pay the compensation, and the relative priority given to the issue by the MOT and the provinces may differ.

5.08 In Kalimantan and Sulawesi disputes are more likely to result from the competing claims of groups moving onto "state land." In West Kalimantan, for example, the Iban, local people who have been moving inland for many years, are aggressive in opening new territory which brings them into conflict with other local peoples and transmigrants. Because of the ambiguous status of land in West Kalimantan the most serious conflicts have arisen in this province. In Central and Southeast Sulawesi, several well publicized cases have involved confrontations between transmigrants and other immigrants, particularly the Buginese who are not part of the transmigration program. These conflicts have been over commercial transactions and over competing claims to land that the province allocated for settlement. Disputes of this sort are to be expected given the scale of the transmigration program and it is important to emphasize that in spite of such incidents, disputes over land have seldom generated permanent antipathy between ethnic groups, due in part to the efforts of provincial governments to resolve these problems equitably.

#### The Provision of Benefits to Local People

5.09 In the past, transmigrants were small in number and were settled on marginal land, mainly with annual crops. They had few advantages in relation to the local population and because of their tenacity they generally earned local respect. Under Repelita III and the first two years of Repelita IV, however, transmigration occurred on a larger scale and benefits to the transmigrants were increased. Since the program shifted its emphasis from settlement to second-stage development, local people are increasingly sensitive to the benefits being provided to transmigrants and they are seeking parallel benefits. Several options are available.

5.10 Settlement within Transmigration Sites. In Repelita III, about 10% of the places in transmigration sites were allocated to local people. This was increased in Repelita IV. Local people and transmigrants in such sites tend to work separately, due to their different languages and cultivation practices. Some local people do well in transmigration settlements, but many maintain their residences in nearby villages, live off the site and return only to farm. Others sell their lots to spontaneous migrants and return to the more familiar life of long-established villages. It is not surprising that some local people, who have joined settlements to obtain land, prefer to return to their own villages: productivity is often low in transmigration sites, services are not well developed, and transmigrants have different

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<sup>1/</sup> In the Bank-assisted Transmigration II project (Ln 1707-IND), an area in Jambi Province was identified which was suitable for the settlement of 30,000 families. Problems over land classification and compensation ultimately reduced this number to about 10,000. Local people were not opposed to settlement, but wanted higher levels of compensation than the Government was prepared to provide.

languages and traditions. For these reasons, the benefits to be provided to local people through transmigration cannot be limited exclusively to settlement within transmigration sites.

5.11 Parallel Development. Local people outside of transmigration sites have benefited from new settlement through improved access and provision of services, and provinces have made an effort to upgrade facilities for local people in the vicinity of transmigration sites. In the future, however, if new settlement were to occur in more remote areas, more systematic attention will have to be given to parallel development for local people. This could involve the provision, as needed, of infrastructure, facilities, wells, and supplementary agricultural inputs (seedlings, livestock and extension). The Ministry of Transmigration could play a useful role in identifying parallel programs, by either paying for them or mobilizing provincial authorities to do so.

5.12 Second-Stage Development. In Repelita IV, the Ministry of Transmigration redirected its efforts from settlement to second-round investments in transmigration sites to improve infrastructure, introduce major tree crops and regularize land registration. There would be no equity issue if this assistance were directed only at critical sites, or if local people in the vicinity were already well-off. However, it is unlikely that major second-round investments can be made in transmigration areas without arousing resentment unless parallel benefits are provided to local people. To address this problem, it is necessary to provide many aspects of second stage investment to both local people and transmigrants, and to do this, investment plans must be prepared that take into account the needs of major receiving districts. This can be done by preparing plans for second stage development on a regional basis.

#### The Treatment of Ethnically Distinct People

5.13 The People. Most outer island people are sufficiently well integrated into the political process to protect their own interests and to accept or reject transmigration depending on the benefits to them. But concern exists that less assimilated people may relinquish land against their best interests, or that very isolated people may be unable to assess the situation properly or assert their views.

5.14 About 1.5 million of the 60 million people in the outer islands are isolated people not fully integrated into the national administrative system. While small in number and ethnically diverse, isolated people are present in many outer island provinces. For example, there are a small number of nomadic, forest-dwelling people called the Kubu in the more remote areas of Jambi and Riau (Sumatra) who are so invisible that their exact numbers and habitat are not known. In the past these people retreated with the forest as local development progressed. To protect these people from both indigenous development and transmigration, and to prevent expropriation of their lands, the Governor of Jambi announced plans in late 1985 to protect a forest area where the Kubu can follow their traditional way of life. A study on the area to be delineated for this purpose is underway. To date, contact with and treatment of such people has been largely a provincial matter.

5.15 Concern has also been expressed about the rights of the Dayak people in Kalimantan, although the term "Dayak" refers to many groups in Kalimantan which vary greatly in their degree of isolation and assimilation. These groups range from the aggressive and politically astute Iban of West Kalimantan, discussed earlier (para. 5.08), to other inland peoples who are more reclusive and retiring. Recognition of these cultural differences in the design of appropriate benefits or protection is important. It is noteworthy, however, that most Sumatran and Kalimantan people also have many common cultural practices, and when assimilated they are not distinguishable from other Indonesian nationals. This is not true in Irian Jaya, where the people are racially and culturally distinctive, and where management of cultural differences will require particular sensitivity. Because of the special features of the Irian situation, this issue will be discussed separately in Section C.

5.16 Policies. Bank policy on the incorporation of ethnically distinct people in development projects is being used by the Government as the basis for its own policies in transmigration areas. This policy indicates that development projects that use occupied lands should only proceed where adequate safeguards are provided for the local people. It also notes that nondisruptive acculturation is necessarily a slow process, and that projects affecting previously isolated people must provide the time and conditions for such acculturation. Projects affecting isolated or distinct people are required to include: (a) the recognition, demarcation and protection of areas containing the resources required to sustain their traditional means of livelihood; (b) appropriate social services, including protection against new diseases and maintenance of health; (c) maintenance, to the extent desired by the local people, of their cultural integrity; and (d) a forum for the participation of local people in decisions affecting them and provision for adjudication and redress of grievances.

5.17 Guided by this policy and with the cooperation of the Government of Indonesia, the Bank's Transmigration V project (Ln 2578-IND) included a number of specific steps to ensure that the rights of local people were taken into account in site selection. Consultants undertaking site screening and evaluation were required to provide information on the number of local people in proposed project areas, describe their culture and subsistence base, and identify the area needed by them to pursue their traditional way of life; they also assessed the attitudes of local people toward compensation, resettlement, and the provision of infrastructure and services outside the site. To carry out these tasks, consulting firms employed appropriately qualified social scientists, and the project advisory group engaged an anthropologist/sociologist on a full-time basis to oversee consultant work. Inclusion of these provisions in the project has had a positive effect in raising the level of awareness in the implementing agencies of social considerations.

#### Improving the Social Soundness of Transmigration Programs

5.18 At the present time new settlement has been slowed and social issues are in abeyance. Were new large-scale settlement to be resumed, however, key institutions should be strengthened to deal with social issues.

- (a) The Ministry of Transmigration is currently receiving technical assistance through the Transmigration V project to evaluate social policies, to resolve land disputes, to determine appropriate parallel benefits or to monitor treatment of isolated or ethnically distinct people. As these functions would increase in importance in any future program, the Ministry of Transmigration should also strengthen the existing Directorate of Social and Cultural Development to participate in these functions. The responsible Directorates should be staffed with appropriate technical specialists.
- (b) The Ministry of Home Affairs (MOHA) has a direct relationship with the Governors and Bappedas which are, in turn, responsible for protecting the rights of local people through the Directorate General of AGRARIA. It would therefore be appropriate for MOHA to organize seminars to sensitize provincial staff to the special problems of less assimilated people and to the Government's own policies in relation to them. MOHA and the Governors are also in the best position to ensure that the concerns of local people are adequately registered and addressed, and close supervision of these activities in the implementation period is required by Bappedas.
- (c) The Ministry of Population and Environment also has a role to play in monitoring the development of appropriate social policies and it could profit from additional technical support from either local or foreign anthropologists. There are also demographic programs in a number of local universities which could provide social assessment of the more traditional groups, working either for the Ministry of Transmigration or the Ministry of Population and Environment.

Given the number of groups with responsibilities in the area, it would be helpful if an interagency coordinating committee, reporting to the Minister of Transmigration, were formed to deal with social issues (see Chapter VIII).

#### B. The Impact of Transmigration on the Environment

5.19 Transmigration has as one of its major objectives the alleviation of population pressure on critical lands in Java and Bali. As noted in Chapter I, in many upper watersheds in the inner islands, food crops are cultivated on dangerously steep slopes and there has been encroachment on legally protected and production forests. Under such conditions, erosion has increased, there has been rapid siltation of dams which has necessitated the construction of new reservoirs, and downstream flooding is acute. To address these problems, the Government must relocate people from critical areas, and transmigration, with the promise of land ownership, offers an acceptable alternative to many farmers. The Government has also used transmigration as one option in the relocation of people displaced by natural disasters and development projects, people who might otherwise move onto increasingly marginal land. In this respect, transmigration has contributed to environmental protection in the inner islands.

5.20 Most attention from environmentalists, however, is focused not on environmental degradation in Java, but on the outer islands and on the impact of transmigration, particularly spontaneous migration, on forest reserves, on areas such as tidal swamps, where the long-run consequences of drainage are uncertain, and on Indonesia's wildlife and biotic resources. The data on these subjects are poor and difficult to analyze, but some relevant facts are known. The following section will focus on the impact of sponsored and spontaneous transmigration on forested land and on the role of shifting cultivation by local farmers and transmigrants. The purpose of this section is both to reduce misunderstanding about the transmigration program and offer concrete suggestions on ways in which environmental concerns can be better addressed.

#### The Impact of Transmigration on Forested Land

5.21 Indonesia contains about 10% of the world's tropical rain forest and perhaps half of that remaining in Asia. It is one of the most biologically diverse areas in the world and has more than 500 species of mammals, 1,500 species of birds (17% of the world's avifauna) and a botanical diversity which includes over 10,000 species of trees.<sup>2/</sup> For this reason, Indonesia's forests and wildlife are a matter of international interest and Indonesia's stewardship of them a matter of utmost importance. Because a portion of new settlement occurs on forested land, transmigration is an important topic among those interested in conservation of the world's natural resources.

5.22 The Conversion of Forested Land. The total area within forest boundaries in Indonesia is estimated at nearly 144 million ha or about 75% of the nation's land. Of this, 122 million ha is closed canopy forest. Areas classified as protection forests and nature reserves cannot be used for sponsored transmigration and are eliminated from consideration in the site screening process. Production forest is that area required for the sustained production of timber. It can be reclassified if the land is suitable for agriculture and if equivalent land is returned to production status. In practice this is difficult because of the strong economic interests of forest concessionaires. Conversion forest is land that can be converted to agriculture or other uses. Most of this land is already deforested or in areas along roads or rivers where exploitation by smallholders is inevitable. About 25% of all of Indonesia's land is in protection or conservation forest, 32% is production forest, and 16% of the area within forest boundaries is earmarked for conversion. Annex 5 shows the classified forest area by province as of May 1984.

5.23 Table 5.1 compares forest reserves by province with the land allocated for transmigration in Repelita III. The Ministry of Transmigration estimates that an average of 30% of land cleared for the sponsored transmigration program was in heavy, logged-over forest. The remaining land cleared was about equally divided between secondary regrowth and grasslands, although the

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<sup>2/</sup> From a 1986 project proposal prepared by the International Union for Conservation of Nature and Natural Resources (IUCN).

Table 5.1: FOREST RESOURCES BY PROVINCE COMPARED TO LAND ALLOCATED FOR TRANSMIGRATION IN REPELITA III  
(ha '000)

	Province area	Defined forest	Conversion forest	Forest as a % of prov. land	Transmigration land /a		Allocated as a % of total forest land		Allocated as a % of conversion forest	
					Available	Allocated	30%	50%	30%	50%
Aceh	5,539	3,282	192	59	27	17	0.1	0.2	2.7	4.5
N. Sumatra	7,168	3,526	253	49	15	13	0.1	0.2	1.5	2.5
W. Sumatra	4,230	2,942	437	70	12	9	0.1	0.1	0.6	1.0
Riau	9,456	6,546	1,754	69	80	58	0.2	0.3	1.0	1.7
Jambi	5,100	2,614	1,013	51	53	38	0.3	0.5	1.1	1.9
S. Sumatra	10,278	4,028	1,186	39	174	171	1.0	1.6	4.3	7.2
Bengkulu	1,978	992	193	50	22	23	0.6	1.0	3.6	6.0
Lampung	3,200	1,244	0	39	102	100	2.4	4.0	-	-
Subtotal	<u>46,949</u>	<u>25,174</u>	<u>5,028</u>	<u>54</u>	<u>489</u>	<u>429</u>	<u>0.4</u>	<u>0.7</u>	<u>2.6</u>	<u>4.3</u>
W. Kalimantan	14,600	7,695	1,508	52	57	25	0.1	0.1	0.5	0.8
C. Kalimantan	15,300	10,997	3,000	72	51	48	0.1	0.2	0.5	0.8
S. Kalimantan	15,114	2,029	284	55	47	37	0.5	0.8	3.9	6.6
E. Kalimantan	3,700	15,951	3,500	75	30	26	0.0	0.1	0.2	0.4
Subtotal	<u>54,824</u>	<u>36,672</u>	<u>8,292</u>	<u>67</u>	<u>187</u>	<u>136</u>	<u>0.1</u>	<u>0.2</u>	<u>0.5</u>	<u>0.8</u>
N. Sulawesi	2,751	1,583	699	58	8	7	0.1	0.1	0.3	0.5
C. Sulawesi	6,803	4,165	335	61	38	30	0.2	0.3	2.7	4.5
S.E. Sulawesi	3,814	2,190	699	57	39	36	0.2	0.5	0.5	0.8
S. Sulawesi	6,292	3,351	259	53	12	12	0.1	0.2	4.2	7.0
Subtotal	<u>19,660</u>	<u>11,289</u>	<u>1,992</u>	<u>57</u>	<u>97</u>	<u>85</u>	<u>0.2</u>	<u>0.3</u>	<u>1.3</u>	<u>2.1</u>
Maluku	8,572	5,096	436	59	18	15	0.1	0.1	1.0	1.7
Irian Jaya	41,066	28,816	11,775	70	34	13	0.0	0.0	0.0	0.1
Subtotal	<u>49,638</u>	<u>33,912</u>	<u>12,211</u>	<u>68</u>	<u>51</u>	<u>28</u>	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>	<u>0.1</u>
Total	<u>171,071</u>	<u>107,047</u>	<u>27,523</u>	<u>63</u>	<u>824</u>	<u>677</u>	<u>0.2</u>	<u>0.3</u>	<u>0.7</u>	<u>1.2</u>

/a Land allocated for transmigration shown in Table 5.2.

Source: FAO/World Bank Cooperative Program, Indonesia Forestry Project, Working Paper I, October 1985.



type of land cover varied by province. The table shows the estimated amount of forest clearing if 30% or 50% of the total transmigration area had been in forest land, both in relation to total forest area and conversion forest. Assuming that 50% (rather than 30%) of all cleared land was forested, land allocated to sponsored migrants exceeded 1% of the total forest area in only three provinces in southern Sumatra. Land made available to transmigrants, but not cleared, would increase these numbers slightly; and it is estimated that land claimed by spontaneous migrants would double the amount of land brought into production by sponsored migrants in Repelita III and would therefore double the percentages shown.

5.24 Table 5.1 also shows that transmigration has brought differing degrees of pressure to forest lands in different areas. Not surprisingly, South Sumatra province with high levels of settlement had a greater portion of conversion forest opened and for this reason, among others, there will be no further sponsored transmigration to that area. With the exception of densely populated South Kalimantan, however, forested land cleared for sponsored migration on the island of Kalimantan comprised less than 1% of the total forested area and perhaps 1-2% of the land intended for conversion. Irian Jaya, the largest province in Indonesia, shows the least impact.

5.25 Despite the fact that only a small proportion of Indonesia's total forested area was utilized in Repelita III, settlement in the five-year period reduced logged-over forest areas in Indonesia by at least 200,000 ha and reduced secondary regrowth by an equal amount, and it also put a smaller uncleared area under the command of sponsored migrants. These numbers suggest a loss of forest cover of perhaps 500,000 ha to the official program in the third five-year plan. Of this perhaps half was secondary regrowth which, while less rich in terms of diversity, nevertheless has environmental importance. If spontaneous migrants occupied an equal area, up to one million hectares of forested land would have been brought into agricultural production in the five-year plan. This is an important loss of tropical rain forest.

5.26 Ideally, no forest areas would be used for development. However, past experience in developed countries and current patterns in developing countries suggests that it will be virtually impossible to prevent the conversion of some forested land to agricultural purposes. For this reason, the effort to protect forests must concentrate on the demarcation and protection of land unsuited to agriculture. To do this it will be necessary to prepare master plans which clearly delimit areas for conservation and timber production; and indicate those areas with agricultural potential.

5.27 Land resource inventories carried out in the 1970s noted that there were 30 million hectares of degraded grassland in Indonesia and the question arises whether this land should not be used for transmigration, rather than forest. In Repelita III grasslands were used wherever possible as they are cheaper and quicker to clear, and very large settlements in Riau, for example, were reclaimed from grassy areas. However, Indonesia is so humid that secondary forest usually reasserts itself within a very few years unless persistent human activity, such as burning for pasture or short fallow cultivation hinders regrowth, or unless the land is seriously degraded and unsuited to trees, as in the shallow soils of the highlands of Sulawesi. In both cases

land is rejected for transmigration either because of local land claims or soil infertility. Since most grassy areas suitable for reclamation and available for settlement were occupied in Repelita III, less of this land will be available in the future.

5.28 Transmigration and Shifting Cultivation. Shifting cultivation is a method of agriculture used by indigenous people on low fertility soils. When the natural vegetation is burned, nutrients are available in the soil for cultivated crops for a year or two, and when exhausted, new land is opened and the old land is left to regenerate. It is important to recognize that shifting cultivation is ecologically sound when population densities are low and the fallow period is long enough to permit forest regeneration. With recent advances in public health and population growth, however, shifting cultivation has led to extensive forest clearance, a short fallow period, and land degradation in many areas.

5.29 Recently, critics of the transmigration program have linked destruction caused by shifting cultivation to the "nomadic practices" of spontaneous transmigrants. This is incorrect. Javanese transmigrants, whether they have been settled under sponsored programs or moved spontaneously, rarely engage in shifting cultivation on a large scale because they have limited access to land. They do encroach upon forested areas, occupying one to two ha per family, but they do not ordinarily put land under production on a temporary basis.

5.30 Most degraded land has been made so by indigenous cultivators. For example, the critical lands of Central Sulawesi and the northern reaches of South Sulawesi, mentioned above, are areas where indigenous cultivators have moved from old lakebeds of reasonable fertility up the sides of mountains with very shallow soils. The resulting grasslands are not suitable for cultivation by either local people or transmigrants. Similarly the degraded areas of Sumatra (the Toba plateau, Padang Bolak) are the result of intensive indigenous cultivation. In East Kalimantan where farmers are blamed for recent forest fires, almost all shifting cultivation is done by local people or Buginese immigrants who have no links to the transmigration program.

5.31 Analysis of maps and figures available for Central Kalimantan shows that about 3.4 million ha or 22% of the province have been cleared, 750,000 ha are degraded and abandoned, and only 300,000 ha are under permanent cultivation. With approximately 260,000 farm families in the province in 1983, this suggests a ratio of 13 ha per farm family. Since there were fewer than 10,000 transmigrant families in Central Kalimantan in 1983, and most had been recently settled, this forest clearing cannot be attributed to transmigrants. Similarly, although land use maps are not yet completed for West Kalimantan, it is estimated that up to one-third of the province (4.8 million ha) has been cleared by a farming population of about 660,000 families. This is not an argument for complacency. However, it does suggest that the problems of forest degradation have been caused in large measure by local people and will not be solved by a halt to transmigration. To resolve the problem, local production systems must be upgraded (through the introduction of more productive tree crops, for example) as this will both reduce shifting cultivation and make some land available for others.



Local farmers practicing shifting cultivation on the shallow soils of highland Central Sulawesi have left permanent grasslands behind them.

#### Other Areas of Environmental Concern

5.32 Swamps. Questions have been raised about the environmental implications of drainage in tidally influenced areas. In particular, concern is expressed about the acidification of rivers in areas where peats are drained, and about the loss of mangroves or wildlife habitats. Environmental impact studies of both Sumatra and Kalimantan, undertaken by Indonesian universities, have not shown irreversible damage to streams or rivers, but concern over the long-term impact remains. In 1984 a long-term monitoring study of the effects of drainage was begun under the second Bank-assisted Swamp Reclamation Project (Ln 2431-IND), but this study focuses primarily on the Bank-assisted settlement area and additional work could profitably be done on other sites. Stronger linkages should be developed between universities and the Ministry of Population and Environment.

5.33 Wildlife. The Indonesian Government is committed to the conservation of forests and wildlife species and has demarcated areas for their conservation. Areas demarcated for conservation purposes cover 10 million ha and

300 sites, and include 17 national parks, and 70 nature and game reserves of which 4 are biosphere reserves. These areas are underfunded and inadequately managed, and an international effort to mobilize funds and technical expertise to improve wildland management is urgently required. The Government is committed to the preservation of endangered species and has relocated some animals, including elephants, from existing transmigration sites in South Sumatra. However, human encroachment on the natural habitats of wild animals will continue to be a problem and mechanisms must be developed to monitor and protect critical areas, and to provide the human resources to carry out these tasks.

5.34 Spontaneous Migration. Transmigration settlements are envisaged as growth poles, but the implications of this, particularly in terms of the space required, have not yet been incorporated into planning and this has had negative environmental consequences. In Lampung, which has received the most unsponsored transmigrants, for example, the integrity of forest and nature reserves is threatened, and in the past few years the Government has undertaken a program to resettle 45,000 families within the province. To help avoid such problems in the future, spontaneous migrants must be incorporated into the planning process and land must be reserved for them. It is also important that the Government develop a mechanism to facilitate land registration and develop credit mechanisms for land purchase. These matters are discussed further in Chapter VII.

#### Improving the Environmental Soundness of Transmigration

5.35 Institutional Development. Three specific agencies have a strong role in improving the environmental soundness of transmigration and protecting wildlife and the environment: the Ministry of Population and Environment; the Regional Environmental Studies Centers, which are located within selected universities; and the Directorate of Conservation within the Ministry of Forestry and the Environmental Directorate within the MOT.

5.36 The Ministry of Population and Environment is in a good position to monitor the transmigration program from an environmental point of view and to help develop policies and guidelines for those carrying out site selection, environmental assessment studies, and land development. Technical support was provided to this agency under the third Bank-assisted transmigration project, and consideration should be given in the future to increasing specialist support to the agency, particularly in wildlife management, swampland assessment, and other technical specialities.

5.37 The Regional Environmental Studies Centers in provincial universities are in a good position to carry out environmental assessment studies and are already doing so, particularly in swamp areas. They could also play a key role in ensuring that buffer zones are established near transmigration sites and that wildlife areas are protected. These centers are currently being assisted by the Bank and UNDP, but they need to be further strengthened, and linkages with the transmigration program should be formalized. Resources for both domestic and external training should also be increased, and support should be given to these universities to train officials and MOT staff in environmental matters.

5.38 The Directorate of Conservation in the Ministry of Forestry (MOF) has the most important role to play in environmental protection as the bulk of all lands which should be gazetted and protected are forestry lands. Considerable work has already been done by the Ministry, by universities, and by organizations such as the World Wildlife Fund, to identify areas of biotic importance and a National Conservation plan was prepared in 1982. Therefore, consideration should now be given to a major program to consolidate this work, determine priority areas for protection and begin the very large tasks of translating this plan into reality.

5.39 An Environmental Directorate has recently been formed in the Directorate General of Settlement Preparation within the MOT. Because of its location, this Directorate can potentially play an important role in improving the environmental soundness of site selection and settlement development and it can serve a useful role in facilitating the work of interagency teams developing policies for environmental protection (Chapter VIII).

5.40 Any effort to mobilize and support an environmental protection program would benefit from close coordination between Indonesian line agencies, particularly the Ministry of Forestry, which has the mandate to carry out such programs; the international environmental organizations (World Wildlife Fund, IUCN, among others) that have the technical expertise to assist in the definition and delineation of priority areas to be protected; and bilateral and multilateral agencies, which have the financial resources to assist in implementation. One possibility would be for the Ministry of Forestry or the Ministry of Population and Environment to form a consortium of environmental organizations and donor agencies interested in environmental protection and to coordinate their technical and financial inputs. It is likely that grants and concessional aid would be made available for a systematic effort in this direction.

### C. The Case of Irian Jaya

#### Special Features

5.41 Irian Jaya, which is about the size of Spain or California, is the largest province in Indonesia and the least densely populated with about 3 people/km<sup>2</sup>. In general, soils in many parts of Irian Jaya are somewhat better than those in areas such as Central Kalimantan. Of the population of 1.2 million, some 800,000-900,000 are people of Papuan descent. Non-Papuan peoples include long-time residents from eastern Indonesia, located primarily on the islands and coastal areas in the west; more recent migrants from surrounding areas; civil servants and transmigrants. About 19,000 transmigrant families were settled in Irian Jaya through Repelita III. Initial targets for Repelita IV projected some 140,000 families moving to Irian Jaya within the overall 750,000-family target, and the prospect of movement on this scale raised alarm among environmental and social scientists. Actual movement in Repelita IV is expected to be only about 7-8% of targets. With the reduction of the land clearing program in February 1986, total settlement of sponsored and partially-assisted transmigrant families in Irian Jaya had reached about 10,000 families by June 30, 1987.

5.42 The Government is committed to settlement in Irian Jaya to (a) help realize the demographic and employment objectives of transmigration; (b) provide the people and economic infrastructure, such as roads, which are crucial to regional development; and (c) promote national integration. The speed of settlement in the area, however, is constrained by the absence of infrastructure and services and the high cost of establishing them. In addition, the social and environmental considerations noted below argue for slow and systematic development.

#### Social Issues

5.43 Perhaps 0.5 million Irianese live in the fertile highlands of the Baliem Valley and Paniai Lakes area where they pursue their traditional way of life with minimum exposure to the modern cash economy. Their main contact with the outside world is through an active missionary network and more recently, through government administration and the educational system. Outside the highlands area, the environment is less hospitable and lowland people are more sparsely settled, often basing their subsistence on shifting cultivation, hunting and gathering, or sago harvesting. Because the highlands are fully occupied, there are no plans for transmigration settlement there. Most sites were planned for coastal areas in the north and west, and on the south coast around Merauke, areas where populations have remained low in relation to carrying capacity due, in part, to climatic factors such as drought and flooding and to endemic malaria. These locations were chosen for settlement as they were felt to have the best agricultural potential of those areas not densely settled.

5.44 The most sensitive issue in such settlement is the fairness with which the rights of the local people will be taken into account. As noted earlier, concern for this issue figured prominently in the design of the most recent Bank-assisted project, Transmigration V. Up to 50% of all those to be settled in transmigration sites in Irian Jaya can be native Irianese, and many of these are likely to be migrants from the highlands and small island areas where economic opportunities are limited. The Government has also recognized the need for culturally appropriate "parallel development," i.e., comparable services provided to local people who do not want to settle in transmigration sites. However, as Bank policy statements acknowledge, the process of acculturation and growth of awareness about one's rights and interests is a long one and for this reason, slow, well-planned transmigration coupled with sound programs to benefit the local people and respect their cultural identity is required.

5.45 Regional development studies financed by UNDP and executed by the Bank are focusing on programs to assist the indigenous people of Irian Jaya, and should be very useful in defining culturally appropriate development. Steps to improve the social soundness of the transmigration program will also contribute to the quality of settlement in Irian Jaya, and a Directorate in the Ministry of Transmigration to develop and monitor programs for indigenous people, could, if appropriately staffed, develop policies to ensure that the rights of Irianese were protected and that benefits provided are consistent with the culture and level of economic development of the people. Since traditional law in Irian Jaya has not been codified, consideration should be given by the MOHA to providing support for such work.

### Environmental Concerns

5.46 Irian Jaya has the largest undisturbed lowland rain forest in Southeast Asia and is unequalled in biotic richness and diversity.<sup>3/</sup> In keeping with the importance of the area, the Government together with the Food and Agriculture Organization, the World Wildlife Fund and others, has prepared a series of proposals for a system of parks and nature reserves in the province. The Government is committed to conservation of these areas and has rejected transmigration sites which infringe on existing or proposed reserves. However, forest concessions, proposed roads and the prospect of large-scale settlement will have a significant impact on the environment unless a major effort is undertaken to complete the gazetting of environmental protection areas, parks and wildlife protection areas. Plans are also needed to keep roads at a distance from protected areas and to create buffer zones between transmigration sites and protected areas. Support for these activities from environmental organizations and bilateral and multilateral agencies would be relatively easy to obtain. Support should also be considered for the Environmental Study Center of Cenderawasih University, Jayapura, to monitor the environmental impact of transmigration in Irian Jaya.

5.47 With respect to transmigration planning in Irian Jaya, the World Wildlife Fund specifically recommends:

- (a) integration of environmental planners into presettlement planning teams and review of settlement plans by the State Ministry for Population and Environment (MPE);
- (b) adequate supervision of land clearing contractors to ensure adherence to site clearing instructions;
- (c) elimination of wasted forest resources by close coordination of land clearing with logging interests; and
- (d) development of an extension service through the Bureau of Environment in the MPE, to create a public awareness and appreciation of conservation values, including adequate information to the settlers themselves.

These recommendations should be adopted and efforts should be expanded to ensure the preservation of important wilderness areas.

### D. Summary and Conclusions

5.48 Impact on Local Peoples. Past transmigration programs have received a generally positive reception, and no program of this magnitude has been carried out with less communal tension. Attitudes could change, however, if the scale of the program increased, or if migrants were sent in large numbers

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<sup>3/</sup> For details see the 1985 World Wildlife Fund study "Conservation and Development in Irian Jaya: A Strategy for Natural Resource Utilization."

to more remote areas, or among people who are culturally different. Particular sensitivity is required in the management of development in Irian Jaya. To improve the social soundness of the transmigration program, the appropriate Directorate within the Ministry of Transmigration should be strengthened to deal with policies for compensation, resolution of disputes, the development of parallel programs for local people, and the protection of ethnically distinct groups. A number of steps have been taken by the Government to assess the needs of local people in transmigration areas and to ensure that they benefit from the program, but successful implementation will require (a) involvement which is voluntary and gradual and provides the time for necessary adaptation; and (b) careful monitoring and strengthening of the institutions responsible for this task.

5.49 Impact on Forested Land. Migrants on average receive and cultivate less than 2.0 ha of land per family. Since 1980, the Government has moved about 500,000 families, and it could possibly move 500,000 more by the end of the century, depending upon the scale of the future program. This means that, at an upper estimate, some 2.0 million ha could potentially be put into production by sponsored migrants. An equal area may be put into production by spontaneous migrants. If 50% of this land is forested, this would mean the loss of 2.0 million ha of forested land by the year 2000. This is a very large area, although it is less than the area under shifting cultivation in Central Kalimantan alone. It is equivalent to about 10% of conversion forest and 2% of the total forested area of the outer islands. The loss of this forested area must, therefore, be weighed against other economic and employment considerations.

5.50 It is unlikely at Indonesia's level of development, that areas suitable for agriculture can be maintained permanently under forest cover. Strong programs are therefore needed to protect areas unsuited to cultivation, to protect wildlife and biotic reserves, and to bring spontaneous migrants into the planning process to reduce their encroachment on protected land. Programs are required to upgrade indigenous agriculture, thereby reducing shifting cultivation and freeing land for population growth and new settlement. In the future, mechanisms must also be developed for land purchase and registration that permit migrants to acquire land already under cultivation.



## VI. AGRICULTURAL PROSPECTS

### A. Upland Sites

6.1 In Repelita III about 290,000 transmigrant families were settled in upland sites based on rainfed food crop agriculture, nearly 80% of all those moved. The upland food crop model permitted the rapid establishment of families and a large increase in the scale of the program; it enabled transmigrants to meet their own subsistence needs and quickly reduce their dependence on the Government; and it was less costly than settlement based on swamp reclamation or tree crop development. To move beyond subsistence, transmigrants were expected to gradually put more land into production, use improved farming and conservation techniques, and increase their yields. Officials expected that the sale of surplus production would increase farmer incomes and reduce national and regional food deficits, particularly in rice. Recent studies indicate, however, that rice production is modest (Table 6.1), and incomes and economic rates of return are low. Therefore, in order to evaluate the prospects for this model, it is necessary to understand the factors which limit production in upland areas and to ask whether these limitations can be overcome.

Table 6.1: REPORTED ANNUAL PRODUCTION OF UNMILLED RICE  
IN UPLAND SITES

	Settlement years	Sample size	Average family production (kg)	Families growing rice (%)	Average family production for growers (kg)
<u>BPS Survey</u>					
Repelita II	1975-79	419	470	83%	567
Repelita III	1980-82	824	824	87%	947
Repelita III	1982-84	746	746	83%	898
<u>IFAD Survey</u>	1974-84	1,200	760	86%	883

Source: Farmer reports, BPS Transmigration Income Survey 1985 and IFAD Transmigration Survey, 1985.

### Factors Affecting Food Crop Production in Upland Sites

6.2 Agro-ecological Conditions. Most transmigration sites are located in upland areas with red-yellow podzolic soils of low inherent fertility. These soils are generally characterized by low pH and aluminum toxicity, which restricts the growth of certain species, and by high erodibility. High levels of exchangeable aluminum, which increase with depth, cause shallow rooting of

plants, and limited organic matter reduces the ability of the soils to retain water and nutrients. Typically, yields on such soils are moderate to good the first year after clearing and burning, and they improve in the second and third year as organic materials (roots, stumps) decay. Yields decline thereafter as nutrients are leached from the soil and weeds become harder to control. Most experts agree that land clearing with chain saws and manual labor is less destructive than mechanical clearing, but regardless of how land is cleared, fertility eventually declines to low levels.

6.3 These problems can be addressed, although not entirely overcome, by liming to increase the pH and reduce aluminum toxicity; by applying chemical fertilizers, particularly phosphates and urea; by incorporating organic material into the soil on a regular basis to add nutrients and improve the water retention capacity; and by introducing erosion control measures such as bunding and bench terracing. However, many of these measures involve complex technologies and are either costly or time-consuming to carry out. For example, bench terracing is estimated to require 200-250 man-days of labor per hectare; and liming, at two tons of lime per hectare, may cost up to US\$80-\$120, the equivalent of 80-120 days of off-farm work. The distribution of lime also entails considerable extra effort on the part of the farmer, particularly if his field is not adjacent to a road. Under these circumstances, such practices are seldom adopted by the farmers unless labor or capital is subsidized, or unless they can be certain of adequate returns.

6.4 Climatic factors work against the certainty of adequate returns. Although most sites in western Indonesia have at least 1,500-2,500 mm of rainfall and a seven- to nine-month growing season, rainfall is highly localized and periods of drought occur even in the wet season. Rainfall at the beginning and end of the rainy season is particularly uncertain. Where soils have high organic content and good water retention properties, dry spells are not a particular problem, but on red-yellow podzolic soils where water retention is poor and crops tend to be shallow rooted, rainless periods at critical points in the growing season can cause serious damage to crops and weaken their natural defenses against disease and insect pests. Agro-ecological studies conclude that the soil and climatic properties of most settlement sites make them well suited to deep-rooting, acid-tolerant tree crops such as rubber, suited to certain tuberous crops such as cassava, only marginally suitable for the production of rice and corn, and unsuited to plants preferring less acidic soils such as soybean.

6.5 One approach to overcoming agroclimatic constraints is through agricultural research intended to develop cropping systems, farm management practices and cultivars suited to outer island conditions. Such research is being carried out by the Agency for Agricultural Research and Development at 20 sites in Indonesia, of which about half are in transmigration areas. This research has already led to the introduction of the rice/corn/cassava system of intercropping used by most transmigrants. To date, however, research has been carried out without adequate attention to the socioeconomic and risk-aversion factors which influence farmers' judgements, and the analysis presented in Chapter III indicates that some proposed high-input/high-output models have lower financial returns than traditional farmer practices. The Agency for Agricultural Research and Development is aware of this problem and modifying its work accordingly.



Transmigrant site located in grassland area.  
The alang-alang (*imperata cylindrica*) in the foreground is easy to clear but difficult to eradicate completely.

6.6 Marketing Constraints. Some transmigration sites are located near major markets, and transmigrants there have earned sizable incomes from the sale of chilies, vegetables, citrus and the like. However, most transmigration sites, by definition, are located in sparsely populated areas. Given the long distances to major markets and the poor quality of roads, transport costs are high and discourage trade. In the past, limited access has meant that perishable goods such as vegetables and fruits were produced almost entirely for home consumption; and nonperishables such as surplus rice and peanuts could be sold to middlemen in the markets, though at low farmgate prices reflecting high transport costs.

6.7 To address marketing constraints, the Government has two mechanisms for intervention. The first and most important is purchases by BULOG (a government body used mainly for the purchase and redistribution of rice). In theory, BULOG purchases all surplus rice meeting specific quality standards from village cooperatives at a specified floor price. In practice, with the rice surpluses of the past year and severe storage problems, BULOG is purchasing only rice of the best quality. Under these circumstances BULOG

purchases have slowed, rice surpluses have gone onto the market, and the price has declined. It would be possible for BULOG to give preference to rice purchases in transmigration sites, but this would be costly to the economy since transport costs are high and it is far more expensive to grow rice in transmigration areas than in either Java or the better areas of the outer islands.

6.8 The second method of intervention is through the establishment of agroprocessing industries in or near transmigration sites. There has been some success in using government estates (PTPs) and private estates either to grow cash crops using transmigrant labor or to purchase cash crops grown by migrants. For example, migrants are growing sugar for PTPs in transmigration areas in Sumatra and Kalimantan, and private enterprises purchase tobacco and cotton from migrants in Sulawesi. Second-stage developments of this type should be strongly encouraged. The Government has also discussed the possibility of linking transmigration settlements to major industrial developments such as the aluminum factory at Asahan, Aceh, or the proposed pulp and paper mill in Sesayap, East Kalimantan. Such projects could circumvent marketing problems and should also be encouraged, but the number of settlements possible on this basis is small.

6.9 Where transmigration sites are located near markets or have good infrastructure, private sector investment typically enters the surrounding areas without government intervention. For example, outside of Way Abung, an older settlement area in Lampung (settled 1965-74), three mills using cassava and cassava by-products were established when roads were improved, and several small estates (500 ha or less) were developed for cassava, peanut and coconut, taking advantage of transmigrant labor. Government regulations intended to protect transmigrants and support the development of cooperatives have discouraged the establishment of small enterprises in transmigration sites in the past and these regulations should be changed. In general, however, private investment in most transmigration areas is likely to be slow since development costs are high in transmigration areas and the returns to investment are low.

6.10 Other Constraints. There are a number of other constraints to production and those related to the remoteness of transmigration sites are particularly difficult to address.

- (a) Extension. Experienced extension workers are not eager to live under pioneer conditions in transmigration sites, so staff in those areas are generally recent graduates with little field experience. Their numbers are small, transport is limited, and they lack the skills to evaluate diverse conditions and to introduce the complex technologies required to manage upland soils.
- (b) Input supply. The supply of inputs is also erratic in remote areas. Steps have been taken to improve input supply but the support packages of seed and fertilizer are often delayed and seed is frequently of inferior quality.

- (c) Credit. Production credit is only available to a limited degree in specific soyabean and maize production programs, and there are virtually no credit programs for other production systems or for opening and developing reserve land.

Specific recommendations to address these problems were given in the first Transmigration Sector Review (April 1981), and some improvements have been made since then in the delivery of services. On the whole, however, most of the problems noted then still persist and cannot be easily overcome. Therefore, while improvements should be strongly encouraged, it is unlikely that the quality of extension and input supply will be significantly different in the near future.

6.11 Design Considerations. While agronomic conditions and constraints on marketing and services are difficult to address, production constraints in transmigration sites arising from factors related to project design are easier to control. Chief among these are the following:

- (a) Land Clearing. Soil scientists, economists, and environmentalists generally favor manual or semimechanical <sup>1/</sup> land clearing methods over the mechanical methods normally employed in the clearance phase of transmigration. While it is possible for experienced operators to use large machines in ways that minimize soil compaction or the loss of topsoil and soil nutrients, care is not always exercised. Therefore, given the difficulty of supervising and managing mechanical land clearing, manual or semimechanical clearance is a desirable alternative. Such methods would also generate more employment.
- (b) Farm Layout. Before 1980, most sites were laid out with fields located directly behind the houseplot or relatively nearby (the linear settlement model). In Repelita III, however, houseplots were generally grouped into villages of 350-500 families and fields were located outside the village area (the nucleated settlement model). Nucleated villages promote interaction, improve access to schools and health centers, reduce the required road infrastructure and facilitate the introduction of water and electricity when the community is developed. But they have disadvantages for agricultural production: it takes more time to get to the fields, the use of intermittent family labor is constrained, the use of inputs is reduced, pest protection is poor, and farm diversification is limited. For these reasons, food crop production on linear settlements is higher than on nucleated settlements. If agricultural production is to be maximized, serious consideration should be given to returning to the seminucleated model.

