Damar Agroforest Establishment and Sources of Livelihood
A Profitability Assessment of *Damar* Agroforest System in Krui, Lampung, Sumatra, Indonesia

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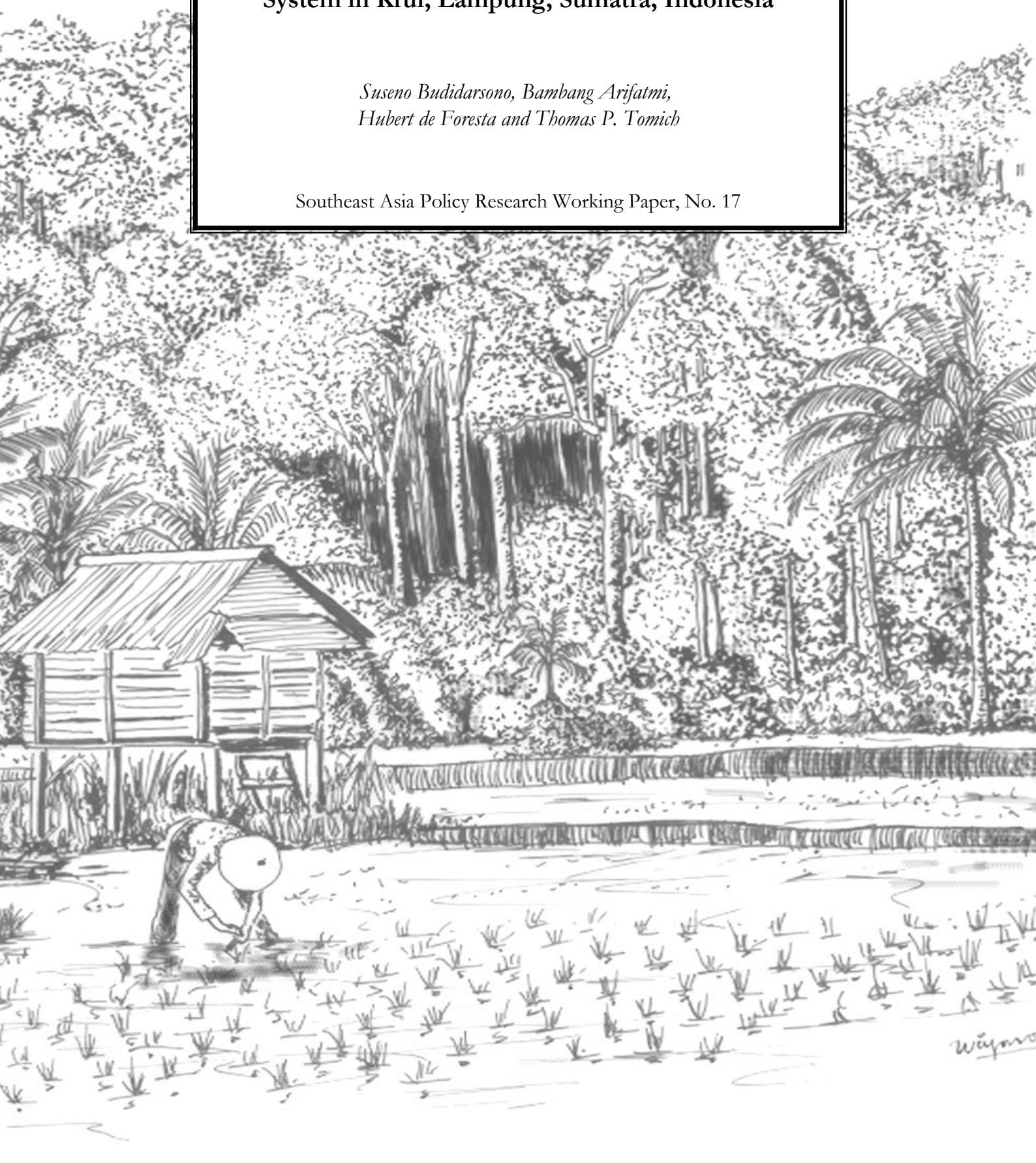

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Final Report

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Summary

Damar agroforest or *repong* damar in Krui, West Coast of Lampung Province, Sumatra, Indonesia, is a forest-like land use system that was developed by small holders to meet multi-dimensional objectives. From conservation point of view, damar agroforest system affords environmental benefit. The forest-like structure of agroforest allows the conservation of large part of natural forest biodiversity. From economic perspective, this land use system provides a wide range of source of income to farmers, their neighborhood and the actors along damar trading chain. One of the interesting parts of the damar story, on which this study is emphasized, lies on the way of farmers to initiate and develop this land use that need 20 - 25 years. Two research questions can be addressed in this assessment therefore : is *repong* damar establishment economically and financially profitable and what is the return to land and labor?