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<sup>1/</sup> Semimechanical land clearing involves the use of chainsaws and sometimes winches to remove large logs.

- (c) Land Allocation. During the 1950-80 period, farmers were ordinarily given 2.0 ha of land, a sufficient holding if irrigation was introduced. With the adoption of the upland farm model in late Repelita II, holdings were first expanded to 5.0 ha and then reduced to 3.5 ha when it became clear (i) that family labor was insufficient to cultivate 5.0 ha, and (ii) that holdings of this size would reduce the number of families which could be settled. Since most families cultivate no more than 1.0-1.25 ha, the Government has recently decided to reduce holdings to 2.0 ha. Unless the farm size is carefully considered, however, this decision could potentially prevent the introduction of tree crops at a later date. This would, in turn, limit production and income on family farms. For this reason, settlements should include at least 2.5-3.0 ha/family, and should be sufficient to generate target annual incomes of US\$1,500 per family.
- (d) Road Maintenance. One of the most severe constraints to input supply and marketing is the quality of roads in transmigration sites. Difficult road conditions raise transport costs, restrict the use of inputs, and hamper marketing. The Government has recognized this problem and begun to allocate funds for road rehabilitation. Improvements are still required, however, in design standards, contractor supervision and routine maintenance.

#### Farmer Responses to Upland Conditions

6.12 Farmer response to the risks inherent in rainfed food crop production is predictable and relatively well documented. In general, farmers avoid large investments of either labor or capital in agricultural production. They do not use recommended applications of fertilizer and pesticides, nor will they undertake costly erosion control even if yields can be increased through such measures. Instead, they concentrate on the production of food for subsistence purposes and for sale within the community, and they diversify their production systems away from food crops over time. In the BPS survey, Repelita III migrants obtained about 30% of their total incomes from food crops and older Repelita II migrants, 20%, while Repelita II migrants obtained three times as much from tree crops as those settled in the early years of Repelita III. Livestock, poultry, eggs, fish and vegetables, raised mainly for subsistence, produced 18% of farm income (see Table 6.2).

6.13 Government officials in the Directorate General of Food Crops (DGFC) are aware of the constraints to production and have made a number of suggestions to improve farmer cropping practices. Chief among these is a recommendation that rice should be produced mainly on wet ricefields (including tidal swamps), and that upland areas should be converted to diversified "conservation farming." The model proposed by DGFC and endorsed by the Agency for Agricultural Research and Development (AARD) would involve a combined field and houselot of 0.75 ha on which a mixture of food crops, tree crops and small livestock would be grown. Advantages to the combined houselot/field plot are that labor can be used more effectively, plant protection can be intensified, soil fertility can be improved by the application of manure and other organic wastes, and postharvest protection is better. Small livestock including

chickens, ducks, rabbits and goats would be an important part of this farming system, contributing both to home consumption and cash incomes. In addition to the area provided to meet subsistence needs, 1.5-2.0 ha per family would be set aside for cash crop development. This land would be allocated when tree crops or cash crops were established and then only to those farmers prepared to undertake the credit and labor obligations entailed in tree crop development. A shift to this model in upland sites should be strongly encouraged.

Table 6.2: DISTRIBUTION OF AGRICULTURAL INCOME IN UPLAND SITES, 1985  
(Annual Income - Rp'000)

	Repelita II 1974-79	Repelita III 1979-82	Repelita III 1982-84	Total	% of Total
(Sample size)	(419)	(292)	(788)	(1,499)	
Food crops	112	210	164	158	27
Tree crops	51	17	6	21	4
Other agriculture	105	108	107	107	18
Subtotal	<u>268</u>	<u>335</u>	<u>277</u>	<u>286</u>	<u>49</u>
Nonagricultural /a	308	320	287	299	51
<u>Total</u>	<u>576</u>	<u>655</u>	<u>564</u>	<u>585</u>	<u>100</u>

/a Excluding pensions and transfers.

Source: BPS Transmigration Income Survey, 1985.

#### Summary

6.14 There is a broad consensus on steps which should be taken to support agricultural production within the existing program. First, those constraints that are a function of design problems should be changed. Manual or semi-mechanized land clearing should be encouraged, both to reduce disturbance to the soil and to generate employment. Houselots and food crop areas should be combined, land allocation should ensure that adequate land remains available for second-stage development, road maintenance standards should be reviewed and funding for maintenance increased. Second, research, extension, input supply and credit arrangements should be strengthened. Finally, upland farm models should assume that farmers will produce food crops largely for subsistence purposes and on-farm diversification should be encouraged. The fact that many of these recommendations have been promoted by the Ministry of Agriculture (MOA), but not adopted by the Ministry of Transmigration, points to the need for a stronger role for MOA in setting agricultural standards and for closer coordination between the two (see Chapter VIII).

6.15 Some older transmigration areas, such as those in Lampung, are now the heart of more densely populated regions and since marketing prospects in

these areas have improved and the prospects of regular input supply are better, experimentation intended to increase food crop production beyond household consumption levels should be focused on existing sites in these areas. In general, however, the inherent limitations in food crop cultivation in remote transmigration sites, the high cost of producing food crops under adverse conditions, and the deteriorating market prospects for commodities such as rice, argue against the assumption that income growth in most upland sites will come from surplus food production.

#### B. Swamp Reclamation Sites

6.16 In Repelita III, about 67,000 families were settled in swamp reclamation sites, 18% of the total moved (see Table 6.3). Settlement in areas of swamp reclamation have a number of attractive features. Good soils in swampy areas have a high organic content and can produce relatively good yields even without fertilizers. For example, tidally influenced areas in South Kalimantan have annually produced two tons of rice/ha for over 40 years and farmers in the older (Repelita II) swamp reclamation sites reported rice yields of 1.7 tons/family and the highest incomes of all food crop cultivators in the BPS transmigration income survey. Areas cultivated are flat, which eliminates erosion problems, and they lend themselves to bunding that holds water on the land and benefits wetland rice. The timber on swamp sites has less commercial value than that on upland sites and since swampy areas are largely uninhabited before they are drained, they are relatively free of land claims.

6.17 There are also serious problems in swamp sites. Some areas have difficult soils which may retard or even prevent the growth of certain crops, water management intended to prevent overdrainage and saline intrusion is a complex and inexact science, particularly under Indonesian conditions, and concerns exist about the possible environmental consequences of the large scale drainage of coastal swamps. Recently settled farmers in tidally reclaimed areas have also experienced very severe problems with rats and insect pests, and farmers in Repelita III swamp sites report the lowest average incomes in the BPS income survey. These swamp sites have the most people below subsistence production, the highest rates of abandonment, and very low incomes from off-farm work. In recognition of the difficulties faced by the settlers in tidal areas, subsistence supplies have been extended from 12 to 18 months by MOT, Repelita IV targets for tidal areas were reduced even before budget constraints slowed the new settlement program, and funds have been diverted to canal rehabilitation and the upgrading of existing sites.

#### Factors Affecting Swamp Development

6.18 Physical Features. Lands used for swamp reclamation are generally located in tidally influenced areas near the coasts of the major islands.<sup>2/</sup> These areas are very flat and have poorly formed drainage networks. For this

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<sup>2/</sup> Freshwater inland swamps also have settlement potential but they are less extensive and have not been developed on a significant scale to date.



reason, low-lying areas are often inundated by surface runoff during heavy rains, by river flood waters in the rainy season or by tidal action which raises the level of the river and backs seawater or freshwater over the land. Such water is trapped when floods or tides recede, and the resulting swamps are difficult to drain on a small scale and have high levels of malaria. For these reasons, most tidally influenced areas are inhospitable to people and have very sparse human populations.

Table 6.3: FAMILIES SETTLED IN SWAMP RECLAMATION SITES IN REPELITA I, II AND III

	Repelita I 1969-73	Repelita II 1974-79	Repelita III 1979-84	Total
<u>Sumatra</u>				
Riau	355	700	12,865	13,920
Jambi	2,585	500	4,845	7,930
South Sumatra	2,100	4,800	34,140	41,040
Subtotal	<u>5,040</u>	<u>6,000</u>	<u>51,850</u>	<u>62,890</u>
<u>Kalimantan</u>				
West	500	2,600	2,600	5,700
South	1,535	750	1,690	3,975
Central	1,675	250	10,875	12,800
Subtotal	<u>3,710</u>	<u>3,600</u>	<u>15,165</u>	<u>22,475</u>
<u>Total</u>	<u>8,750</u>	<u>9,600</u>	<u>67,015</u>	<u>85,365</u>

6.19 There are two main types of soils in tidal areas: peat soils and unripe clays and each requires a different system of soil and water management. Some unripe clays, which are stable when submerged, contain pyrites, which oxidize when drained causing a high level of acidity in the soils. This lowers the pH, increases aluminum toxicity and may be detrimental to plants. Such acidification can generally be prevented or controlled by maintaining a high water table or by running fresh water over the land to leach out the toxic elements. To date, very conservative cultivation practices, adopted to avoid exposing potentially acid soils, combined with high rainfall have kept acidity within manageable limits in most swamp reclamation areas.

6.20 Deep peats are a more serious impediment to agriculture, and due to micronutrient deficiencies, among other problems, rice cannot ordinarily be grown in peat soils over one meter thick. Even in shallower areas, irreversibly dried peats can cause total crop failure and some transmigrants have experienced problems with peat fires. Soil salinity may also have an adverse effect on crops and in many areas measures must be taken to contain or prevent saltwater intrusion.

6.21 Agricultural Development. Because of the technical skills required for large-scale drainage works, the identification and initial development of tidal lands is the responsibility of a Directorate within the Ministry of Public Works (MPW). As the first step in opening tidally influenced lands, this Directorate digs a large navigation canal which permits access by barges of up to 50 tons and allows water to flow freely out to the river or sea. Thereafter, primary and secondary canals are constructed. Tertiary canals are established by the farmers in their fields. In some areas the construction of drains has lowered the water table and caused oxidation of acid sulphate soils. To avoid this, simple hydraulic structures have been recommended to maintain the water table, prevent oxidation of the soils, and prevent salt-water intrusion and flooding, but water structures which have been constructed are poorly maintained by the farmers and may be totally neglected. More complicated gates and polders are not economically justified.

6.22 Until the beginning of Repelita III, MPW also undertook both research and extension in swamp reclamation areas. These functions were transferred to the Ministry of Agriculture in 1978, but systematic research in swamplands by AARD only began in 1984. Farming practices developed by MPW involve very shallow cultivation to avoid exposing acid sulphate soils. The use of plows and draft animals has been discouraged, even though areas of nonacid soils might potentially profit from puddling by water buffalo or cattle. Where soils permit and labor is available, farmers may elevate the soil to create alternate high and low areas in the fields to be used for rice intercropped with vegetables such as eggplants, fruit trees and coconut. Produce is transported by foot or bicycle to the primary canal where it is rafted to local market centers. Since most sites in Sumatra and many in Kalimantan are over 10 hours by boat to major markets, transport costs and consumer prices are higher, on average, in tidal areas than in upland sites.

#### Experience to Date

6.23 General. The First World Bank Transmigration Sector Review concluded that the income of migrants with two hectares of wet rice justified swamp reclamation, if deep peats and acid sulphate soils could be avoided and if drainage canals and other infrastructure could be provided at relatively low cost. This conclusion was based on studies which showed that many families in Upang Delta annually produced an average of two to three tons of rice/family, well beyond their subsistence needs. The recent BPS income survey indicates that Upang settlers are still doing well and produced 1.7 tons of rice/family in 1984. Repelita II tidal settlements generally produced 1.7 tons, but Repelita III tidal sites produced only an average of 0.6 tons of paddy/family, about equal to older upland sites. Within sites, yields are also very erratic and many recent settlers produce less than their subsistence needs.

6.24 Some hypotheses are possible for the lower yields in Repelita III areas. First, Repelita II sites may have been selected from better areas. Although most sites have been identified under plan-as-you-proceed procedures, nearly seven times as many people were settled in swamp areas in Repelita III as Repelita II and this may mean that some recent sites are less favorably located. Government officials acknowledge that high Repelita III targets led to rapid settlement prior to thorough soil studies and that some families

settled on deep peats or areas subject to flooding have subsequently had to be moved. Master plan studies currently under way should help to identify land suitable for settlement, but the wide variation within sites and the need to link information on soil type to on-farm management, suggests that there is also a need for careful land evaluation after clearing, and for farm level studies of settled areas on which recommendations about farm practices can be based.

6.25 Two other factors that may be affecting yields are inappropriate farm layout, and partial clearing of farmland. The shift from linear to nucleated settlements appears to have had a more important impact on tidal sites than upland sites. The BPS data show annual incomes from food crops of Rp 177,000 in linear swamp settlements and Rp 93,600 in nucleated settlements. Most of the nucleated settlements are newer and also have other problems. However, the data suggest that a return to linear settlements should be considered. Some Repelita III sites, including Bank-assisted sites, also left uncleared land within the agricultural area on the assumption that land clearing could best be carried out by the migrants themselves. It is now evident that this practice has contributed to pest problems.

6.26 Several other factors affect productivity in all swamp sites:

- (a) Transport. A major problem in swamp areas has been maintenance of the navigation and primary canals to permit passage of boats into and out of sites. MPW has recognized this problem and recently diverted funds from new settlement to canal maintenance.
- (b) Market Limitations. In the early years of swamp settlement when there was a strong demand for rice and prices were relatively high, middlemen actively sought rice for purchase in tidal sites. Recently, with high transport costs and falling prices, this trade has declined. While potentially affecting all transmigration sites, this phenomenon is likely to be particularly serious in tidal sites that are not highly diversified and that appear to have limited off-farm work.
- (c) Health. Health problems are more serious in tidal than in upland sites for two reasons: first, the widespread incidence of malaria; and second, problems of potable water supply, caused by salt water intrusion which makes canal water undrinkable in many areas in the dry season. Rainwater collectors have been distributed, but are not sufficient for family needs and many families buy water from traders. To reduce these problems, specific efforts need to be made in tidal areas by MOT and the Ministry of Health.
- (d) Management. Establishing settlements in swamp reclamation areas requires the close coordination of the Ministry of Public Works and the Ministry of Transmigration. This has been difficult in the past because of very different institutional arrangements in the two agencies. Therefore, to improve implementation it is important that one agency have an overview of the entire operation. Consideration might also be given to bringing land development, settlement and

agricultural development under a single management entity in swamp development projects.

6.27 Bank-assisted projects. A July 1985 review of the first Bank-assisted swamp reclamation project in Karang Agung, South Sumatra (Loan 1958-IND) makes specific recommendations for addressing the problems of tidal sites. To reduce severe rat and pig problems, the review recommends that the farm layout be changed, that a protective perimeter (a moat or fence) be established around the area, and that all land within this perimeter be completely cleared, that better coordination be exercised in planting and harvesting and that extension officials be trained to coordinate intensive campaigns for pest control. The report also recommends an adjustment of farm layout to include all cultivated areas in one plot near the house and it suggests that this is the single most important factor in stimulating land reclamation, increasing labor availability, and improving farm management and pest control.

6.28 With respect to soil and water management, the report recommends improved mapping of the area once the land is opened and closer attention to soil differences. Recommendations are also made to improve farm practices including early on-farm diversification based on poultry and small livestock, aquaculture and coconuts; improved training and extension for farmers; establishment of seed farms; and improved marketing infrastructure, including adequate markets, docks and transport facilities. Some of these measures have been put into place and yields in 1985/86 are expected to improve.

#### Conclusions and Recommendations

6.29 Despite the serious problems now experienced in swamp reclamation areas, most technical specialists agree that tidal areas have good prospects for growing rice and for diversification into other crops. To realize that potential, however, a concerted effort is required to systematically address the problems of these sites. To do this, Government should take the necessary steps to:

- (a) improve past practices of site selection and evaluation, taking into account distances from markets and the availability of off-farm employment as well as technical parameters;
- (b) promote judicious drainage and proper land development;
- (c) establish a mechanism for reviewing soil properties after clearing and settlement in order to provide recommendations for on-farm management;
- (d) review the linear settlement model and decide on optimal farm layout;
- (e) provide adequate cleared land to facilitate quick startup and discourage pests;
- (f) improve agricultural support services;

- (g) develop an intensive pest management strategy, including agreement on the type of physical barriers, land clearing practices and organizational arrangements best suited to pest control;
- (h) increase attention to problems of potable water by (MOT) and of malaria control (Department of Health);
- (i) pay close attention to on-site transportation, particularly from fields to secondary canals; and
- (j) improve management and agency coordination.

6.30 Large-scale new settlement in tidal areas does not appear justified until current problems leading to low production and low incomes can be overcome. Government officials have recognized this problem and they have redirected funds to upgrading and second-stage development. There is also concern about the viability of communities based primarily on rice production, and every effort should be made to promote on-farm diversification including, where possible, the introduction of perennial crops. On the other hand, the ready availability of tidally influenced lands and the good yields in successful sites, argue strongly that priority should be given to resolution of problems in this farm model.

### C. Tree Crop Development

6.31 Most tree crop development in transmigration sites is relatively new, so experience is limited, but barring a prolonged downturn in world commodity prices the outlook for settlers on such schemes is promising. Agricultural incomes on tree crop schemes are projected to be about US\$1,500/family in year 10, Nucleus Estate and Smallholder (NES) rubber and oil palm and Project Management Unit (PMU)-based rubber tree crop projects have an internal rate of return which exceeds an opportunity cost of capital of 10%, and tree crop projects with relatively high incomes offer scope for cost recovery. Not only are tree crops critical for proposed pioneer settlements in remote areas where both markets for food crops and off-farm work are limited, but demand for tree crops is also very large in existing transmigration sites.

6.32 The Government recognizes the advantages of tree crops and in recent years has taken a number of steps to promote the development of tree crops for transmigrants (Chapter I). However, the impact of tree crop development on the transmigration program to date has been small. Only about 7,400 transmigrant families were settled on NES/PIR projects in Repelita III (about 2% of the total moved) and an additional 3,800 families were settled in 1984/85, for a total of about 11,200 transmigrant families settled under the NES/PIR program through 1984/85 (Table 6.4). During this same period about 20,500 local families were settled on NES/PIR schemes. Preliminary figures suggest that an additional 20,670 transmigrant families were settled in NES/PIR projects in 1985/86 for a total of about 32,000 families in such schemes in mid 1986.

Table 6.4: TRANSMIGRANTS SETTLED ON NES/PIR SCHEMES  
(Households)

Scheme	Actual		Projected /a	
	1980-1984	1984/85	1985/86	1986/87
NES Rubber /b	891	2,446	6,250	5,900
NES Oil Palm	-	-	6,605	4,600
NES Coconut	-	-	3,749	3,377
Subtotal	<u>891</u>	<u>2,446</u>	<u>16,604</u>	<u>13,877</u>
PIR Khusus Rubber /c	5,207	614	7,925	6,708
PIR Khusus Oil Palm	1,294	796	8,268	4,600
Subtotal	<u>6,501</u>	<u>1,410</u>	<u>16,193</u>	<u>11,308</u>
<u>Total</u>	<u>7,392</u>	<u>3,856</u>	<u>32,797/d</u>	<u>25,185</u>

/a Includes both local people and transmigrants (NES).

/b Nucleus Estate and Smallholder Projects are externally assisted.

/c Perkebunan Inti Rakyat (PIR) Projects are domestically financed.

/d Of these, 20,700 families were settled.

#### Tree Crop Establishment

6.33 The main constraint to expanded tree crop development, whether for local people or transmigrants, is institutional capacity. Tree crops in Indonesia are established in several ways.

- (a) Spontaneous Planting. Indonesia has about 6 million ha of rubber, oil palm and coconut, of which about half was planted by smallholders using unselected planting material and family labor. Yields and returns to labor on such stands are low, and in many areas rubber tapping and copra production are neglected at current commodity prices.
- (b) Project Management Units. To improve the quality of smallholder planting, about 870 Project Management Units (PMUs) have been formed by the Directorate General of Estates. About half of these PMUs are for rubber and coconut development, and the other half are for minor tree crops (coffee, cloves), or cash crops such as sugar or cotton. PMUs provide planting materials, inputs and extension to local farmers as well as compensation for all or part of the cost of farmer labor. Funds for this purpose are provided as a credit to the farmer to be repaid when trees are mature. There have been no PMU programs directed specifically at transmigrants to date, although local smallholders may include former migrants.
- (c) Public Sector Estates. Tree crops are also established by publicly owned estates (PTPs) under the NES/PIR programs. In these programs,

estates establish a nucleus of estate-owned trees and then plant additional areas for smallholders. The PTPs construct roads, houses and community facilities and they block-plant tree crops using settler labor. When mature, trees are divided into 2 ha plots and distributed to the farmers who obtain credit for both the cost of tree crop establishment and housing.

- (d) Private Estates. There are about 850 private estate companies with rubber as their main crop and 18 are planted to oil palm. Most rubber plantations are small and need rehabilitation. Only 3% of the 3 million ha under coconut is managed by private estates. Private estates have not yet been used for smallholder development.

During Repelita III about 120,000 ha of tree crops (22%) were planted by the PTPs and about 430,000 ha (78%) were planted by PMUs. The area planted under each program is shown in Annex 6. Oil palm accounted for 6% of the area planted, rubber for 34%, and coconut for 60%.

6.34 In 1984, the World Bank undertook a study of the prospects for Indonesia's major tree crops (rubber, oil palm and coconut) during Repelita IV. This Sector Review (Report 5318-IND, published April 15, 1985) endorsed an official (PTP and PMU) planting program of about a million ha for Repelita IV including up to 770,000 ha for smallholders. The report concluded that Indonesian rubber would remain competitive on the world market and that oil palm and coconut production should be increased, both to meet the domestic demand for edible oils and to earn foreign exchange. The cost of the proposed program was estimated at US\$2.9 billion (1984) for Repelita IV and to finance a program of this scale, the report recommended: (a) that the provision of funds for smallholder credit be shifted from the development budget to funds mobilized by the banking system; (b) that the liquidity of the estates be improved so they could prefinance their own development from borrowing; (c) that ways be sought to decrease the cost of tree crop establishment; and (d) that the private sector be involved in estate crop development.

6.35 Implementation constraints were also reviewed in detail in the Sector Review. The report concluded that the rapid buildup of the NES programs in Repelita III and, more recently, the increasing demands for ever larger PIR programs had overstretched the management, financial and technical capacity of the PTPs and resulted in a downturn in the quality of plantings, a reduction in investments for maintenance and replanting on existing estates, and a deterioration in the financial condition of the PTPs. The rapid expansion of the PMU program without commensurate manpower development had also resulted in poor quality plantings, financial problems and target short-falls. An action plan to address these issues is being developed by the Government, but implementation will understandably be slow, and any recommendations intended to expand tree crop establishment for transmigration must be carefully formulated to avoid exacerbating problems in the sector.

#### Tree Crops for Transmigrants

6.36 Existing Programs. Experience gained during Repelita III provides a number of useful observations on ongoing PTP and PMU programs and their

complementary roles in tree crop development. The use of public sector estates is preferred when new infrastructure must be developed and large areas are to be block-planted, but PTPs are not well suited to the development of scattered fields or to the replanting of existing smallholdings. PMUs, on the other hand, are better suited to the establishment of tree crops on existing smallholder lots, and they could potentially be used in conjunction with settlement by the MOT to develop tree crops in new sites.

6.37 The choice of commodity also affects the management system required. Establishment of oil palm is best done by PTPs or private estates because the development of associated processing facilities and regular collection requires managerial skills and financial capacity that cannot easily be provided by smallholders or by PMUs. Estates have no technical problems establishing rubber, but rubber is less costly in financial terms when established by PMUs since they pay incentive payments to the farmer-owner which are less than the full value of his labor. The better PMUs are technically able to produce planting material and to assist with rubber establishment, and PMUs are particularly well suited to the establishment of coconut which is the least technically demanding smallholder crop. These commodity distinctions are already evident from data for Repelita III. During that five-year period, all smallholder oil palm was established by PTPs, rubber establishment was split almost evenly between PTPs and PMUs, and virtually all smallholder coconut was established by PMUs.

6.38 New Programs. Since early 1984, three programs have been proposed to increase the number of transmigrant families which can be settled with tree crops.

- (a) Accelerated PIR. Under this program, five of the most capable PTPs are to get funds from the development budget to accelerate the establishment of oil palm for transmigrants. The MOT would be responsible for selection, settlement and social development, and the PTPs for housing, infrastructure and tree crop establishment (as under current NES/PIR projects). Settlers would receive the initial settlement package on grant and obtain credit for tree crop establishment. Under the initial proposal, estates were to plant 500,000 ha in 5 years. This target has since been reduced to 300,000 ha, but given existing demands on the estates, the Bank estimated in late 1985 that only 65,000-100,000 ha could be planted in the proposed time frame. This number may be further reduced if commodity prices remain low, a factor which would reduce the PTP's incentive for new investment and make financing more difficult.
- (b) PMU Programs. The Government has recently shown an interest in using PMUs to establish tree crops on new sites and a sizeable nursery program is currently being considered to produce planting material for new and existing sites. If linked with new settlements, the DGE would have an input into settlement design and the MOT would be responsible for settlement planning, land development for the houselot and food crop areas, the selection and transfer of migrants, and for their initial support. In the second year after arrival, PMUs would assist the farmers in opening and planting one





Transmigrant farmers harvesting oil palm fruits planted for them by a Government owned estate.

hectare of tree crops and in the third year they would help plant a second hectare. Introduction of such a model for rubber and coconuts and possibly other crops, would significantly improve the income prospects of new settlers.

- (c) Private Sector Tree Crop Development. A Ministerial Decree was issued in June 1985 which provided a framework for private sector investment in tree crops. Each investor is required by the Government to develop 3 ha of smallholder land for each 2 ha of nucleus estate and to prefinance smallholder development costs until the trees are transferred to the participating farmer, at which time the investment is to be repaid by a state bank. The principal concerns of the investors are export taxes, which have been relatively volatile in the last several years; regulations which require the sale of palm oil at a controlled domestic price; high interest rates for borrowed funds; and the possibility that conversion of the smallholder area and repayment of funds pre-financed by the estate will be delayed.

6.39 To improve the financial returns to private sector investment, the Bank has recommended an exemption from export taxes for new private sector investors (windfall profits can be captured through an existing income tax); freedom to sell at international prices; relaxation of the planting ratio of smallholders/estates; and relief from obligation to prefinance smallholder development.

6.40 The DGE target calls for the private sector to plant 360,000 ha of oil palm and settle 180,000 transmigrant families from 1984/85 to 1988/89. The Bank estimates that the maximum likely to be planted is about 100,000 ha over the next five years and even this number is unlikely to be achieved if palm oil prices remain at the low levels of mid-1986.

6.41 Second-Stage Development. To date very little estate or PMU capacity has been focused on the upgrading of transmigration sites. One exception is the Bank-assisted NES III project (Loan 1751-IND) which uses PTP VI to plant rubber in Rimbobujang, an ongoing transmigration settlement in Jambi Province. As noted, the Government and Bank have also developed a proposal to establish nurseries for rubber and coconut which could be used for tree crop establishment, under PMU direction, in existing transmigration sites, and this should receive strong support.

6.42 One problem encountered in planning for second-stage development is land fragmentation and land shortages in transmigration sites. At least 1.5-2.0 ha of tree crops/family are needed to improve family incomes, permit cost recovery, and, in the case of rubber, to discourage overtapping. But in many sites, reserve land has not been allocated, and in some places it has been settled by spontaneous migrants and local people. In some areas, reserve land is too far away to be developed and maintained, while in others only 1.25 ha or at most 2.0 ha are available for both food crops and tree crops. This points to the need for ensuring that future land allocation is sufficient for second-stage development. On existing holdings of 2.0 ha, the DGE has proposed that the reserve land of 0.75 ha be opened and cleared in year one and that 0.75 ha of cleared food crop land be planted to tree crops and intercropped with rice three years later. In year six, when intercropping ceases, the first hectare of rubber would be tapped and food crop production would be limited to a 0.5-ha garden lot. Under these circumstances, a portion of family food would be purchased. The use of this model should be supported.

#### The Proposed Tree Crop Program in Support of Transmigration

6.43 Table 6.5 gives the Bank projections on the maximum number of hectares which could potentially be planted for smallholders over the five-year period 1986/87 to 1990/91, a period which covers the remainder of Repelita IV and the first years of Repelita V. The table indicates that in the absence of financial constraints, an estimated 250,000 ha of major tree crops could be planted under ongoing NES/PIR programs during Repelita IV and an additional 64,000 ha could potentially be established under the two proposed programs (accelerated oil palm and smallholder tree crop development by private estates). About 250,000 ha of tree crops could also be established by PMUs during the remainder of Repelita IV, if adequate funds are available.

Table 6.5: BANK PROJECTIONS FOR NEW PLANTING, REPLANTING AND REHABILITATION OF TREE CROPS FOR SMALLHOLDERS /a  
(ha planted)

Planting program	Repelita IV							Repelita V			
	Program		Bank projections			Total ha	% Trans	Total families /b	1989/90	1990/91	Families/year
	1984/85	1985/86	1986/87	1987/88	1988/89						
<u>Ongoing Estate Projects</u>											
<u>A. NES Projects</u>											
NES - Oil palm	13,200	9,200	10,000	10,000	10,000	52,400	60	15,720	15,000	15,000	4,500
NES - Rubber	12,500	11,800	9,000	7,000	6,000	46,300	50	11,550	6,000	6,000	1,500
NES/Trans - Coconut	7,500	6,800	6,000	6,000	-	26,300	100	13,150	-	-	-
Subtotal NES	<u>33,200</u>	<u>27,800</u>	<u>25,000</u>	<u>23,000</u>	<u>16,000</u>	<u>125,000</u>	<u>New</u>	<u>40,420</u>	<u>40,000</u>	<u>45,000</u>	<u>6,000</u>
<u>B. PIR Projects</u>											
PIR Khusus - Oil palm	16,500	9,200	10,000	10,000	10,000	55,700	80	22,280	15,000	15,000	6,000
PIR Khusus - Rubber	15,850	13,400	6,000	8,000	11,000	54,250	80	21,700	15,000	18,000	7,200
PIR Khusus - Rubber/ oil palm	5,250	1,300	3,000	3,000	3,000	15,500	0	-	3,000	3,000	-
Subtotal PIR	<u>37,600</u>	<u>23,900</u>	<u>19,000</u>	<u>21,000</u>	<u>24,000</u>	<u>125,500</u>	<u>New</u>	<u>43,980</u>	<u>33,000</u>	<u>36,000</u>	<u>13,200</u>
Total A + B	<u>70,800</u>	<u>51,700</u>	<u>44,000</u>	<u>44,000</u>	<u>40,000</u>	<u>250,500</u>	<u>New</u>	<u>84,400</u>	<u>73,000</u>	<u>81,000</u>	<u>19,200</u>
<u>Proposed Estate Projects</u>											
PIR Akselerasi - Oil palm	-	-	10,000	12,000	12,000	34,000	80	13,600	15,000	15,000	6,000
PIR Swasta - Oil palm	-	-	-	10,000	20,000	30,000	80	12,000	40,000	50,000	20,000
Subtotal New PIR	<u>-</u>	<u>-</u>	<u>10,000</u>	<u>22,000</u>	<u>32,000</u>	<u>64,000</u>	<u>New</u>	<u>25,600</u>	<u>128,000</u>	<u>146,000</u>	<u>26,200</u>
Total A + B + C	<u>70,800</u>	<u>51,700</u>	<u>54,000</u>	<u>66,000</u>	<u>72,000</u>	<u>314,500</u>	<u>New</u>	<u>110,000</u>	<u>128,000</u>	<u>146,000</u>	<u>45,200</u>
<u>Ongoing PMU Projects</u>											
SRDP - Rubber	4,772	5,815	7,000	9,000	12,000	38,587	50	9,650	18,000	25,000	6,250
SCDP - Coconut	4,763	11,240	8,000	3,000	8,000	35,003	50	8,750	10,000	15,000	3,750
PMU - Rubber	-	23,293	7,000	6,000	6,000	42,293	50	10,550	5,000	5,000	1,250
PMU - Coconut	-	31,277	30,000	35,000	40,000	136,277	50	34,050	40,000	45,000	11,250
Subtotal PMU	<u>9,535</u>	<u>71,625</u>	<u>52,000</u>	<u>53,000</u>	<u>66,000</u>	<u>252,160</u>	<u>Old</u>	<u>63,000</u>	<u>73,000</u>	<u>90,000</u>	<u>22,500</u>
Total A + B + C + D	<u>80,335</u>	<u>123,325</u>	<u>106,000</u>	<u>119,000</u>	<u>138,000</u>	<u>566,660</u>	<u>-</u>	<u>173,000</u>	<u>201,000</u>	<u>236,000</u>	<u>67,700</u>

/a Do not reflect recent budget constraints which may cause a downward revision of targets.

/b At 2 ha/family.

6.44 Standards already set for ongoing NES/PIR programs would permit the settlement of transmigrants on 50-60% of the area planted for smallholders, and about 80% of land to be established under new PIR programs is earmarked for transmigrants. Thus, Bank projections initially suggested that about 75,000-85,000 transmigrant families could be settled under ongoing NES/PIR programs in Repelita IV and an additional 25,000 families could potentially be settled if the accelerated oil palm and private estate programs moved forward quickly. In total, therefore, the Bank estimated that Government could settle some 75,000-100,000 families with tree crops in Repelita IV and that the number settled could potentially rise to 40,000-50,000 families annually by mid-Repelita V. These figures are now thought to be high in view of budget constraints.

6.45 These figures also illustrate the trade-off in transmigration between the quality of settlements and the number of families that can be settled under the sponsored program. The Government originally proposed to settle 750,000 migrants in Repelita IV of whom about 400,000 would be moved with full sponsorship; of these about 100,000 families were to be settled on tree crop sites. This implies that all other families were to be settled on food crops. To improve the quality of the program by relying principally on new settlement with tree crops, the Government would have to significantly curtail the targets for sponsored settlement.

#### Issues and Recommendations

6.46 New Settlement vs. Second-Stage Development. If all future tree crop development by estates and PMUs were used for new settlement, higher targets could be met. However, this is neither feasible nor desirable since (a) there is a strong need for replanting and new planting among indigenous smallholders who are the backbone of the traditional tree crop sector; (b) providing tree crops to local people has long been seen as a way of shifting from extensive to intensive agriculture and freeing land for new settlement; (c) there is an urgent need to establish tree crops for existing migrants in order to promote growth and diversification; and (d) second-stage development is generally more economically attractive than new settlement since previous expenditures are treated as sunk costs. For these reasons, proposed PMU programs to expand new planting or replanting on existing farms, including those of both local smallholders and transmigrants, are appropriate.

6.47 Program Scale and Managerial Emphasis. The projected planting program of about 570,000 ha (Table 6.5) is only one half the government target and only 75% of that initially endorsed in the Tree Crops Sector Report. However, most observers feel that pressure to exceed the figures shown would result in poor planting and undue managerial and financial strain and should not be encouraged. The capacity of the private sector has not been tested, and with low commodity prices the figures provided are thought to be optimistic for Repelita IV. Therefore, the main opportunity for expanding rubber and coconuts is through the PMU program and this depends on the speed with which PMUs can be rationalized and staffed with adequately trained personnel, operating under adequate supervision from the DGE. This particularly applies to the government-financed tree-crop program (PRPTE) which has been poorly administered in the past.

6.48 There are a number of advantages to PMU operations. First, externally assisted programs have demonstrated that plantings of reasonable quality can be established even if the farmer is reimbursed for less than the full value of his labor. Incentive payments reduce government financial outlays, limit farmer indebtedness, and often increase his commitment to the program and to the resource he has obtained. In addition, since PMUs are generally run by agricultural high school graduates, overheads are low when compared to those of the PTPs, and PMU programs can potentially be expanded more rapidly. The greatest scope for expansion in the tree crop program appears to be in the establishment of coconuts by PMUs and secondarily in the expansion of rubber areas by PMUs or estates.

6.49 Management and Coordination. In March 1986, a Ministerial Decree was issued which gives the budget and authority for tree crop development to the Directorate General of Estates (DGE), establishes new arrangements for financing both credit and noncredit components and provides incentives for development to public sector estates. This decree lays the groundwork for future estate crop development for transmigrants and includes a coordination team headed by the Junior Minister for Tree Crops and including the heads of the two Directorate Generals from the MOT, among others. Full support from the MOT will be necessary to ensure a strong and growing role for tree crops in transmigration schemes. (These issues are reviewed in Chapter VIII.)

#### Priorities

6.50 Given that there is a sound rationale for increasing tree crop production in Indonesia, and that management and financial capacity are constrained and likely to continue to be so under the current austerity conditions, attention must be given to priorities in tree crop development. New development should, other things being equal, take place as close as possible to existing infrastructure rather than in remote areas, and make use of existing grasslands (which are cheaper to clear) rather than forest. To obtain the right to use such land, local people must have access to some of the benefits of tree crop schemes and, for this reason, the distinction between estate crop projects for locals and for transmigrants should be abolished, so that each scheme incorporates both types of settlers.

6.51 There is also scope for associating new settlements with PMU development of tree crops but the benefits of this must be weighed against the economic advantages of providing tree crops to existing farmers, whether transmigrants or local families. As noted in Chapter III, second-stage development with tree crops has the highest rate of return of the models considered and the lowest financial cost. Such development would also have the effect of increasing regional production and spontaneous migration. Caution should be exercised, however, in assuming that estate and/or PMU capacity to plant tree crops can be rapidly expanded. This must be a slow and systematic process done in the context of improving implementation capacity of the tree crop sector as a whole.

#### D. Summary and Conclusions

6.52 A major finding of this study is that food crop production in upland sites appears to be carried out mainly to meet the subsistence needs of the transmigrant community. Furthermore, the report concludes that this is due to agro-economic conditions, marketing and manpower constraints which are difficult to address. To improve income prospects in existing sites, priority should be given to improving agricultural supporting services (research, extension, input supply and credit) and to second-stage development, including adequate maintenance of existing roads.

6.53 Tidal sites have better prospects for food crop production than upland sites, but incomes in Repelita III tidal sites are very low, due apparently to inadequate site selection, inappropriate farm layout, and a relative scarcity of off-farm work. For this reason, the report endorses the Government's reduction in targets for tidal areas and it recommends a shift in farm layout and a concerted effort at pest control to see whether current problems can be overcome. If so, and if settlement is to continue in tidal areas, more attention must be given to site evaluation, soil surveys and site planning. Site selection should be placed in a regional development framework which takes account of markets and employment prospects, management should be better integrated, and a major effort is needed to address problems of water supply and malaria control.

6.54 Tree crop schemes entail less risk to farmers, and provide higher incomes and better economic returns. The report therefore supports Government efforts to mobilize the estate sector for new settlement, and it recommends a strong effort to expand PMU capacity to plant for existing smallholders. Since coconuts are one of the easiest commodities for PMUs to establish, there is a need to expand PMU programs to establish coconuts for migrants in coastal upland and tidal sites. The declining trend in commodity prices for tree crops is a matter of considerable concern. However, even with lower price projections, economic returns are equal to or above 10% for rubber and palm oil. To protect farmers from the effects of periodic low prices, food crop cultivation for subsistence should be encouraged.

6.55 The foregoing analysis suggests, however, that there is a trade-off between the number and the quality of settlements. To maximize migrant welfare by shifting to cash crop or tree crop development in the future, the Government would have to limit the amount of new settlement. If Government chooses to continue large scale settlement and does not develop a mechanism for second-stage development, settlements would be likely to remain at subsistence levels and contribute only marginally to regional growth. Should market prospects for tree crops deteriorate, the Government will be faced with very difficult choices.

VII. OTHER FACTORS AFFECTING THE SCALE OF THE FUTURE PROGRAM:  
LAND AVAILABILITY, FINANCIAL CONSIDERATIONS, AND  
SPONTANEOUS MIGRATION

A. Land Availability

Prospects for Settlement on Upland Sites <sup>1/</sup>

7.01 Sumatra. Sumatra can be divided into those provinces where the possibilities for large-scale settlement were almost fully exhausted by the end of Repelita III (Aceh, North Sumatra, West Sumatra, Bengkulu and Lampung) and those where new large-scale settlements will be virtually completed in the course of Repelita IV (Riau, Jambi, and South Sumatra). Thereafter, new settlement is expected to be largely through tree crop schemes, fill-in programs assisted by the MOT, and spontaneous movement.

7.02 The number of families which can be settled on tree crop schemes in Sumatra will depend partly on institutional capacity (Chapter VI) and partly on the ability to persuade local smallholders to upgrade and consolidate existing holdings, thus making way for partial settlement by transmigrants. NES schemes which benefit local smallholders and also include transmigrants have been generally successful in obtaining land, but tree crop schemes intended solely for transmigrants may be less attractive to local people and less helpful as a mechanism for identifying land. Similarly, fill-in programs, which involve the settlement of transmigrants on empty lands within or adjacent to transmigration sites, are likely to be small unless a mechanism for compensation is developed for local smallholders.

7.03 Although there are limitations on further sponsored settlement, Sumatran provinces are expected to receive the bulk of spontaneous migrants in the foreseeable future. Successful settlement of these migrants and protection of land unsuited to agriculture will depend on the development of mechanisms for (a) land registration, (b) land purchase, and (c) demarcation and protection of areas unsuitable for settlement. These matters should receive high priority from the GOI and are covered in more detail in subsequent sections of this report.

7.04 Kalimantan. Estimating the settlement potential of Kalimantan is more complex. The areas suitable for agriculture in the small province of South Kalimantan are almost fully utilized and continued large-scale settlement in West Kalimantan is possible only if indigenous smallholders agree to consolidate areas of "wild" rubber or to relinquish land under shifting cultivation. They would be more likely to do this if given financial compensation or the opportunity to obtain high-yielding rubber through estate crop

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<sup>1/</sup> Most of the information in this section is drawn from a study to assess land resources, under way with assistance from the British Overseas Development Authority (ODA).

programs. East Kalimantan and Central Kalimantan have considerable potential for tree crop development, but most land is in production forest, infrastructure is poorly developed and routine services are limited. Therefore, given the long period required to develop infrastructure and services, and the high cost of doing so, potential future settlement in Kalimantan would not be expected to exceed past levels of 18,000-20,000 families per year and these figures could be reached only if some land in production forest were reclassified.

7.05 Forestry constraints are well illustrated in Central Kalimantan. Because of its large land areas, this province was believed to have the greatest potential for settlement with tree crops. For this reason it was the first area reviewed in detail by the Land Resources Development team from ODA. Over half the province is unsuitable for any type of agriculture due to infertile sand terraces, deep peat, steep-sided hills or mountains. The area suitable for agriculture is almost entirely of low fertility soil and most (80%) would require high technology to develop (such as high-input tree crops). In addition, virtually all land is forested. Only 9% of Central Kalimantan is outside forest boundaries, 28% is in conversion forest, 40% in production forest, and the remainder in protected areas. Table 7.1 summarizes the settlement potential of Central Kalimantan within forest class.

Table 7.1: ESTIMATED AREA, CARRYING CAPACITY AND FORESTRY STATUS OF POTENTIAL SITES IN CENTRAL KALIMANTAN

Recommended land use	No. of sites	Settlement Potential <sup>/a</sup> (estimated families)		Total families (A + B)
		(A)	(B)	
Upland food crops <sup>/b</sup>	23	4,500	26,700	31,200
Wetland food crops <sup>/b</sup>	7	8,990	2,610	11,600
Nucleus estate projects	32	34,850	77,830	112,680
Commercial estates (no food crop component)	19	7,930	68,890	76,820
<u>Total</u>	<u>81</u>	<u>56,270</u>	<u>176,030</u>	<u>232,300</u>

<sup>/a</sup> (A) If settlement is confined to conversion forest or nonforest areas.  
(B) If production forest suitable for agriculture is reclassified.

<sup>/b</sup> The introduction of tree crops is also recommended in these models.

Source: Review of Phase 1B Results, Central Kalimantan (RePPPProT), June 1985.

7.06 Several points are evident from Table 7.1. First, only about 43,000 families could be settled on food crop land (20% of the total). Of that number, only 13,500 families could be settled if there were no settlement in



areas now classified as production forest. All told, about 50,000-60,000 families could be settled on land which is in conversion or unforested areas, while about four times that many could be settled if forest boundaries were changed. To do this, mechanisms for the review and reclassification of production forest would be required.

7.07 However, there are many reasons why the conversion of forests should be weighed carefully. Forests have commercial value and development in forested areas is often not economically attractive if foregone uses (i.e., commercial forestry) are taken as project costs. Land clearing for settlement also reduces the area under forest cover and may lead to erosion and negative effects on the environment and wildlife. These trade-offs call for some guidelines for development. Since forests have ecological and commercial value, they should not be cut or converted unless the proposed development is economic and sustainable. Evidence from Chapter II suggests that food crop farm models are not economically attractive on soils such as those in Central Kalimantan and should not be contemplated in remote upland areas. Tree crop development, on the other hand, has better economic prospects and is less destructive to the environment. This does not mean that all land suitable for tree crops can or should be developed. Most inner Kalimantan areas will be expensive to develop and relatively unattractive to established estates. Therefore, in light of budgetary constraints, projected low commodity prices and marketing difficulties, remote areas in Kalimantan would have low priority for tree crop development.

7.08 Eastern Islands. The eastern islands have very limited prospects for new settlement. Sulawesi could absorb no more than 20,000 additional sponsored families and as the remaining available area is degraded uplands and ultra-basic rock unsuitable for agriculture, spontaneous movement into such areas would be limited. The Moluccas have little land available for settlement and are unlikely to attract large numbers of spontaneous transmigrants given their rather limited economic possibilities and the number of migrants from the eastern islands competing for jobs in those areas.

7.09 Irian Jaya. As noted earlier, Irian Jaya is the largest province in Indonesia and one of the least densely settled, averaging three people/km<sup>2</sup>. The indigenous population is located mainly in the fertile highlands, and some areas, particularly in the south around Merauke, are only sparsely settled due, in part, to malaria and to the limitations of traditional production systems. Although the Merauke area has considerable land suitable for settlement, there are physical, financial and social constraints associated with development in the area.

7.10 Physical development near Merauke will necessarily be slow because there is little existing infrastructure, and road construction is difficult due to the absence of suitable foundation material. There is insufficient local transport on rivers to permit large-scale development at present and the local labor supply is limited. For these reasons, development of the area is likely to be costly and marketing difficult. Therefore, future settlement could only be contemplated if planned in the context of an overall regional development program based on crops with good market prospects.

7.11 To improve planning, the Bank is financing the preparation of a regional development plan in the Merauke area. This plan includes provisions for the development of economic activities, the demarcation of lands for local people and the provision of services to them. Concentrated development in an area such as Merauke is believed to be preferable to widespread scattered settlements, both from the point of view of planning and monitoring and of minimizing adverse effects on indigenous populations. However, financial and social constraints are likely to slow development in Merauke.

7.12 In general, the most important reasons for proceeding slowly in Irian Jaya are social and environmental. As noted in Chapter V, most Irianese follow traditional subsistence patterns and have limited contact with outsiders. To provide them with the benefits of development and to prevent demoralization and social tensions, change must be gradual and priority given to the needs of the local people. This is not consistent with rapid, large-scale settlement. The environment in Irian Jaya is also an important resource, and care must be given to the development of a comprehensive plan for demarcating and protecting valuable wilderness areas. Bank projections in light of such considerations place any future settlement for the province at less than 5,000 families/year. If such settlement were carefully managed and monitored, these settlement levels could be achieved with a minimum disruption to the indigenous population. This would, however, depend on strong resolve on the part of Government.

#### Tidally Influenced Areas

7.13 As Table 7.2 indicates, a substantial portion of Indonesia's total land area is in coastal swamps. Since these areas are often malarial and generally cannot be cultivated unless drained, they are virtually unpopulated and for this reason attractive for settlement if malaria can be brought under control. The Repelita IV target originally called for the settlement of 75,000 families in tidal areas, but in 1985 this was reduced to about 37,000 families due to financial constraints and production problems. This level is now expected to be considerably lower. There were no plans to open swamplands in Irian Jaya in Repelita IV.

Table 7.2: SWAMP AREAS IN INDONESIA  
( '000 ha)

Island	Swamp area	Total area	Swamps as % of total area
Sumatra	13,211	47,360	28
Kalimantan	12,764	53,946	24
Irian Jaya	12,780	42,195	30
Sulawesi	469	18,204	3
<u>Total</u>	<u>39,224</u>	<u>161,705</u>	<u>24</u>

7.14 Since 1981, consultants have been carrying out a nationwide inventory of coastal and near-coastal swamplands. This study has surveyed some 25 million ha of swampland in Sumatra, Kalimantan and Irian Jaya. Of this, 5.5 million ha were classified as having settlement potential. The largest areas are in the coastal lowlands of southern Sumatra (1.3 million ha), West and Central Kalimantan (1.2 million ha), and Irian Jaya (2.8 million ha). This indicates that sufficient land would be available in the coastal plains to potentially settle 10,000 families/year through Repelita V and VI, if pest and production problems could be overcome, and if better microplanning were done to eliminate unsuitable soils within sites. Without these measures, future large-scale development should not be encouraged.

7.15 Mangrove areas are protected in Indonesia, but environmentalists are concerned about large-scale drainage in swamps in the absence of detailed studies of the effects on soils, water, fish life and marine habitats, particularly from the acidification of water in drained sites. Wetlands are also important as wildlife habitat. As noted in Chapter V, environmental impact studies are included in both the First and Second Bank-assisted Swamp Reclamation Projects (Loans 1958 and 2431-IND), but more could be done to formalize institutional arrangements and provide adequate funding for studies and for wildlife management in tidally influenced areas, and to establish plans for development which indicate crucial areas for conservation and protection.

#### Summary

7.16 In summary, land availability is a serious constraint to future settlement. Only a limited amount of land remaining in upland areas is suitable for food crop production, but a rather large amount of outer island land is suitable for tree crops. In Sumatra and West Kalimantan the main limitation on tree crop development is the presence of low productivity "wild rubber" and upgrading and intensifying local smallholder agriculture would be a prerequisite to further sponsored settlement. In Central and East Kalimantan the introduction of tree crop schemes is limited by economic and forestry constraints, while in Irian Jaya the pace of future settlement is limited by the absence of existing infrastructure and by environmental and social considerations. Land per se is not an immediate constraint in swamp reclamation areas, but settlement in these areas should not be considered until production problems are overcome.

7.17 Province-by-province projections made prior to reductions in the settlement program in 1986 suggested that the maximum level for sponsored settlement, consistent with land availability and institutional capacity, was about 300,000 families in Repelita IV and V, declining in Repelita VI. Settlement levels are now expected to be about 200,000 families in Repelita IV. Future high levels of settlement could be achieved only if agreement were reached on forest classification and if the Government were in a position to bear the cost of settlement in increasingly remote sites.

7.18 The natural resource inventories already under way should permit the completion of master plans on a province-by-province basis by the end of Repelita IV and completion of this work should be given priority by the GOI.

Such plans would lead to a more realistic assessment of settlement potential for Repelita V and permit planning consistent with both economic development and environmental protection. A knowledge of the area under forest cover is also critical to policy formulation and further settlement planning.

#### B. Spontaneous Migration

7.19 Promoting spontaneous migration is a major objective of the Government, and has gained increasing attention as financial resources have become more limited. Recognizing the importance of large-scale unassisted migration, a Directorate for Self-initiated (Swakarsa) Movement was set up in the former Directorate General of Transmigration in 1979 and its tasks were set out in a Ministerial Decree issued in 1982. Several partially assisted programs were envisioned, including the identification and settlement of spontaneous migrants already in transmigration sites. Although some spontaneous families were settled in existing areas, no program of partially assisted movement or of support for spontaneous migration was developed in Repelita III. However, the Repelita III target of 500,000 families was eventually achieved by including 169,500 "spontaneous" families in the total moved. Of these, about 30,000 families were moved with partial assistance and the remaining 140,000 moved without assistance, but were identified in sending or receiving areas (Table 7.3). It is important to emphasize that these families were identified to round out official targets, and the data collected from sending provinces is not a good indicator of the number of people who actually move.

7.20 Of the target of 750,000 families for Repelita IV, the Government initially intended that 315,000 would be settled in upland and tidal programs, 105,000 in tree crop programs and the remainder, 330,000 families, would be settled on various partially assisted or unassisted programs. To ensure that unassisted movers would be counted, Government also required that first-time migrants register before they move.

#### The Process of Spontaneous Movement

7.21 In the past, the Government has been limited in its ability to identify and generate the policies needed to stimulate spontaneous migration. To understand what policies are needed, it is necessary to understand both the process of spontaneous movement and the constraints to settlement. Spontaneous migrants moving outside of government-assisted programs must ensure that they have adequate funds for transport and initial subsistence and that they have reasonable certainty of a cheap place to stay and employment in the destination area. Very poor people cannot afford to move on their own, even to areas with good employment prospects. Indeed, the very poorest people seldom, if ever, move without outside help, and virtually all spontaneous migration occurs through pre-existing chains of social support. When labor shortages arise in transmigration sites, earlier settlers alert friends and relatives, encourage their immigration and assist in their initial support. It follows that settlers in pioneer areas need the most assistance from Government (because they do not have family and friends to help them), and that if employment is generated in the receiving area, subsequent migrants will require less and less assistance.

Table 7.3: BREAKDOWN OF SELF-INITIATED (SWAKARSA) FAMILIES COUNTED  
IN REPELITA III

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<u>With Assistance</u>	
Moved with assistance from provincial governments	2,675
Other	27,875
<u>Subtotal</u>	<u>30,550</u>
<u>Without Assistance</u>	
Relatives in projects	46,132
Those obtaining identification forms in sending areas	33,293
Settled in projects	4,877
PIR projects /a	4,264
Unexplained	50,381
<u>Subtotal</u>	<u>138,947</u>
<u>Total</u>	<u>169,497</u>

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/a These families obtain considerable assistance and should be regarded as sponsored settlers.

Source: Joan Harjono from MOT statements on Swakarsa transmigration issued in 1984.

7.22 This suggests that the benefit package should be diversified by region, remoteness, and stage in the settlement process. For example, the demand for land is so strong in Sumatra that virtually all land identified under the fill-in (sisipan) program could be settled if infrastructure and access were provided; but settlement in the more remote areas of Kalimantan and Irian Jaya would require substantial government investment and support. Conversely, given a much reduced sponsored program, relatively little spontaneous movement is expected to occur in Kalimantan and Irian Jaya.

#### Constraints to Spontaneous Movement

7.23 Once spontaneous migrants are in the receiving area, the major factor limiting settlement is the inability to find appropriate land and obtain legal rights to it. This problem, in turn, is due to (a) traditional systems of land tenure in the outer islands, (b) difficulties in land registration, (c) problems in providing compensation to land owners, and (d) Government policies which have encouraged complete occupation of available sites to meet settlement targets. These points are expanded briefly below.



Local people in a spontaneous settlement along the trans-Sumatra highway.

- (a) Land Tenure. Land rights in rural areas of the outer islands are generally governed by customary law (adat). Under customary law, authority over land may reside in extended families or local territorial groups, and individual smallholders are seldom in a position to transfer the ownership of their land. If a spontaneous migrant wants land, he does what is called ganti-rugi -- compensates for loss, either to the individual or group. Compensation may be for the loss of the right to use the land or the loss of productive trees, but it is not generally for the land itself. Therefore, if the land improves in value, as it does with increased immigration or the planting of perennial crops, migrants may be requested to pay additional money or to return the land. They may even be subject to counter claims that the person who received the initial payments was not the person who had the right to do so. For this reason, many people are unwilling or unable to move without government assistance in finding land.

- (b) Land Registration. It is possible to legally transfer land title in the outer islands, but this entails official surveys and complex registration procedures which are costly and difficult to arrange. While the Directorate General of Agraria has staff in all outlying districts, they must give priority in land registration to development projects, to cadastral surveys in urban areas and towns and to registration for commercial enterprises, so the registration of smallholder land is difficult. Furthermore, the cost of cadastral surveys and land registration is currently about US\$70, well beyond the capacity of most transmigrants to pay.
- (c) The Cost of Land. Migrants are also limited in their ability to purchase land. There are many areas in the outer islands where land of moderate fertility is available at a "fair price", often about US\$40-60/ha. However, migrants seldom have this amount of money and Government does not pay cash compensation for land (See Chapter V). Therefore, since land cannot be alienated without local consent, an impasse results in which the better land is seldom relinquished for transmigration, and spontaneous migrants settle on steep slopes or in protected forest areas, even though there are large areas of better, underutilized land available at a reasonable price.
- (d) Planning. Finally, spontaneous migrants are not taken into account in the planning process. Under the pressure of high targets, most areas which were identified in Repelita III were settled with fully sponsored migrants, and little thought was given to the amount of land needed to incorporate spontaneous migrants or to provide for family expansion. To overcome these problems it is crucial that Government develop new approaches to facilitate spontaneous movement in the long-term, and develop specific medium- and short-term programs to promote the settlement of past spontaneous migrants and incorporate future ones into the settlement plan.

Successful programs to facilitate spontaneous movement will require actions to address these constraints.

#### The Long-Term Program

7.24 Once agricultural land suitable for large-scale sponsored settlement in the traditional receiving provinces of Sumatra, Sulawesi and Kalimantan is used, most resettlement occurring in these islands would be by spontaneous migrants seeking underutilized land or off-farm employment. In many areas this situation already exists. The Government must therefore give increased attention to those policies which facilitate spontaneous movement, but reduce overcrowding on old sites, competition with local residents, and encroachment on forested areas. The three main components of such a program are (a) improvements in the mechanisms for land identification and land registration, (b) provision of capital for land purchase and land registration, and (c) the development of strong measures for environmental protection.

7.25 Land Registration. The best way to facilitate land transfer in the immediate future is to increase the incentives for district and sub-district officials to identify and register landholdings suitable for small numbers of migrants. To establish a program along these lines, the MOT might allocate a lump sum of perhaps US\$150-200 for settling a family on 2 ha of land. Up to half this amount would be allocated to the district level Agraria office for land surveys and registration. The remainder would be paid to the district (kabupaten) or subdistrict (kecamatan) treasury as an incentive to identify land and facilitate registration. Land registration criteria would eliminate steep slopes and protected areas and ensure reasonable access. Although it would undoubtedly be a slow process to develop the required procedures, such a program could reduce the cost of settlement per family to 3-4% of current costs.

7.26 Credit Mechanisms for Land Purchase. In the past, many communities willingly relinquished underutilized land to the Government for transmigration in order to obtain associated infrastructure, markets and services. In most areas of Sumatra even marginal land now has a financial value and people with claims to such land are generally unwilling to part with it without remuneration. At the moment, however, Indonesia has no form of rural credit for the purchase of land by individuals or groups outside of government programs. Both the Government and banks have been wary of credit for land purchase, fearing that borrowers might be unwilling or unable to repay, or that the availability of credit would drive up land prices. However, the development of credit or the provision of funds for land purchase is a necessary aspect of rational land allocation, and such mechanisms must now be developed.

7.27 As a temporary measure, while more general credit mechanisms are being developed, the MOT should consider providing a line of funds for land purchase and land registration. Initially, these funds could be made available to NGOs or other migrant associations which could guarantee repayment. In the long run, however, rational, economic land use will depend on the development of credit mechanisms that enable individual migrants to buy land and improve its productivity. Complete cost recovery would reduce the cost of the program to the cost of administration alone. Even if such funds were not repaid, however, this program could potentially reduce the cost of settlement to US\$200-500/family, about 4% to 10% of the current cost.

7.28 Environmental Protection. Wherever spontaneous migrants go, they try to settle on land that does not have local land claims. These areas are often either poorly suited to agriculture (e.g. steep slopes) or in protected forest. Therefore, any program to encourage spontaneous migration must also be accompanied by strong measures for environmental protection. This means that areas of production and conservation forest must be clearly identified and demarcated so migrants are aware of the status of the land. Local officials should also be made aware of land status and there should be sanctions against officials who permit settlement in protected areas as well as against those who encroach on such land. Since spontaneous movement is already occurring at high rates in Sumatra, priority should be given to land demarcation on that island, and master plans for environmental protection should be developed by the Bappedas and ratified by MOT and MOF in the receiving provinces.





Spontaneous transmigrants developing sawah (wet ricefields) from forested land.

#### Medium-Term Program (Repelita V)

7.29 Due to financial and implementation constraints, any future settlement in the remainder of Repelita IV is likely to be slow. This means that the opportunity exists to plan a Repelita V transmigration program which takes into account the locations to be settled, the mix of settlement models (upland food crops, tree crops, and swamps), and levels of support ranging from fully sponsored through partially assisted and unassisted migrants. The main elements to be considered when deciding on the level of assistance to be provided to migrants in the Repelita V program are (a) location; (b) area of recruitment; and (c) phasing of settlement.

7.30 Fully assisted. If sites are new and/or remote, or if those being settled are poor families recruited in Java or Bali (i.e. families without relatives or friends in the receiving areas), the full settlement package must be provided. There should be no exceptions to this rule. There is no "cushion" in the current transmigration package which can or should be left out if farmers have been recruited in Java and have no alternative means of

support. Saving money by reducing the subsistence or agricultural packages, for example, could have serious negative consequences with no major saving in cost. Therefore, in planning the Repelita V program, it should be assumed that farmers sent from Java or Bali to new and remote locations should have full support.

7.31 Partially assisted. Fill-in (sisipan) sites (small areas between large-scale sites) and the later phases of successful new sites can be settled using partial packages if migrants are recruited among spontaneous migrants and second generation families already in the receiving areas. Because such households already have family and friends in the area, because they know the area and the difficulties inherent in settlement, and because they are, in the case of spontaneous migrants, self-selected, they can make reasonable decisions about whether they have the resources and ability to cope with new settlement in the absence of full support.

7.32 Recruitment in the receiving areas implies a shift in emphasis from counting migrants "moved" to counting those families "settled". The Government is concerned that such a shift may lessen the demographic impact of transmigration in critical areas, but this need not be the case. Intensive recruitment in critical areas such as upper watersheds could continue under the fully sponsored program, and spontaneous migrants from these areas would be expected to follow.

7.33 Several options are available for partially assisted schemes:

(a) Homesteading. The basic component of any partially assisted package is land. For the last decade or so a number of writers have proposed an Indonesian homesteading policy such as that used to settle the outlying areas of the United States and the Philippines. Under homesteading, the Government would identify and obtain the land to be settled, divide it into plots and possibly provide minimum infrastructure. These plots would then be given to farmers registering on site. Such a program would work best in Sumatra where the infrastructure is already available and where many migrants would have relatives in the vicinity. It is unlikely to be successful in the more remote areas earmarked for transmigration. The cost of such a package would be on the order of \$500/family, e.g., the amount needed for site selection and evaluation.

(b) Other Land Allocation Schemes. The second most important element is access. In successful settlement areas, where infrastructure exists or is being put into place, the provision of individual plots of land along village roads would be more than sufficient to induce settlement by spontaneous migrants already in the area. To encourage resettlement in slightly less developed areas, 0.25 ha house-lots along the road could be cleared as roads were constructed. To promote agricultural production, foodcrop lots should be allocated directly behind the houses in order to facilitate clearing and development by family labor. Land titling should be done after the land is cleared by the farmer. Adequate reserve land should also be provided for second stage development. The cost of this package is estimated at about US\$1,000/family.

- (c) Land Allocation with Other Benefits. Most partially assisted migrants would also profit from start-up funds for housing and agricultural supplies. Ideally this would be in the form of a cash grant of at least US\$500 which could be used by the migrants for needed goods and services. The Government is wary of cash grants since it is concerned that migrants may register for the cash alone or that funds may be diverted. Recognizing these problems, goods could be provided in kind. In order of priority these are: (a) subsistence supplies; (b) agricultural inputs; and (c) building supplies. These elements are worth about \$1,000. Construction of a house, rather than the provision of building materials, would add about \$500 to this package. The cost of this partially assisted package including building supplies would be roughly US\$2,000, and with a constructed house it would cost about US\$2,500, about half the current cost.
- (d) Unregistered Migration. Any mandatory registration, particularly if accompanied by checks in the area of origin or the receiving area, will potentially discourage circulatory migration and free movement. For this reason mandatory registration is to be discouraged. Instead MOT should introduce positive incentives for people to check in with transmigration offices and register in both Java and the outer islands. The incentive for check-in in Java might be to obtain discounts on transportation, maps and information. The incentives in the receiving area might be in the form of information on benefits which can be obtained in terms of land, extension, or other forms of support. The number of unassisted migrants should be counted in the receiving provinces.

7.34 Toward a Staged Program of Settlement. The Government has experimented in the past with programs where a portion of the site was allocated to sponsored migrants, a portion to local people, and a part was reserved for spontaneous migrants, the so-called tri-partial approach. In the light of budget constraints, a new program of this type is required on a phased basis. In the first stage, pioneer settlers (who can be recruited in the sending or receiving provinces) should receive the full-benefit package. In the second stage, partially assisted migrants could be recruited in receiving areas. Land would also be reserved for third-stage settlement by spontaneous migrants and the second generation. Local people could be settled at any point in this process.

#### Short-term Measures

7.35 As of FY86/87, the Government had cleared land for 60,000 families and constructed houses for 54,000 families, but due to budgetary constraints it had funds for settling only 26,000 families on the fully sponsored upland program and for settling 10,000 fully sponsored families on tree crop schemes. Under these circumstances, there has been growing interest in partially assisted programs which could potentially accelerate settlement while reducing costs. It is important that the government recognize, however, that the urgency of budget constraints does not alter the guidelines listed above:

- (a) the first settlers in pioneer sites, settlers in remote sites where off farm work is not widely available, and settlers recruited in Java and moved to areas where they do not have family or friends should be fully supported;
- (b) if the package is to be reduced, settlers should be recruited in the receiving areas;
- (c) the better the area, and the more existing and spontaneous migrants in the vicinity, the more the package can be reduced.

Within these guidelines, partially assisted programs are appropriate. The programs cited above would also go a long way toward relieving the pressure for land by spontaneous migrants in existing sites and a special effort should be made to ensure that surplus land within existing settlements (that beyond 3.5 ha/family) is allocated to spontaneous migrants before the community is transferred to the province.

#### Institutional Mechanisms for Program Development

7.36 There is a Directorate of Self-Initiated (Swakarsa) movement in the Directorate General of Mobilization and Development; however, this Directorate is relatively new and its staff are not sufficiently senior to recommend major policy changes. For this reason, program development has been slow and has focused on the components of the settlement package (i.e., eliminating the cost of transport, land clearing or houses), rather than on supporting the ongoing process of spontaneous settlement.

7.37 Recently, the office of the Secretary General in the MOT has tackled several important program and policy issues by forming special teams drawn from select senior officials and the staff of appropriate Directorates. This model could also be used to design key policies to support spontaneous migration and develop short-, medium- and long-term programs for partially assisted settlement. These policies and programs could be developed in the office of the SEKGEN and then discussed by the Minister with the other Ministries involved. The Swakarsa Directorate would function as the Secretariat for this purpose.

#### The Prospects for Spontaneous Movement

7.38 About 1.1 million people moved from the inner to the outer islands during 1975-80, of whom 878,000 moved to rural areas. At least 600,000 of these people were not sponsored transmigrants. This is the equivalent of about 150,000 families <sup>2/</sup> of spontaneous movers or perhaps 30,000 families per year. With the level of investment and amount of development activity in the outer islands in Repelita III, it is reasonable to assume that this level increased significantly, at least doubling to 50,000-75,000 families/year.

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<sup>2/</sup> This is an estimate since spontaneous migrants often move individually.

Government targets for FY85/86 called for over 100,000 families to move on partial or unassisted programs, and the question is whether this level of movement can be achieved or should be attempted.

7.39 The amount and direction of spontaneous movement in Repelita IV will depend on a number of factors. First, the state of the economy and the pattern of government investment. The relatively large amount of spontaneous movement from the inner to the outer islands in the last ten years has been in response to labor opportunities created there. Some of this employment has been generated in the process of creating transmigration sites, some as a result of the need for secondary services by migrants, some in different sectors such as mining and manufacturing. If public investment in the outer islands slackens and economic development slows, the number of spontaneous migrants will lessen.

7.40 Second, since spontaneous migrants often follow relatives or friends, it follows that spontaneous migrants will not be the first settlers in pioneer areas. In the absence of a strong sponsored program, only a few inner island residents would be expected to move spontaneously to Irian Jaya. More would move to Kalimantan, where there are already sponsored settlers and where employment opportunities in the timber industry are attractive, and the vast majority of spontaneous migrants will continue to go to Sumatra. Since much of the available land in Sumatra is already occupied, strong government encouragement to move there in the absence of improved land acquisition systems and strong environmental protection measures could have negative consequences. Chief among these would be a flood of unskilled labor onto provincial markets which would drive down wages and increase underemployment. These factors should be carefully monitored by the MOT.

7.41 In summary, it is not certain that the Government can achieve high levels of spontaneous movement to the outer islands if investment there slackens, and efforts to sustain high levels of movement in the absence of employment creation could have an adverse effect on the regional economies. For this reason it is important that the MOT use targets only as guidelines and concentrate on the key policies required to facilitate spontaneous movement. Among these, establishment of a responsive system of land registration, establishment of a short-term (MOT-supported) and longer-range (bank-supported) credit system for land purchase, and development of strong environmental protection measures are urgently required. Other programs such as homesteading and partially-assisted settlement packages will help circumvent immediate budgetary constraints, but they cannot circumvent long-term problems of land availability and economic land use in the outer islands.

### C. Financial Constraints

#### Repelita III

7.42 During Repelita III, finances were not a limiting factor in transmigration development. As Table 7.4 shows, in four of the last six years for which data are available, budgets for transmigration exceeded expenditures, and between 1981/82 and 1984/85 funds expended as a percent of funds budgeted actually declined. The main reason for decreasing expenditures was that

implementation constraints led to the decision taken toward the end of Repelita III to include spontaneous migrants within the official 500,000 family transmigration target. Since budgets were compiled on the assumption that 500,000 families would be settled under the sponsored program and only 366,000 families were settled in this way, by the end of Repelita III, the MOT had growing budget carry-overs from preceding years. For example, in October 1985, actual expenditures from the 1984/85 budget (ending 6 months earlier) totaled only about 20% of the FY84/85 budget. The bulk of MOT expenditures in 1984/85 was from previous years' budgets.

Table 7.4: BUDGETS FOR THE TRANSMIGRATION SECTOR AND EXPENDITURES FOR REPELITA III AND EARLY REPELITA IV  
(Rp billion)

	Repelita III					Repelita IV	
	79/80	80/81	81/82	82/83	83/84	84/85	85/86
Transmigration budget <u>/a</u>	138	332	370	475	460	515	546
Actual expenditures <u>/a</u>	143	300	376	387	399	360	-
Expenditures as a % of budget	104	90	101	81	87	70	-
Total development expenditures	2,490	3,865	4,603	5,091	7,419	7,462	-
Transmigration expenditures as a % of total expenditures	6	8	8	8	5	5	-

/a This table shows budget approved by BAPPENAS for the sector rather than the MOT and actual expenditures within the FY as recorded by the Ministry of Finance, not expenditures from the FY budget.

Source: Ministry of Finance and MOT.

#### Repelita IV

7.43 During Repelita IV, the budgetary situation is dramatically different. With the fall in oil prices austerity measures were announced in January 1986, which reduced the MOT budget from Rp 501 billion (US\$452 million) in FY85/86 to Rp 323 billion (US\$293 million) in FY86/87, a reduction of about 35%. (Since preceding budgets had overestimated MOT expenditures, this did not necessarily imply a 35% cut in the transmigration expenditures.) Then in April 1986 with the prolonged recession in oil prices, the MOT budget was further reduced to Rp 208 billion (US\$180 million). This amounted to 42% of the FY85/86 budget and 58% of FY84/85 expenditures.

7.44 Under the circumstances, in mid 1986 the MOT reviewed and revised its priorities. Under the FY86/87 program the following items are listed in descending order of emphasis.

- (a) Site Development. Highest priority is given to the fulfillment of MOT's commitment to existing migrants through the provision of social and economic elements of the standard transmigration package (subsistence supplies, agricultural inputs). Second, is the upgrading of production systems for those farmers who are not yet self-sufficient, for which a budget for 35,000 families is provided. Third, is the upgrading of infrastructure, including the rehabilitation of 3,500 km of roads and 3,700 bridges. The Government places priority on these matters, both to meet its commitment to those who have already moved, and to improve the quality of life in existing settlements in order to attract spontaneous migrants.
- (b) Committed Projects. Three types of commitments are recognized. First, priority is given to the completion of contracts that the MOT has already signed. Although most Repelita IV contracts with provincial firms are single year contracts, several multi-year contracts are still underway for planning and site preparation. Second, the MOT recognizes the need to complete investments in housing and settlement for sites which have already been cleared, in order to take advantage of the financial investments already made. Third, MOT has given priority to the provision of counterpart funds for externally assisted projects which augment the resources available to the Ministry. These projects, assisted by IBRD and ADB, are projected to settle only about 4,000 families in FY86/87. Counterpart funds are also allocated for the continuation of studies and the provision of services (e.g., World Food Programme) involving external assistance.
- (c) Institutional Development. Finally, the Government has given priority to institutional development, including the coordination of ongoing services, monitoring and evaluation, training, efficiency improvement and studies.

This is an appropriate response to difficult resource conditions.

#### Implications of Budget Reductions

7.45 These priorities have significant consequences for the transmigration program. First, and most important, no new land clearing will be begun in FY86/87 except for that which is intended to make areas already cleared, ready for settlement,<sup>3/</sup> and for the relatively small area under externally assisted projects. This does not mean that transmigration will halt. As of March 31, 1986, 53,700 houses had been completed by MOT, and the DGE held a

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<sup>3/</sup> Typically houselots are cleared and houses are constructed before field areas are cleared. This means that some land clearing will have to be carried out to permit settlement in areas where houselots have been cleared and houses established.

budget for 26,000 houses which would permit settlement in areas where 56,700 ha of tree crops had been established for transmigrants.

7.46 A second implication of current planning is that programs will have to be developed for partially assisted settlers. About 52,000 houses will be available to migrants on upland and tidal schemes, but sufficient funds are available to move only 26,000 families on fully sponsored programs. Similarly the DGE may have houses for nearly 34,000 families, but the MOT budget includes funds for moving only 10,000 families. MOT officials explain that this discrepancy is intentional, and the residual houses are to be filled by partially assisted migrants who do not get other support. As noted in the previous section, for this strategy to be successful, partially assisted migrants should be given preference for the best (most accessible sites). It is also urgent that programs to settle partially assisted migrants be initiated immediately as houses cannot remain unoccupied in Indonesia for more than a few months without severe deterioration.

7.47 Finally, the budget situation has important consequences for planning. The Government has already identified areas that are potentially suitable for 400,000 families on the outer islands. Of these, land for about 170,000 families is in Kalimantan where local land use and forest constraints may limit actual settlement, and sites for 140,000 families are located in Irian Jaya, where settlement prospects are likely to be limited by costs and by social and environmental considerations (Chapter V). This large backlog of potential sites, combined with a downturn in settlement levels, means that planning must also be slowed, and to this end the second phase of studies proposed under the Bank-assisted Transmigration V project has been cancelled.

#### The Future Transmigration Program

7.48 Oil revenues are not expected to return to previously high levels in the immediate future. For this reason, the Government will face trade-offs in the future between second-stage development or new settlement, and between high-input programs (cash crops) on a smaller scale or lower-input projects (annual crops) on a larger scale. The Government can contain costs in three main ways:

- (a) by reducing the sponsored program and emphasizing fill-in (partially assisted) and spontaneous programs;
- (b) by reducing the number of people settled in more remote areas; and
- (c) by reducing targets.

Tree crop development reduces total program cost on a longer term basis because 50-75% of costs can be recovered. Since they cost more initially, however, tree crops do not address the immediate problem of financial constraints. Cost savings cannot be realized by reducing unit costs or limiting upgrading programs without serious negative consequences for the migrants, and cost recovery on food crop schemes does not seem feasible given the low incomes of migrants.



## VIII. INSTITUTIONAL CONSIDERATIONS

### Overview

8.01 During Repelita III, the responsibility for transmigration was distributed among the line agencies normally in charge of each sector. Chief among these were the Directorate General of Transmigration (DGT) in the Ministry of Manpower and Transmigration, the Directorate of City and Regional Planning in the Ministry of Public Works, the Directorate General of Agraria in the Ministry of Home Affairs, and the various Directorates General in the Ministry of Agriculture (MOA). Coordination between agencies was provided by a Junior Minister for Transmigration (JMT). Under the Indonesian system, Junior Ministers provide coordination across Ministries and provide information and advice to the parliament and the cabinet on the progress of interagency programs.

8.02 These arrangements were not satisfactory. The Office of the JMT had insufficient authority to coordinate planning and budgeting, interagency objectives differed, and the coordination of implementation was poor. Because of these problems, a new Ministry of Transmigration (MOT) was formed in 1983. The former Directorate General of Transmigration became the Directorate General for Mobilization and Development (DGMD), and the Public Works Directorates responsible for site selection and evaluation and for land preparation became the Directorate General for Settlement Preparation (DGSP) within the MOT. The budgets of some agencies such as Health and Education were also incorporated into the MOT budget, while other agencies such as Agraria and the Directorates in the Ministry of Agriculture retained control over their own funds. Under the new Ministry, the staff and functions of the Inspector General and the Secretary General were expanded in order to improve financial and administrative control.

8.03 While these steps have laid the groundwork for future development, problems remain. Planning, budgeting, monitoring and evaluation, which are the chief management tools of the Ministry, remain weak; and with the combination of the two most important agencies in the program, coordination with other agencies has lessened. In addition, due to the pressure of high targets during Repelita III and the first two years of Repelita IV, the agency focused on the very difficult tasks of site selection, site preparation, and the selection and transfer of migrants under the sponsored program, while policy and institutional issues took a back seat to program expansion.

8.04 This chapter will look at the most important institutional matters affecting transmigration implementation: planning and budgeting, monitoring and evaluation, manpower development, and structural arrangements within the MOT. It will also discuss problems of interagency coordination and the MOT's future role. It concludes by indicating needed shifts in direction and emphasis over the next 20 years.

A. Institutional Development Within the MOT

Planning

8.05 Problems of interagency coordination during Repelita III had a very serious impact on planning. In the initial years of the program, targets were established with only limited knowledge about land availability, and budgets were prepared based on targeted figures for each province and district (kabupaten). The Ministry of Public Works (MPW) agencies fared better than others because the agency was relatively centralized, tendering occurred at a national level, and there was some flexibility in the use of funds, so that if sites could not be opened in one district, contractors could be deployed to another. MPW also had the advantage of doing the initial work on each site. Agencies later in the sequence, such as the DGT, had more problems with planning and budgeting and those decentralized agencies last on site, such as the Directorate General of Food Crops, had a difficult task.

8.06 During Repelita III, planning improved. Better site selection and evaluation allowed more accurate estimates of the number of families to be settled on a given site; annual meetings of provincial officials and line agencies provided a forum for obtaining a provincial consensus on the targets and areas to be developed; and midway into the period the Governor's offices began providing a "green light" for settlement after the necessary first steps had been completed. Planning and implementation were also increasingly decentralized and the provincial planning agencies (Bappedas) played a growing role in reconciling development objectives and facilitating implementation. However, many management problems persisted and the recent reorientation of the Ministry from new settlement to second stage development and changes in budgeting procedures that eliminate budget carry-overs, are placing increased demands on the planning system.

8.07 In Repelita IV, the MOT's Office of the Secretary General (OSG) is responsible for planning, budgeting, monitoring and evaluation. This office sits outside of the Ministry's two Directorates General and should be in a good structural position to undertake these tasks. However, integrated planning functions are new to the office, and it is not yet adequately staffed. Some planning and monitoring functions are also being carried out in other agencies (Directorates) within the MOT and the relative roles of the OSG and the Directorates are still being clarified. High priority should, therefore, be given to strengthening the Planning Bureau in the OSG and to reducing duplication of functions in the MOT.

Budgeting

8.08 Budgeting is a subsection of planning. If program targets are unrealistic, if information on the status of implementation is not available, or if unit costs are not updated from the field, adequate budget preparation is impossible. In part, because of these problems, MOT carry-overs in September 1985 amounted to more than twice the budget allocation for FY86/87. Under the new budget procedures, carry-overs of funds from one year to the next are not permitted and budget preparation will have to be improved. Elements of the process should include:

- (a) the preparation of realistic program targets at the provincial level;
- (b) development of realistic implementation schedules for contracted works and schedules based on actual experience to date;
- (c) careful review of actual unit costs on a province-by-province basis;
- (d) close monitoring of implementation progress so the amount of work already done (and to be done) is known;
- (e) computer processing of financial information;
- (f) annual updating of key parameters (implementation time, unit costs); and
- (g) manpower development commensurate with the task at hand.

Improvements in bookkeeping and accounting procedures are also required, and the Bureau of Finance in the MOT is in need of technical support.

#### Monitoring and Evaluation

8.09 One of the weakest points in transmigration has been the monitoring and evaluation of project implementation (quantity, quality and cost) and project impact. In Repelita III, the Bank and the United Nations Development Programme (UNDP) provided technical support to the JMT to monitor project implementation, finance, and impact, and to develop an early-warning system intended to detect and react to problems on site. Because of limitations on JMT staff and resources, however, this system was never effective and has been abandoned. New systems must now be developed to meet these functions.