Traditionally, agricultural undertakings during repong damar establishment were done without any external farm input application. Since the middle of 80s there has been significant development in the agricultural undertakings : fertilizer application for coffee and pepper cultivation during *kebun* stage, herbicide for weed control and implementing more frequent tree-pruning to reduce the shade in order to prolong productive lifetime of coffee and pepper. Based on farm budget calculation, the study reveals that this system (namely semi intensive system) has higher return, employs more labor and also more profitable than the comparable traditional system. Efforts to prolong the kebun stage bring about significant change in the farmers' economy and the neighborhood as it creates more employment opportunity in the village.

Profitability assessment figures out that repong damar establishment both traditional system and semi-intensive system are profitable. Based on the macroeconomic parameters of on July 1997, returns to land per hectare at private prices are Rp 6.98 million for traditional system and Rp 9.32 million for semi-intensive system. Economically (farm budget calculation valued at social prices), returns to land for those systems are respectively Rp 9.50 million (traditional system) and Rp 13.45 million (semi-intensive system). Similarly for returns to labor. Both systems provide returns to labor about three times higher than the average wage rate in Sumatra. The prevailing monetary crisis in Indonesia had increased the systems' attractiveness, because the prices of the main agricultural product (coffee, pepper and damar) are increased along with the Rupiah depreciation against US$. Hence, the returns to land are increased by 46.3% to 51.9% at private prices calculation and 57.8% to 55.3% in social prices calculation. Whereas return to labor are increased about 47% in private prices and 52% in social prices.

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I. INTRODUCTION

1.1. Damar agroforest establishment : does it worth ?

The excellence and the uniqueness of damar agroforest system in Krui have been documented in many reports. Torquebiau (1984), Mary and Michon (1987) and Michon (1993) reveal that damar agroforest or *repong*[1] damar in Krui is a forest-like land use system invented by local people over generations living at the margin of rainforest in West Coast of Lampung province in Sumatra island. The resin-producing tree called *damar (Shorea javanica)* that dominates its vegetation structure (de Foresta and Michon, 1994), had been domesticated by local people since the second half of 19 century (Rappard 1937, in Michon and de Foresta, 1995). Recently, the satellite images indicates that there are approximately 55,000 ha of this mature agroforest in Krui (Fay *et al*, 1998).

From natural conservation point of view, damar agroforest system affords environmental benefit. The forest-like structure of agroforest allows the conservation of large part of natural forest biodiversity (de Foresta and Michon, 1994). The mature damar agroforest is made up of an intimate mixture of various tree crops and managed by smallholder. The trees shade out the crops, occupy different strata and produce high value product such as fruits, resins, and medicinal and high-grade timber. Inventories of the tree population in mature damar agroforest in Krui recorded 39 tree species (trees over 20 cm in diameter, on 75 randomly plots of 20x20m) with mean density 245 trees and mean basal area of 33 m2 per hectare (Wijayanto, 1993). These quite high figures, associated with a well-balanced diameter class distribution, shows the close structural similarity between natural forest and mature damar agroforest managed by farmers. As far as mammals are concerned, Sibuea and Herdimansyah (1993) recorded that almost all mammal forest species are present in damar agroforest (at least 46 mammal species including 17 species protected by Indonesian law). Density of the primate population (macaques, leaf monkeys, gibbons, and *siamang*) in the agroforest are quite similar to those observed for natural forests. In addition, Thiolay (1993. p 341) observed that at least 92 bird species present in this land use system.

From economic perspective, this land use system provides a wide range of source of income to farmers, their neighborhood and the actors along damar trading chain (Levang, 1989; Dupain 1994; Bouamrane, 1996). Damar trees, with about 65% of the tree community, provide regular cash income from the harvesting and sale of damar resin. Fruit trees comprise almost a quarter of the tree community, although not in monthly basis, also provide additional cash income. According to de Foresta and Michon (1997), based on their study in Pahmungan village of Lampung Province in 1995, per hectare of mature damar agroforest provides annual farm income ranging between Rp 1.65 million (no fruiting season) and Rp 3.84 million (in fruiting season).

One of the interesting parts of the damar story, on which this study is emphasized, lies on the way of farmers to initiate and develop this land use. In the first year, after slash and burn, subsistence food crops (primarily dry-land paddy) are planted along with coffee and *dadap* (*Eryhtrina)* stands as living poles for pepper planting and shading tree for young plantations. In the second year, after paddy is harvested, they plant pepper, resin producing tree (*Shorea Javanica*), fruit trees such as durian (*Durio zibethinus*), duku (*Lansium domesticum*), mangosteen, and rambutan, and other trees which has economic-important value for additional household income (*pete* or *Parkia specioca*, *asam kandis* or *Garcinia spp*). Where ever possible they plant any kind of vegetables for their own need.

This crop mixture has economic importance as it makes the basis of succession of harvestable commercial product before damar trees are fully developed and the damar resin can be tapped in the 20th to 25th year after it is planted. Food crops (dry-land paddy and vegetables) are the first yields that are harvested mainly used for daily consumption before other commercial crops come to the time to be harvested. Starting from the third year up to the tenth to fifteenth year, coffee and pepper can be harvested and provide annual income for farmers. From the eighth year to the 15th-20th year, farmers have additional annual income from harvesting fruit trees.

It is clear that repong damar establishment creates sources of income for the operators as well as its neighborhood in harvesting the yields. It is also clear that there are

[1] *Repong* is a local term in Pesisir of the Kabupaten of Lampung Barat that lexically means garden. This term refers to a land use system of mixture-perennial crops cultivation that provides source of income to the owners. (Nadapdap, A, Iwan T.,

conservation measures involve in damar agroforest system that provides income-related incentives to farmers. Besides this economics interest for farmers in establishing damar agroforest, Wollenberg *et al* (1998 p. 73) argue that it also needs to be understood in the context of social incentives, such as positive identity group, higher social status, and meeting an obligation to provide the resources as a heritage to descendants.

1.2. Research Questions and Objectives

None of the references available is focusing on the economics assessment of such investment in damar agroforest system. Many researches and assessments emphasize on the mature agroforest system in various perspectives. Two research questions can be addressed in this assessment therefore: is *repong* damar establishment economically and financially profitable and what is the return to land and labor?

This assessment is expected to contribute to the discussion of *repong* damar's benefits, specifically in the financial and economic analyses of *repong* damar establishment as a long term investment in a land use system, both from the smallholder and the policy makers' perspectives.

1.3. Methodology

1.3.1. Policy Analysis Matrix (PAM): approach and technique

The assessment heavily applies Policy Analysis Matrix approach and technique. The PAM is a matrix of information about agricultural and natural resource policies and market imperfections that is created by comparing multi-year land use system budget calculated at private and social prices (Monke and Pearson, 1995). Private prices are the prices that farm households are facing (local or domestic market price of inputs and output). Therefore, profitability or NPV valued at private prices, so called private profitability, is an indicator for production incentive (Tomich et al, 1998). Social prices are the economic prices that removes the impact of policy distortion (taxes, subsidy and other local levies) and market imperfections. Usually it is derived from export or import parity prices of particular input or

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and Mundardjito 1995, pp. 84-86; Lubis, 1996, p : 8).

output. Profitability measured at social prices, so called social profitability, is an indicator of potential profitability. Appendix A summarizes the approach used in this assessment.

As long as profitability calculation is concerned, the appropriate measure of profitability for long term investment is net present value *(NPV), i.e.,* the present worth of benefit (revenues) less the present worth of the cost of tradable inputs and domestic factors of productions (Gittinger, 1992). Mathematically it is defined as:

$$NPV = \sum_{t=0}^{t=n} \frac{(B_t - C_t)}{(1+i)^t}$$

where B_t is benefit at year t, C_t cost at year t, t is time denoting year and i is discount rate. An investment is appraised as profitable if NPV is greater than 0.

1.3.2. Pricing the Costs and Returns

Concerning profitability assessment that needs a detail-farm budget calculation, it is necessary to clarify the proper prices for the costs and returns calculation and the macroeconomic assumption used in this assessment.

Taking into account the monetary crisis prevailing in Indonesia since the second half of 1997, the study makes two farm budget calculations based on two difference macroeconomic conditions prevailing in Indonesia. ***Firstly***, farm budget calculation based on the macroeconomic parameters of July 1997 (before monetary crisis wave hit the country). As it is argued in Tomich *et al* (1998, pp. 62-63), macroeconomic parameters of July 1997 are considered as a better guide to assess a land use system over the longer term, than those have prevailed during the crisis. ***Secondly***, farm budget calculation based on the macroeconomic parameters of April 1999, when the fieldwork was carried out, to get more understanding on the impact of monetary crisis on *repong* damar establishment. The macroeconomic parameters used in the study are tabulated in following Table 1.1. It needs to be noted here that real interest rates (that is interest rate net of inflation) are the discount

factors used to value future cash flows in current term. The explanation of the interest rates used here, for both private and social prices, heavily refers to Tomich et al (1998, pp 63-64). The study also makes no different interest rates between 1997 and 1999 farm budget calculations.