8.10 In Repelita IV, the Planning Bureau in the OSG has been given the task of overall monitoring and it is attempting to establish a comprehensive monitoring system. However, the ability of the Planning Bureau in the OSG to develop an adequate monitoring system has been hampered by the fact that the office is trying to gather too much material. Data sheets are too long, they include information not readily available to MOT staff, and are therefore difficult to complete, and they are collected monthly, thus taking a great deal of time. For these reasons, collection rates are low (recently 35%) and declining. To reduce this problem, monitoring undertaken by the Planning Bureau should be greatly simplified and confined to key indicators of physical and financial progress. Questionnaires should not contain information unavailable to the site manager, or, if this information is critical, mechanisms should be introduced for contractors and other agencies to provide such information to the site manager. Information should be collected no more than once every three months.

8.11 At the same time that monitoring in the OSG is simplified and given priority, monitoring systems at the provincial level and within the Directorates General should also be redefined and developed.

- (a) Local level. Since procurement, tendering and contractor supervision have been decentralized, these tasks must also be monitored at the provincial and district levels. Information on migrant welfare and specific site problems must be provided on a regular basis to the provincial MOT head (Kakanwil) so that action can be undertaken to resolve problems before they become serious. Reporting systems already exist, but technical support from the OSG to improve local level monitoring systems should be considered.
  
- (b) Directorates General. Technical data on the progress and quality of implementation should flow from the provinces to the Directorates General. In addition, since each Directorate General is required to develop guidelines for implementation, they should be able to carry out special studies that would assist in policy formulation, for example, studies on road standards, the condition of potable water, fertility levels and child nutrition in transmigration sites.

Certain data collected from the provinces by the Directorates General should be forwarded to the Planning Bureau, and the roles of these agencies in data collection should be clarified.

#### Manpower Development

8.12 The Ministry of Transmigration could profit from both a simplification of structure and consolidation of existing staff numbers. However, future functions will require a clearer policy orientation and good high-level staff. These staff should be recruited from the best officials in provincial offices, so that they have field experience and so that career opportunities are developed within the agency. Improved training is also required.

8.13 In order to improve the quality of manpower in the Ministry of Transmigration a number of initiatives have been taken. Technical support has been provided under the Bank-assisted Transmigration IV project to assist the training unit within the OSG to assess training needs, assign priorities and develop the curriculum and instructors required for the task. Training materials are being developed and diploma courses have been established at Gadjah Mada University to train transmigration officials in the theory and practice of the program. About 600 staff of MOT are also to be trained under the United States Agency for International Development assisted management training program, open to all agencies, and about 60 staff will be sent overseas by MOT to earn advanced degrees. These efforts deserve continued support.

#### Other Steps Needed to Improve Quality Control and Program Management

8.14 The Role of the Directorates General in Project Implementation. As noted, setting standards and drawing up contracts, procuring goods and services and supervising works were largely in the hands of the national offices of the various line agencies in Repelita III, particularly for larger contracts. In order to decentralize authority and responsibility and to

distribute the benefits of government investment to the regions, these functions were transferred to the provinces in Repelita IV. This action has placed the central Directorates and Directorates General in a weak position, and contractor supervision and quality control have suffered. To address this problem it is urgent that institutional arrangements be reviewed with an eye to improving quality control. To do this the central Directorates General should be given a stronger role in setting standards, in strengthening the capacity of provincial staff to do adequate supervision, and in monitoring the quality of such work. The Inspector General working through the central Directorates also has a strong role in reviewing the quality of works undertaken at the provincial and local level and can withhold funds where quality is inadequate.

8.15 Management Review. At the present time, senior MOT officials are aware of the institutional problems facing the Ministry of Transmigration, but they are often unclear about mechanisms for addressing them. Most high level decisions must be made by the Minister and his advisory staff, but they do not have adequate time to consider policy issues systematically. To address this constraint, there should be a formal review of management issues on a regular basis. This should be carried out by a team of senior officials, including the Director Generals and Directors, provided with secretariat services by the Office of the Secretary General. Such a team should evaluate core management functions in the MOT (planning and budgeting, monitoring and evaluation) and make recommendations for improvement. It should also review on-site management, arrangements for settlement transfer and contractor performance. Alternative arrangements are possible, but the need for high level staff in the MOT to give collective attention to management and policy issues on a regular basis is clear.

#### B. Interagency Coordination

##### Organizational Arrangements

8.16 Repelita III. With the large number of agencies involved in Repelita III, a number of mechanisms were put into place to achieve interagency coordination. Chief among these were the following:

Junior Minister	Special Minister for Coordination between Ministries
BAKOPTRANS	Interministerial Council
SATDAL TRANS	Committee of Director Generals
SATBIN TRANS I	Committee of Provincial Level Staff
SATBIN TRANS II	Committee of District Level Staff

In addition, regional coordinators (KORWILs) were to be appointed by the Junior Minister to coordinate activities at the district level, and site coordinators (KORLAPs) were to be appointed to coordinate on-site interaction.

8.17 Under these arrangements the Office of the Junior Minister held a pivotal role, and for this reason Bank financial support was provided to the JMT to provide management assistance and to set up a planning, budgeting and monitoring and evaluation system. As noted, this assistance was not well

utilized as the Junior Minister did not have the authority, permanent staff or budget to carry out the task. Under these circumstances, coordination at the center remained weak, KORWILs and KORLAPs were not appointed, and overall monitoring was poor. Inadequacies in this system led directly to the formation of the Ministry of Transmigration in 1983.

8.18 Repelita IV. Under Presidential Decree 59, 1984, the responsibility for coordination of the transmigration program was given to the Minister for Transmigration assisted by (a) a Secretariat in the Office of the Secretary General; (b) a supervisory team in the Inspectorate General; and (c) a technical team consisting of the various Director Generals. There is no longer any policy making body such as the BAKOPTRANS, although agencies can be called together by the MOT. The Governor and Bupati (district head) are responsible for coordination in the province and district, respectively, and they are assisted by committees consisting of representatives of the various implementing agencies. These arrangements are spelled out in further Ministerial Decrees. In spite of the provisions for coordination, however, there are now a number of areas where improved coordination and integration of purpose are urgently required.

#### Key Areas for Coordination

8.19 Agricultural Development. Several problems hamper coordination between the MOA and MOT. Staff in the MOA feel they have only limited influence over the choice of farm model, selection of sites, and adoption of technical parameters. For example, since the early 1980s, MOA officials, supported by the AARD, have opposed the nucleated farm model and advocated complex farming systems rather than food crop monoculture, but these ideas have yet to be adopted. At the same time, these staff are poorly equipped to be assertive in policy matters. The Agricultural Technical Team is chaired by a single senior official who operates with limited staff, and most team members are concerned with activities other than transmigration. As a result, policy issues are not clearly formulated and brought to the attention of MOT. Finally, in matters of dispute, no agency has clear authority. In order to formulate the accelerated oil palm program, for example, senior officials outside MOT and MOA had to be involved to reconcile conflicting views. The current situation is not satisfactory. The Agricultural Technical Team should be strengthened, and a mechanism should be developed for reviewing agricultural policy in the MOT, and for integrating the views of MOA and MOT.

8.20 Forestry and the Environment. There are several agencies concerned with forestry matters and environmental protection. The first is the Ministry of Forestry (MOF) which is responsible for identifying, demarcating and protecting forest areas, among other tasks. One problem in reconciling forestry and transmigration objectives is that there is no clear agreement on the areas within the Ministry of Forestry's jurisdiction. The MOF is basing its classification of protection, production and conversion forests on inaccurate 1:500,000-scale maps and has not shown an interest in using the land system classification maps at 1:250,000 prepared by MOT and BAKOSURTANAL (the national mapping agency). To resolve these issues: (a) MOF should utilize the most recent land cover mapping information to improve the accuracy of forest delineation; (b) the criteria for preservation of forest and for

conversion should be more clearly formulated; and (c) MOT and MOF should develop mechanisms for deciding on land availability early in the planning process. In matters of environmental protection, close coordination is also required with the MPE. The Directorate of Environment in the Ministry of Transmigration also has an important role to play in identifying important issues and agencies in resolving them.

8.21 Settlement Transfer. Coordination with the provinces is also needed to facilitate settlement transfer. Transmigration settlement areas are under MOT authority until a reasonable level of self-sufficiency is achieved, a period averaging about five years. The settlement is then transferred to the province which assumes the responsibility for public administration, maintenance of roads and public facilities, health, education and other routine services. Prior to transfer, these services are paid for by the MOT. The two main problems in settlement transfer are in road maintenance and the transfer of staff.

- (a) Roads. Roads are often so deteriorated on transfer that their improvement overwhelms the limited capacity of the district public works offices, and for this reason upgrading is often deferred. To address this problem, mechanisms are needed for road maintenance while sites are under MOT authority, and the provinces require ample forewarning of infrastructure to be transferred, of its status, and of the upgrading work required (including financial implications).
- (b) Transfer of staff and officials. Many of the staff in schools, clinics and the extension service in transmigration sites are on honoraria rather than in structural positions, and they expect to become civil servants when the community is transferred to provincial authority. With budget constraints, this may be difficult, and long-range planning by MOT and the provinces for the transfer of these staff is imperative.

8.22 Spontaneous Migration. Chapter VII argues for a major initiative by the MOT to develop systems of land registration and mechanisms for land purchase in the outer islands in order to facilitate and regulate spontaneous migration. The agency responsible for surveys and registration is the Directorate General of Agraria in the Ministry of Home Affairs. Arrangements for land purchase would involve the Directorate General of Regional Development (Bangda), the Ministry of Finance and the development banks. The agency responsible for initiating these activities is the Directorate of Swakarsa (Self-Initiated) Settlement; however, staff in this Directorate are not sufficiently senior, or experienced, to convene and guide the agencies which would have to be involved.

8.23 Social Affairs. Improved coordination is required between regional officials and the MOT in the evaluation of policies for compensation, the settlement of disputes, the identification and provision of culturally-appropriate benefits to local people, and the treatment of ethnically distinct peoples. Policy formulation and coordination on these matters could potentially be handled within MOT by the Directorate for Social and Cultural Development or by a special Directorate formed for this purpose.

Steps Needed to Improve Coordination

8.24 National Level. It is necessary to further develop the resources in the Planning Bureau of the OSG to support the interagency coordination committees established under Presidential Decree 59. To do this, special teams might be formed, as required, to review and recommend policies on matters requiring interagency coordination. These teams could be provided with secretariat services by Directorates within the MOT. Possible organization arrangements are shown in Table 8.1. Formation of such interagency teams or the establishment of alternative methods of promoting interagency policy formulation and coordination are critical to further program development.

Table 8.1: POSSIBLE ORGANIZATION OF PROPOSED SPECIAL TEAMS TO ADDRESS MANAGEMENT AND POLICY ISSUES

Issue	Key Members	Secretariat
<u>Management Team</u>	Senior MOT officials	Office of the Secretary General
<u>Policy Development teams</u>		
Agricultural Development	OSG, DGSP, /a DGMD /b, Agricultural Technical Team	Directorate for Economic Development
Forestry and Environment	MOF, MPE, DGSP, DGMD	Planning Bureau (DGSP) or the Environment Directorate (MOT)
Social Affairs	Bangda, DGA, Health, Education, DGMD	Directorate of Social Cultural Development
Spontaneous Migration and Land Registration	Bangda, DGA, OSG, DGMD, DGSP	Directorate of Swakarsa Migration
Settlement Transfer	Bangda, DGMD, DGSP	Directorate of Social Cultural Development

/a DGSP: The Directorate General of Settlement Preparation in the MOT.

/b DGMD: The Directorate General of Mobilization and Development in the MOT.

8.25 Provincial/District Level Coordination. Transmigration coordination committees already exist at the provincial, district and subdistrict levels to coordinate the day-to-day activities of transmigration. The work of these groups has improved significantly in the last five years, and could be further facilitated by the provision of secretariats with adequate budgets within the transmigration offices at the provincial and district level. As with the central secretariats, regional secretariats would establish agendas and issue proceedings.



8.26 On-site Coordination. Although mechanisms for coordination between provincial agencies have been improved, on-site coordination remains weak, particularly where site development entails the coordination of a number of agencies as in swampland development. This is partly because the site manager for MOT has no control over non-MOT staff, and decision makers affecting the settlement are located variously in the subdistrict, district or provincial capitals depending on the agency in question, thereby making coordination difficult to achieve. One solution to on-site coordination problems is to form a Project Management Unit (PMU) at each settlement with control over its own budget and the ability to purchase needed services. This model worked successfully in the first Bank-assisted transmigration project and in two other externally-assisted projects, the Luwu Project assisted by the United States Agency for International Development (South Sulawesi) and the Southeast Sulawesi Project assisted by the Asian Development Bank. A second possibility is to give the MOT project head authority over all other agencies at the site level. Other options may be possible, but it is clear that action must be taken to improve on-site coordination.

### C. The Changing Role of the MOT

8.27 Preceding sections of this report have suggested that prospects are limited for the food crop farm model, and that there are serious land and budget constraints. The report, therefore, recommends a shift to new settlement with tree crops, an emphasis on second-stage development (including but not necessarily limited to tree crop development), and steps to facilitate and improve spontaneous migration. These recommendations have significant institutional implications.

#### New Settlement with Tree Crops

8.28 In the past the bulk of the work of the MOT and the funds expended by it were devoted to activities involved in settlement on food crop schemes: land identification and site preparation, selection, transport and initial support of settlers. In the NES/PIR tree crop development programs, the estates take the initiative in identifying and clearing land, and establishing houses and physical facilities. When the social and administrative infrastructure is ready, the estates through the Governor indicate that settlers are required. MOT then selects and transports migrants, and settles them, while the estate employs the migrants as wage laborers in tree crop development until trees are mature. Although these arrangements have worked relatively well with only 30,000 families involved, they have the disadvantage, from the point of view of the MOT, that they do not permit adequate forward planning and they reduce MOT's control over a major part of its future program.

8.29 In March 1986 a Ministerial Decree was issued that provides funds for tree crop development by public sector estates from the transmigration development budget, but gives the Directorate General of Estates (DGE) the authority for tree crop development. This decree also establishes a coordinating committee chaired by the Junior Minister for Tree Crops and including representatives from MOT. There are a number of advantages in having the DGE take the lead in planning and implementing tree crop development, and the pre-

sent policy of financing smallholder development through the DGE in close cooperation with the MOT is welcome. Nevertheless, close coordination between the DGE and MOT is imperative and the MOT has a strong role to play in land identification, settlement, and in monitoring migrant welfare and ensuring that migrants are treated equitably between schemes. This should be supervised by the Directorate of Economic Development.

### Second-stage Development

8.30 Ordinarily, transmigration projects are under the authority of the MOT until they are self-sufficient, at which time they are transferred to the provinces and the buildings, staff and services are taken over by the appropriate provincial agencies. In the coming years the MOT intends to give increased emphasis to road rehabilitation, the provision of cash crops and tree crops, and other upgrading activities on sites under its authority. However, if these activities take longer than the period the schemes are under MOT authority, problems of budgetary responsibility arise. This is one reason that second-stage development has been carried out mainly after the settlements have been transferred to the provinces and then by sectoral agencies in the course of ongoing development work. For example, in the past, PMU programs have not established tree crops for transmigrants until after the settlement is transferred to the province, which means that the time from the date of settler arrival to tree crop maturity is about 15 years. This is unsatisfactory.

8.31 There are several possibilities for addressing this problem: (i) the MOT could begin the work while the site is under its authority and the line agencies would have the budget after settlement transfer. Although this appears to be the simplest, line agencies are reluctant to be committed in this way to activities which may have priority to the MOT but not to the agency involved. Alternatively, (ii) the MOT could hold the budget for second-stage development even after the community is transferred to the province; (iii) communities could remain under MOT's authority until all needed work is finished, or (iv) MOT could enlist sectoral agencies to begin work using their own budgets before the transfer of sites. This option could potentially involve a bridging period between the time when sites are under MOT control and fully transferred to the province.

8.32 The second option could be taken under review, but the third option would probably prolong dependency and limit Bappeda involvement, and should not be encouraged except on critical sites. There are strong arguments to be made favoring the last option. MOT staff are on site, and after 2-3 years they are in a good position to describe the status of development (current incomes, land availability, etc.) and recommend upgrading and second-stage development. MOT could collate these data at the provincial level and negotiate with sectoral agencies on the location and type of activities needed for second-stage development. Funds earmarked for second-stage development could then be allocated to the line agencies and the MOT could ensure that technical Ministries give priority to second-stage development in planning and budgeting. This approach may be difficult in light of budget constraints, but decisions are required before large-scale second-stage development is begun.

## Spontaneous Migration

8.33 To date, the MOT has had only a modest role in promoting spontaneous migration because it has viewed the opportunities for intervention in terms of the sponsored settlement process--registration, selection, transport, settlement, and agricultural development--and has asked the question, how many of these elements should be provided to partially-assisted migrants, and at what cost. As this report has emphasized, however, in the future, partially-assisted programs should be tailored to the level of development of the settlement and surrounding region (i.e., the more developed, the less support). In the longer term, the management of spontaneous migration will require the identification of constraints and the formulation of policies to overcome them. This cannot be done by a small Directorate alone. Instead, this report recommends that an interagency team be formed to discuss and develop needed policies and programs to promote less costly settlement.

### D. Summary and Conclusions

8.34 Planning, Budgeting, Monitoring and Evaluation. Program planning (including budgeting) and monitoring and evaluation have been weak links in the transmigration program to date, and these tasks are likely to become more important in the future as innovative programs are initiated and resources are constrained. To improve performance in these areas, a high-level team should be formed in the MOT to review management functions, determine problem areas and develop mechanisms to resolve them. Technical support should also be provided to strengthen the OSG. Institutional structures should be simplified, manpower requirements defined and training improved. To improve quality control, the role of the central Directorates should be defined in relation to the provinces and mechanisms should be developed in the MOT for regular management reviews of line agency functions.

8.35 Coordination. Despite the adjustments made over the last few years, poor interagency coordination persists. In the past, the coordinating function was carried out by formal committees and supported to some extent by the JMT and advisory staff. These functions must now find a new home. Recently, considerable authority has been given to the Office of the Secretary General (OSG) in the MOT and the ability of this agency to serve a coordinating function would be strengthened by the establishment of a strong secretariat which convenes regular meetings for this purpose. In addition, some interagency mechanism must be developed to deal with policy formulation and implementation problems in agriculture, forestry and the environment, spontaneous migration, settlement transfer, and social affairs.

8.36 The Future Role of MOT. Twenty years from now, the possibilities for settlement following the current sequence of steps in the transmigration program will be limited. Instead, a broad spectrum of interagency programs and policy initiatives will be required to foster labor migration. To move from the current highly logistical operation to one centering on policy formulation and facilitation will not be easy. To achieve these objectives, it will be important to identify the agency intended to provide guidance and policy direction, to give it appropriate authority and make the maximum effort to strengthen it. At the moment, it appears that this position would best be

filled by the Office of the Secretary General (OSG). If so, a concerted effort is needed to define the function of the OSG, to attract the most skilled manpower to it, and to give it adequate authority to integrate the work of the other agencies. Technical direction and supervision would be left in the hands of the various Directorates General.

## IX. WORLD BANK INVOLVEMENT IN TRANSMIGRATION

### Overview

9.1 Since 1976, the World Bank has been involved in the evolution of Indonesia's transmigration program through five Transmigration projects, two Swamp Reclamation projects, and through Nucleus Estate and Smallholder (NES) projects which provide tree crops and other cash crops (sugar) to both transmigrants and local people (see Table 9.1). Two projects have been appraised that provide cattle in transmigration areas where livestock are in short supply, one receiving financial assistance from the International Fund for Agricultural Development (IFAD), the other from IFAD and the World Bank. Projects for agricultural research and extension have included components to strengthen agricultural supporting services in transmigration areas. In support of this lending program the Bank has carried out two Transmigration Sector Reviews, one in 1980, the second (this report) in 1986.

9.2 Bank commitments for upland transmigration and swamp reclamation total about US\$560 million or 20% of Bank lending for Indonesian agriculture and 7% of the Bank's lending to Indonesia in the past decade. Bank-assisted projects, when completed, will settle about 47,000 families in new sites, and upgrade existing settlements including about 16,000 families. IFAD and Bank-assisted projects will provide cattle directly to about 120,000 families and benefit about twice this many through the redistribution of offspring. An additional 400,000 families will benefit through improved site selection and evaluation. In addition, the Bank has committed about US\$680 million for Nucleus Estate and Smallholder projects which will settle about 95,000 families of whom perhaps 25% will be transmigrants. Bank disbursements amounted to about 5% of the cost of the Repelita III program, and are estimated to be about 10% of expenditures in Repelita IV.

9.3 Bank-supported projects have introduced a number of innovative features into the transmigration program including improved site screening and evaluation, support for and evaluation of the major farm models used, assistance for program management, and the development of procedures for utilizing timber from transmigration sites. They have also experienced a number of problems. Some problems are common to all projects in Indonesia (land allocation, coordination and quality control), but others are due to the difficulties inherent in programming a complex sequence of events and to high program targets which strained institutional capacity. On balance, however, the World Bank believes that the transmigration program has both merited and profited from Bank support.

### Projects in Support of the Upland Transmigration Program

9.4 Transmigration I. The first Bank-assisted transmigration project (Ln 1318-IND) was approved in 1976 and completed in 1983. It consisted of two pilot schemes in southern Sumatra: (a) the rehabilitation of an existing settlement of 12,000 families in Way Abung, in Lampung province; and (b) the

Table 9.1: BANK SUPPORT FOR TRANSMIGRATION PROJECTS

Project	Ln/Cr number	Total project cost -- (US\$ million) --	Bank assistance -- (US\$ million) --	Effective date	Actual or estimated closing date	Components
<u>Transmigration Projects</u>						
Transmigration I	Ln 1318-IND	56.8/a	30.0	11/30/76	04/13/83	Settlement of 4,500 families in Baturaja; rehabilitation of communities with 12,000 families in Way Abung.
Transmigration II	Ln 1707/ Cr 919-IND	242.0	90.0/ 67.0	10/04/79	12/86	Settlement of 20,000 new families in Jambi and South Sumatra provinces; upgrading at sites with 4,000 families in Jambi; site selection and evaluation for 50,000 families.
Transmigration III	Ln 2248-IND	185.8	101.0/b	07/01/83	06/87	Site selection and evaluation for 300,000 families and settlement of 2,000 additional families in Baturaja.
Transmigration IV/b	Ln 2288-IND	61.2	53.5	09/06/83	06/89	Settlement and tree crop establishment for 6,000 families in East Kalimantan.
Transmigration V/c	Ln 2578-IND	145.5	97.0	04/29/86	12/90	Site selection and evaluation for 300,000 families; institutional development.
Swamps I	Ln 1958-IND	44.6	22.0	07/09/81	12/87	Reclamation of 9,000 ha of swampland in Karang Agung and settlement of 3,200 families.
Swamps II	Ln 2431-IND	108.3	64.8/b	09/05/84	06/91	Reclamation of 30,000 ha of swampland in South Sumatra and settlement of 11,500 families.
Smallholder Cattle Development	IFAD, Ln 35-10	40.0	/d	09/01/81	02/87	Distribution of 45,000 head of cattle to transmigrant and local families in existing settlement areas of Sumatra.
Smallholder Cattle Development	Ln 2628-IND	66.4	32.0	04/17/86	03/92	Distribution of cattle to about 76,500 families in Sumatra, of whom about 90% are expected to be transmigrants.

/a Cost as originally estimated at appraisal. At completion, the project cost was US\$57.3 million.

/b Loan amount excludes front-end fee. Total project cost and loan amounts here are revised estimates.

/c This loan was reduced to about 100,000 families in light of budget constraints.

/d Project was financed by GOI and an IFAD loan for US\$21.8 million, but appraised and administered by the Bank.

settlement of 4,500 families near Baturaja, in South Sumatra province. It also provided funds for research on cropping systems and for long-term monitoring and evaluation.

9.5 New settlers in Baturaja were provided with 5.0 ha farms which included 1.25 ha cleared for food crops and 1.0 ha of rubber trees established for the smallholders by a public sector estate (PTP X). These benefits were provided to the settlers as a grant. To promote food crop development, farmers were given cattle for draft power, and free agricultural inputs (seed, fertilizer and pesticides) for three years. Transmigrants also received a house and one year of subsistence supplies. The project was implemented by a Project Management Unit (PMU) with considerable financial autonomy, and both domestic and foreign technical assistance was provided to support the PMU.

9.6 A Project Performance Audit Report (No. 5157, June 25, 1984) concluded that the project was successful. Farmers in a number of locations produced marketable food surpluses, and wage employment generated by ongoing settlement and by tree crop development provided reasonable cash incomes. These incomes sources combined with future rubber revenues are expected to produce annual household incomes at full development of about US\$1,500/family, exceeding the target income for rural areas of about US\$1,000/family. Spontaneous transmigrants now comprise about 27% of all settlers. Rehabilitation in Way Abung also generated considerable employment and project activities combined with other developments in the area (the establishment of a sugar plantation and the introduction of irrigation) have raised farmer incomes and stimulated regional development.

9.7 A number of lessons were learned in the implementation of Transmigration I. Yields were lower than projected and reserve land was not put into food crop production on the large scale envisioned in the appraisal report; lowered expectations were then incorporated into later projects. Farmers using draft animals were able to open up to one-half hectare more of land than those who did not, and this led to the development of two subsequent cattle distribution projects. The monitoring and evaluation component, undertaken by a university team, started late and did not provide timely information to project management, so later support was provided to develop monitoring capacity in the line agency. Finally, the amount of technical support and the absence of cost recovery led to questions of replicability, and subsequent Bank-assisted projects used institutional arrangements which were less management-intensive and included mechanisms for cost recovery for tree crop establishment and livestock distribution.

9.8 Transmigration II. The second Bank-assisted transmigration project (Ln 1707/Cr 919-IND), approved in 1979, was intended to settle 30,000 families along the new Trans-Sumatra highway in Jambi province and to improve Singkut, an older settlement of 4,000 transmigrant families. The project was intended as a model for the Repelita III (1979-84) transmigration program. Under Transmigration II, technical assistance was also provided to the Junior Minister for Transmigration to aid in coordination of the overall program.



Cattle distribution programs are used to increase land in production and improve incomes.

9.9 The settlement component of the Transmigration II project encountered several start-up problems, due in part to a shortage of suitable land. Detailed mapping in the original project area revealed sufficient flat land for food crops for only about 10,000 of the proposed 30,000 families. The project was, therefore, reformulated to settle about 20,000 families, 10,000 in Jambi and 10,000 in South Sumatra, and the balance of funds was reallocated to site screening and evaluation for the program as a whole. The Transmigration II site screening and evaluation component, known as the Site Feasibility Studies and Engineering (SFSE 1980), was carried out by consultants under the supervision of the Directorate of City and Regional Planning in the Ministry of Public Works assisted by an expatriate Technical Advisory Group. This component was successfully executed and set new, improved standards for site screening and evaluation.

9.10 Settlement commenced in October 1981 and was completed by the end of 1986. The settlement component experienced a number of implementation and coordination problems. Second-stage development in Singkut started slowly due



to problems of interagency coordination, plans were not made for the introduction of tree crops into new settlement sites, and the components to promote spontaneous migration were not implemented. The technical team provided to assist in the coordination of implementation was not well utilized since the office of the Junior Minister (JMT) did not have adequate authority and staff to carry out its task. However, managerial problems highlighted, in part, by project consultants and JMT staff, led eventually to the formation of a new Ministry in Repelita IV.

9.11 Transmigration Sector Review. In 1981 the Bank reviewed the Government's upland and swamp transmigration programs (Transmigration Program Review, Report No. 3170-IND). The report described the history of the transmigration program, acknowledged the role that the program could potentially play in meeting the Government's development objectives, and concentrated on steps needed to improve project implementation. A major conclusion of the report was that yields and income prospects in lowland swamp reclamation areas were promising, but that a greater role should be given to mixed farming systems including tree crops in upland schemes. The report also recommended that increased attention be given to site selection and evaluation, institution building and staff training, and that a major effort be made to promote better resource utilization through the development of grasslands and the utilization of timber from forested areas which were cleared. The report projected an increase in the size of the transmigration program in Repelita III to about 175,000-200,000 families over five years, about half the number actually moved, and it indicated that the Bank was prepared to assist the Government in the implementation of the program as long as reasonable standards of settlement were attained.

9.12 Transmigration III. Given the difficulty of finding sites suitable for large-scale settlement, and given the considerable risk to migrants settled on unsuitable sites, in 1983 the Bank agreed to finance a project providing technical support for the Government's entire program of site selection and evaluation, so long as future upland settlement was confined to sites selected under improved procedures. The Transmigration III project (Ln 2248-IND) was intended to identify sites for up to 300,000 families to be settled during the latter part of Repelita III and early Repelita IV. Under the SFSE 1983 planning program, better reconnaissance was initiated to exclude unsuitable sites early in the planning process, expanded terms of reference were drawn up which permitted investigation of a larger number of farming models and required the financial evaluation of typical settlements, increased attention was given to determining the amount and value of timber on the site in order to decide whether the site should be accepted, and the Technical Advisory Group was strengthened.

9.13 In addition to site selection and evaluation, Transmigration III also financed: (a) the settlement of 2,000 families adjacent to the first Bank-assisted project in Baturaja, South Sumatra, and additional services and facilities in the existing settlement; (b) staff training in the Directorate General of Transmigration; (c) agricultural research in support of transmigration under the Agency for Agricultural Research and Development; and (d) technical assistance to the Ministry of Population and Environment (MPE) to monitor and improve the environmental soundness of transmigration projects.

9.14 Most components are finished and the project is to be completed in 1988. In total, sites have been identified for about 250,000 families. As of June 1986 only about 20,000 families had been settled on sites selected under the SFSE 1983 program (many more were in progress), so an evaluation of improvement on such sites was not possible. Nevertheless, GOI officials and Bank staff believe that standards introduced under the SFSE program will improve migrant welfare and resource utilization. The Baturaja extension was also completed successfully.

9.15 Transmigration IV. This project (Ln 2288-IND), which will settle 6,000 families in East Kalimantan, was identified in 1979 and approved by the Bank in late 1983. This long gestation period was due to the introduction of several innovative features in line with recommendations in the Transmigration Sector Review. The project established procedures to permit the recovery of commercially valuable timber in areas to be cleared, and it developed institutional arrangements for the introduction of 2.0 ha of tree crops early in the settlement period. The project also included components to improve the coordination of Bank-assisted projects and to facilitate implementation of the GOI program.

9.16 The settlement model established under Transmigration IV influenced the design of GOI's transmigration tree crop development program adopted in early 1986; but due to delays in contracting, caused by falling timber prices and a lower amount of recoverable timber than bidders anticipated, land clearing and settlement were delayed. Contractors started clearing in November 1984, but three of four contracts were cancelled and replaced by new contractors in mid-1986. Although the slow start-up was disappointing, timber in the site cleared by a logging concessionaire has been utilized, the remaining sites have been logged, and procedures established under the project to ensure timber utilization have been applied to other areas. By June 1986 over 600 families had been settled.

9.17 Transmigration V. Under Transmigration V (Ln 2578-IND), approved in 1985, six firms were to be engaged in the first phase of studies and eight in a second phase to identify land for a total of about 300,000 families. Outline terms of reference are provided in Annex 9. This project also included technical assistance to improve mapping, to help set standards for land clearing, to supervise contractor performance, and to undertake a regional development study of southern Irian Jaya. The project was viewed as a means of improving mapping, containing program targets for Repelita IV (set at 750,000 families), promoting a shift to models other than food crops, and improving the environmental and social aspects of the transmigration program.

9.18 The first round of six site selection studies got underway in late 1986, but with the reduction in the settlement program resulting from the budget constraints of 1986, the second round of eight studies was cancelled. The reformulated project would help identify sites for about 100,000 new settler families and additional studies would be carried out to determine appropriate second stage development on existing sites. Consultants initially hired to supervise land clearing would be used to review standards for roads and bridges and to help plan and implement programs to rehabilitate existing physical infrastructure. Preliminary work on the Irian Jaya regional develop-

ment study has begun, but early indications suggest that the financial costs and social implications of settlement will dictate very slow development.

#### Other Projects Supporting Transmigration

9.19 Swamp Reclamation I and II. The first Swamp Reclamation Project (Ln 1958-IND), approved in 1980, was intended to reclaim some 9,000 ha in Karang Agung, South Sumatra, settle 3,200 families, and demonstrate improved methods of implementation, land reclamation, land clearing and agricultural development. Funds were also included for the preparation of master plans identifying priority areas for swamp reclamation. Problems were experienced in the coordination of infrastructure development and settlement, which were carried out by different agencies, and in 1985 this project encountered production problems, due mainly to pests. Action plans intended to alleviate these problems have been put into effect and harvests improved significantly in 1986.

9.20 Based on the findings of the first Transmigration Sector Review (1981), which found the best rice yields in settlement areas in swamp development sites, the Bank decided in 1982 to expand the pilot scheme in Karang Agung, and in May 1984 the Swamp Reclamation II Project (Ln 2431-IND) was approved. This project was designed to reclaim 30,000 ha of tidal swamps and settle 11,500 transmigrant families in an extension of the First Swamp Reclamation Project. It also supported institution building for the Directorate of Swamp Reclamation, lowland agricultural research, and studies for future swamp reclamation and rehabilitation projects. Infrastructure development in this project has just begun.

9.21 Smallholder Cattle Development. The World Bank also prepared and appraised two projects which provide cattle to local smallholders in transmigration areas where animals for draft purposes are in short supply. The first of these projects (IFAD-Loan 35), was financed by the Government of Indonesia and the International Fund for Agricultural Development (IFAD) and administered by the Bank. It was intended to procure cattle in Java and South Sulawesi and distribute them in Sumatra. By the end of the project in 1987 about 51,500 head of cattle had been distributed (about 46,000 head to transmigrants and 5,500 to local smallholders). Purchase and transfer were accomplished without major losses and the average area cultivated by the 60% of farmers using their animals for draft purposes increased by about half. These receiving cattle are required to return two heifers to be redistributed to other smallholders, and the original investment is, therefore, expected to benefit over 100,000 families.

9.22 The Second Smallholder Cattle Development Project (Ln 2628-IND), approved in 1985, is intended to procure 84,000 head of cattle from Nusa Tenggara Timur and Sulawesi for distribution to about 76,500 transmigrant and local families in Sumatra. This project is jointly financed by the Bank, IFAD and the GOI. The return and redistribution of heifers under this program is expected to benefit over 180,000 families.

9.23 Nucleus Estate and Smallholder Projects. Since 1978, the Bank has also assisted a major program of tree-crop and cash-crop development through its Nucleus Estate and Smallholder projects. In these projects, existing public sector estates are provided with technical and financial support to establish their own (nucleus) holdings and to develop adjacent areas for smallholders who may be indigenous people, existing transmigrants, or new settlers. When completed, these projects will settle about 95,000 families with 2.0 ha of tree crops and additional food crop land. About 10,000 families will be drawn from existing transmigration settlements and another 10,000-20,000 may be relocated from Java depending on the number of local people who elect to join the settlements. Most NES projects have been based on the major tree crops, rubber and oil palm, but one project (Ln 2344-IND) has been used to develop sugarcane on the holdings of local people and transmigrants.

#### Lessons Learned

9.24 Program Scale. Bank assistance to the transmigration program began in 1976 when settlement levels averaged about 10,000 families/year. These numbers were judged to be small in relation to the overpopulation and increasing environmental degradation on Java, and to the resources available in the outer islands, so decisions about program scale were related largely to implementation capacity and to the cost and benefits of specific settlements. The Transmigration Sector Review, issued in 1981, predicted an increase in settlement to about 40,000 families a year and concentrated mainly on ways to improve project implementation. The settlement of 366,000 families in Repelita III was nearly twice the number predicted by the Bank. In addition, the 1981 census indicated that the number of migrants to the outer islands doubled in the decade between 1971 and 1981 and the evidence suggests that the rate of movement increased in Repelita III. This level of sponsored movement, coupled with evidence of growing spontaneous migration, has changed the framework for program evaluation. Transmigration is now a program which significantly affects regional development and natural resource utilization, and decisions about the future program must be made with reference to appropriate program scale.

9.25 Farm Model. The sustainability of the food crop farm model was an issue in the design of both the first and second Bank-assisted transmigration projects and was a major topic in the Bank's first Transmigration Sector Review. This Review indicated that there were many communities which had persisted for years on poor soils in rainfed areas, but that incomes in such communities were low. It, therefore, argued that the rising expectations of rural settlers and the location of sites on increasingly marginal land provided a strong argument for expanding the role of tree crops in the transmigration program. Consistent with arguments in the Sector Review, terms-of-reference for consultants doing site selection and evaluation under the Bank-assisted Transmigration III project were expanded to include an analysis of several productive models, and Transmigration V established detailed procedures for planning tree-crop and other types of sites. Transmigration IV, located in East Kalimantan, included 2.0 ha of tree crops/family.

9.26 Spontaneous and Partially Assisted Movement. Transmigration II included a number of components to promote spontaneous movement. These components were not carried out by the DGT/MOT. The reasons are diverse. The Government was preoccupied with the larger questions of land identification, project implementation, and settlement for sponsored migrants; innovative components in the Bank projects proved difficult to implement in a large program with uniform standards throughout; and the Directorate responsible for developing programs for partially assisted and spontaneous migrants did not have sufficient authority to carry out this task. However, the current scale of spontaneous movement, the potential for environmental problems created by this level of movement, the increasing difficulty in finding suitable land for sponsored settlement, and the Government's financial constraints, mean that policies for facilitating and regulating spontaneous migration are now urgently required. The mix of fully sponsored, partially-assisted and spontaneous migrants and the policies needed to support them should be developed for Repelita V.

9.27 Environmental and Social Issues. Although environmental and social issues have been discussed in past Bank reports and figured prominently in the design of Transmigration V, with the increased scale of transmigration in Repelita III and IV environmental and social issues have become increasingly important, and a major program to address these issues is now required. Steps needed to promote environmental protection and programs for the local population are discussed in detail in Chapter V. Action on these measures will be difficult, since the required activities (such as the development of environmental master plans) are not fully under MOT control. Nevertheless, it is clear that the MOT must take an increasingly strong role in mobilizing and coordinating programs that affect transmigration and that it must be instrumental in the development of adequate social and environment safeguards in transmigration areas. Because of the importance of these issues, in preparation for Repelita V steps should be taken to develop environmental masterplans to support the Environmental Directorate in MOT, and to form or strengthen a Directorate in the MOT dealing with local people.

9.28 Project Management. The first Bank-assisted project was implemented by a Project Management Unit (PMU) and was the most efficiently implemented of the Bank-assisted projects. The Second and Fourth Transmigration Projects and the two Swamp Reclamation Projects have been carried out under the same institutional arrangements as the overall program and have experienced problems due, in part, to difficulties in coordinating the chain of events prior to and after settlement. Steps needed to improve overall coordination must entail realistic targets, a strengthening of MOT management, and establishment of appropriate coordinating structure at the site, district and provincial levels. To improve on-site coordination it will be necessary to return either to PMUs (in which implementation authority, including financial control, is under the MOT site manager), which might be possible in a program of reduced scale, or to develop alternative arrangements to strengthen the role of the MOT site manager. Such steps will also be necessary to obtain the flexibility necessary to develop diverse farming and settlement models.

9.29 Bank-assistance to the Sector. The first Bank-assisted projects in the upland and swamp reclamation programs were site-specific projects which

included all aspects of land development and settlement. Because of the large number of components in such projects, and the Bank's emphasis on innovative features intended to improve project implementation, these projects have been difficult to implement. And even though the demonstration components (e.g. procedures for timber disposal) have played an important role in program evolution, the consensus is that any future projects should be simplified. The site selection and evaluation components, and the cattle distribution projects, which either assisted the entire Government effort or focused on a single subsector, have been more successful. This has been due to a clear definition of objectives and the means to achieve them, the introduction of uniform procedures, and the provision of technical support in the sector to be developed. Possible subsectors for program-wide support if settlement is resumed would be land registration, land preparation and/or road construction, tree crop development, site selection and detailed planning in swamp areas, the upgrading of health (wells, sanitation, clinics, family planning) and social services on sites already selected under Bank-assisted projects, and projects for environmental protection.

## X. SUMMARY OF MAJOR RECOMMENDATIONS IN THE MAIN REPORT

### Second Stage Development

10.1 At a time of resource constraints, there is a strong argument for further investment in existing sites in order to sustain and improve migrant incomes and to capture the economic benefits of the manpower and infrastructure which are already in place. In addition, the Government should make an effort to sustain reasonable levels of investment in those provinces and districts which received large numbers of migrants in Repelita III, in order to prevent increasing competition for work, falling wages and possible second round flows of labor either back to Java or to outer island cities.