Table 1.1. Macro economic parameters used in the study

	July 1997	April 1999
Exchange rate (Rp / US $)	2,400	8,600
Wage rate in Sumatra (Rp/person-days)	4,000	6,000
Real interest rate (net of inflation)		
Private	20% per annum	
Social	15% per annum	

In determining the prices, the study uses annual average prices (eight to ten years' annual average) of all tradable farm inputs and farm commodities that are cast in the respective constant prices (constant price 1997). The study uses local market prices as the basis of calculation of farm budget valued at private prices. Whereas for the comparable farm budget at social prices, the study applies export or import parity prices at farm gate as the basis of calculation. In this regard, the period under study for 1997 farm budget calculation is 1989 to June 1997, whereas the period under study for 1999 farm budget calculation is 1991 to April 1999. See the detail in Appendix B.

Another component that also needs to be thought over in farm budget calculation is the value of standing stock of trees in the *repong* damar at year 25. Hence, the value of marketable timber that can be harvested at year 25. Referring to the planting scenario used in the assessment (see Chapter 2), there will be 172 trees standing in a hectare of repong damar. But the volume of marketable timber still very low and most farmers would not sale it in that age of tree. Therefore, the standing stock of repong damar at year 25 would not be included in farm budget calculation. Whatever the price or value of standing stock, it will add up the return.

1.3.3. Data collection

The approach and technique require set of essential data on agricultural activities, the market prices of any agricultural inputs as well as its the output and its comparable social

prices, and also the related agricultural system. Data collection was done using rapid rural appraisal (RRA) technique[2] in which the 'triangulation principles' in collecting a particular data from various sources to assure the reliability of the data collected was also applied.

Unit of analysis of this assessment is *repong* damar land use system in Krui[3], and the unit of observation is agricultural activities during the period of repong damar establishment; hence all agricultural undertakings during the first 25 years of repong damar establishment[4]. What were observed and collected was focused on the information that is needed for the assessment (that is a continuous 25 years farm budget of *repong* damar). To be able to do so, cross-section data collection technique was applied according to the stages of *repong* damar establishment as it is mentioned in Lubis (1996: pp. 21-27), that there are three stages of land use changes in repong damar establishment after land clearing during 25 years: *darak, kebun* and *repong*[5].

Data and information needed for *darak* stage were collected from farmers who have newly opened land (two-three year old) in Rata Agung village in the North (*Kecamatan* Pesisir Utara) that is intended to develop *repong* damar in the future. The data and information collected from those farmers were then verified to other sources from the owners of the older repong in Malaya (Pesisir Utara) and Way Jambu (Pesisir Selatan). The key question for that particular issues is whether the land clearing techniques, the food crop cultivation and perennial tree crop and commercial crop planting are still the same with their ancestor.

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[2] RRA consist of short, intensive and informal field survey that focuses on people own views of their problem (Khon Kaen University 1985; Chambers *et al*, 1989). Generally, the method involves open-ended exploration of important issues and more focused understanding on important themes from key informants' perspectives. Two data collection techniques were applied i.e., field observation and in-depth interview with key informants using semi structured interview guide.

[3] Krui area administratively covers three sub-districts (kecamatan): Pesisir Utara, Pesisir Tengah and Pesisir Selatan.

[4] It needs 25 years of time to develop a land to be performing as mature damar agroforest land use system (Michon and de Foresta, 1995; Nadapdap *et al*, 1995; Lubis, 1996).

[5] It refers to local term. *Darak* is an initial stage of *repongs* damar establishment (0-2 years) after land clearing when the lands still under food crop cultivation. *Kebun* is a stage when commercial cash crop (coffee and pepper) are intensively managed and constitute the main sources of income while other tree crop still young. *Repong* is the stage where the land already fully occupied with various tree crops that are expected to be sources of income after coffee and pepper are not productive any longer (Lubis 1996: pp. 21-27).

Data and information of *kebun* stage were collected from *repong* damar owners in Way Jambu in the South (Pesisir Selatan). Most of the repong damar in this village is less then 20 years of age, some of them still harvesting coffee and pepper. For *repong* stage, data and information were collected from Panengahan and Pahmungan, the two villages where mature damar is prevailing. Figure 1.1 presents the sites where data for this assessment are collected.

1.4. Structure of the Report

Following this section, the report first describes *repong* damar establishment from land clearing activities until *repong* damar is developed as mature damar agroforest. It includes all agricultural undertakings during the process of establishment, profitability assessment, and the developments of farm management to establish *repong* damar. The report then presents the findings of the assessment to draw the conclusion.

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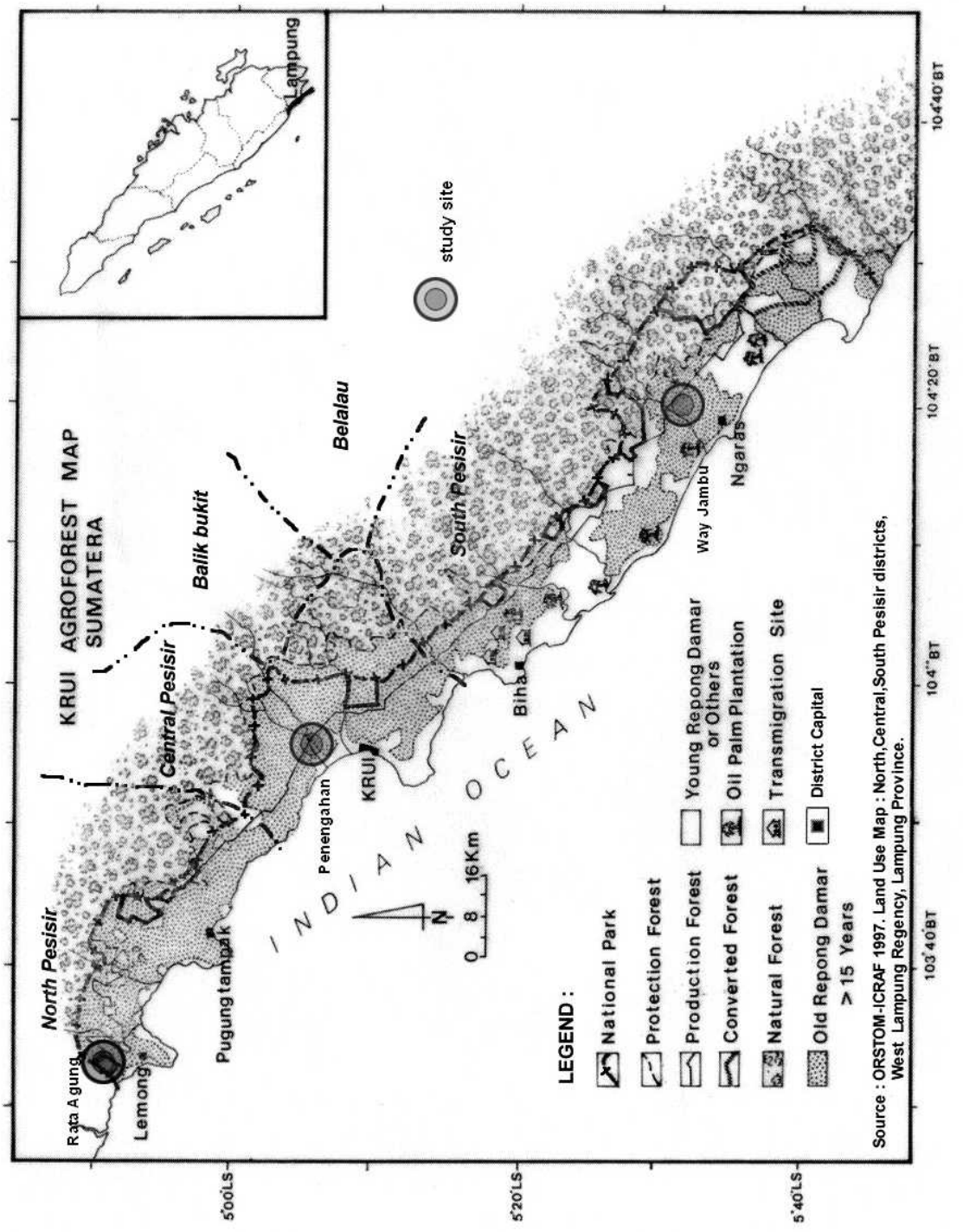