10.2 The most important form of second-stage development is likely to be in tree crop establishment in existing sites. To establish tree crops for transmigrants, the PMU programs must be strengthened and expanded, and the MOT should conduct an inventory of sites to determine which ones require tree crops and whether the sites have sufficient land for tree crop development. To support such development, steps are needed to mobilize private sector investment in tree crop establishment in transmigration sites.

10.3 Maintenance of settlement infrastructure must also be given high priority. In transmigration settlements, road maintenance is particularly critical to economic growth. The Government has taken steps to identify and register transmigration roads, and assistance in absorbing and upgrading transmigration roads is urgently required in the districts that received large numbers of transmigrants.

10.4 There are a number of other improvements that can be made in transmigration sites. For example, the introduction of livestock, fishponds and minor tree crops, the acceleration of land titling, and the improvement of research and extension should be encouraged. However, this report cautions that steps to ameliorate natural conditions, through liming and bench terracing for example, may be too costly to be replicable on a large-scale. The report also suggests that integrated, multi-component programs will be difficult to manage and it encourages an approach in which the MOT, in conjunction with the line agencies, identifies the needs of existing sites and contracts with the line agencies for these services.

### New Settlement

10.5 Program Consolidation. Fill-in programs which make use of existing infrastructure should have priority over new settlement in pioneer areas. Such programs, which involve the settlement of migrants within or adjacent to existing sites, will have the highest rate of return and can be carried out under partially-assisted programs if settlers are recruited among spontaneous migrants already in the area. Programs of consolidation will depend heavily on regional authorities for land identification and implementation, and are expected to contribute substantially to regional development.

10.6 Choice of Farm Model. In the ongoing second-stage development program, and in any future new settlement, the following principles should guide the choice of farm model.

- (a) Annual Crops. Settlements based mainly on annual crops may be possible in limited areas with good soils, in swamp reclamation areas (d, below) and in fill-in areas where ample opportunities for wage work already exist.
- (b) Tree Crops. Tree crop programs, such as NES/PIR projects, have good prospects as they provide higher incomes and rates of return than projects based on annual crops in marginal areas and they have the potential for cost recovery. PMU programs can be tapped for new settlement, but priority for PMU schemes should be given to older sites.
- (c) Other Cash Crops. Cash crops such as sugar (Sumatra and Kalimantan) and cotton (SE Sulawesi) may have potential either in first or second stage development. However, most cash crops (fruits, vegetables, soyabeans) will be more attractive in densely settled areas with better market prospects.
- (d) Swamp Reclamation. Settlement in areas of swamp reclamation has a number of attractive features. However, to realize the potential of swamp sites, steps are needed to improve agro-hydrological surveys, drainage, and land development techniques; to improve coordination and agricultural supporting services; to develop an intensive pest management strategy; and to address problems of potable water and malaria control.

#### Partially-Assisted and Spontaneous Migration

10.7 In the near- and medium-term (Repelita IV and V) two principles must be borne in mind: first, pioneer settlement should be fully sponsored, as settlers in new areas will not have family, friends or well-developed institutions to support them. Second, partially-assisted migrants should be recruited among spontaneous migrants and second generation families already in the receiving areas. In the longer term, however, (Repelita VI) the success of transmigration program will depend on the ability of MOT to facilitate the settlement of individual families moving on their own. To promote this:

- (a) incentives should be developed to encourage local-level officials to identify, register, and transfer underutilized land to transmigrants and to arrange for financial compensation as required;
- (b) credit mechanisms should be developed to permit poor smallholders to purchase and register land; and
- (c) emphasis should be given to parallel programs for environmental protection in areas where spontaneous migrants are expected to settle.



To avoid the adverse effects of spontaneous movement, it is important that the MOT use targets only as guidelines and concentrate on the key policies required to facilitate settlement.

### Environmental and Social Factors in Transmigration

10.8 Environmental Soundness. A major effort is needed to identify, demarcate and gazette areas needed for conservation purposes. Improved maps are being prepared by Bakosurtonal, and additional specialist assistance could facilitate the completion of the land resource suitability maps needed to reconcile development priorities, forest boundaries, and environmental master plans. Even when maps are available, however, considerable work will still be required to assess areas of biotic importance and to demarcate areas for conservation. To facilitate this task, a consortium should be considered, consisting of donor countries and environmental groups willing to provide financial and technical support. Government officials and consortium members could decide on the most efficient ways of studying and gazetting important lands and determining the priority to be given to specific areas for protection. Since wetlands appear to have good potential for settlement, these areas should also receive attention to ensure an adequate strategy for their development.

10.9 Social Soundness. Further steps need to be taken to provide benefits to local people in the vicinity of transmigration settlements and to link second-stage development to regional development. To improve the MOT's ability to understand and assist local people in the vicinity of transmigration settlements, and to aid MOT in developing appropriate procedures for the provision of compensation and parallel benefits, either the Directorate for Social and Cultural Development should be strengthened or a new Directorate within the MOT should be developed to deal with matters relating to local people. To improve social assessment, the demographic departments of local universities might be used to undertake assessment studies and impact monitoring; and provincial and district officials in receiving provinces should be sensitized to the special issues concerning isolated people.

### Institutional Development

10.10 Management. The MOT is aware of implementation problems, but has very few staff in positions to address management issues. To address this problem, senior MOT officials should meet on a regular basis to review the core management functions (planning, budgeting, monitoring and evaluation) and make recommendations for their improvement. To improve the role of the central Directorates should be strengthened and contractor supervision should be improved.

10.11 Interagency Coordination. To improve interagency coordination:

- (a) The office of the Secretary General in the MOT should convene an interagency forum on a regular basis to identify implementation problems and evaluate progress. A secretariat should be formed to support the work of these meetings and issue regular reports.

- (b) Consideration should be given to the formation of interagency policy development teams for agricultural development, forestry and the environment, social affairs, and spontaneous migration, and these teams should report regularly to the interagency forum or to the Minister.
- (c) Working secretariats should be formed within the provincial and district transmigration offices to convene interagency meetings and prepare materials. Increased budgets should be allocated for this purpose by Bappenas.
- (d) The MOT project head (pimpro) on each site should be given the authority to convene and coordinate other agency heads (pimpros), regardless of their location or status.

10.12 Planning and Budgeting. Under new budget procedures which allocate funds for only one year, much better planning must occur. Recently a special team has been formed to reconcile program and budget functions. High priority must be given to institutionalizing the functions of this team in the Office of the Secretary General, MOT.

10.13 Monitoring and Evaluation. There is an urgent need to strengthen monitoring and evaluation:

- (a) Office of the Secretary General (MOT). The monitoring system in the OSG should be greatly simplified. Only major indicators of physical and financial progress should be aggregated at this level to provide needed information for programming and budgeting.
- (b) Directorates General. Detailed monitoring of project implementation and impact should be carried out by the Directorates General and this material, where necessary, should be forwarded to the OSG.
- (c) Provinces. With the decentralization of procurement and implementation responsibility, there should be increased emphasis on developing appropriate monitoring and reporting capacity within the provinces, and clear decisions on that information to be channeled to the Directorates and the OSG.
- (d) Other Agencies. Improved monitoring and evaluation are also needed in the agricultural sector and could be carried out by a strengthened Agricultural Technical Team or by AARD. The capacity to undertake environmental monitoring should be developed under MPE.

Technical support for monitoring and evaluation should be used to build an overall system operating at all these levels, and adequate budget should be provided for this purpose.

#### The Future Transmigration Program

10.14 Due to financial constraints, implementation problems, and evidence of low farm incomes, Government is now concentrating on maintenance of settlement

infrastructure and second-stage development, and this policy is likely to continue through Repelita IV. During this period, emphasis should also be given to planning and preparation for Repelita V and to institutional development.

10.15 Forward planning for Repelita V should entail the preparation of base maps indicating those areas suitable for settlement and those with forest claims or other contingencies; the production of draft master plans indicating areas for upgrading and new settlement; the mix of farm models; and areas where sponsored, partially assisted and spontaneous migrants are to be settled. A major effort should also be given to the development of parallel master plans for environmental protection and the development of action plans to address implementation constraints.

10.16 Whether or not sponsored migration is resumed on a large scale, spontaneous migration is expected to continue, and programs to channel spontaneous migrants onto good agricultural land are urgently required. The number of spontaneous migrants who will seek land in Repelita V is difficult to predict and will depend on economic factors, on the attractiveness of past settlements, and on the ability of the Government to establish policies which support land acquisition and land registration by individual families.



Repelita III Settlement by Year and Province  
(Families)

Province	1979/80	1980/81	1981/82	1982/83	1983/84	Total Repelita III
<u>Sumatra</u>						
Aceh	0	2,580	3,724	4,390	77	10,771
North Sumatra	0	855	1,986	1,086	4,139	8,066
West Sumatra	1,000	2,000	397	1,040	3,166	7,603
Riau	1,247	8,677	12,286	7,518	7,794	37,522
Jambi	2,068	4,183	3,775	2,584	4,072	16,682
South Sumatra	8,234	22,948	24,673	18,162	17,323	91,340
Bengkulu	2,022	2,596	1,679	3,611	2,279	12,187
Lampung	1,813	5,204	0	19,187	16,672	42,876
Subtotal	<u>16,384</u>	<u>49,043</u>	<u>48,520</u>	<u>57,578</u>	<u>55,522</u>	<u>227,047</u>
<u>Kalimantan</u>						
West Kalimantan	0	1,877	6,420	6,478	366	15,141
Central Kalimantan	250	2,228	4,072	4,780	16,891	28,221
South Kalimantan	315	5,769	4,033	3,676	1,581	15,374
East Kalimantan	0	2,102	2,853	2,554	4,369	11,878
Subtotal	<u>565</u>	<u>11,976</u>	<u>17,378</u>	<u>17,488</u>	<u>23,207</u>	<u>70,614</u>
<u>Sulawesi</u>						
South Sulawesi	450	650	750	1,220	537	3,607
Central Sulawesi	2,000	2,372	5,582	3,273	2,513	15,740
Southeast Sulawesi	1,010	3,928	5,895	4,589	3,803	19,225
North Sulawesi	75	1,216	1,667	366	830	4,154
Moluku/others	319	1,497	1,996	2,948	2,214	8,974
Subtotal	<u>3,854</u>	<u>9,663</u>	<u>15,890</u>	<u>12,396</u>	<u>9,879</u>	<u>51,700</u>
<u>Irian Jaya</u>	290	2,521	2688	5,362	5,755	16,616
<u>Total</u>	<u>22,093</u>	<u>77,283</u>	<u>98,405</u>	<u>104,237</u>	<u>63,959</u>	<u>365,977</u>
Unassisted Migrants	1,985	3,359	8,961	32,445	122,747	169,497
<u>Grand Total</u>	<u>24,078</u>	<u>80,642</u>	<u>107,366</u>	<u>136,682</u>	<u>186,706</u>	<u>535,474</u>

Source: Ministry of Transmigration.

Repelita IV Settlement by Type of Migrant Family  
and Province Through June 30, 1987

Province	Sponsored	Partially assisted	Spontaneous	Total
<u>Sumatra</u>				
Aceh	5,855	40	6,045	11,940
North Sumatra	3,575	285	7,025	10,885
West Sumatra	2,440	310	5,855	8,605
Riau	24,160	1,990	22,465	48,615
Jambi	19,115	555	18,870	38,540
South Sumatra	20,705	4,040	57,695	82,440
Bengkulu	6,800	150	10,350	17,300
Lampung	16,465	1,255	55,545	73,265
Subtotal	<u>99,115</u>	<u>8,625</u>	<u>183,850</u>	<u>291,590</u>
<u>Kalimantan</u>				
West Kalimantan	13,100	2,035	16,760	31,895
Central Kalimantan	13,145	2,065	17,955	33,165
South Kalimantan	9,575	1,210	15,590	26,375
East Kalimantan	9,125	495	23,195	32,815
Subtotal	<u>44,945</u>	<u>5,805</u>	<u>73,500</u>	<u>124,250</u>
<u>Sulawesi</u>				
South Sulawesi	3,275	370	4,280	7,925
Central Sulawesi	8,905	1,065	3,965	13,935
Southeast Sulawesi	6,640	550	4,145	11,335
North Sulawesi	2,515	5	2,190	4,710
Moluku/Others	4,160	460	4,150	8,770
Subtotal	<u>25,495</u>	<u>2,450</u>	<u>18,730</u>	<u>46,675</u>
<u>Irian Jaya</u>	<u>9,400</u>	<u>40</u>	<u>5,125</u>	<u>14,565</u>
<u>Total</u>	<u>178,955</u>	<u>16,920</u>	<u>281,205</u>	<u>477,080</u>

Source: Ministry of Transmigration.

## Sites Covered in BPS Survey

Site	Province	Arrival date	Households			Farm layout	Critical site
			On arrival	February 1985	Sample size		
<u>Repelita II Sites</u>							
<u>Tidal</u>							
Sei Rateh	Riau	07/78-06/80	714	705	39	nucleated/combined	No
Upang Delta	S. Sumatra	09/74-03/75	525	546	40	linear	No
Tanah Grogot	E. Kalimantan	04/73-02/76	151	202	20	linear	No
Subtotal			<u>1,390</u>	<u>1,453</u>	<u>99</u>		
<u>Upland</u>							
Pematang Panggang	S. Sumatra	05/75-12/76	3,633	4,219	201	linear	No
Babulu Darat	E. Kalimantan	01/79-05/79	933	1,173	40	linear	Yes
Sepaku	E. Kalimantan	07/75-07/76	537	362	20	combined	No
Malonas	C. Sulawesi	12/76-02/76	980	926	100	linear/nucleated	No
Subtotal			<u>6,143</u>	<u>6,680</u>	<u>361</u>		
<u>Upland with Trees</u>							
Baturaja	S. Sumatra	10/76-06/79	1,702	2,524	100/a	linear	No
Subtotal			<u>1,702</u>	<u>2,524</u>	<u>100</u>		
<u>Repelita II Total</u>			<u>9,235</u>	<u>10,657</u>	<u>560</u>		
<u>Repelita III Sites</u>							
<u>Tidal</u>							
Air Sugihan	S. Sumatra	04/80-08-84	4,486	4,506	221	linear	Yes
Terusan Tengah	C. Kalimantan	03/80-02/82	1,600	1,657	120	nucleated	No
Pangkoh	C. Kalimantan	04/80-01/85	4,906	5,019	140	nucleated	No
Saka Lagon/ Sunggal Muhur	E. Kalimantan	11/79-10/81	769	780	40	linear/nucleated	No
Subtotal			<u>11,761</u>	<u>11,962</u>	<u>521</u>		
<u>Upland</u>							
Bellias	Riau	01/81-11/84	4,010	3,877	180	nucleated	Yes
Teluk Kuantan	Riau	01/80-12/84	4,176	4,122	60	linear/nucleated	No
Pematang Panggang	S. Sumatra	02/80-06/83	6,039	6,640	281	linear/nucleated	No
Sunggal Waras	S. Sumatra	02/82-06/82	800	818	59	nucleated	No
Batulicin	S. Kalimantan	03/80-08/82	4,239	4,309	178	linear/nucleated	No
Kumai/Hanjalian	C. Kalimantan	06/80-11/80	547	294	20	combined	No
Teluk Dalam	E. Kalimantan	03/81-04/81	1,925	1,819	159	nucleated	Yes
Lahumbuti	S.E. Sulawesi	-	-	-	60	linear/nucleated	No
Subtotal			<u>21,736</u>	<u>21,839</u>	<u>997</u>		
<u>Upland with Trees</u>							
Baturaja	S. Sumatra	04/79-06/81	1,731	2,077	80	linear	No
Tepong Tandung /b	Riau	04/82-11/84	500	500	20	linear	No
Batulicin /b	S. Kalimantan	01/82-04/84	1,203	1,054	20	linear	No
Subtotal			<u>3,434</u>	<u>3,671</u>	<u>120</u>		
<u>Repelita III Total</u>			<u>36,931</u>	<u>37,432</u>	<u>1,638</u>		
<u>TOTAL</u>			<u>46,166</u>	<u>48,089</u>	<u>2,198</u>		

/a Baturaja 19 households classified as estate by BPS, the others as upland.

/b PIR Projects.

Comparison of Income, Net Value of Production and Expenditure  
in Transmigrant Communities and in Sending and Receiving Provinces

	Sample size	Mean monthly income (Rp)	Net value of prod. (Rp'000)			Net value of production (%)			Expenditure (%)		Exp. as % of income	Mean income in 1985 prices
			Food crops	Tree crops	Other agri.	Food crops	Tree crops	Other agri.	Food	Non-food		
<u>Sending Areas - 1984</u>												
West Java	3,452	67,702	11,776	2,568	1,756	17	4	3	70	30	90	73,660
Central Java	3,527	53,537	15,062	4,495	3,895	28	8	7	66	34	85	58,248
D.K. Yogyakarta	1,275	66,970	14,956	1,892	5,275	22	3	8	62	38	83	72,863
East Java	4,155	58,764	14,885	2,890	4,637	25	5	8	63	37	84	63,935
Bali	1,461	56,208	20,241	6,389	10,710	26	8	14	66	34	78	83,827
NTB	1,506	61,738	14,325	1,989	5,686	25	4	10	70	30	83	61,154
<u>Total</u>	<u>17,241</u>	<u>61,738</u>	<u>13,099</u>	<u>2,985</u>	<u>4,060</u>	<u>21</u>	<u>5</u>	<u>7</u>	<u>66</u>	<u>34</u>	<u>85</u>	<u>67,171</u>
<u>Receiving Areas - 1984</u>												
Riau	380	104,951	11,147	48,401	19,776	11	46	19	75	25	84	114,187
South Sumatra	883	79,305	21,959	14,194	4,699	28	18	6	74	26	95	86,284
Central Kalimantan	271	76,894	22,642	15,082	8,394	29	20	11	75	25	91	83,661
South Kalimantan	229	75,091	26,835	1,649	12,605	36	2	17	76	24	95	81,699
East Kalimantan	393	89,865	15,556	4,708	9,681	17	5	11	72	28	86	97,773
Central Sulawesi	195	58,407	23,170	13,522	15,318	40	23	26	82	18	79	63,547
Southeast Sulawesi	480	86,346	13,515	10,905	13,592	16	13	16	70	30	81	93,944
<u>Total</u>	<u>2,831</u>	<u>83,396</u>	<u>18,730</u>	<u>15,935</u>	<u>10,647</u>	<u>22</u>	<u>19</u>	<u>13</u>	<u>74</u>	<u>26</u>	<u>88</u>	<u>90,735</u>
<u>Transmigrants in Receiving Provinces - 1985</u>												
Riau	300	65,513	12,624	436	8,099	19	1	12	75	25	95	71,278
South Sumatra	981	52,888	11,955	2,805	5,527	23	5	10	78	22	87	57,542
Central Kalimantan	320	39,131	8,483	25	7,679	22	0	20	84	16	97	42,575
South Kalimantan	239	55,369	11,905	150	8,240	22	0	15	78	22	91	60,241
East Kalimantan	100	107,893	38,606	5,021	18,786	36	5	17	77	23	63	117,388
Central Sulawesi	100	60,231	10,470	817	4,717	17	1	8	74	26	78	65,531
Southeast Sulawesi	160	89,062	19,360	533	15,106	22	1	17	75	25	57	96,899
<u>Total</u>	<u>2,200</u>	<u>58,343</u>	<u>13,218</u>	<u>1,661</u>	<u>7,748</u>	<u>23</u>	<u>3</u>	<u>13</u>	<u>78</u>	<u>22</u>	<u>84</u>	<u>63,477</u>

Sources: Sending and receiving areas - 1984 Susenas; transmigration areas - BPS Transmigration Income Survey, 1985.



Source of Income by Farm Model and Location

Site	Sample	Agric.	Wages	Non- agric.	Gov't asst.	Transfer	Total	Agric.	Wages	Non- agric.	Gov't asst.	Transfer	Site inc. as a % of ave. Annual Income /A	Annual US\$
<b>Repelita II Sites</b>														
<b>Tidal</b>														
Sei Rateh	39	41,045	7,077	14,391	1,408	(2,887)	61,034	67	12	24	2	(5)	105	666
Upang Delta	40	26,811	13,588	17,966	0	18,525	76,890	35	18	23	0	24	132	839
Tanah Grogot	20	28,992	37,250	45,500	61	0	111,803	26	33	41	0	0	192	1,220
Subtotal	99	32,859	15,803	22,120	567	6,348	77,697	42	20	28	1	8	134	848
<b>Upland</b>														
Pematang Panggang	201	8,351	14,035	11,561	3,858	3,776	41,581	20	34	28	9	9	72	454
Babulu Darat/Sepaku	40	42,238	31,413	6,700	8,539	3,365	92,255	46	34	7	9	4	159	1,006
Malonas	100	18,068	14,935	14,088	2,579	9,978	59,648	30	25	23	4	17	103	656
Subtotal	341	15,176	16,337	11,731	4,032	5,547	52,823	29	31	22	8	10	10	578
<b>Upland w/Trees</b>														
Baturaja	100	32,761	9,034	18,580	4,415	1,805	66,595	49	14	28	7	3	115	726
Subtotal	0	32,761	9,034	18,580	4,415	1,805	66,595	49	14	28	7	3	115	726
<b>Repelita II Total</b>	<b>540</b>	<b>21,674</b>	<b>14,887</b>	<b>14,904</b>	<b>3,468</b>	<b>5,001</b>	<b>59,934</b>	<b>36</b>	<b>25</b>	<b>25</b>	<b>6</b>	<b>8</b>	<b>103</b>	<b>655</b>
<b>Repelita III Sites</b>														
<b>Tidal</b>														
Air Sugihan	221	17,097	3,474	19,320	5,155	(461)	44,586	38	8	43	12	(1)	77	486
Terusan Tengah	120	16,832	5,862	9,261	2,212	2,550	36,717	46	16	25	6	7	63	401
Pangkoh	120	16,165	1,667	8,487	7,722	412	34,553	47	5	25	22	1	59	376
Saka Lagon/Sungai Muhur	40	9,628	16,075	3,751	5,090	3,987	38,531	25	42	10	13	10	66	420
Subtotal	501	16,214	4,619	13,073	5,060	824	39,791	41	12	33	13	2	68	434
<b>Upland</b>														
Belias	140	11,049	17,709	9,403	10,687	5,567	54,415	20	33	17	20	10	94	594
Teluk Kuantan	60	30,447	29,953	16,008	9,355	720	86,484	35	35	19	11	1	149	943
Pematang Panggang	281	23,808	12,122	14,071	2,603	1,310	53,914	44	22	26	5	2	93	558
Sungai Waras	59	16,353	30,483	8,415	9,030	5,938	70,219	23	43	12	13	8	121	766
Central Kalimantan	60	19,844	5,618	21,343	10,358	791	57,954	34	10	37	18	1	100	632
Batulicin	178	18,283	9,410	18,803	9,605	3,620	59,722	31	16	31	16	6	103	652
Teluk Dalam	20	50,153	13,700	11,617	144	275	75,889	66	18	15	0	0	131	828
Lahumbuti	179	35,091	15,079	17,419	23,251	1,683	92,524	38	16	19	25	2	159	1,009
Subtotal	977	23,294	14,807	15,051	10,049	2,599	65,801	35	23	23	15	4	113	718
<b>Upland w/Trees</b>														
Baturaja	80	20,648	11,711	14,652	9,303	2,256	58,570	35	20	25	16	4	101	639
Tepong Tandung	20	14,579	61,903	11,102	3,333	8,925	99,842	15	62	11	3	9	172	1,089
Batulicin	20	5,999	41,300	2,667	0	(551)	49,415	12	84	5	0	( )	85	539
Subtotal	120	17,195	25,008	12,063	6,758	2,900	63,923	27	39	19	11	5	110	697
<b>Repelita III Total</b>	<b>1,598</b>	<b>20,616</b>	<b>12,379</b>	<b>14,207</b>	<b>8,238</b>	<b>2,065</b>	<b>57,505</b>	<b>36</b>	<b>22</b>	<b>25</b>	<b>14</b>	<b>4</b>	<b>99</b>	<b>627</b>
<b>Total</b>	<b>2,138</b>	<b>20,893</b>	<b>13,012</b>	<b>14,383</b>	<b>7,033</b>	<b>2,807</b>	<b>58,118</b>	<b>36</b>	<b>22</b>	<b>25</b>	<b>12</b>	<b>5</b>	<b>100</b>	<b>634</b>

Source: BPS Transmigration Income Survey, 1985.

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Price Structures for Agricultural Inputs and Outputs /a  
(1986 constant prices)

	Operation	1986	1987	1990	1995+
<u>Rice</u> (Prices used in economic analysis are import parity-based through 1984. From 1985 onwards, they are an unweighted average of the import and export parity-based price.)					
<u>Import Parity Price</u>					
Export price, Thai 5% broken, FOB Bangkok (US\$/ton)		205	178	362	342
Quality adjustment	90%	184	160	326	308
Freight and insurance	+	32	32	32	32
CIF price Palembang	=	216	192	360	340
Port handling and storage losses /b	+	26	26	26	26
Transfer to wholesalers	+	4	4	4	4
Transfer mills to wholesalers	-	3	3	3	3
Ex-mill price Palembang	=	250	225	391	367
Conversion to paddy	60%	150	135	235	220
Milling and cleaning costs	-	7	7	7	7
Paddy transport to Palembang by wholesaler	-	24	24	24	24
Economic farm-gate price (US\$/ton)	=	119	104	204	189
Economic farm-gate price (Rp/kg)	=	130	115	224	208
<u>Export Parity Price</u>					
Export price, FOB Jakarta (US\$/ton)		205	178	362	342
Quality adjustment	90%	184	160	326	308
Port handling, storage and losses	-	26	26	26	26
Transfer to wholesalers	-	4	4	4	4
Transfer mills to wholesalers	-	3	3	3	3
Ex-mill price Palembang	=	152	127	293	275
Conversion to paddy	60%	91	76	176	165
Milling and cleaning costs	-	7	7	7	7
Paddy transport to Palembang by wholesaler	-	24	24	24	24
Economic farm-gate price (US\$/ton)	=	60	45	145	134
Economic farm-gate price (Rp/kg)	=	66	50	160	147
<u>Average of Import and Export Parity Price</u>	=	<u>98</u>	<u>83</u>	<u>192</u>	<u>178</u>
<u>Financial Farm-gate Price (Rp/kg) (average price received by farmers, not BULOG floor price)</u>	=	<u>120</u>	<u>150</u>	<u>200</u>	<u>200</u>
<u>Maize</u>					
Export price, FOB US Gulf port (US\$/ton)		98	79	121	118
Adjusted export price, FOB Palembang /c	+	15	15	15	15
Port handling	+	10	10	10	10
Transport wharf to wholesaler	+	6	6	6	6
Transport farm to wholesaler	-	21	21	21	21
Economic farm-gate price (US\$/ton)	=	108	89	131	128
Economic farm-gate price (Rp/kg)	=	118	98	144	141
Financial farm-gate price (Rp/kg)	=	130	130	130	140
<u>Cassava</u>					
Economic and financial farm-gate price					
US\$/ton		17	17	17	17
Rp/kg		19	19	19	19
<u>Groundnuts</u>					
Export price, CIF Rotterdam (US\$/ton) /d		345	301	336	324
Freight and insurance	+	25	25	25	25
CIF price, Palembang	=	370	326	360	349
Port handling, storage, transport to wholesaler	+	16	16	16	16
Transport, farm to wholesaler	-	24	24	24	24
Economic farm-gate price (US\$/ton)	=	362	318	352	341
Economic farm-gate price (Rp/kg)	=	398	350	387	375
Financial farm-gate price (Rp/kg)	=	450	450	450	450

	Operation	1986	1987	1990	1995+
<u>Urea</u>					
World price, FOB Europe (US\$/ton)		130	159	206	220
Premium for Asian markets	+	16	16	16	16
Economic price, FOB Palembang	=	146	175	222	236
Port handling	+	10	10	10	10
Ex-factory economic price (US\$/ton)	=	156	185	232	246
Ex-factory economic price (Rp/kg)	=	172	203	255	271
Handling, transport and storage - factory to farm	+	40	40	40	40
Economic farm-gate price (Rp/kg)	=	212	243	295	311
Financial farm-gate price (Rp/kg)	=	120	130	150	200
<u>TSP</u>					
World price, FOB Florida (US\$/ton)		140	140	144	158
Freight and insurance to Palembang	+	35	35	35	35
Handling, transport, storage - port to farm	+	40	40	40	40
Economic farm-gate price (US\$/ton)	=	215	215	219	233
Economic farm-gate price (Rp/kg)	=	236	236	241	256
Financial farm-gate price (Rp/kg)	=	120	130	150	200
<u>Pesticides</u>					
Economic farm-gate price (Rp/kg)		7,000	7,000	7,000	7,000
Financial farm-gate price (Rp/kg)		1,500	1,500	3,000	5,000
	<u>1986</u>		<u>1987+</u>		
<u>Labor /e</u>					
<u>Hired Labor</u>					
Financial daily wage rate	Rp 1,200	1986 wage rate grows in real terms with projected growth in per capita gross domestic income. This growth is assumed to be:			
		1987	= 1.3%		
		1988	= 1.1%		
		1989	= 2.8%		
		1990	= 2.5%		
		1991-95	= 3.5%		
		1996+	= 3.7%		
Economic daily wage rate	0.65 * financial daily wage rate				
<u>Family Labor</u>					
Economic	Shadow-priced estimate of income foregone in Java. This is assumed to be Rp 222,000 per year in 1986, growing thereafter in real terms with growth in per capita gross domestic income.				

/a All economic prices except cassava, pesticides, and unskilled labor based on World Bank price projections as presented in the "Half-Yearly Revision of Commodity Price Forecasts, January 1986. Prices converted at an exchange rate of US\$1 = Rp 1,100. Prices are smoothed between the years shown on the Table.

/b Derived from BULOG records.

/c Includes a US\$15 transport premium for Asian markets.

/d The Bank no longer publishes prices for groundnuts. These prices have been derived from prices for groundnut oil at assumed extraction rates from kernel of 46%.

/e See Chapter 3 for discussion of how labor is handled in the economic and financial analysis of the food crop models.

Price Structures for Tree Crops /a  
Projected Palm Oil, Kernel, and FFB Financial and Economic Prices  
(Rp/kg in 1986 constant prices)

	Palm oil FOB <u>/b</u>	Palm kernels FOB <u>/c</u>	Export value of FFB <u>/d</u>	Smallholder FFB Export <u>/e,f</u>
1985	519	303	120	60
1986	266	117	60	30
1987	292	119	65	33
1990	581	178	128	64
1995+	565	195	126	63

/a Based upon World Bank Commodity Price Forecasts, January 1986. Prices for the years not shown (1988, 1989, 1991-1994) are assumed to move to the next projection linearly.

/b IBRD commodity forecasts adjusted for freight and insurance to obtain FOB, or US\$50/ton less.

/c FOB price adjusted from CIF prices by deducting US\$65/ton.

/d By virtue of extraction rates of 21% for palm oil and 3.5% for kernels.

/e Deductions equivalent to 50% of FFB value.

/f Economic price assumed to be 10% higher.

Projected Copra Financial and Economic Prices /a  
(Rp/kg in 1986 constant prices)

	Copra Rp/kg CIF NW Europe	Ex-factory price /b (10% moisture)	Farm-gate prices /c	
			Paid by PTPs/NES /d	SCDP /e
1985	443	264	218	185
1986	303	124	103	87
1987	274	96	79	67
1988	343	165	136	116
1989	412	234	193	164
1990	481	303	250	212
1991	476	299	246	209
1992	472	295	243	206
1993	468	290	239	203
1994	464	286	236	200
1995	460	282	262	197

/a Based on World Bank Commodity Price Forecasts, January 1986.

/b Inter-island freight, port handling, adjustment for losses, processing costs, adjustment for moisture content, US\$162/t in 1986.

/c Conversion to economic prices is 5% higher.

/d Deduction of general charges, selling expenses, and profit margin or 17.5% of ex-factory price.

/e Prices paid by middlemen and KUD, etc. to smallholders about 70% of ex-factory prices.

Projected Rubber Financial and Economic Prices /a  
(Rp/kg in 1986 constant prices)

	CIF New York RSS1 (US\$/kg)	FOB Sumatra RSS1 /c (Rp/kg)	Farm-gate prices /b	
			NES /d	SRDP /e
1985	96	918	617	543
1986	95	908	610	537
1987	93	891	598	527
1988	106	1,033	694	611
1989	119	1,175	790	695
1990	132	1,318	885	779
1991	133	1,328	892	785
1992	134	1,338	899	791
1993	135	1,348	906	797
1994	136	1,358	912	803
1995+	137	1,368	919	809

/a Based on World Bank Commodity Price Forecasts, January 1986.

/b Economic prices are assumed to be 7% higher when withholding and other taxes are added back to FOB values.

/c Freight and insurance paid at US cents 12.5/kg.

/d Four percent discount from RSS1 to account for SIR 10-20-50 mix as compared with RSS1 prices and 30% discount as smallholders assumed to receive 70% of maximum FOB sales value of the product.

/e Assumed to receive 12% less than NES farmers to account for production of SIR 20 and 50 grades and profits to middlemen.

ECONOMIC AND FINANCIAL ANALYSIS  
OF UPLAND LOW INPUT FOODCROP MODEL  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+
<b>Commodities</b>																				
Rice				1	0.9	0.8	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
				0.4	0.6	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1
				184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178
				152	149	152	127	125	150	150	150	190	190	190	190	190	180	180	180	180
Corn				0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
				0.1	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
				135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141
				120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140
Cassava				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
				0.15	0.25	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts				0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
				0.05	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
				469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375
				400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Vegetables and Fruit ('000 Rp)				50	60	75	75	75	90	90	100	100	100	100	100	120	120	120	120	120
Small Livestock ('000 Rp)				12	18	24	30	36	36	36	36	36	36	36	36	36	36	36	36	36
<b>Costs of Production</b>																				
Planting Material ('000 Rp)				9.2	13.3	18.1	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
Urea (t) (first 3 years provided free by GDI)				0.1	0.1	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311
				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
TSP (t) (first 3 years provided free by GDI)				0.1	0.1	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
				240	238	237	222	236	238	239	241	244	247	250	253	256	256	256	256	256
				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
Pesticide (kg)				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5
Hired Labor (days)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor Required (days)				200	200	180	180	160	160	160	160	160	160	160	160	160	160	160	160	160
				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other ('000 Rp)				45	45	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
<b>Production (t)</b>																				
Rice				0.400	0.540	0.640	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
Corn				0.070	0.090	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
Cassava				0.900	1.500	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800	1.800
Peanuts				0.013	0.015	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
<b>Economic Value of Field Crops ('000 Rp)</b>																				
				106	147	167	148	127	113	142	171	200	198	196	193	191	189	189	189	189
Financial Value of Field Crops ('000 Rp)				91	128	155	151	150	169	169	169	199	199	199	199	199	192	192	192	192
<b>Gross Farm Income ('000 Rp)</b>																				
Economic				168	225	266	253	238	239	268	307	336	334	332	329	347	345	345	345	345
Financial				153	206	254	256	261	295	295	305	335	335	335	335	355	348	348	348	348
<b>Total Production Costs ('000 Rp)</b>																				
Economic, Including Income Foregone, Java				340	341	310	281	280	284	287	294	301	310	319	328	337	347	358	369	380
Financial, Including only Hired Labor				77	81	47	36	38	39	40	40	40	43	43	43	43	51	51	51	51
<b>AGRICULTURE ALONE</b>																				
Net Economic Farm Income ('000 Rp) (excludes economic value of GDI expenditures)				-172	-116	-44	-29	-41	-45	-19	13	35	24	13	1	10	-2	-12	-23	-35
Net Return to Household ('000 Rp)				96	144	228	220	223	256	254	264	294	291	291	291	311	297	297	297	297



AGRICULTURE AND OFF FARM WORK

Off Farm Income: Financial (Rp '000)	174	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314
Off Farm Income: Economic (Rp '000)	158	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Net Economic Household Income (Rp '000)	-14	57	156	171	159	158	186	223	251	248	244	241	257	254	253	252	251
Net Return to Household (Rp '000)	270	334	448	440	443	479	480	496	532	537	546	555	584	579	589	600	611

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)

Base Case	472	2227	1657	10	10	9	9
More Remote	590	2784	2072	12	12	11	11
Very Remote	708	3340	2486	15	15	13	13

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)

Base Case	-472	-2227	-1657	-181	-125	-53	-38	-41	-45	-19	13	35	24	13	1	10	-2	-12	-23	-35
More Remote	-590	-2784	-2072	-184	-128	-56	-40	-41	-45	-19	13	35	24	13	1	10	-2	-12	-23	-35
Very Remote	-708	-3340	-2486	-186	-130	-58	-42	-41	-45	-19	13	35	24	13	1	10	-2	-12	-23	-35

IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	negative	-3826
More Remote	negative	-4711
Very Remote	negative	-5595

(calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)

Base Case	-472	-2227	-1657	-24	47	147	162	159	158	186	223	251	248	244	241	257	254	253	252	251
More Remote	-590	-2784	-2072	-26	45	144	160	159	158	186	223	251	248	244	241	257	254	253	252	251
Very Remote	-708	-3340	-2486	-28	42	142	158	159	158	186	223	251	248	244	241	257	254	253	252	251

IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	2%	-2311
More Remote	0%	-3195
Very Remote	-1%	-4080

(calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days):	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Family Labor valued at																	
subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%
Total labor available for off farm work after farming activities (days) (1):	150	164	199	214	249	266	283	301	319	338	358	358	358	358	358	358	358
Off farm income, economic:	158	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Off farm income, financial	174	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314

(1) Maximum amount of off farm work available assumed to be 190 days.

ECONOMIC AND FINANCIAL ANALYSIS OF UPLAND  
LOW INPUT MODEL WITH COM  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+
<b>Commodities</b>																				
Rice	Yield (t/ha)			1	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Area (.2 ha rice replaced w/ forage)			0.4	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	Economic Price (Rp/kg)			184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178
	Financial Price (Rp/kg)			152	149	152	127	125	150	150	150	190	190	190	190	190	180	180	180	180
Corn	Yield (t/ha)			0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Area (ha)			0.1	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Economic Price (Rp/kg)			135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141
	Financial Price (Rp/kg)			120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140
Cassava	Yield (t/ha)			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Area (ha)			0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Economic Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Financial Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts	Yield (t/ha)			0.25	0.25	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Area (ha)			0.05	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	Economic Price (Rp/kg)			469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375
	Financial Price (Rp/kg)			400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Vegetables and Fruit ('000 Rp)				50	60	75	75	75	90	90	100	100	100	100	100	120	120	120	120	120
Small Livestock and Cattle Offspring ('000 Rp)				12	18	24	30	36	60	36	84	350	225	201	221	217	259	257	252	252
<b>Costs of Production</b>																				
Planting Material (incl forage seed) ('000 Rp)				9.2	13.3	23.1	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Urea (t) (first 3 years provided free by BDI)				0.1	0.1	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Economic Cost-Rp/kg				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
TSP (t) (first 3 years provided free by BDI)				0.1	0.1	0.1	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Economic Cost-Rp/kg				240	238	237	222	236	238	239	241	244	247	250	253	256	256	256	256	256
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	200	200	200	200	200
Pesticide (kg)				8	8	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Economic Cost-'000 Rp/kg)				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Financial Cost-'000 Rp/kg)				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5
Hired Labor (days)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor (days)				200	200	170	170	150	150	150	150	150	150	150	150	150	150	150	150	150
Financial Cost of Hired Labor ('000 Rp/day)				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other (including plow and medicine) ('000 Rp)				45	45	30	10	10	10	10	10	10	10	10	10	10	10	10	10	10
<b>Production (t)</b>																				
Rice				0.400	0.600	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960	0.960
Corn				0.070	0.105	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
Cassava				0.900	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Peanuts				0.013	0.015	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
Economic Value of Field Crops ('000 Rp)				106	160	223	175	149	130	167	204	242	239	236	233	230	228	228	228	228
Financial Value of Field Crops ('000 Rp)				91	139	206	179	178	202	202	202	240	240	240	240	240	232	232	232	232
<b>Gross Farm Income ('000 Rp)</b>																				
Economic				168	238	322	280	260	280	293	388	692	564	537	554	567	607	605	600	600
Financial				153	217	305	284	289	352	328	386	690	565	541	561	577	611	609	604	604
<b>Total Production Costs ('000 Rp)</b>																				
Economic, including Income Foregone, Java				382	383	354	305	304	308	311	318	325	334	343	352	361	371	382	393	404
Financial, including only Hired Labor				86	90	80	49	51	52	53	53	53	59	59	59	59	71	71	71	71
<b>AGRICULTURE ALONE</b>																				
Net Economic Farm Income ('000 Rp) (excludes economic value of BDI expenditures)				-214	-144	-32	-26	-44	-28	-18	78	367	231	695	202	206	236	223	207	196
Net Return to Household ('000 Rp)				87	146	246	235	238	300	274	332	637	506	482	502	518	539	537	532	532

AGRICULTURE AND OFF FARM WORK

Off Farm Income: Financial (Rp '000)	174	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314
Off Farm Income: Economic (Rp '000)	158	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Net Economic Household Income (Rp '000)	-56	28	168	174	156	175	187	281	583	454	426	442	454	492	489	483	482
Net Return to Household (Rp '000)	261	336	466	455	458	523	499	564	874	751	736	765	790	821	830	836	847

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)

Base Case	472	2227	1657	294	10	9	9
More Remote	590	2784	2072	296	12	11	11
Very Remote	708	3340	2486	299	15	13	13

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)

Base Case	-472	-2227	-1657	-507	-154	-41	-35	-44	-28	-18	70	367	231	195	202	206	236	223	207	196
More Remote	-590	-2784	-2072	-510	-157	-44	-37	-44	-28	-18	70	367	231	195	202	206	236	223	207	196
Very Remote	-708	-3340	-2486	-512	-159	-46	-39	-44	-28	-18	70	367	231	195	202	206	236	223	207	196

IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	-1%	-3356
More Remote	-2%	-4240
Very Remote	-3%	-5124

(calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)

Base Case	-472	-2227	-1657	-350	18	159	165	156	175	187	281	583	454	426	442	454	492	489	483	482
More Remote	-590	-2784	-2072	-352	16	156	163	156	175	187	281	583	454	426	442	454	492	489	483	482
Very Remote	-708	-3340	-2486	-354	13	154	161	156	175	187	281	583	454	426	442	454	492	489	483	482

IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	5%	-1841
More Remote	4%	-2725
Very Remote	2%	-3609

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise stated)

Total Family Labor Supply (Days)	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314			
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286			
Family Labor valued at subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386			
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318			
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%			
Total labor available for off farm work after farming activities (days) (1):	150	164	209	224	259	276	293	311	329	348	368	368	368	368	368	368	368			
Off farm income, economic:	158	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286			
Off farm income, financial:	174	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314			

(1) Maximum amount of off farm work available assumed to be 190 days.