Figure 1.1. Location of the study sites

II. REPONG DAMAR ESTABLISHMENT

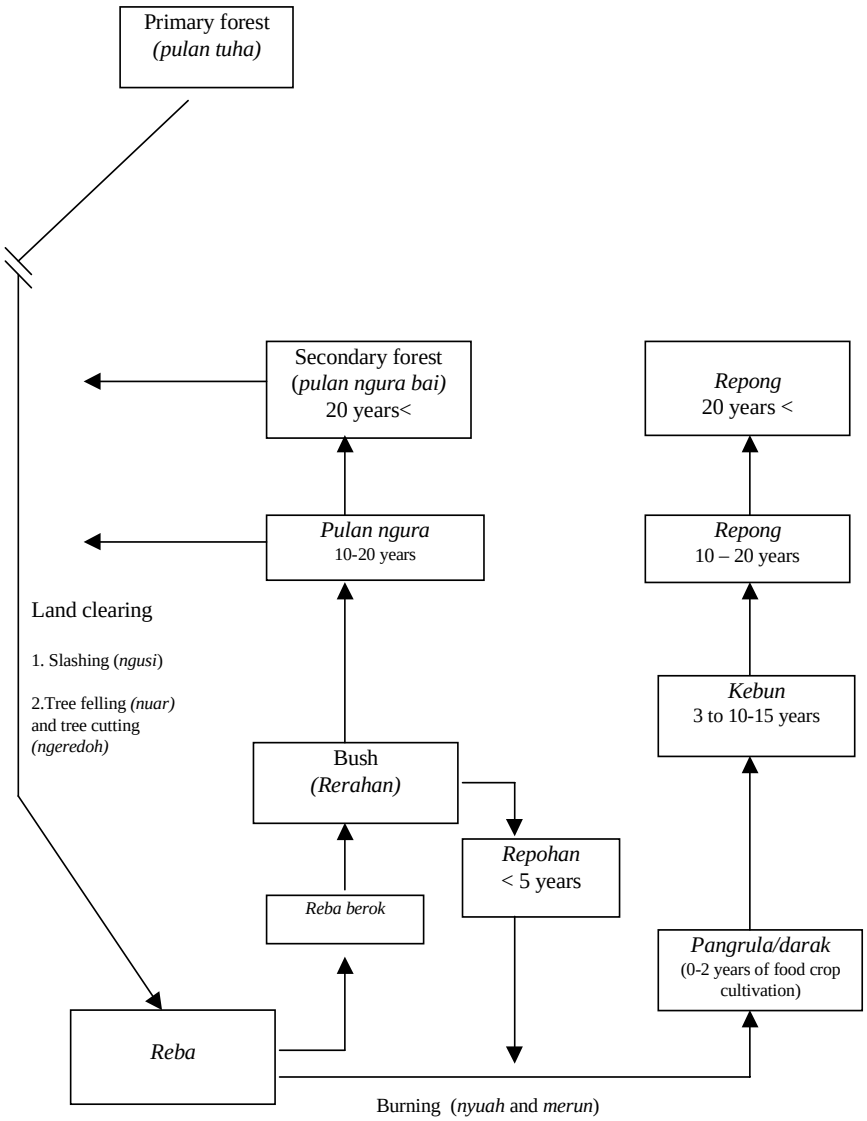
2.1. Converting forest to develop forest-like land use system

Repong damar establishment in Krui, was always begun by converting forest – either primary forest or secondary forest – into agricultural purposes in the initial stage. Forest conversions which are intended to develop *repong* damar, consist of three stages of land use change after forest clearing: food crops farming in the initial years, and then evolves to commercial crops cultivation (coffee and pepper) mix with other tree crops planting. It then slowly evolves to a forest like land use system – with Shorea *javanica* dominates its vegetation structure – which is so-called *repong* damar. The entire process from opening up the forest to become damar agroforest takes 20 to 25 years. Lubis (1996, pp. 21-27) describes this succession pattern according to the local term: *darak, kebun* and *repong*. Figure 2.1 presents the process of forest conversion into agricultural purposes aiming at *repong* damar.

Darak stage is the shortest period in the process (the first two years) when the land performs as *ladang* in which food crop (paddy and/or vegetables) constitute the main sources of income and mainly used for subsistence. In this stage food crop farming, commercial cash crops and tree crops planting are simultaneously implemented. Commercial cash crops and tree crops are expected to be the main source of income in the subsequent stages.

Kebun stage is the period where commercial cash crop of coffee and pepper that are intensively managed, come to the time to produce yields. These two crops play a significant role in the smallholder's economy. The period begins in the third year until the two main commercial crops (coffee and pepper) no longer productive. Traditionally farmers will abandon their *kebun* in the year 8^{th} or year 10^{th}. In some cases were found farmers are practicing more developed system to prolong the period of *kebun* stage by using external inputs for their coffee and pepper, and more diligently prune the trees to reduce the shade, expecting coffee and pepper remain producing yield as long as possible. However, it will not be longer than 15 years of age.

Figure 2.1. General succession pattern from forest to *repong* damar (adapted from Lubis 1996 : p. 22)



Note :
Generally the land which is used to established *repong* damar was primary forest (*pulan tuha)* or secondary forest (*pulan ngura*). *Reba* is land that has been cleared from its vegetation after slashing and ready to be burned. When it is burned and ready for cultivation the land is called *pangrula* or *darak*, which is slowly evolve to *kebun* and finally *repong*. In some cases *reba* remains not burned due to rain or other reason so that it will evolve to bush, so called *reba berok* or *rerahan* and then finally perform as *pulan*. If the *rerahan* is reopened for cultivation it is called *repohan* and then after it is burned the land is then called *pengrula* or *darak*.

Repong stage is the period when intimate mixtures of various tree crops come to appear and evolving to a forest-like land use system. It needs to note that beginning in year 11th or 15th until year 20th the plot is temporarily abandoned. However, the owner keeps harvesting any kind of fruits and other produce seasonally as the main source of income. When the damar trees are mature enough to be tapped, in the year 20th, damar resin become the main source of income. Table 2.1 summarizes the stages described above.

Table 2.1. Three stages of *repong* damar establishment: species planted and yields harvested.

Stages	Year	Species planted	Yield harvested
Darak	0-1	Dry-land paddy (*Oryza sativa)*, vegetable, coffee (*Cofea robusta*), *Erythrina* (stand poles for pepper) , damar (*Shorea javanica*, fruit trees and other perennial crops (*Parkia speciosa, Doria zibethinus, and Pithecelobium jiringe*)	dry land paddy vegetables
	2	Pepper (*Peppernigrum*)	
Kebun	3 to 10-15	None	Coffee, pepper, fruits, pete, *jengkol* and fuel woods
Repong	20 <	None	Damar resin, fruits, pete, *jengkol*, fuel woods, timber

Note: At the beginning of year 11th or 15th the plot is temporarily abandoned. Until *repong* damar mature enough to be tapped. During that period, the owners seasonally harvest the fruits and collecting fuel wood.

2.2. Agriculture Undertakings during repong damar establishment

As described above, there are two main activities involved in *repong* damar establishment: opening forest (land clearing) and agricultural undertakings (food crop cultivation, coffee and pepper farming and tree plantings). At present, the way of farmer to implement land clearing is not very much different from what they ancestors did. They work in a group of five to ten farmers for land clearing (slashing, tree cutting and burning). Those are carried out in the similar techniques. Although the use of chain saw for tree cuttings are already in trend recently, but it is not widely applied. Most of damar farmers in Rata Agung, who just opened new damar plots during the last three years, mentioned that they used manual tools such as *kapak* and *parang* or *golok* (axe and cleaver). Concerning perennial

crops planting, farmers are not merely relied on their own nursery. Since couple years ago the seedlings of any kind of tree crops, including damar tree seedlings, can be incurred from and are available in local market, either in farmers' plots or it is sold in the weekly market. Previously farmers developed they own nursery for all trees they want to plant or just naturally regenerated.

With regard to newly established *repong* damar, the observation found that in Rata Agung, at the borders of Bengkulu and Lampung Province (about 35 km northwest Krui), land clearing and agricultural undertakings aiming at *repong* damar establishment, done by about 40 villagers from Penengahan, have been taking place since the last 4 three years. Besides, some villagers in Malaya were found doing land clearings to develop *repong* damar in the old *kebun.* It is also found a villager in Malaya cultivates a plot of steep slope and stony-ground land to develop *repong* damar although the plot previously was considered as an "unsuitable" land for cultivation.

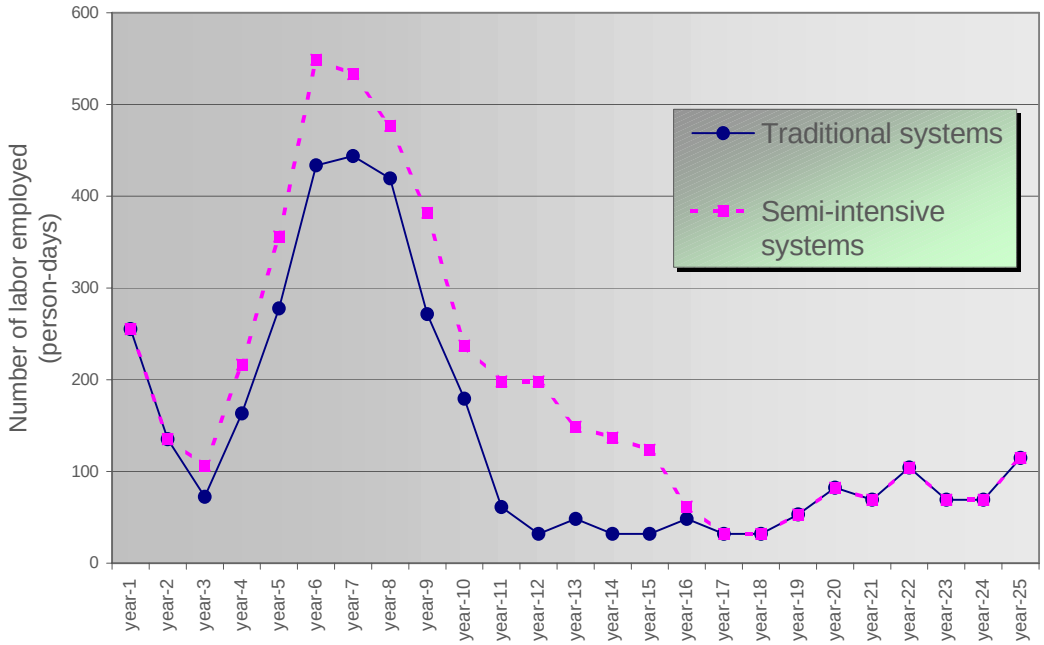
From the management point of view, the observation revealed two broad different systems of agricultural undertakings during *repong* damar establishment, specifically in coffee and pepper culture during *kebun* stage, namely traditional system and what is so called semi-intensive system. As presented in Table 2.2, the differences lie on the way of farmers managing commercial crop farming. Semi intensive system constitutes farming techniques to prolong the productive lifetime of coffee and pepper by increasing crop care intensity (pruning and weeding) and the use of external inputs. The differences in managing coffee and pepper culture apparently bring about the difference in its labor input (See Table 2.2 and Figure 2.2), external purchased inputs and certainly the cash outflow. As seen in the graph (Figure 2.2), in the first two years the two systems employ the same amount of labor and in the beginning of year 3rd until year 17th farmers who practicing semi-intensive system requires more labor inputs than the traditional system.