ECONOMIC AND FINANCIAL ANALYSIS OF UPLAND  
DIVERSIFIED (MARKET ACCESS REQUIRED) FODDCROP MODEL  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+
<b>Commodities</b>																				
Rice				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Area (ha)				0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Economic Price (Rp/kg)				184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178
Financial Price (Rp/kg)				152	149	152	127	125	150	150	190	190	190	190	190	190	180	180	180	180
Corn				0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Area (ha)				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Economic Price (Rp/kg)				135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141
Financial Price (Rp/kg)				120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140
Cassava				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Area (ha)				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Economic Price (Rp/kg)				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Financial Price (Rp/kg)				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Area (ha)				0.05	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Economic Price (Rp/kg)				469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375
Financial Price (Rp/kg)				400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Vegetables and Fruit ('000 Rp)				60	200	300	400	500	500	500	500	500	500	500	500	500	500	500	500	500
Small Livestock ('000 Rp)				25	56	113	133	133	133	133	133	133	133	133	133	133	133	133	133	133
<b>Costs of Production</b>																				
Planting Material ('000 Rp)				34	46	21	16	11	11	11	11	11	11	11	11	11	11	11	11	11
Urea (t) (first 3 years provided free by GOI)				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Economic Cost-Rp/kg				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
TSP (t) (first 3 years provided free by GOI)				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Economic Cost-Rp/kg				240	238	237	222	236	238	239	241	244	247	250	253	256	256	256	256	256
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
Pesticide (kg)				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Economic Cost-('000 Rp/kg)				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Financial Cost-('000 Rp/kg)				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	3	5	5	5	5
Hired Labor (days)				100	76	41	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor (days)				450	440	420	400	380	400	400	400	400	400	400	400	400	400	400	400	400
Financial Cost of Hired Labor ('000 Rp/day)				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other ('000 Rp)				55	60	25	25	25	30	30	30	30	30	30	30	30	30	30	30	30
<b>Production (t)</b>																				
Rice				0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400
Corn				0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
Cassava				1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
Peanuts				0.030	0.060	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
<b>Economic Value of Field Crops ('000 Rp)</b>																				
Financial Value of Field Crops ('000 Rp)				120	140	146	128	106	94	111	127	145	143	142	140	139	138	138	138	138
<b>Gross Farm Income ('000 Rp)</b>																				
Economic				205	396	559	661	739	727	744	760	778	776	775	773	772	771	771	771	771
Financial				189	372	546	656	755	765	765	765	781	781	781	781	781	778	778	778	778
<b>Total Production Costs ('000 Rp)</b>																				
Economic, including income foregone, Java				543	536	458	422	404	418	424	434	444	454	464	474	485	496	506	517	528
Financial, including only hired labor				261	248	149	99	96	105	113	113	125	125	125	125	161	161	161	161	161
<b>AGRICULTURE ALONE</b>																				
Net Economic Farm Income ('000 Rp) (excludes economic value of GOI expenditures)				-339	-140	101	239	335	309	320	326	333	322	311	299	287	275	265	254	242
Net Return to Household ('000 Rp)				-52	144	417	558	659	660	652	652	668	656	656	656	656	617	617	617	617

AGRICULTURE AND OFF FARM WORK																		
Off Farm Income: Financial (Rp '000)	0	0	0	0	34	30	51	74	99	127	158	164	169	175	182	188	195	
Off Farm Income: Economic (Rp '000)	0	0	0	0	31	28	46	67	90	115	144	149	154	159	165	171	178	
Net Economic Household Income (Rp '000)	-339	-140	101	239	366	337	366	394	423	438	454	448	441	434	430	425	420	
Net Return to Household (Rp '000)	-32	163	438	558	694	691	703	726	767	783	814	820	826	792	799	806	813	

OTHER MDI DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)																		
Base Case	472	2227	1657	10	10	9	9											
More Remote	590	2784	2072	12	12	11	11											
Very Remote	708	3340	2486	15	15	13	13											

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)																				
Base Case	-472	-2227	-1657	-348	-150	92	230	335	309	320	326	333	322	311	299	287	275	265	254	242
More Remote	-590	-2784	-2072	-351	-152	90	228	335	309	320	326	333	322	311	299	287	275	265	254	242
Very Remote	-708	-3340	-2486	-353	-155	87	226	335	309	320	326	333	322	311	299	287	275	265	254	242

IRR AND NPV AT 10% IRR NPV ('000 Rp)		
Base Case	2%	-2335
More Remote	1%	-3219
Very Remote	0%	-4103

(calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)																				
Base Case	-472	-2227	-1657	-348	-150	92	230	366	337	366	394	423	438	454	448	441	434	430	425	420
More Remote	-590	-2784	-2072	-351	-152	90	228	366	337	366	394	423	438	454	448	441	434	430	425	420
Very Remote	-708	-3340	-2486	-353	-155	87	226	366	337	366	394	423	438	454	448	441	434	430	425	420

IRR AND NPV AT 10% IRR NPV ('000 Rp)		
Base Case	5%	-1820
More Remote	3%	-2705
Very Remote	2%	-3589

(calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days):	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314		
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286		
Family Labor Valued at																			
subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386		
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318		
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%		
Total labor available for off farm work after farming activities (days) (1):	0	0	0	0	29	26	43	61	79	98	118	118	118	118	118	118	118		
Off farm income, economic:	0	0	0	0	31	28	46	67	90	115	144	149	154	159	165	171	178		
Off farm income, financial	0	0	0	0	34	30	51	74	99	127	158	164	169	175	182	188	195		

(1) Maximum amount of off farm work available assumed to be 190 days.

ECONOMIC AND FINANCIAL ANALYSIS OF  
UPLAND SUSTAINED INPUT FOODCROP MODEL  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+
<b>Commodities</b>																				
Rice																				
Yield (t/ha)	0.6	0.9	1.2	1.2	1.2	1.2	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8
Area (ha)	0.4	0.55	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Economic Price (Rp/kg)	184	176	176	117	117	117	98	83	83	119	135	192	189	186	183	180	178	178	178	178
Financial Price (Rp/kg)	152	149	152	127	127	127	125	150	150	150	150	190	190	190	190	190	180	180	180	180
Corn																				
Yield (t/ha)	0.5	0.6	0.8	1	1	1	1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.5
Area (ha)	0.4	0.55	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Economic Price (Rp/kg)	135	167	170	149	149	149	118	98	98	113	128	144	143	143	142	142	141	141	141	141
Financial Price (Rp/kg)	120	140	150	130	130	130	130	150	150	130	130	130	130	130	130	130	140	140	140	140
Cassava																				
Yield (t/ha)	8	9	10	11	11	11	12	12	12	12	13	13	13	14	14	14	14	15	15	15
Area (ha)	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Economic Price (Rp/kg)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Financial Price (Rp/kg)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts																				
Yield (t/ha)	0.5	0.6	0.7	0.8	0.8	0.8	0.9	0.9	1	1	1	1	1	1	1	1	1	1	1	1
Area (ha)	0.4	0.8	0.4	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Economic Price (Rp/kg)	469	584	501	535	398	350	350	362	374	387	385	382	382	382	380	378	375	375	375	375
Financial Price (Rp/kg)	400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Vegetables and Fruit ('000 Rp)	50	60	75	75	75	75	75	90	90	90	100	100	100	100	100	100	120	120	120	120
Small Livestock ('000 Rp)	12	18	24	30	30	30	36	36	36	36	40	40	40	40	40	40	40	40	40	40
<b>Costs of Production</b>																				
Planting Material ('000 Rp)	50	75	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Urea (t) (first 3 years provided free by BDI)	0.1	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Economic Cost-Rp/kg	250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311	311	311	311
Financial Cost-Rp/kg	99	96	104	95	120	130	150	150	150	150	150	150	150	150	150	150	200	200	200	200
ISP (t) (first 3 years provided free by BDI)	0.05	0.075	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Economic Cost-Rp/kg	240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256	256	256	256
Financial Cost-Rp/kg	99	96	104	95	120	130	150	150	150	150	150	150	150	150	150	150	200	200	200	200
Pesticide (kg)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Economic Cost-('000 Rp/kg)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Financial Cost-('000 Rp/kg)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Hired Labor (days)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor Required (days)	150	225	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Financial Cost of Hired Labor ('000 Rp/day)	1.20	1.20	1.20	1.20	1.20	1.22	1.20	1.22	1.23	1.25	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other ('000 Rp)	100	100	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
<b>Production (t)</b>																				
Rice	0.240	0.495	0.960	0.960	0.960	1.040	1.120	1.200	1.200	1.280	1.360	1.360	1.360	1.360	1.360	1.360	1.440	1.440	1.440	1.440
Corn	0.200	0.330	0.640	0.800	0.800	0.800	0.880	0.880	0.880	0.960	1.040	1.040	1.040	1.040	1.040	1.040	1.120	1.120	1.120	1.200
Cassava	0.800	1.800	2.000	2.200	2.200	2.400	2.400	2.400	2.400	2.600	2.600	2.600	2.600	2.600	2.600	2.800	2.800	3.000	3.000	3.000
Peanuts	0.200	0.480	0.280	0.480	0.480	0.720	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
Economic Value of Field Crops ('000 Rp)	180	457	445	530	528	528	505	577	647	728	737	749	749	754	748	748	767	771	783	783
Financial Value of Field Crops ('000 Rp)	156	346	400	484	484	604	688	700	704	762	777	796	796	807	807	807	829	833	844	844
<b>Gross Farm Income ('000 Rp)</b>																				
Economic	242	535	544	635	639	631	703	787	868	877	889	894	908	908	908	908	927	931	943	943
Financial	218	424	499	589	589	715	814	826	844	902	917	926	926	947	947	967	989	993	1004	1004
<b>Total Production Costs ('000 Rp)</b>																				
Economic, including Income Foregone, Java	423	463	444	442	432	442	442	447	457	467	476	486	486	496	496	506	517	527	538	550
Financial, including only Hired Labor	168	200	164	162	169	172	178	178	178	178	181	181	181	181	181	181	200	200	200	200
<b>ASRUCTURE ALDNE</b>																				
Net Economic Farm Income ('000 Rp) (excludes economic value of BDI expenditures)	-181	72	101	193	207	189	256	330	400	400	400	403	392	402	410	410	404	404	404	393
Net Return to Household ('000 Rp)	65	246	356	427	546	642	646	666	724	736	755	766	786	786	789	793	804	804	804	804

AGRICULTURE AND OFF FARM WORK																	
Off Farm Income: Financial (Rp '000)	220	161	91	108	127	148	169	196	224	246	254	263	272	282	292	303	314
Off Farm Income: Economic (Rp '000)	200	146	83	99	115	134	154	178	203	223	231	239	248	256	266	276	286
Net Economic Household Income (Rp '000)	19	218	183	292	322	323	410	508	604	623	634	637	649	667	670	680	679
Net Return to Household (Rp '000)	285	407	457	536	672	790	817	862	948	982	1010	1029	1058	1071	1085	1107	1119

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)																	
Base Case	472	2227	1657	9	9												
More Remote	590	2784	2072	12	12	11	11										
Very Remote	708	3340	2486	15	15	13	13										

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)																				
Base Case	-472	-2227	-1657	-191	62	92	184	207	189	256	330	400	400	403	398	402	410	404	404	393
More Remote	-590	-2784	-2072	-194	60	89	182	207	189	256	330	400	400	403	398	402	410	404	404	393
Very Remote	-708	-3340	-2486	-196	57	87	180	207	189	256	330	400	400	403	398	402	410	404	404	393

IRR AND NPV AT 10% IRR NPV ('000 Rp)		
Base Case	4%	-1900
More Remote	3%	-2784
Very Remote	2%	-3669

(calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)																				
Base Case	-472	-2227	-1657	9	209	174	283	322	323	410	508	604	623	634	637	649	667	670	680	679
More Remote	-590	-2784	-2072	6	206	172	281	322	323	410	508	604	623	634	637	649	667	670	680	679
Very Remote	-708	-3340	-2486	4	204	170	278	322	323	410	508	604	623	634	637	649	667	670	680	679

IRR AND NPV AT 10% IRR NPV ('000 Rp)		
Base Case	8%	-594
More Remote	7%	-1479
Very Remote	5%	-2363

(calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days):	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314		
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286		
Family Labor valued at subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386		
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318		
Assumptions about growth in per capita GDP:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%		
Total labor available for off farm work after farming activities (1):	200	139	79	94	109	126	143	161	179	198	218	218	218	218	218	218	218	218	218
Off farm income, economic:	200	146	83	99	115	134	154	178	203	223	231	239	248	256	266	276	286		
Off farm income, financial:	220	161	91	108	127	148	169	196	224	246	254	263	272	282	292	303	314		

(1) Maximum amount of off farm work available assumed to be 190 days.

ECONOMIC AND FINANCIAL ANALYSIS OF UPLAND  
HIGH INPUT LABOR INTENSIVE FOODCROP MODEL  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998*
<b>Commodities</b>																				
Rice				1	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Area (ha)			0.4	0.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Economic Price (Rp/kg)			184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178
	Financial Price (Rp/kg)			152	149	152	127	125	150	150	150	190	190	190	190	190	180	180	180	180
Corn	Yield (t/ha)			1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Area (ha)			0.4	0.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Economic Price (Rp/kg)			135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141
	Financial Price (Rp/kg)			120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140
Cassava	Yield (t/ha)			8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Area (ha)			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Economic Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Financial Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts	Yield (t/ha)			0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Area (ha)			0.4	0.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Economic Price (Rp/kg)			469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375
	Financial Price (Rp/kg)			400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Vegetables and Fruit ('000 Rp)				50	60	75	75	75	90	90	100	100	100	100	100	120	120	120	120	120
Small Livestock ('000 Rp)				12	20	25	30	40	40	40	40	40	40	40	40	40	40	40	40	40
<b>Costs of Production</b>																				
Planting Material ('000 Rp)				38	71	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Urea (t) (first 3 years provided free by GDI)				0.108	0.202	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
	Economic Cost-Rp/kg			250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311
	Financial Cost-Rp/kg			99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200
TSP (t) (first 3 years provided free by GDI)				0.108	0.202	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
	Economic Cost-Rp/kg			240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256
	Financial Cost-Rp/kg			99	96	104	95	120	130	150	150	150	150	150	150	200	200	200	200	200
Pesticide (kg)				14	26	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	Economic Cost-('000 Rp/kg)			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Financial Cost-('000 Rp/kg)			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	5	5	5	5	5
Hired Labor (days)				0	86	221	206	191	174	157	139	121	102	82	82	82	82	82	82	82
Total Labor (days)				300	450	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
	Financial Cost of Hired Labor ('000 Rp/day)			1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other ('000 Rp)				52	57	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
<b>Production (t)</b>																				
Rice				0.400	0.900	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Corn				0.400	0.900	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
Cassava				1.600	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Peanuts				0.240	0.450	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600
<b>Economic Value of Field Crops ('000 Rp)</b>																				
				271	610	790	713	565	490	569	649	731	724	718	711	705	699	699	699	699
<b>Financial Value of Field Crops ('000 Rp)</b>																				
				235	478	704	655	652	689	689	689	749	749	749	749	749	746	746	746	746
<b>Gross Farm Income ('000 Rp)</b>																				
	Economic			333	690	890	818	680	620	699	789	871	864	858	851	865	859	859	859	859
	Financial			297	558	804	760	767	819	819	829	889	889	889	889	909	906	906	906	906
<b>Total Production Costs ('000 Rp)</b>																				
	Economic, Including Income Foregone, Java			463	693	888	871	848	848	844	844	843	840	835	848	862	876	890	904	918
	Financial, Including only Hired Labor			132	309	485	462	457	445	438	421	401	433	411	415	419	520	525	529	534
<b>AGRICULTURE ALONE</b>																				
<b>Net Economic Farm Income ('000 Rp) (excludes economic value of GDI expenditures)</b>																				
				-131	-3	2	-53	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59
<b>Net Return to Household ('000 Rp)</b>																				
				185	268	339	297	310	374	381	408	488	456	478	474	490	386	381	377	372



AGRICULTURE AND OFF FARM WORK																		
Off Farm Income: Financial (Rp '000)	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off Farm Income: Economic (Rp '000)	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Economic Household Income (Rp '000)	-78	-3	2	-53	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59	
Net Return to Household (Rp '000)	244	288	375	297	310	374	381	408	488	456	478	474	490	386	381	377	372	

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)																		
Base Case	472	2227	1657	9	9													
More Remote	590	2784	2072	12	12	11	11											
Very Remote	708	3340	2486	15	15	13	13											

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)																				
Base Case	-472	-2227	-1657	-141	-13	-7	-62	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59
More Remote	-590	-2784	-2072	-143	-15	-9	-64	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59
Very Remote	-708	-3340	-2486	-146	-18	-11	-66	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59

IRR AND NPV AT 10%			IRR	NPV ('000 Rp)
Base Case	negative	-3960		
More Remote	negative	-4844		
Very Remote	negative	-5729		

(Calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)																				
Base Case	-472	-2227	-1657	-88	-13	-7	-62	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59
More Remote	-590	-2784	-2072	-90	-15	-9	-64	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59
Very Remote	-708	-3340	-2486	-93	-18	-11	-66	-168	-228	-144	-55	28	25	23	2	3	-17	-31	-45	-59

IRR AND NPV AT 10%			IRR	NPV ('000 Rp)
Base Case	negative	-3924		
More Remote	negative	-4808		
Very Remote	negative	-5693		

(Calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days):	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314	
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286	
Family Labor valued at																		
subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386	
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318	
Assumptions about growth in per capita BDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%	
Total labor available for off farm work after farming activities (1):	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Off farm income, economic:	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Off farm income, financial:	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

(1) Maximum amount of off farm work available assumed to be 190 days.

ECONOMIC AND FINANCIAL ANALYSIS OF  
UPLAND HIGH INPUT WITH CATTLE MODEL  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+	
<b>Commodities</b>																					
Rice	Yield (t/ha)			1	1.25	1.5	1.75	2	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	
	Area (ha)			0.4	0.8	1	1.2	1.35	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
	Economic Price (Rp/kg)			184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178	
	Financial Price (Rp/kg)			152	149	152	127	125	150	150	150	190	190	190	190	190	190	180	180	180	
Corn	Yield (t/ha)			0.75	1	1.25	1.5	1.75	2	2	2	2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	
	Area (ha)			0.4	0.8	1	1.2	1.35	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
	Economic Price (Rp/kg)			135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141	
	Financial Price (Rp/kg)			120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140	
Cassava	Yield (t/ha)			10	11	12	13	14	15	15	15	15	16	17	18	18	18	18	18	18	
	Area (ha)			0.1	0.2	0.25	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
	Economic Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
	Financial Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
Peanuts	Yield (t/ha)			0.6	0.7	0.8	0.9	1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
	Area (ha)			0.4	0.8	1	1.2	1.35	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
	Economic Price (Rp/kg)			469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375	
	Financial Price (Rp/kg)			400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450	
Vegetables and Fruit ('000 Rp) (.2 ha)				10	37	39	41	41	50	75	100	125	100	150	175	200	200	200	200	200	
Small Livestock and Cattle Offtake ('000 Rp)				12	20	25	30	40	60	40	84	350	225	201	221	217	259	257	252	252	
<b>Costs of Production</b>																					
Planting Material ('000 Rp) 1/				130	120	145	170	335	200	200	200	200	360	200	200	200	200	200	200	200	
Urea (t) (first 3 years provided free by BDI)				0.13	0.25	0.31	0.38	0.44	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Economic Cost-Rp/kg				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311	
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	
TSP (t) (first 3 years provided free by BDI)				0.1	0.2	0.25	0.3	0.35	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Economic Cost-Rp/kg				240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256	
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	
KCl (t)				0.1	0.125	0.15	0.175	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Economic Cost-Rp/kg				176	169	180	184	181	181	181	181	190	190	190	190	190	196	196	196	196	
Financial Cost-Rp/kg				99	96	104	95	90	120	150	150	150	150	150	150	150	200	200	200	200	
Pesticide (kg)				17.5	35	43.75	52.5	61.25	70	70	70	70	70	70	70	70	70	70	70	70	
Economic Cost-('000 Rp/kg)				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
Financial Cost-('000 Rp/kg)				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5	
Hired Labor (days)				0	0	0	19	72	124	107	89	71	52	32	32	32	32	32	32	32	
Total Labor Required (days)				138	275	344	413	481	550	550	550	550	550	550	550	550	550	550	550	550	
Financial Cost of Hired Labor ('000 Rp/day)				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72	
Other ('000 Rp)				100	100	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
<b>Production (t)</b>																					
Rice				0.400	1.000	1.500	2.100	2.700	3.680	3.680	3.680	3.680	3.840	3.840	4.000	4.000	4.000	4.000	4.000	4.000	
Corn				0.300	0.800	1.250	1.800	2.363	3.200	3.200	3.200	3.200	3.360	3.360	3.520	3.520	3.520	3.520	3.520	3.520	
Cassava				1.000	2.200	3.000	3.900	5.600	6.000	6.000	6.000	6.000	6.400	6.800	7.200	7.200	7.200	7.200	7.200	7.200	
Peanuts				0.240	0.560	0.800	1.080	1.350	1.760	1.760	1.760	1.760	1.920	1.920	1.920	1.920	1.920	1.920	1.920	1.920	
<b>Estate Crop</b>																					
Economic Value of Field Crops ('000 Rp)				246	678	918	1166	1187	1349	1551	1752	1962	2067	2057	2098	2082	2065	2065	2065	2065	
Financial Value of Field Crops ('000 Rp)				212	527	817	1061	1359	1874	1874	1874	2021	2152	2160	2218	2218	2214	2214	2214	2214	
<b>Gross Farm Income ('000 Rp)</b>																					
Economic				268	735	982	1237	1268	1459	1666	1936	2437	2392	2408	2494	2499	2524	2522	2517	2517	
Financial				234	584	881	1132	1440	1984	1989	2058	2496	2477	2511	2614	2635	2673	2671	2666	2666	
<b>Total Production Costs ('000 Rp)</b>																					
Economic, including Income Foregone, Java				649	812	873	1005	1284	1296	1294	1297	1302	1458	1294	1306	1320	1334	1346	1358	1371	
Financial, including only hired labor				289	328	314	383	656	627	632	613	592	834	649	651	652	849	851	853	855	

AGRICULTURE ALONE

Net Economic Farm Income ('000 Rp) (excludes economic value of GDI expenditures)	-381	-77	108	232	-16	163	371	639	1136	934	1115	1188	1180	1190	1176	1159	1146
Net Return to Household ('000 Rp)	-32	299	624	749	784	1357	1357	1445	1904	1643	1861	1964	1983	1824	1820	1813	1811

AGRICULTURE AND OFF FARM WORK

Diff Farm Income: Financial (Rp '000)	220	103	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diff Farm Income: Economic (Rp '000)	200	94	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Economic Household Income (Rp '000)	-181	17	145	232	-16	163	371	639	1136	934	1115	1188	1180	1190	1176	1159	1146
Net Return to Household (Rp '000)	188	402	664	749	784	1357	1357	1445	1904	1643	1861	1964	1983	1824	1820	1813	1811

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)

Base Case	472	2227	1657	294	10	9	9
More Remote	590	2784	2072	296	12	11	11
Very Remote	708	3340	2486	299	15	13	13

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)

Base Case	-472	-2227	-1657	-675	-86	99	223	-16	163	371	639	1136	934	1115	1188	1180	1190	1176	1159	1146
More Remote	-590	-2784	-2072	-677	-89	97	221	-16	163	371	639	1136	934	1115	1188	1180	1190	1176	1159	1146
Very Remote	-708	-3340	-2486	-680	-91	95	218	-16	163	371	639	1136	934	1115	1188	1180	1190	1176	1159	1146

IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	10%	-109
More Remote	8%	-993
Very Remote	7%	-1878

(calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days):	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518
Family Labor valued at subsistence income in Java, Financial terms	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%

1/ Includes application of lime. Lining: 1982, 2t; 1983 .5t; 1984 .5 t; 1985 .5 t; 1986 4t; 1991 4t. Lime is costed at Rp 40,000 per ton (quarry is assumed to be on site).

ECONOMIC AND FINANCIAL ANALYSIS OF TIDAL LOW INPUT  
FOODCROP MODEL WITH SEVERE PEST PROBLEMS  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+	
<b>Commodities</b>																					
Rice				0.8	0.9	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Yield (t/ha)				0.4	0.6	0.7	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Area (ha)				184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178	
Economic Price (Rp/kg)				152	149	152	127	125	150	150	150	190	190	190	190	190	180	180	180	180	
Financial Price (Rp/kg)				0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Corn				0.1	0.15	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Yield (t/ha)				135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141	
Area (ha)				120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140	
Economic Price (Rp/kg)				4.5	4.5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Financial Price (Rp/kg)				0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Cassava				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
Yield (t/ha)				19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
Area (ha)				469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375	
Economic Price (Rp/kg)				400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450	
Financial Price (Rp/kg)				40	50	60	60	75	75	80	90	90	100	100	100	112	112	112	112	112	
Vegetables and Fruit ('000 Rp)				12	20	25	30	40	40	40	40	40	40	40	40	40	40	40	40	40	
Small Livestock ('000 Rp)																					
<b>Costs of Production</b>																					
Planting Material ('000 Rp)				5.2	8.3	10.5	11.7	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	
Urea (t)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Economic Cost-Rp/kg				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311	
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	
TSP (t)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Economic Cost-Rp/kg				240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256	
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	
Pesticide (kg)				5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Economic Cost-('000 Rp/kg)				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
Financial Cost-('000 Rp/kg)				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5	
Hired Labor (days)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Labor (days)				250	200	180	180	180	160	160	160	160	160	160	160	160	160	160	160	160	
Financial Cost of Hired Labor ('000 Rp/day)				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72	
Other ('000 Rp)				45	45	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
<b>Production (t)</b>																					
Rice				0.320	0.540	0.525	0.600	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	
Corn				0.060	0.075	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	
Cassava				0.450	0.900	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	
Peanuts																					
Economic Value of Field Crops ('000 Rp)				76	125	123	105	76	68	85	103	121	119	118	117	115	114	114	114	114	
Financial Value of Field Crops ('000 Rp)				64	108	115	109	89	101	101	101	119	119	119	119	119	115	115	115	115	
<b>Gross Farm Income ('000 Rp)</b>																					
Economic				128	195	208	195	191	183	205	233	251	259	258	257	267	266	266	266	266	
Financial				116	178	200	199	204	216	221	231	249	259	259	259	271	267	267	267	267	
<b>Total Production Costs ('000 Rp)</b>																					
Economic, Including Income Foregone, Java				308	311	266	267	269	272	275	281	287	295	304	313	322	332	342	353	365	
Financial, Including only Hired Labor				58	61	22	23	25	25	25	25	25	31	31	31	31	39	39	39	39	
<b>AGRICULTURE ALONE</b>																					
Net Economic Farm Income ('000 Rp) (excludes economic value of GOI expenditures)				-180	-116	-58	-72	-78	-89	-69	-48	-36	-36	-46	-56	-55	-66	-76	-87	-99	
Net Return to Household ('000 Rp)				59	117	178	177	180	191	196	206	224	228	228	228	240	228	228	228	228	

AGRICULTURE AND OFF FARM WORK																	
Off Farm Income: Financial (Rp '000)	116	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314
Off Farm Income: Economic (Rp '000)	105	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Net Economic Household Income (Rp '000)	-75	57	142	128	122	113	136	162	180	187	185	183	193	191	190	188	187
Net Return to Household (Rp '000)	174	307	398	397	400	414	421	438	461	474	482	491	512	510	521	531	543

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)																	
Base Case	472	1589	2252	1952	10	10	9	9									

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)																				
Base Case	-472	-1589	-2252	-2132	-126	-68	-81	-87	-89	-69	-48	-36	-36	-46	-56	-55	-66	-76	-87	-99

IRR AND NPV AT 10%		
IRR	NPV	('000 Rp)
Base Case	negative	-5376

(calculated over a thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)																				
Base Case	-472	-1589	-2252	-2027	47	132	119	113	113	136	162	180	187	185	183	193	191	190	188	187

IRR AND NPV AT 10%		
IRR	NPV	('000 Rp)
Base Case	-2%	-3897

(calculated over a thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days)	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Family labor valued at subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%
Total labor available for off farm work after farming activities (days) (1):	100	164	199	214	229	266	283	301	319	338	358	358	358	358	358	358	358
Off farm income, economic:	105	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286
Off farm income, financial	116	190	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314

(1) Maximum amount of off farm work available assumed to be 190 days.

**ECONOMIC AND FINANCIAL ANALYSIS OF TIDAL  
LOW INPUT WITH REASONABLE PEST CONTROL**  
(all prices in 1986 constant Rp)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998+
<b>Commodities</b>																				
Rice	Yield (t/ha)			0.8	0.9	1	1.2	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Area (ha)			0.4	0.7	1	1	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	Economic Price (Rp/kg)			184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178
	Financial Price (Rp/kg)			152	149	152	127	125	150	150	150	190	190	190	190	190	180	180	180	180
	Yield (t/ha)			0.6	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	Area (ha)			0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Corn	Economic Price (Rp/kg)			135	167	170	149	118	98	113	128	144	143	143	142	142	141	141	141	141
	Financial Price (Rp/kg)			120	140	150	130	130	130	130	130	130	130	130	130	130	140	140	140	140
	Yield (t/ha)			6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Area (ha)			0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Cassava	Economic Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Financial Price (Rp/kg)			19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Yield (t/ha)																			
	Area (ha)																			
Peanuts	Economic Price (Rp/kg)			469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375
	Financial Price (Rp/kg)			400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450
	Yield (t/ha)																			
	Area (ha)																			
Vegetables and Fruit ('000 Rp)				40	50	60	60	75	75	80	90	90	100	100	100	112	112	112	112	112
	Small Livestock ('000 Rp)			12	20	25	30	40	40	40	40	40	40	40	40	40	40	40	40	40
<b>Costs of Production</b>																				
Planting Material ('000 Rp)				5.2	9.5	12.5	15.5	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Urea (t)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Economic Cost-Rp/kg				250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	200	200	200	200	200
TSP (t)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Economic Cost-Rp/kg				240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256
Financial Cost-Rp/kg				99	96	104	95	120	130	150	150	150	150	150	150	200	200	200	200	200
Pesticide (kg)				4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Economic Cost-('000 Rp/kg)				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Financial Cost-('000 Rp/kg)				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5
Hired Labor (days)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor (days)				250	250	280	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Financial Cost of Hired Labor ('000 Rp/day)				1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72
Other ('000 Rp)				45	45	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
<b>Production (t)</b>																				
Rice				0.320	0.630	1.000	1.200	1.625	1.625	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Corn				0.060	0.140	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160
Cassava				0.600	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
Peanuts																				
Economic Value of Field Crops ('000 Rp)				78	157	215	187	201	173	279	353	430	424	418	412	406	401	401	401	401
Financial Value of Field Crops ('000 Rp)				67	136	199	196	247	287	344	344	424	424	424	424	424	405	405	405	405
<b>Gross Farm Income ('000 Rp)</b>																				
Economic				130	227	300	277	316	288	399	483	560	564	558	552	558	553	553	553	553
Financial				119	206	284	286	362	402	464	474	554	564	564	564	576	557	557	557	557
<b>Total Production Costs ('000 Rp)</b>																				
Economic, Including Income Foregone, Java				301	305	259	262	265	268	271	277	283	291	300	309	318	328	338	349	361
Financial, Including only Hired Labor				56	61	26	29	32	32	32	32	32	35	35	35	35	39	39	39	39
<b>AGRICULTURE ALONE</b>																				
Net Economic Farm Income ('000 Rp) (excludes economic value of GOI expenditures)				-170	-78	41	15	51	20	128	206	277	272	258	243	239	225	215	204	193
Net Return to Household ('000 Rp)				63	146	258	258	330	371	432	442	522	529	529	529	541	518	518	518	518

AGRICULTURE AND OFF FARM WORK																	
Off Farm Income: Financial (Rp '000)	116	132	114	108	127	148	169	196	224	246	254	263	272	282	292	303	314
Off Farm Income: Economic (Rp '000)	105	120	104	99	115	134	154	178	203	223	231	239	248	256	266	276	286
Net Economic Household Income (Rp '000)	-65	42	145	114	166	154	282	384	480	496	489	482	487	482	481	480	478
Net Return to Household (Rp '000)	179	278	372	366	457	518	601	638	745	775	783	792	813	800	811	822	833

OTHER NOT DEVELOPMENT COSTS PER HOUSEHOLD ('000 Rp)

Base Case	472	1589	2252	1952	10	10	9	9
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ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION ('000 Rp)

Base Case	-472	-1589	-2252	-2122	-88	31	6	42	20	128	206	277	272	258	243	239	225	215	204	193
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IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	-2%	-4102
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(Calculated over thirty year period)

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK ('000 Rp)

Base Case	-472	-1589	-2252	-2017	32	135	105	157	154	282	384	480	496	489	482	487	482	481	480	478
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IRR AND NPV AT 10% IRR NPV ('000 Rp)

Base Case	3%	-2865
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(Calculated over thirty year period)

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Notes (values in '000 Rp unless otherwise noted)

Total Family Labor Supply (Days)	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518	518
Potential Off Farm Income (1): Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314		
Potential Off Farm Income (1): Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286		
Family labor valued at subsistence income in Java	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386		
Subsistence Income in Java, Economic terms	222	222	222	222	222	225	228	234	240	248	257	266	276	285	296	307	318		
Assumptions about growth in per capita GDY:	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	1.1%	2.8%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.7%	3.7%	3.7%		
Total labor available for off farm work after farming activities (days) (1):	100	114	99	94	109	126	143	161	179	198	218	218	218	218	218	218	218		
Off farm income, economic:	105	120	104	99	115	134	154	178	203	223	231	239	248	256	266	276	286		
Off farm income, financial:	116	132	114	108	127	148	169	196	224	246	254	263	272	282	292	303	314		

(1) Maximum amount of off farm work available assumed to be 190 days.

FARM BUDGET: Swamps-Improved (Medium Input)

RICE VALUE (BOON): Average of Import and Export Parity Price from 1985 onwards

		YEAR																			
Commodities		1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Rice	Yield (t/ha)				1.5	1.75	2	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	Area (ha)	0.4	0.7	1	1.3	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Econ Price (Rp/kg)		184	176	165	117	98	83	119	155	192	189	186	183	180	178	178	178	178	178	178	178
	Fincl Price (Rp/kg)	152	149	152	127	125	150	150	150	190	190	190	190	190	190	190	180	180	180	180	180
Corn	Yield (t/ha)	0.8	1	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Area (ha)	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Econ Price (Rp/kg)	135	167	170	149	118	98	113	128	144	143	143	142	142	142	142	141	141	141	141	141
Cassava	Yield (t/ha)	120	140	150	130	130	130	130	130	130	130	130	130	130	130	130	140	140	140	140	140
	Area (ha)	8	10	12	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Econ Price (Rp/kg)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Peanuts	Yield (t/ha)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Area (ha)																				
	Econ Price (Rp/kg)	469	584	501	535	398	350	362	374	387	385	382	380	378	375	375	375	375	375	375	375
Estate	Yield (t/ha)	400	400	430	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
	Area (ha)																				
	Econ Price (Rp/kg)																				
Vegetables/Fruit ('000 Rp)			40	50	60	60	75	75	80	90	90	100	100	100	100	112	112	112	112	112	112
Livestock ('000 Rp)			12	20	25	30	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Costs of Production																					
Planting Material ('000 Rp)			5.2	9.5	12.5	15.5	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Urea (t) (first 3 years provided free by GOI)			0.10	0.10	0.12	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Economic Cost-Rp/kg			250	223	269	266	212	243	259	275	295	298	302	305	308	311	311	311	311	311	311
Financial Cost-Rp/kg			99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	200	200
TSP (t) (first 3 years provided free by GOI)			0.05	0.05	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Economic Cost-Rp/kg			240	238	237	222	236	236	238	239	241	244	247	250	253	256	256	256	256	256	256
Financial Cost-Rp/kg			99	96	104	95	120	130	150	150	150	150	150	150	150	200	200	200	200	200	200
KCl (t)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Economic Cost-Rp/kg			176	169	180	184	181	181	181	181	190	190	190	190	190	196	196	196	196	196	196
Financial Cost-Rp/kg			99	96	104	95	120	130	150	150	150	150	150	150	200	200	200	200	200	200	200
Pesticide (kg)			4	5	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Economic Cost-('000 Rp/kg)			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Financial Cost-('000 Rp/kg)			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	3	3	3	3	5	5	5	5	5	5	5
Kieserite (kg)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Economic Cost-('000 Rp/kg)			0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Financial Cost-('000 Rp/kg)			0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Hired Labor (days)			0	0	0	6	41	24	7	0	0	0	0	0	0	0	0	0	0	0	0
Total Labor (days)			250	300	350	400	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Financial Cost-('000 Rp/day)			1.20	1.20	1.20	1.20	1.20	1.22	1.23	1.26	1.29	1.34	1.39	1.44	1.49	1.54	1.59	1.65	1.72		
Other ('000 Rp)			45	45	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Production (t)																					
Rice			0.600	1.225	2.000	3.120	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840	3.840
Corn			0.080	0.200	0.360	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450
Cassava			0.800	1.000	1.200	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Peanuts																					
Estate Crop																					
Economic Value of Field Crops ('000 Rp)			136	268	414	461	458	391	536	681	831	819	807	795	784	775	775	775	775	775	775
Financial Value of Field Crops ('000 Rp)			116	230	381	483	567	663	663	663	663	817	817	817	817	817	783	783	783	783	783
Gross Farm Income ('000 Rp)																					
Economic			188	338	499	551	573	506	656	811	961	959	947	935	936	927	927	927	927	927	927
Financial			168	300	466	573	682	778	783	793	947	957	957	957	969	935	935	935	935	935	935
Total Production Costs ('000 Rp)																					
Economic, Including Income Foregone, Java			338	346	333	355	385	380	372	375	384	393	403	413	423	433	444	455	466		
Fincl, Hired Labor			71	76	50	65	117	100	84	75	75	86	86	86	86	112	112	112	112	112	112



AGRICULTURE ALONE

Net Economic Farm Income ('000 Rp) (excludes economic value of GOI expenditures)	-149	-8	166	195	188	126	284	436	576	565	544	522	513	494	484	473	461	461	
Net Return to Household ('000 Rp)	112	238	416	508	565	678	699	718	871	871	871	871	883	823	823	823	823		
Off Farm Income: Financial (Rp '000)	116	74	33	0	0	0	0	13	36	62	91	94	98	101	105	109	113		
Off Farm Income: Economic (Rp '000)	105	67	30	0	0	0	0	12	33	57	83	86	89	92	95	99	102		
AGRICULTURE AND OFF FARM WORK																			
Net Economic Household Income (Rp '000)	-44	59	196	195	188	126	284	448	609	622	627	608	602	586	579	572	564	564	
Net Return to Household (Rp '000)	228	312	467	508	565	678	699	731	908	933	962	965	980	924	928	932	936		
OTHER MOT DEVELOPMENT COSTS PER KK																			
Base	472	1589	2252	1952	10	10	9	9											

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION

Base	-472	-1589	-2252	-2101	-18	156	186	179	126	284	436	576	565	544	522	513	494	484	473	461	461
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IRR AND NPV AT 10% IRR NPV  
Base 3% -2818

ECONOMIC NET BENEFIT STREAM, AGRICULTURAL PRODUCTION AND OFF FARM WORK

Base	-472	-1589	-2252	-1996	49	186	186	179	126	284	448	609	622	627	608	602	586	579	572	564	564
------	------	-------	-------	-------	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

IRR AND NPV AT 10% IRR NPV  
Base 4% -2435

These IRRs and NPVs assume that the full cost of infrastructure investments is inputted to the project. In fact, part of the benefits accrue to the local population and spontaneous migrants (see para 3.05 in main text). IRRs which take these factors into account are shown in the text (Table 3.4).

Total Family Labor																			
Supply (Days)	350	364	379	394	409	426	443	461	479	498	518	518	518	518	518	518	518	518	518
Off Farm Income: Financial	220	220	220	220	220	223	225	232	237	246	254	263	272	282	292	303	314		
Off Farm Income: Economic	200	200	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286		
Subsistence Income in Java, Financial																			
Subsistence Income in Java, Economic	270	270	270	270	270	274	277	284	291	302	312	323	334	346	359	372	386		
Assumptions about per capita GDY:																			
INDEX	1.00	1.00	1.00	1.00	1.00	1.01	1.02	1.05	1.08	1.12	1.16	1.20	1.24	1.28	1.33	1.38	1.43		
Total labor avail for off farm work:																			
Days required for off farm work assumed to be 190	100	64	29	0	0	0	0	11	29	48	68	68	68	68	68	68	68		
off farm income, economic:	105	67	30	0	0	0	0	12	33	57	83	86	89	92	95	99	102		
off farm income, financial	116	74	33	0	0	0	0	13	36	62	91	94	98	101	105	109	113		

NES SCHEME ECONOMIC ANALYSIS  
2 HA RUBBER, .5 HA HOUSELOT AND GARDEN AREA  
(CONSTANT 1986 '000 RP)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Production MT							0.9	1.4	1.8	2.15	2.45	2.7	2.85	3	3	3	3	2.9	2.75	2.6	2.4	2.2	1.95	1.7	1.5	1.3	1.1	0.85	0.8	0.7	
Selling Price							955	962	969	976	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984
Value of Sales							860	1347	1744	2098	2411	2657	2804	2952	2952	2952	2952	2854	2706	2558	2362	2165	1919	1673	1476	1279	1082	836	787	689	
Operating Costs																															
Inputs							209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	
Household Labor (1)							248	257	266	276	285	296	307	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	
Investment Costs																															
Household Labor (1)	222	222	225	228	234	240																									
Fertilizers/Agrochem.	625	113	151	285	303	322																									
Materials Equipment	404	62	36	27	27	106																									
Agricultural Mach.	44	44	36																												
Overheads/Mgmt. Fee (2)	252	76	58	53	52	69																									
Cash Payment	73																														
Housing		930																													
Roads	251	251	251																												
Buildings	42	42	42																												
Others	151	151	151																												
Total Costs	2064	1890	949	593	616	737	457	466	475	485	494	505	516	527	527	527	527	527	527	527	527	527	527	527	527	527	527	527	527	527	
Net Benefit Stream	-2064	-1890	-949	-593	-616	-737	402	880	1269	1613	1916	2151	2288	2425	2425	2425	2425	2326	2179	2031	1834	1637	1391	1145	949	752	555	309	260	161	
IRR=	14%																														
(over 30 year period)																															
-----																															
NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS (INCLUDES MINISTRY OF TRANSMIGRATION COSTS FOR NES PROJECTS)																															
Additional MDT Costs	1166	8	8	8	8																										
Net Benefits from .5 ha houselot/garden (3)			25	53	89	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	
Net Benefit Stream	-3230	-1898	-931	-548	-535	-640	493	971	1373	1736	2054	2288	2423	2558	2567	2566	2468	2320	2173	1976	1779	1533	1287	1090	893	697	451	401	161		
IRR=	13%																														
(over 30 year period)																															
-----																															
NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS WITH OFF FARM WORK STARTING IN 1988																															
Economic Value to Off Farm Work (4)				205	211	216	164	192	221	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	270	270	270	270	270	270	
Net Benefit Stream	-3230	-1898	-931	-343	-324	-424	657	1163	1595	1984	2310	2554	2699	2844	2853	2852	2852	2754	2606	2458	2262	2065	1819	1573	1360	1163	967	721	671	431	
IRR=	15%																														
(over 30 year period)																															

(1) Shadow priced subsistence income in Java. Land clearing is smoothed over the first two years.  
(2) Overheads are 15% of the direct financial costs of field crop establishment, excluding agricultural machinery (financial costs in Chapter III, Table 3.8).  
(3) Proxy for this is one half of the net benefits of the low input foodcrop model, after the opportunity cost of labor is excluded.  
(4) Transmigrant households assumed to work an average of 269 days per year for maintenance and harvesting of rubber once rubber starts to produce, and about 80 days/year on their garden. The young transmigrant family starts to work off farm in year 4 and works 190 days per year in off farm work for 3 years until harvesting of rubber begins. Then off farm work declines for three years until the family labor supply has grown to the level to supply 190 days per year for off farm work, after meeting labor requirements for rubber and the garden.

NES/PIR OIL PALM ECONOMIC ANALYSIS  
2 HA OIL PALM, .5 HA HOUSELOT AND GARDEN AREA  
(CONSTANT 1986 '000 RP)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Production MT FFB					12	20	24	28	30	32	32	32	32	32	32	32	30	30	28	28	26	26	24	24	22	22	22	20	20	
Selling Price					60	71	71	70	70	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	
Value of Sales					720	1420	1704	1960	2100	2208	2208	2208	2208	2208	2208	2208	2070	2070	1932	1932	1794	1794	1656	1656	1518	1518	1518	1380	1380	
Operating Costs																														
Inputs					333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	
Household Labor (1)					234	240	248	257	266	276	285	296	307	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	
Investment Costs																														
Household Labor (1)		222	222	225	228																									
Fertilizers/Agrochem.		794	303	511	416																									
Mach Service/Plant. Mat.		326	97	52	52																									
Agricultural Mach.		36	36	36																										
Overheads/ Mgmt. Fee (2)		233	97	101	96																									
Cash Payment		73																												
Housing			930																											
Roads		251	251	251																										
Buildings		34	34	34																										
Others		151	151	151																										
Total Costs	2119	2120	1360	792	567	573	581	590	599	609	618	629	640	651	651	651	651	651	651	651	651	651	651	651	651	651	651	651	651	
Net Benefit Stream	-2119	-2120	-1360	-792	153	847	1123	1370	1501	1599	1590	1579	1568	1557	1557	1557	1419	1419	1281	1281	1143	1143	1005	1005	867	867	867	729	729	
IRR =	14%																													
NPV (10%)=	2,345																													
(over 30 year period)																														

NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS (INCLUDES MINISTRY OF TRANSMIGRATION COSTS FOR NES PROJECTS)

Additional MOT Costs	1166	8	8	8	8																								
Net Benefits from .5 ha houselot/garden (3)			25	53	89	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142	142
Net Benefit Stream	-3284	-2128	-1343	-747	234	944	1214	1460	1605	1722	1728	1715	1703	1691	1700	1699	1699	1561	1561	1423	1423	1285	1285	1147	1147	1009	1009	871	871
IRR =	13%																												
NPV (10%)=	2067																												
(over 30 year period)																													

NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS WITH OFF FARM WORK STARTING IN 1989

Economic Value to Off Farm Work (4)					144	171	211	231	239	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
Net Benefit Stream	-3284	-2128	-1343	-747	378	1114	1425	1691	1844	1970	1984	1981	1979	1977	1986	1985	1985	1847	1847	1709	1709	1571	1571	1433	1433	1295	1295	1157	1157
IRR =	15%																												
NPV (10%)=	3585																												
(over 30 year period)																													

- (1) Shadow priced subsistence income in Java. Land clearing is smoothed over the first two years.
- (2) Overheads are 15% of the direct financial costs of field crop establishment, excluding agricultural machinery (financial costs in Chapter III, Table 3.8).
- (3) Proxy for this is one half of the net benefits of the low input foodcrop model, after the opportunity cost of labor is excluded.
- (4) Transmigrant households assumed to work an average of 183 days/year for maintenance and harvesting of oil palm after trees begin to produce, and about 80 days/year on their garden, leaving time to pursue off farm work starting year 5 on site. In year 5, settler works about 130 days off farm, rising to 150 the next year, 180 days the following year, and 190 days per year thereafter (the maximum number of days of work assumed to be available).

NES/PIR SCHEME ECONOMIC ANALYSIS  
 2 HA HYBRID COCONUTS, .5 HA HOUSELOT AND GARDEN AREA  
 (CONSTANT 1986 '000 RP)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Production MT FFB						1.28	1.60	3.04	5.60	6.60	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.40	7.00	7.00	7.00	7.00	
Selling Price						262	259	255	251	247	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	
Value of Sales						335	414	775	1406	1630	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1806	1708	1708	1708	1708	
<b>Operating Costs</b>																															
Inputs							353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	
Household Labor (1)							248	257	266	276	285	296	307	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	
<b>Investment Costs</b>																															
Household Labor (1)	222	222	225	228	234	240																									
Fertilizers/Agrochem.	473	133	190	209	227	227																									
Tools, Mach./Plant Mat.	545	70	27	36	36	36																									
Agricultural Mach.		36	36	36																											
Overheads/Mgmt. Fee (2)	270	74	59	59	60	34																									
Cash Payment	73																														
Housing		930																													
Roads	226	226	226																												
Buildings	42	42	42																												
Others	178	178	178																												
Total Costs	2066	1910	982	532	557	537	601	610	619	629	638	649	660	671	671	671	671	671	671	671	671	671	671	671	671	671	671	671	671	671	
Net Benefit Stream	-2066	-1910	-982	-532	-557	-201	-186	165	787	1001	1168	1157	1146	1135	1135	1135	1135	1135	1135	1135	1135	1135	1135	1135	1135	1135	1037	1037	1037	1037	
IRR=	9%																														
NPV (10%)=					-596																										
(over 30 year period)																															
-----																															
NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS (INCLUDES MINISTRY OF TRANSMIGRATION COSTS FOR NES PROJECTS)																															
Additional MOT Costs	1166	8	8	8	8																										
Net Benefits from .5 ha houselot/garden (3)				25	53	89	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142
Net Benefit Stream	-3232	-1918	-965	-487	-476	-105	-96	256	891	1125	1306	1293	1281	1269	1277	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1276	1179	1179	1179	1179
IRR=	9%																														
NPV (10%)=																															
(over 30 year period)																															
-----																															
NET BENEFIT STREAM, NES PROJECTS FOR TRANSMIGRANTS WITH OFF FARM WORK STARTING IN 1988																															
Economic Value to Off Farm Work (4)				205	211	216	223	231	239	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
Net benefit stream	-3232	-1918	-965	-282	-265	111	127	487	1130	1373	1562	1559	1557	1555	1563	1562	1562	1562	1562	1562	1562	1562	1562	1562	1562	1562	1562	1465	1465	1465	1465
IRR=	11%																														
NPV (10%)=																															
(over 30 year period)																															

(1) Shadow priced subsistence income in Java. Land clearing is smoothed over the first two years.  
 (2) Overheads are 15% of the direct financial costs of field crop establishment, excluding agricultural machinery (financial costs in Chapter III, Table 3.8).  
 (3) Proxy for this is one half of the net benefits of the low input foodcrop model, after the opportunity cost of labor is excluded.  
 (4) Transmigrant households are assumed to work an average of 166 days/year on maintenance and harvesting of coconuts, and about 80 days/year on their garden, which permits them to work the maximum of 190 days a year of off farm employment from year 4 onwards.

PMU PLANTED RUBBER ECONOMIC ANALYSIS  
2 HA RUBBER, .5 HA HOUSELOT AND GARDEN AREA  
(CONSTANT 1986 '000 RP)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014								
Production MT							0.85	1.30	1.70	2.00	2.30	2.60	2.80	2.80	2.75	2.60	2.45	2.20	2.00	1.80	1.55	1.30	1.05	0.90	0.75	0.70	0.70	0.70	0.70									
Selling Price							955	962	969	976	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984								
Value of Sales							812	1251	1647	1952	2263	2558	2755	2755	2706	2558	2411	2165	1968	1771	1525	1279	1033	886	738	689	689	689	689									
Operating Costs																																						
Inputs							250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	125	125	125	125	125								
Household Labor (1)							248	257	266	276	285	296	307	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318	318								
Investment Costs																																						
Household Labor (1)							222	222	225	228	234	240																										
Fertilizers/Agrochem.							586	151	227	322	340	340																										
Materials Equipment							431	18	18	9	27	80																										
Agricultural Mach.							19	19	19																													
Overheads/Mgmt. Fee (2)							253	74	61	53	57	67																										
Roads							67	67	67																													
Buildings							17	17	17																													
Others							67	67	59																													
Total Costs							1662	634	692	613	658	727	498	507	516	526	535	546	557	568	568	568	568	568	568	443	443	443	443	443								
Net Benefit Stream							-1662	-634	-692	-613	-658	-727	314	743	1131	1426	1728	2012	2198	2187	2138	1990	1843	1597	1400	1203	957	711	465	317	295	246	246	246	246			
IRR= (over 30 year period)								16%																														
NPV(10%)=																																						
NET BENEFIT STREAM INCLUDING SETTLEMENT COSTS																																						
COST ALTERNATIVE ONE:																																						
Additional MOT Costs (3)							472	1806	1657	10	10	9	9																									
Net Benefits from .5 ha houselot garden (4)										25	53	89	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142			
Net Benefit Stream, Alternative One							-472	-1806	-1657	-1672	-644	-676	-568	-569	-630	404	834	1235	1549	1866	2149	2333	2321	2280	2132	1984	1738	1541	1345	1099	853	607	459	437	387	387		
IRR= (over 30 year period)								9%																														
NPV(10%)=																																						
COST ALTERNATIVE TWO:																																						
Additional Settlement Costs, NES Levels (3)							1532	1231	309	8	8																											
Net Benefits from .5 ha houselot garden (4)										25	53	89	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142	142		
Net Benefit Stream, Alternative Two							-3194	-1865	-976	-567	-577	-630	404	834	1235	1549	1866	2149	2333	2321	2280	2132	1984	1738	1541	1345	1099	853	607	459	437	387	387	387	387	387		
IRR= (over 30 year period)								11%																														
NPV(10%)=																																						
NET BENEFIT STREAM, INCLUDING OFF FARM WORK STARTING IN 1988																																						
Economic Value to Off Farm Work (5)								205	211	216	164	192	221	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286		
Net Benefit Stream, Alternative One							-472	-1806	-1657	-1672	-644	-676	-568	-364	-419	620	998	1428	1771	2113	2405	2599	2596	2566	2418	2270	2024	1827	1630	1384	1138	892	745	722	657	657	270	270
IRR= (over 30 year period)								11%																														
NPV(10%)=																																						
Net Benefit Stream, Alternative Two							-3194	-1865	-976	-567	-372	-419	620	998	1428	1771	2113	2405	2599	2596	2566	2418	2270	2024	1827	1630	1384	1138	892	745	722	657	657	657	657	657		
IRR= (over 30 year period)								13%																														
NPV(10%)=																																						

- (1) Shadow priced subsistence income in Java. Land clearing is smoothed over the first two years.
- (2) Overheads are 15% of the direct financial costs of field crop establishment, excluding agricultural machinery (financial costs in Chapter III, Table 3.8).
- (3) Since this model has not been used to settle transmigrants, and it is not clear what institution will provide the settlement infrastructure what the associated costs will be, two alternatives are presented. The first uses Ministry of Transmigration standard costs for settlement with the land clearing and agricultural input package halved, to reflect the reduced foodcrop area (0.5 ha cleared instead of 1 ha cleared for foodcrops). The second alternative uses NES level investment for housing, roads, buildings, cash payment to settler, and other. Settlers provide their own foodcrop agricultural inputs. MOT provides investments for ancillary services, settlement and relocation only (US\$1,362 as in NES Projects). The second alternative is less expensive, and shows that the rate of return is slightly higher if settlement costs can be contained to NES levels.
- (4) Proxy for this is one-half of the net benefits of the low input foodcrop model, after the opportunity cost of labor is excluded.
- (5) Transmigrant households assumed to work an average of 269 days per year for maintenance and harvesting of rubber once rubber starts to produce, and about 80 days/year on their garden. The young transmigrant family starts to work off farm in year 4 and works 190 days per year in off farm work for 3 years until harvesting of rubber begins. Then off farm work declines for three years until the family labor supply has grown to the level to supply 190 days per year for off farm work, after meeting labor requirements for rubber and the garden.

PMU PLANTED RUBBER AS SECOND STAGE DEVELOPMENT FOR  
EXISTING TRANSMIGRANTS, RUBBER PLANTED ON 1.5 HA  
(CONSTANT 1986 '000 RP)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
<b>Without Project Scenario</b>																																
Net Agriculture Income from 1 ha foodcrops	194	181	181	209	247	276	273	270	268	285	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283
Off farm income	158	173	200	200	200	203	205	211	216	223	231	239	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
<b>With Project Scenario, PMU and settlers clear 1 ha reserve land and replace .5 ha of foodcrop with rubber</b>																																
Production MT, on 1.5 ha.							0.61	0.93	1.21	1.43	1.64	1.85	2.00	2.00	1.96	1.85	1.75	1.57	1.43	1.28	1.10	0.93	0.75	0.64	0.53	0.50	0.50	0.50	0.50	0.50	0.50	
Selling Price							955	962	969	976	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984	984
Value of Sales							578	891	1174	1391	1613	1823	1963	1963	1928	1823	1718	1542	1402	1262	1087	911	736	631	526	491	491	491	491	491	491	
<b>Operating Costs</b>																																
Inputs							188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	
Household Labor (1)																																
<b>Investment Costs</b>																																
Household Labor (1)																																
Fertilizers/Agrochem.	440	113	170	242	255	255																										
Materials Equipment	324	13	13	7	20	60																										
Agricultural Mach.	19	19	19																													
Overheads/Mgmt. Fee (2)	190	56	46	40	43	50																										
Roads	67	67	67																													
Buildings	17	17	17																													
Others	67	67	59																													
Total Costs	1123	352	391	289	318	365	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	
Net Benefit Stream, Treecrops	-1123	-352	-391	-289	-318	-365	391	703	986	1203	1425	1635	1775	1775	1740	1635	1530	1355	1215	1074	899	724	548	443	432	397	397	397	397	397	397	
Garden Production (3)	97	91	90	104	123	138	136	135	134	143	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142
Net Benefit Stream with Garden Production	-1026	-261	-300	-184	-195	-227	527	839	1120	1346	1566	1777	1917	1917	1882	1777	1672	1496	1356	1216	1041	865	690	585	574	539	539	539	539	539	539	
<b>With Project Minus Without Project</b>																																
Project Net Benefit Stream	-1219	-442	-481	-393	-442	-503	254	568	852	1061	1283	1494	1634	1634	1599	1494	1388	1213	1073	933	757	582	407	302	290	255	255	255	255	255		
IRR= (over 30 year period)	162																															
NPV(10%)=							2,214																									
<b>Including Off Farm Work</b>																																
Net Benefit Stream, Including Off Farm Work				205	211	216	164	192	221	248	256	266	276	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	
<b>With Project Minus Without Project</b>																																
Net Benefit Stream, Including Off Farm Work	-1377	-615	-681	-388	-431	-489	214	550	858	1085	1308	1520	1662	1663	1619	1504	1388	1213	1073	933	757	582	407	302	275	240	240	240	240	240		
IRR= (over 30 year period)	15X (5)																															
NPV(10%)=							1,811																									

- (1) Cost of labor is the opportunity cost of labor, or the without project scenario benefits from food crops and off farm income.
- (2) Overheads are 15% of the direct financial costs of field crop establishment, excluding agricultural machinery (financial costs in Chapter III, Table 3.8).
- (3) Proxy for this is one-half of the net benefits of the low input foodcrop model, after the opportunity cost of labor is excluded.
- (4) Transmigrant households assumed to work an average of 201 days per year for maintenance and harvesting of 1.5 ha of rubber once rubber starts to produce, and about 80 days/year on their garden. The young transmigrant family starts to work off farm in year 4 and works 190 days per year in off farm work for 3 years until harvesting of rubber begins. Then off farm work declines for three years until the family labor supply requirements for rubber and the garden.
- (5) Rate of return declines slightly when off farm work is incorporated into the analysis, because the settlers lose some benefits of off farm work when labor is shifted to treecrops.

Projected Rice Yields at Appraisal from World Bank-Financed Transmigration  
Projects and Yields in Models Presented in Chapter III

Project or Model	Year of Staff Appraisal Report	Rice Yield At Full Development (t/ha)
<u>Project</u>		
<u>Upland</u>		
Transmigration I (Ln. 1318)	1976	2.10
Transmigration II (Ln. 1707/Gr. 919)	1979	1.70
Transmigration III (Ln. 2248)	1983	2.00
Transmigration IV (Ln. 2288)	1983	1.50
<u>Tidal</u>		
Swamp Reclamation I (Ln. 1958)	1981	2.40
Swamp Reclamation II (Ln. 2431)	1984	2.50
<u>Models in Chapter III</u>		
Upland low input		0.75
Upland diversified		1.00
Upland low input with cow		1.20
Upland sustained input		1.80
Upland high input with cattle		2.50
Tidal, severe pests		0.75
Tidal low input		1.25
Tidal improved		2.00

Population and Transmigrants in Receiving Provinces  
( '000)

Province	Provincial population				Growth rate 1980-85 (%)	Transmigration population		
	1980/a	1985/a	Increase			1971-80/b	1980-85/c	1971-85
			1971-80	1980-85				
Aceh	2,611.3	2,999.9	602.7	388.6	2.81	9.6	61.0	70.6
N. Sumatra	8,360.9	9,452.0	1,739.1	1,091.1	2.48	1.8	37.1	38.9
W. Sumatra	3,406.8	3,779.6	613.6	372.8	2.10	34.8	23.2	58.0
Riau	2,168.5	2,513.4	527.0	344.9	3.00	29.3	177.9	207.2
Jambi	1,446.0	1,755.3	439.9	309.3	3.95	96.0	107.8	203.8
Bengkulu	768.1	946.9	248.8	178.8	4.27	41.7	61.1	102.8
S. Sumatra	4,629.8	5,423.1	1,189.2	793.3	3.21	141.3	379.0	520.3
Lampung	4,624.8	6,089.7	1,847.8	1,464.9	5.66	133.3	188.2	321.5
<u>Sumatra</u>	<u>28,016.2</u>	<u>32,959.9</u>	<u>7,208.1</u>	<u>4,943.7</u>	<u>3.30</u>	<u>487.8</u>	<u>1,035.3</u>	<u>1,523.1</u>
W. Kalimantan	2,486.1	2,771.5	466.2	285.4	2.20	23.7	131.9	155.6
C. Kalimantan	954.4	1,123.9	252.4	169.5	3.32	9.4	109.8	119.2
S. Kalimantan	2,064.6	2,285.5	365.5	220.9	2.05	41.0	91.4	132.4
E. Kalimantan	1,218.0	1,603.0	484.2	385.0	5.65	29.6	55.5	85.1
<u>Kalimantan</u>	<u>6,723.1</u>	<u>7,783.9</u>	<u>1,568.3</u>	<u>1,060.8</u>	<u>2.97</u>	<u>103.7</u>	<u>388.6</u>	<u>492.3</u>
N. Sulawesi	2,115.4	2,359.0	396.9	243.6	2.20	11.2	18.8	30.0
C. Sulawesi	1,289.6	1,549.8	375.9	260.2	3.74	51.5	75.5	127.0
S. Sulawesi	6,062.2	6,547.7	881.6	485.5	1.55	36.5	25.0	61.5
S.E. Sulawesi	942.3	1,091.9	228.2	149.6	2.99	37.9	92.1	130.0
<u>Sulawesi</u>	<u>10,409.5</u>	<u>11,548.4</u>	<u>1,882.6</u>	<u>1,138.9</u>	<u>2.10</u>	<u>137.1</u>	<u>211.4</u>	<u>348.5</u>
Maluku	1,411.0	1,617.4	321.4	206.4	2.77	4.3	35.1	39.4
NTB	2,724.7	3,045.1	521.2	320.4	2.25	NA	6.9	NA
E. Timor	555.3	608.4	NA	53.1	1.84	NA	1.0	NA
Irian Jaya	1,173.9	1,332.0	250.5	158.1	2.56	10.6	75.6	86.2
<u>Total</u>	<u>51,013.7</u>	<u>58,895.1</u>	<u>11,752.1</u>	<u>7,881.4</u>	<u>2.91</u>	<u>743.5</u>	<u>1,753.9</u>	<u>2,497.4</u>

/a BPS, Statistik Indonesia 1984, Table 3.1.2.

/b P. Gardner, Provincial Population Projections (Jakarta: UNCHS/GOI NUDS Project, 1985), Table 4.

/c Departemen Transmigrasi, Daftar Proyek Transmigrasi Yang Dibina Tahun 1985/86 (To August 1985).



## 1970-85 Transmigrants As % 1980 Provincial and Kabupaten Population /a

Province/Kabupaten	Sponsored transmigrants	Population 1980	% Transmigrants	Province/Kabupaten	Sponsored transmigrants	Population 1980	% Transmigrants
<u>Aceh</u>	<u>60,957</u>	<u>2,611,271</u>	<u>2.3</u>	<u>South Kalimantan</u>	<u>91,442</u>	<u>2,064,649</u>	<u>4.4</u>
Aceh Utara	7,533	625,296	1.2	Kota Baru	78,913	193,650	40.8
Aceh Timur	9,271	423,418	2.2	Barito Kuala	11,442	169,952	6.7
Aceh Barat	23,878	288,422	8.3	Tabalong	1,087	124,939	0.9
Aceh Selatan	16,093	275,458	5.8	<u>East Kalimantan</u>	<u>55,513</u>	<u>1,218,016</u>	<u>4.6</u>
Aceh Tengah	4,182	163,341	2.6	Kutai	32,784	368,501	8.9
<u>North Sumatra</u>	<u>37,070</u>	<u>8,360,894</u>	<u>0.4</u>	Samarinda (KM)	2,375	264,718	0.9
Tapanuli Selatan	37,070	757,159	4.9	Balikpapan (KM)	2,586	280,675	0.9
<u>Riau</u>	<u>177,880</u>	<u>2,168,535</u>	<u>8.2</u>	Bulungan	6,069	176,923	3.4
Indragiri Ilir	10,312	398,276	2.6	Berau	11,699	45,903	25.5
Indragiri Ulu	34,246	229,182	14.9	<u>Total Kalimantan</u>	<u>388,644</u>	<u>6,723,086</u>	<u>5.8</u>
Bengkalis	38,368	566,671	6.8	<u>North Sulawesi</u>	<u>18,817</u>	<u>2,115,384</u>	<u>0.9</u>
Kampar	91,582	362,867	25.2	Gorontalo	12,146	502,695	2.4
Kepulauan Riau	3,372	425,277	0.8	Bolaang Mongondow	6,671	299,696	2.2
<u>West Sumatra</u>	<u>23,153</u>	<u>3,406,816</u>	<u>0.7</u>	<u>Central Sulawesi</u>	<u>75,531</u>	<u>1,289,635</u>	<u>5.9</u>
Sawah Lunto	17,594	224,446	7.8	Banggai	27,396	268,203	10.2
Pasisir Selatan	4,288	315,954	1.4	Donggala	17,818	581,772	3.1
Solok	1,271	355,539	0.4	Poso	21,794	266,708	8.2
<u>Jambi</u>	<u>107,819</u>	<u>1,445,994</u>	<u>7.5</u>	Buol Toli-Toli	8,523	172,952	4.9
Bungo Tebo	24,457	302,386	8.1	<u>South Sulawesi</u>	<u>24,991</u>	<u>6,062,212</u>	<u>0.4</u>
Sarko (Sarolangun)	48,585	217,653	22.3	Luwu	14,424	503,757	2.9
Tanjung Jabung	20,922	216,897	9.6	Mamuju	10,567	99,796	10.6
Batang Hari	13,855	237,604	5.8	<u>Southeast Sulawesi</u>	<u>92,114</u>	<u>942,302</u>	<u>9.8</u>
<u>Bengkulu</u>	<u>61,112</u>	<u>768,064</u>	<u>8.0</u>	Kendari	59,583	306,675	19.4
Bengkulu Utara	49,207	178,250	27.6	Kolaka	4,566	144,446	3.2
Bengkulu Selatan	7,465	236,775	3.2	Ruton	21,662	317,124	6.8
Rejang Lebong	4,440	288,256	1.5	Muna	6,303	174,057	3.6
<u>South Sumatra</u>	<u>378,959</u>	<u>4,629,801</u>	<u>8.2</u>	<u>Total Sulawesi</u>	<u>211,453</u>	<u>10,409,533</u>	<u>2.0</u>
Banyuasin	250,012	591,074	42.3	<u>Maluku</u>	<u>35,139</u>	<u>1,411,006</u>	<u>2.5</u>
Ogan Komering Ilir	42,595	564,080	7.6	Maluku Tengah	35,139	443,940	7.9
Ogan Komering Ulu	27,100	750,799	3.6	<u>West Nusa Tenggara</u>	<u>6,878</u>	<u>2,724,664</u>	<u>0.3</u>
Lahat	32,204	484,893	6.6	Dompu	6,878	95,827	7.2
Musi Rawas	19,937	367,037	5.4	<u>Irian Jaya</u>	<u>75,604</u>	<u>1,173,875</u>	<u>6.4</u>
Lematang Ilir	7,111	430,834	1.7	Jayapura	12,071	151,308	8.0
<u>Lampung (S)</u>	<u>188,178</u>	<u>4,624,785</u>	<u>4.1</u>	Manokwari	9,980	84,757	11.8
Lampung Utara (SS)	207,053	882,479	23.5	Sorong	24,881	134,833	18.5
Lampung Tengah	4,949	1,690,947	0.3	Merauke	22,229	172,662	12.9
<u>Total Sumatra</u>	<u>1,035,128</u>	<u>28,016,160</u>	<u>3.7</u>	Panisi	6,443	177,619	3.6
<u>West Kalimantan</u>	<u>131,890</u>	<u>2,486,068</u>	<u>5.31</u>	<u>East Timor</u>	<u>965</u>	<u>555,350</u>	<u>0.2</u>
Pontianak	10,734	608,893	1.76	Bobonaro	965	61,980	1.6
Sanggau	14,540	323,499	4.49	<u>All Receiving Areas</u>	<u>1,753,811</u>	<u>51,013,674</u>	<u>3.4</u>
Sambas	92,792	603,104	15.39				
Ketapang	10,870	253,828	4.28				
Kapuas Hulu	2,954	128,647	2.30				
<u>Central Kalimantan</u>	<u>109,799</u>	<u>954,353</u>	<u>11.51</u>				
Kapuas	56,201	258,473	21.7				
Kotawaringin Timur	23,900	83,166	13.0				
Kotawaringin Barat	27,730	94,544	29.3				
Barito Selatan	1,940	69,020	2.8				
Barito Utara	28	63,601	0.0				

/a Repelitas II, III and IV to August 1985.

Notes: KM = Kotamadya; S does not include resettlement within province; SS includes resettlement from other kabupaten in Lampung.

Source: Department of Transmigration, 1985.

Population by Place of Birth, Place of Previous Residence, Place of Residence Five Years Ago  
and Place of Present Residence  
(Urban and Rural)

	Present residence					Total
	Sumatra	Java	Kalimantan	Sulawesi	Other Islands	
<u>Place of Birth</u>						
Sumatra	24,825,271	718,420	25,474	22,651	19,879	25,611,695
Java	2,906,014	89,999,829	374,097	167,393	137,364	93,584,697
Kalimantan	19,594	121,807	4,165,294	9,758	4,626	6,321,079
Sulawesi	145,417	136,745	123,413	10,108,689	139,614	10,653,878
Other Islands	30,789	114,883	11,282	74,185	10,126,012	10,357,151
Abroad	39,703	59,310	10,220	7,990	7,525	124,748
Not stated	29,139	65,976	7,116	9,882	11,112	123,225
<u>Total</u>	<u>27,995,927</u>	<u>91,216,970</u>	<u>6,716,896</u>	<u>10,400,568</u>	<u>10,446,132</u>	<u>146,776,473</u>
<u>Place of Previous Residence</u>						
Sumatra	24,729,720	767,199	19,676	24,093	14,265	25,556,953
Java	2,849,120	89,621,756	373,046	196,381	154,013	93,194,316
Kalimantan	25,481	156,685	6,142,569	25,364	6,183	6,356,282
Sulawesi	127,617	151,183	117,960	10,008,948	141,535	10,547,243
Other Islands	38,146	150,707	10,780	88,719	10,083,534	10,371,886
Abroad	35,658	56,060	9,368	9,673	8,520	119,279
Not stated	190,185	313,380	43,497	47,470	38,082	632,514
<u>Total</u>	<u>27,995,927</u>	<u>91,216,970</u>	<u>6,716,896</u>	<u>10,400,548</u>	<u>10,446,132</u>	<u>146,776,473</u>
<u>Place of Residence 5 Years Ago</u>						
Sumatra	22,544,460	261,137	12,949	12,451	10,670	22,841,667
Java	810,340	78,296,777	131,438	77,794	67,463	79,403,812
Kalimantan	10,432	43,860	5,446,630	7,855	2,246	5,511,023
Sulawesi	21,269	38,891	38,173	8,674,190	44,703	8,817,226
Other Islands	15,116	76,806	4,868	43,006	8,709,324	8,849,120
Abroad	4,154	10,269	1,243	2,611	3,265	21,542
Not stated	35,387	77,630	8,310	11,663	8,127	141,117
<u>Total</u>	<u>23,441,158</u>	<u>78,803,370</u>	<u>5,663,611</u>	<u>8,829,570</u>	<u>8,845,798</u>	<u>125,585,506</u>

Note: Population 5 years of age and over.

Classification of Forest Land, May 1984

Province (1)	Province area (ha) (2)	Protection area (ha) (3)	Park and reserved forest (ha) (4)	Limited production forest (ha) (5)	Definitive production forest (ha) (6)	Total definitive forest (ha) (3+4+5+6) (7)	Conversion forest (ha) (8)	Other utiliza- tion (ha) (9)	Conversion forest and other utilization	
									Ha (8+9) (10)	Percentage by province (11)
Aceh	5,539,000	1,051,400	666,800	1,375,700	188,300	3,282,200	192,700	2,064,100	2,256,800	41
North Sumatra	7,168,068	1,391,100	253,900	1,349,900	531,500	3,526,400	253,700	3,387,968	3,641,668	31
West Sumatra	4,229,730	1,206,600	599,700	539,900	596,800	2,942,800	437,700	849,230	1,286,930	30
Riau	9,456,156	741,800	267,200	2,764,200	2,772,900	6,546,100	1,754,100	1,155,960	2,910,060	31
South Sumatra	10,277,500	774,700	796,500	333,000	2,124,000	4,028,200	1,186,500	5,062,800	6,249,300	61
Jambi	5,100,000	1,147,500	493,000	974,000	-	2,614,500	1,013,200	1,472,300	2,485,500	49
Bengkulu	1,978,870	465,500	249,900	242,000	34,100	991,500	193,600	793,770	987,370	50
Lampung	3,200,000	315,000	356,000	-	573,000	1,244,000	-	1,956,000	1,956,000	61
West Java /b	4,630,000	229,500	196,400	-	547,980	973,800	-	3,656,200	3,656,000	79
Jakarta /b	59,000	-	15	-	1,100	1,115	-	57,885	57,885	98
Central Java /b	3,421,000	65,500	3,000	-	605,100	673,600	-	2,747,400	2,747,400	80
Yogyakarta /b	317,000	3,200	200	-	13,200	16,600	-	300,400	300,400	95
East Java /b	4,791,970	255,800	245,300	-	847,100	1,348,200	-	3,443,770	3,433,770	72
West Kalimantan	14,680,700	2,047,100	1,336,700	2,988,700	1,323,000	7,695,500	1,508,700	5,476,500	6,985,200	48
Central Kalimantan	15,300,000	800,000	729,400	3,400,000	6,068,000	10,997,400	3,000,000	1,302,600	4,302,600	28
South Kalimantan	3,700,000	432,700	66,000	200,600	1,330,400	2,029,700	284,700	1,385,600	1,670,300	45
East Kalimantan	21,144,000	3,643,900	1,968,600	4,826,100	5,513,100	15,951,700	3,500,000	1,692,300	5,192,300	25
North Sulawesi	2,751,501	285,400	326,600	741,200	230,500	1,583,700	699,400	468,401	1,167,600	42
Central Sulawesi	6,803,300	1,156,900	616,700	1,364,100	1,028,000	4,165,700	335,000	2,302,600	2,637,600	39
Southeast Sulawesi	3,814,000	420,800	273,400	827,100	668,900	2,190,200	699,400	924,000	1,623,800	42
South Sulawesi	6,292,650	2,004,100	189,600	993,100	165,000	3,351,800	259,400	2,681,450	2,940,850	47
Bali	563,286	84,100	32,000	5,700	3,900	125,700	-	437,586	437,586	78
West Nusa Tenggara	2,015,315	481,700	134,800	222,800	224,100	1,063,400	195,900	756,015	951,915	47
East Nusa Tenggara	4,738,920	677,600	131,900	399,000	278,100	1,486,600	2,801,600	450,720	3,252,320	69
Maluku	8,572,800	1,550,400	441,000	2,075,600	1,029,900	5,096,900	436,400	3,039,500	3,475,900	41
Irian Jaya	41,066,000	8,648,500	8,311,800	4,732,300	7,123,500	28,816,100	11,775,400	474,500	12,249,900	30
East Timor	1,468,937	435,300	38,800	170,500	45,200	689,800	10,000	761,137	771,137	53
<b>Total</b>	<b>193,871,707</b>	<b>30,316,100</b>	<b>18,725,215</b>	<b>30,525,300</b>	<b>33,866,600</b>	<b>113,433,215</b>	<b>30,537,400</b>	<b>49,101,092</b>	<b>79,638,492</b>	<b>41</b>

Source: FAO/World Bank Cooperative Program. Indonesia Forestry Project Working Paper #1. October 1985. Preliminary figures.

Planned and Actual Plantings for Ongoing and New Smallholder Tree Crops Development Programs - Repelita III and IV  
(ha)

Planting programs	Repelita III			1984/85			Repelita IV			Total (1984/85 actual + plan 1985/86-1988/89)	
	Planned	Actual	%	Plan	Actual	%	1985/86 Plan	1986/87 Plan	1987/88 Plan		1988/89 Plan
<b>Rubber</b>											
NES, foreign aided	59,870	54,972	92	18,462	8,886	48	10,100	8,400	6,030	-	33,416
Transmigration III	-	-	-	1,000	1,000	100	1,000	-	-	-	2,000
PIR Khusus	61,100	17,875	29	30,486	3,680	12	36,400	30,000	9,000	6,000	85,080
PIR Lokal	7,000	4,725	68	2,275	-	0	4,000	2,000	-	-	6,000
Subtotal NES/PIR	127,970	77,572	61	52,223	13,566	26	51,500	40,400	15,030	6,000	126,496
SRDP I planting/replanting	28,100	26,400	94	9,280	4,772	51	5,815	16,750	20,500	20,000	67,837
PRPTE planting/replanting	150,982	78,257	52	-	-	-	23,293	/b	/b	/b	23,293
PERSB (West Sumatra)	7,600	4,994	66	806	409	51	-	-	-	-	409
Subtotal PMU planting	186,682	109,651	57	10,086	518	51	29,108	16,750	20,500	20,000	91,539
Subtotal rehabilitation (PRPTE)	50,134	893	1.8	-	-	-	-	/b	/b	/b	-
<b>Total Rubber</b>	<b>364,786</b>	<b>186,116</b>	<b>52</b>	<b>62,309</b>	<b>18,747</b>	<b>30</b>	<b>80,608</b>	<b>57,150</b>	<b>35,530</b>	<b>26,000</b>	<b>218,035</b>
<b>Oil Palm</b>											
<b>Ongoing Programs</b>											
NES, foreign aided	14,840	16,099	96	12,482	3,411	29	10,310	10,350	4,298	-	28,569
PIR Khusus	17,000	5,440	32	21,300	7,423	35	8,000	9,500	6,780	3,000	34,703
PIR Lokal	21,742	13,059	60	9,072	2,000	22	3,873	-	-	-	5,873
Subtotal	55,582	34,598	62	42,853	13,034	30	22,183	19,850	11,078	3,000	69,145
<b>New Programs</b>											
NES	-	-	-	-	-	-	-	8,750	6,050	5,600	20,400
PIR	-	-	-	-	-	-	500	8,000	26,500	35,000	70,000
PIR Akcelerasi	-	-	-	-	-	-	-	14,500	22,000	23,500	60,000
PIR Swasta	-	-	-	-	-	-	-	28,500	74,000	108,500	211,000
Subtotal	-	-	-	-	-	-	500	59,750	128,550	172,600	361,400
<b>Total Oil Palm</b>	<b>55,582</b>	<b>34,598</b>	<b>62</b>	<b>42,853</b>	<b>13,034</b>	<b>30</b>	<b>22,683</b>	<b>79,600</b>	<b>139,628</b>	<b>175,600</b>	<b>430,545</b>
<b>Coconuts /a</b>											
NES, foreign aided	5,370	6,278	117	3,857	1,823	47	3,500	2,980	1,000	3,000	12,303
Transmigration IV	-	-	-	1,000	500	50	3,000	4,000	-	-	7,500
SCDP planting - hybrids	33,399	17,693	53	8,100	4,768	59	11,240	-	-	-	16,008
PRPTE planting - hybrids	9,656	6,966	72	-	-	-	5,113	10,000/b	15,000/b	25,000/b	55,113
PRPTE planting - talls	168,423	125,874	75	-	-	-	26,164	30,000/b	35,000/b	40,000/b	131,164
PRPTE rehabilitation	262,449	169,218	65	-	-	-	-	10,000/b	15,000/b	20,000/b	45,000
Subtotal	479,297	326,029	68	12,957	7,091	55	49,017	56,980	66,000	88,000	267,088
<b>Total All Crops</b>	<b>899,665</b>	<b>548,743</b>	<b>61</b>	<b>118,119</b>	<b>38,872</b>		<b>152,308</b>	<b>193,730</b>	<b>239,158</b>	<b>289,600</b>	<b>915,668</b>

/a Data provided by Team Khusus and the managers of each planting program, October 1985. The following programs in effect during Repelita III -- SRDP rubber rehabilitation, SCDP coconut rehabilitation, SCDP planting of talls -- are not planned for continuation in Repelita IV.

/b Annual targets not finalized; 246,000 ha of smallholder plantings of tall and hybrid coconut and 107,200 ha of smallholder coconut rehabilitation are targeted for Repelita IV.

These figures were estimated prior to recent budget constraints and may be subject to significant downward revision.

Description of Transmigrant Surveys Reviewed

Large Scale Surveys

1. BPS Income Survey of Transmigrants, 1985.

Survey of 2,200 transmigrants in Sumatra, Kalimantan and Sulawesi. Surveys were undertaken in 110 villages in about 22 locations in seven major receiving provinces, and in each village 20 households were randomly selected for interviews. Upland, tidal and upland sites with tree crop development were included in the survey. The survey was based on the National Social-Economic Survey (Susenas) to permit comparisons between transmigrant and nontransmigrant households.

2. Smallholder Cattle Development Project Socioeconomic Impact Survey, 1985.

Survey of 1,200 households on upland sites. Of the 1,200 households interviewed, 600 had received cattle and 600 had not. Information was collected on gross cash income, including income from off farm work.

3. MOT Income Survey of Transmigration Areas, 1985.

Survey of 1,500 sponsored transmigrants in Sumatra, Kalimantan and Sulawesi on upland and tidal sites. Information was collected on yields and annual on farm and off farm income.

Small-Scale Surveys

4. Perry, Douglas et al. "The Economics of the Transmigrant Farmer: A Survey of Sitiung II and Sitiung III, West Sumatra", October 1983, Balai Penelitian Tanaman Pangan.

Study of 30 transmigrants in rainfed upland sites in West Sumatra. Information collected on farming and off farm activities, labor inputs into upland rice, yields, and livestock.

5. Levang and Riskan Marten. "Sembamban I, Agro-economic Survey of a Transmigration Center on South Kalimantan", Indonesia-Orstom Transmigration Project, Jakarta 1984.

Study of 60 transmigrants in Sembamban I, a site settled between 1979 and 1981. Information includes yields on rice, peanuts, soybeans, maize and cassava, marketed crops, non-agricultural activities and other sources of income.

6. Euroconsult-ID Consultants, Joint Advisory Services, Quarterly Report No. 6, April-June 1983, Transmigration II Project Jambi Province.

Report contains results of a survey of 180 farmers in Singkut, a site settled between 1974 and 1979, and 77 farmers in an area of Kubang Ujo settled between 1981 and 1982. Information collected on rice yields, use of fertilizers and insecticides, fruit and tree crop developments, cash income and types of off-farm employment, farm labor, and marketing.

7. Chapman, Barbara. "Diet and Production Survey of Sitiung, West Sumatra, Research Memos 2 and 3." Tropsoils Project, December 1984.

Survey was done in April 1984, and 77 households were interviewed about agricultural production, off farm income, and quality of diets.

8. Khan, Marshal. "An Inquiry into the Agricultural Economy of Singkut", Jakarta, December 1980.

This survey was conducted in Singkut, a site with settlement that started in 1974. Information was collected from 78 households on the value of crops produced, net farm earnings, and off farm income, including a breakdown of types of off farm work.

9. Stuart, Robert. "Employment in Singkut, 1983". Euroconsult, 1983.

Survey of 182 farmers in Singkut. Information includes detailed breakdown on off-farm employment.

10. U.H.K. Golaszinski, "Employment and Income Survey, Middle-Mahakam-Area, 1984".

Employment and income survey of 388 households in eight villages in East Kalimantan. The sample included transmigrants, Kutainese and Banjarnese. Information was collected on agricultural production, livestock, off-farm employment, and income levels.

11. Levine, et al. "Transmigrants and Tolakis in Kecamatan Tinanggea Southeast Sulawesi, Socio-economic Survey Results for the Southeast Sulawesi Transmigration and Area Development Project". Resources Management International, Inc.

Survey of 45 families in a transmigration village and 60 local families in an upland area of Southeast Sulawesi during December 1982-January 1983. Information collected on land and labor use and on and off-farm income.

12. Davis, Gloria. "Migrant Welfare in Five Transmigrant Communities." Working Paper, World Bank, 1980.

Survey of agricultural production of 592 farmers in transmigrant communities dependent on rainfed agriculture (Sitiung, Baturaja, Rimbogujang, and Way Abung) and 219 farmers in transmigrant tidal sites.

### Methodology for Demographic Analysis Contained in Chapter IV

The potential population impact of sponsored transmigration on the inner and outer islands depends upon several factors. These factors include the age and size of sponsored transmigrant households and their fertility and mortality levels and the rate at which sponsored transmigrants or their offspring might return to the inner islands. In addition, the impact depends upon the number of spontaneous transmigrants who are attracted, in turn, by the sponsored movement and the opportunities that the transmigration program creates, and the fertility, mortality and return migration rates of spontaneous transmigrants.

A cohort component population projection was done to illustrate the long run population impact of alternative levels of sponsored transmigration along with high, low, and zero levels of associated spontaneous transmigration for the period 1980 to 2020.

#### Age-Sex Structures of Population and of Transmigrants

The age-sex structures for the population of the major islands in 1980 provide the base for the population projections, and this is taken from the 1980 census. Transmigrants were assumed to have the same young age-sex structure as a sample of 1120 sponsored migrants arriving in Baturaja in 1983/84 (Table 1). Household size of sponsored transmigrants is assumed to decline over the period of the population projections due to projected declines in fertility. Household size is assumed to average 4.1 persons per household from 1980 to 1984, 4.0 from 1985 to 1989, 3.8 from 1990 to 1994, and 3.6 thereafter.

#### Projected Fertility and Mortality Rates

Fertility and mortality rates for 1980 were derived from the 1980 census. To simplify the analysis, which is more concerned about the impact of migration than fertility, fertility and mortality rates were assumed to be the same for all provinces in the inner islands (Java, Bali and Lombok). A separate projection of fertility and mortality was used for the outer islands (the outer islands refer primarily to Sumatra, Kalimantan, Sulawesi, Irian Jaya and Moluku). Fertility rates are significantly lower in the inner islands than in the outer islands of Indonesia, and this is reflected in the analysis. Fertility and mortality rates are projected to decline over the

Table 1: AGE-SEX STRUCTURE FOR SPONSORED MIGRANTS  
UPON ARRIVAL TO BATURAJA, /a 1983/84  
(percent)

Age	Males	Females
0-4	9	8
5-9	8	6
10-14	6	4
15-19	4	5
20-24	5	8
25-29	7	6
30-34	6	3
35-39	3	2
40-44	3	2
45-49	1	1
50-54	1	1
55-59	1	0
60+	0	0
Total	54	46

/a Settlement site financed by Transmigration I. Sample size is 1120 people.

period to replacement level<sup>1/</sup> by the year 2010 for the inner islands and by the year 2020 for the outer islands. Projected Total Fertility Rates (TFR) and life expectancies are presented in Table 2. For the purposes of the analysis, transmigrants are assumed to adopt the fertility and mortality levels of the destination area after their move.

1/ Replacement level fertility and mortality, where the net reproduction rate (NRR) is one, indicates that at these levels of fertility and mortality, childbearing women, on the average, bear only enough daughters to replace themselves in the population. Indonesia has a strong family planning program in place relative to the level of development. Nevertheless, the assumptions about declines in mortality and especially fertility are quite optimistic.



**Table 2: PROJECTED TOTAL FERTILITY RATES AND LIFE EXPECTANCIES  
FOR THE INNER AND OUTER ISLANDS, 1980-2020**

	1980-84	1985-89	1990-94	1995-99	2000-04	2005-09	2010-14	2015-19
<b>INNER ISLANDS</b>								
Total Fertility Rate /a	4.16	3.70	3.17	2.76	2.48	2.20	2.17	2.15
E(o) males /b	53	55	57	59	62	65	67	68
E(o) females /b	56	58	61	63	66	69	70	72
<b>OUTER ISLANDS</b>								
Total Fertility Rate /a	4.94	4.33	3.63	3.11	2.88	2.65	2.43	2.2
E(o) males /b	55	58	60	62	63	64	64	65
E(o) females /b	58	61	64	66	67	67	68	69

/a The total fertility rate represents the number of children that would be born per woman, if she were to live to the end of her childbearing years and bear children at each age in accord with prevailing age-specific fertility rates.

/b E(o), or life expectancy, is the number of years a newborn male or female would live if subject to the mortality risks prevailing for the cross-section of population at the time of his or her birth.

Assumptions about the Levels of Spontaneous Migration  
Associated with Sponsored Migration

The demographic impact of spontaneous migration to rural areas in the outer islands is clearly as important as sponsored movement. This is discussed in Chapter IV, paras. 4.04 to 4.06, with evidence from the 1980 census. Overall the ratio of rural spontaneous transmigrants to sponsored transmigrants in 1980 is 1.2 to 1 (see Table 4.1 of main report). This figure excludes Lampung and North Sumatra because these provinces received many migrants prior to 1940. The ratio is much higher (5.5 to 1) if Lampung and North Sumatra are included.

As many micro-level studies of transmigration communities have shown, almost all of these spontaneous settlers have moved as a result of chain migration. With the exception of the government's sponsored program, virtually no one moves to transmigration areas without friends or relatives in the destination area who can provide them with information about what to expect, a place to stay and other help getting started in the new area. The move would otherwise be unacceptably risky for a poor laborer from the inner islands.

In order to mathematically model this chain migration in the demographic projections, a variety of functions were tested relating sponsored transmigration to spontaneous transmigration. A simple model was chosen, whereby a transmigrant moves, and then for 10 years this move induces the move of a fixed proportion of transmigrants per year. These migrants, in turn, pull other migrants to the outer islands.

For the demographic projections, three levels of spontaneous migration were used. The first assumes that sponsored migration induces no spontaneous migration, a very unrealistic assumption, but included just to show the population impact of purely sponsored movement. The second assumes that a sponsored migrant induces .05 more transmigrants annually for the ten years following the move. The third assumes that a sponsored migrant induces .075 more transmigrants annually for the ten years following the move. The second and third assumptions fall within the movements of spontaneous migration from sponsored migration to rural outer island areas that we can estimate from the 1980 census.

#### Assumptions about the Level of Sponsored Transmigration

Demographic projections with several different levels of sponsored transmigration were made in the course of the exercise. Given current information of land availability, implementation capacity, and financial resources, two scenarios are presented in Chapter IV, Table 4.3. One is high, the maximum level of transmigration which could be achieved under the sponsored program if land availability issues are resolved, financial resources are made available, and implementation capacity in the tree crop subsector is significantly improved. The second scenario, considered to be intermediate, appears at present to be more realistic. The high scenario assumes the sponsored movement of 300,000 families in Repelitas IV and V, falling to 240,000 families in Repelita VI. The intermediate scenario assumes sponsored transmigration levels of 200,000 families in Repelitas IV and V, falling to 100,000 families in Repelita VI.

#### Assumptions about Labor Force Participation Rates

The labor force participation rate is assumed simply to be 53% of the population age 15 and over.

#### Summary

Table 4.3 in the main report presents the summary figures from the demographic projections. The demographic impact of transmigration is compared with population growth assuming zero migration. In other words, in the without migration scenario, population in the year 2020 is simply a function of natural increase alone (fertility and mortality), all forms of migration are assumed to be zero. Sponsored transmigration at levels of high and intermediate levels is projected to have a significant impact on population growth and labor absorption. This demographic impact includes not just the sponsored transmigrants themselves, but their children and any spontaneous migration that is induced by the sponsored program.

Summary TORs For Phase II and III Studies

Phase II Studies: Reconnaissance and Master Plan

A. General

This is a rapid reconnaissance of areas identified for transmigration and is often referred to as the screening process. One objective is to assess the suitability of the area for a particular form of development, so that a decision can be made as to whether it is worthwhile undertaking more detailed surveys. A second objective is to carry out socio-anthropological studies of the local people living in and around the settlement areas to be developed and determine their attitudes towards transmigration. A third objective is to prepare a master plan for developing the sites found to be suitable including a preliminary development plan.

It is assumed that aerial photographs at scale 1/50,000 and 1/30,000, rectified semi-controlled photo mosaics at scale 1/100,000 and topographic maps at scale 1/50,000 with 25 m contour intervals will be supplied to consultant firms by Bakosurtanal through Bina Program prior to the implementation of studies.

B. Summary of Activities

The Phase II studies for one settlement unit (SKP) of about 1,500-2,000 families (KK) covering a gross area of about 20,000-25,000 ha are summarized below. The type, density and distribution of field observations are given in Table 1.

- (a) Preliminary interpretation of aerial photographs at scales 1/50,000 and 1/30,000.
- (b) Investigation of land units and preparation of a land unit map at a scale of 1/50,000, based on air photo interpretation, field observations of slopes and soils along traverses a maximum of 2 km apart over the whole SKP.
- (c) Investigation of climate and hydrology based on analysis of existing climate and hydrological data supplemented by additional field and map observations of the drainage network and flooding hazard.
- (d) Preparation of present land use and forest status maps at a scale of 1/50,000 based on air photo interpretation, field investigations and local enquiry to establish land availability.

- (e) Preparation of land suitability maps at scale 1/50,000.
- (f) Social-economic studies to establish the activities of the existing populations, their access to outside markets and/or traders and the type and value of goods traded.
- (g) Socio-anthropological studies based on direct interviews with local people and government officials to assess the number of inhabitants in the area, the tribal and administrative organization, the age structure, the literacy, the health conditions, the land occupied, the desire to participate in the transmigration program, the method of participation, and the willingness to release land.
- (h) Preparation of agricultural development proposals taking into account local people's attitude and participation.
- (i) Preparation of an SKP master plan at a scale of 1:50,000 and modification of the 1/100,000 regional structure plan if necessary.
- (j) Preparation of a preliminary 10 year development plan for settlement units.
- (k) Reporting.
- (l) Formal and on-the-job training of the national associate staff in the preparation of Phase II studies.

The composition of the study team and man-month requirements to carry out a package of 24 Phase II studies per consultant contracts is given in Table 3.

Phase III Studies: Settlement Structure Plan and Economic Feasibility

Phase III studies will be undertaken only for those SKP which, following the reconnaissance Phase II studies, are found to be suitable for further development and which have been approved by the Project Working Group and cleared by the Provincial Authorities. The planning and surveys done in Phase III studies will follow the type of development proposed in Phase II studies. In most sites to be developed, standard TOR will apply but in areas with particular problems or when new development models are considered, special TOR will be proposed by the consultant and approved by the Bank and Bina Program.

The objectives of Phase III studies are to:

- (a) Confirm that an area is technically suitable for transmigration.
- (b) Prepare physical plans and cost estimates for the settlement and in particular define the areas within which land clearing should take place.
- (c) Ensure that the proposed development and agricultural activities are economically and financially feasible.

- (d) Ensure that the proposed settlement is socially and environmentally viable.
- (e) Prepare detailed development plans for each settlement unit.

It is assumed that Phase II maps and reports have been completed and that recent air photographs of scales 1/50,000 and 1/30,000 and topographic maps at scale 1/50,000 are readily available through Bina Program.

The Phase III studies for one SKP covering a gross area of about 10,000-12,000 ha and consisting of 4-5 villages (SP) of 300 to 400 families each are summarized below. The type, density and distribution of field observations are given in Table 2.

- (a) Preparation of a 1/20,000 scale topographic map with, where necessary, surveyed control based on traverses no more than 3 km apart. Topographic detail is derived from field data and <sup>1/</sup>aerial photographs or from any suitable available control data.
- (b) Reconnaissance slope surveys: overall density of one observation per 5 ha, data obtained by measurement every 50 m along traverses (rentisans) not more than 1 km apart. Data to be presented and slope map prepared at 1/20,000 scale using air photo interpretation.
- (c) Soil survey at semi-detailed level: overall density of one observation per 25 ha, data obtained from observation every 250 m along rentisan not more than 1 km apart. Soil map prepared at 1/20,000 scale.
- (d) Present land use survey: overall density of one observation per 5 ha, data obtained from observations every 50 m along rentisan not more than 1 km apart. Present land use map prepared at 1/20,000 scale using air photo interpretation.
- (e) Forestry investigations to establish volumes of marketable timber with a sampling error of 10% at 95% significance level. Minimum sample of 0.5% by area. Proposals for utilization of timber and forest products in the light of existing laws and regulations.
- (f) Water resource investigations primarily to establish and prepare designs for potable water supplies for village sites and for drainage and flood protection requirements for the SKP.
- (g) Preparation of land suitability map at 1/20,000 scale.

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<sup>1/</sup> This activity will not be required if radar/laser maps at scale 1/10,000 with 5 m contour intervals are available.

- (h) Preparation of agricultural and other development proposals for incoming transmigrants and local people.
- (i) Preparation of preliminary SP structure plan at 1/20,000 scale showing blocks of land within which more detailed surveys for houselots and arable land should take place and demarking any areas required for the use of local people.
- (j) Survey of slopes within area of houselots and arable land: one observation per 1 ha; data obtained from observations every 50 m along rentisan 250 m apart.<sup>2/</sup>
- (k) Access and main village road alignment survey at 1/20,000 scale.
- (l) Preparation of final SP structure plan at scale 1/20,000 showing the land allocations for incoming transmigrants and local people, the village boundaries subdivided into hamlets of 20-50 families, the blocks for houselots, the first arable land, the second farm land, the reserved lands, and the areas to be cleared. Alignments for access and village roads will also be shown.
- (m) Cost estimates for settlement development and assessment of the land use rights given up by local people.
- (n) Study of regional and environmental setting.
- (o) Prepare an economic and financial feasibility study including farm budgets, cost estimates and benefits to settlers. A comparative analysis of costs and benefits of maintaining the area as productive forest under current or proposed management systems.
- (p) Prepare detailed settlement development plans for the first five years of settlement and indicative development plans for the following five years for each settlement unit.
- (q) Recommend, in the most satisfactory way possible, the way of participation of indigenous people in the transmigration development projects and the most equitable compensation arrangements.
- (r) Reporting.
- (s) Formal and on-the-job training of the national associate staff in the preparation of Phase III studies.

The composition of a study team and the man-months requirements for the implementation of a package of 16 Phase III studies per consultant contract are given in Table 3.

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<sup>2/</sup> This activity will not be required if radar/laser maps at scale 1/10,000 with 5 meters contour intervals are available.

Type, Density and Distribution of Field Observations  
In Phase II Studies

Type	Observations	Minimum Density	Distribution
<u>Slope</u> /a	- Clinometer measurements	1/10 ha	1 every 50 m along traverse Traverses 2 km apart over whole SKP
<u>Soils</u>	- auger boring or profile pit description	1/200 ha	1 every 1 km along traverse Traverses 2 km apart over whole SKP
<u>Present land use</u>			
	- field observation	1/10 ha	As for slope measurements
	- local enquiry	variable	All village heads. Some farmers
<u>Socio- Anthropology</u>	- field observation	variable	All village and districts heads
	- local enquiry		Some villagers.
<u>Hydrology</u>	- river flow direc- tion and flood hazard	variable	All river intersects along traverses
	- potable water supply	variable	Existing wells
	- tidal fluctuation	variable	All major tide-affected rivers

/a These observations will not be required if radar/laser ground profiles are available.

Note: Traverses may be along cut lines (rentisan) or along existing roads or footpaths where these give representative sections at an appropriate spacing.

Type, Density and Distribution of Field Observations  
In Phase III Studies

Type	<u>Observations</u> Minimum Density	Distribution Maximum spacing
<u>Slope reconnaissance</u> /a - clinometer measurement	1/5 ha	1 every 50 m along traverse Traverses <u>1 km</u> apart
<u>Slope confirmation within land clearing block</u> /a - clinometer measurement	1/1.25 ha	1 every 50 m along traverse Traverses <u>250 m</u> apart
<u>Soils</u> - auger borings or pit descriptions	1/25 ha	1 every 250 m along traverse Traverses <u>1 km</u> apart
<u>Present land use</u> - field observation	1/5 ha	1 every 50 m along traverse. Traverses <u>1 km</u> apart
- local enquiry	variable	All village heads. Minimum of 50 farmers
<u>Forest inventory</u>	0.5% by area	Within each major forest type
<u>Water resources</u> - river flow directions and flood hazard	variable	All river intersects along traverses
- tidal fluctuations	variable	All tide-affected rivers
- potable water supply	variable	Existing wells Additional bore holes Surface water storage

/a These activities will not be required if radar/laser maps at scale 1/10,000 with 5 m contour intervals are available.



Settlement Planning

Man-Month Requirements per Average Phase II and III Contract  
(Assuming 24 Phase II studies and 16 Phase III studies  
carried out over a total contract period of 30 months)

Specialists	<u>Phase II studies</u>		<u>Phase III studies</u>		<u>Total</u>	
	Foreign	National	Foreign	National	Foreign	National
Project manager	12	12	18	18	30	30
Team leader	18	18	24	24	42	42
Topographers	18	20	36	42	54	62
Soils specialists	18	20	36	42	54	62
Planners	18	18	12	12	30	30
Sociologists	12	12	12	12	24	24
Agronomists	12	12	18	18	30	30
Tree crops specialists	-	-	12	12	12	12
Foresters	12	12	12	12	24	24
Agroeconomists	12	12	18	18	30	30
Aerial photographic int.	12	12	12	12	24	24
Cartographers	12	12	12	12	24	24
Civil engineers	12	14	18	24	30	38
Water engineers	12	12	12	12	24	24
Training specialists	12	12	18	18	30	30
Miscellaneous /a	8	16	30	33	38	49
<u>Total</u>	<u>200</u>	<u>214</u>	<u>300</u>	<u>321</u>	<u>500</u>	<u>535</u>
Average per study	8.3	8.9	18.8	20.0	-	-
Total for 14 packages	2,800	3,000	4,200	4,500	7,000	7,500

/a Includes short-term assignments of the following specialists, among others: marketing, storage and processing, rural institutions (cooperatives), agricultural credit, regional planning, hydrogeology, health, nutrition, education and fisheries.

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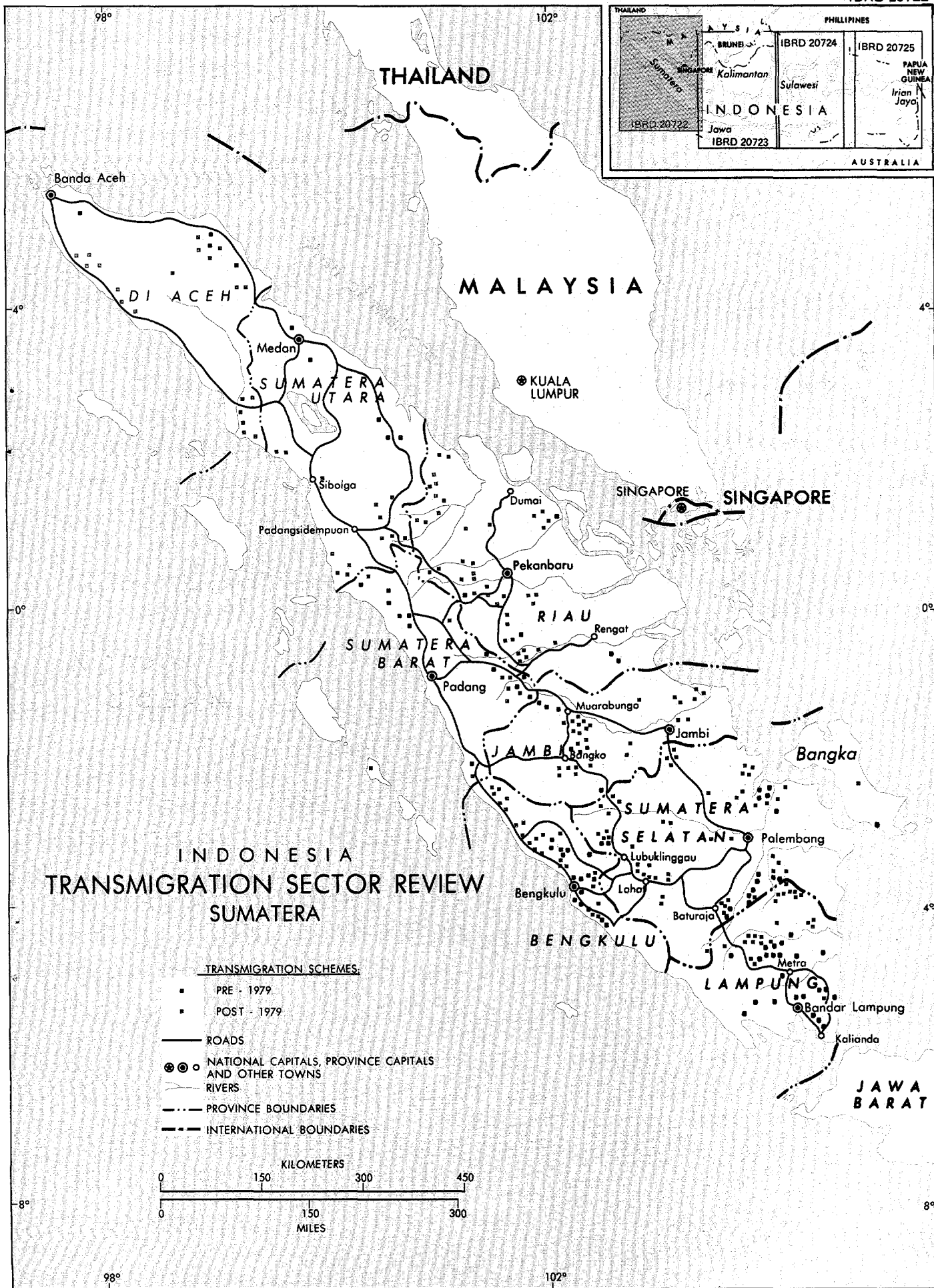
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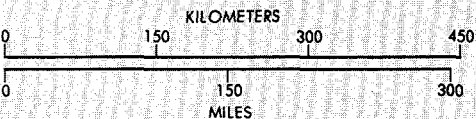
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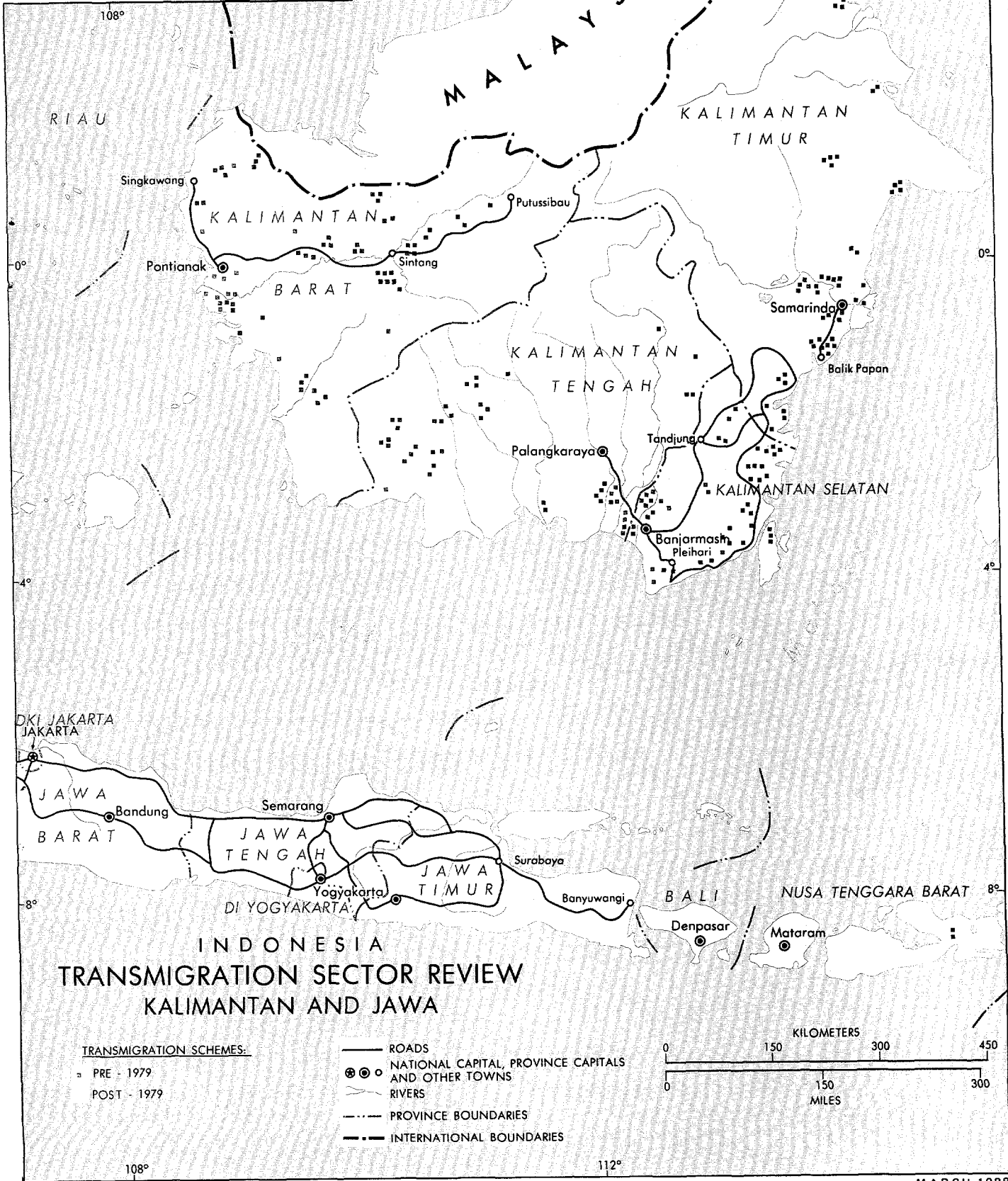
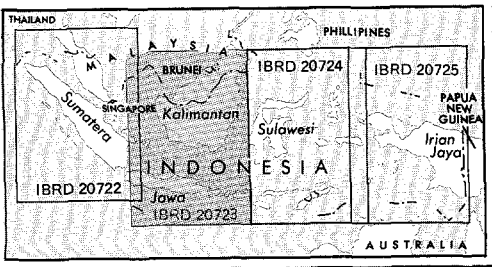
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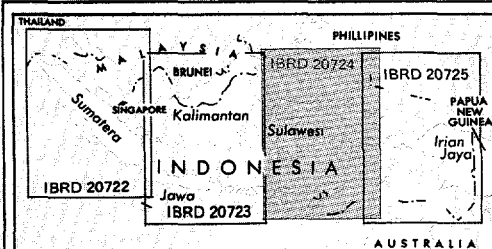
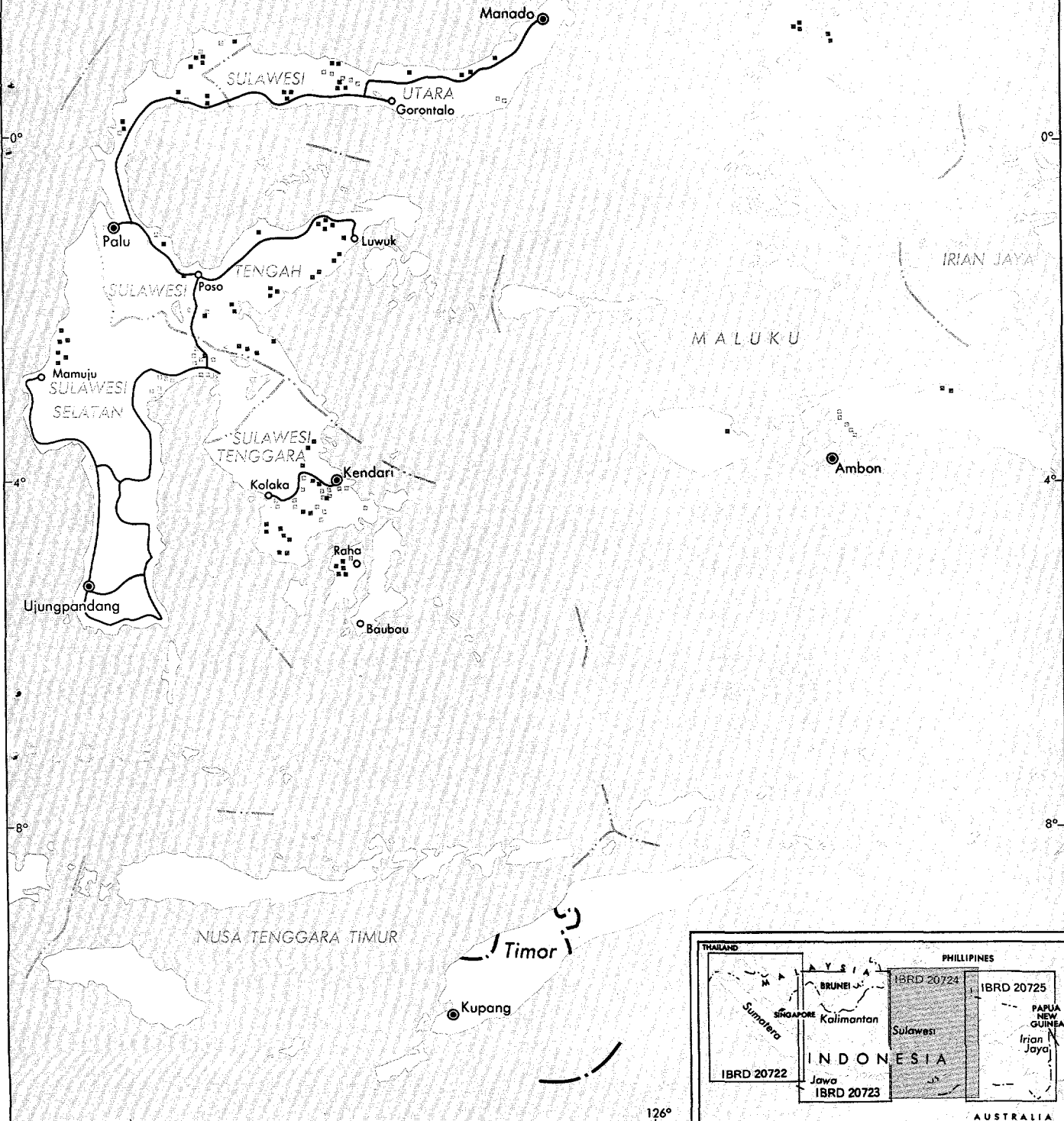


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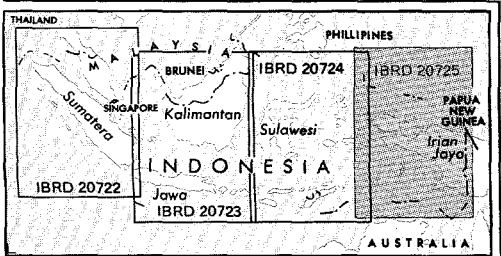
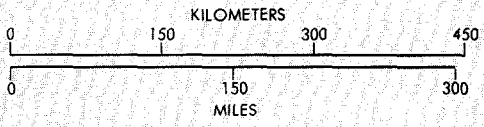
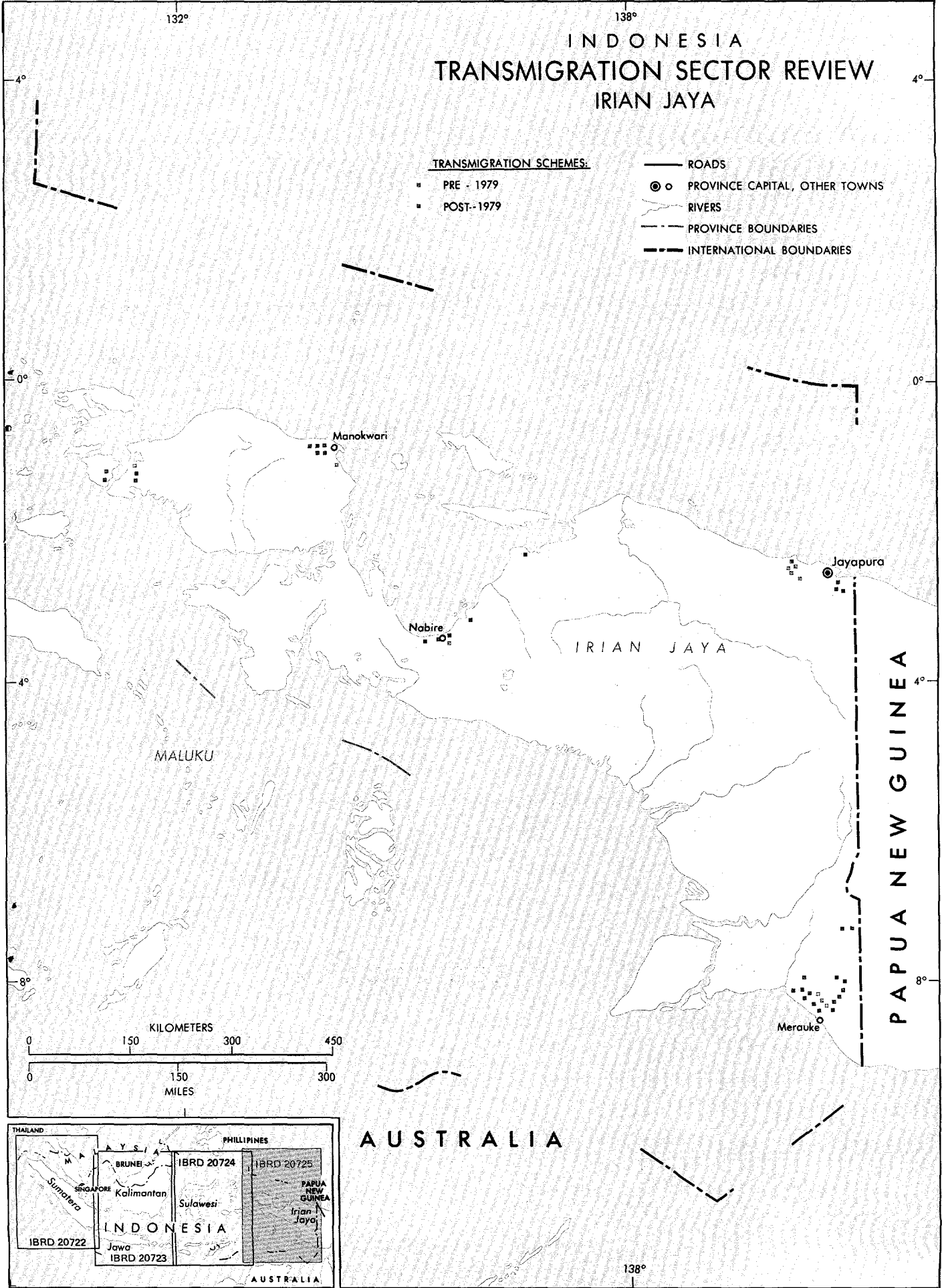


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