Table 2.2. Coffee and pepper culture during *repong damar* establishment: traditional and semi-intensive systems

Activities	Traditional			Semi intensive		
	Frequencies Per annum	Year of implementation	Labors employ-ed	Freqs. Per annum	Year of implementation	Labors employ ed
Coffee pruning	3	3rd to 9th	105 ps-d	3 2 1	3rd to 9th 10th to 12th 13th to 15th	150 ps-d
Erytrina (pepper vine stand poles) pruning	1 2	1st 2nd to 10th	285 ps-d	1 2 3	1st and 13th to 15th 2nd and 10th to 12th 3rd to 9th	600 ps-d
Perennial trees pruning	-	-	-	1	8th and 13th	96 ps-d
Weeding	3	3rd to 9th	105 ps-d	-	-	-
Herbicide application	-	-	-	3 1	3rd to 9th 10th to 15th	108 ps-d
Fertilizer application	-	-	-	1	3rd to 4th	10 ps-d

Sources: Authors' calculation
Note : ps-d : person-days

Figure 2.2.
Labor inputs by year of cultivation



Regarding tree population, it is dynamics in nature depend on of the succession stages and farmers' decision to plant. Tree population as well as its species will be different among the tree stages. As mentioned before, during *darak* and *kebun* stages, per ha of land

that is cultivated to be *repong* damar, will be dominated by coffee and pepper's living poles of *dadap* (*Eryhtrina)*. In average there are 1250 trees respectively. This number gradually decreases, as the other main perennial trees of *repong* (such as *Shorea Javanica, Durio zibethinus, Lansium domesticum, and Parkia speciosa)* are growing. Mostly coffee and pepper (including) poles of *Eryhtrina* begin to decrease in year 10 to 12. Although some time there are coffee and pepper found in the 20 years old of repong, but there is not economically productive. In a mature *repong* damar, Wijayanto (1993), based on his observation on 74 randomly selected mature damar plots (40m^2 each), listed 39 trees species with DBH 20 cm and above, recorded tree density 250 trees per ha, dominated by *damar* tree (*Shorea Javanica*) 78%, *durian* (*Durio zibethinus*) 12% and *duku* (*Lansium domesticum*) 2%. The other 8% comprise 36 tree species, which is very low in percentage for individual species.

As mentioned above, the assessment will be based on farm budget calculation. For that purpose, the assessment developed tree and crop composition over 25 years, based on field observation and panel interview with key informants. Table 2.3 presents the main economically productive trees and crop population and its yield, excluding food crops that are cultivated in the first two years.

2.3. The Costs and Returns

This sub-section will elaborate *repong* damar establishment in more detail, specifically to describe the results of farm budget calculation (including the profitability).

2.3.1. Cost of Repong Damar Establishment

The result of 25 years farm budget calculation (based on 1997 macroeconomic assumption) figures out that financially, the total expenditure (discounted) spent for repong damar establishment under traditional system is estimated Rp 6.967 million per hectare, whereas under semi-intensive system it is estimated Rp.9.445 million per hectare.

Table 2.3. Tree population and yields : succession from *darak* to r*epong*

Year	Coffee 1)				Peper and its living pole of *Erythrina* 1)				Durian 2) *(Durio zibethinus)*		Duku 2) (*Lansium domesticum)*		Petai 2) (*Parkia speciosa)*		Damar 3) *(Shorea Javanica)*	
	Traditional		Intensive		Traditional		Intensive									
	No.	Yield kg/ha	No.	Yield kg/ha	No.	Yield kg/ha	No.	Yield kg/ha	No of tree	Yield	No of tree	Yield	No of tree	Yield	No of tree	Yield
Year 1	1,250		1,250													
Year 2	1,250		1,250		1,250		1,250		25		15		8		124	
Year 3	1,250	46	1,250	69	1,250		1,250		25		15		8		124	
Year 4	1,250	460	1,250	690	1,250	41	1,250	54	25		15		8		124	
Year 5	1,250	1,035	1,250	1,553	1,250	200	1,250	264	25		15		8		124	
Year 6	1,250	1,357	1,250	2,036	1,250	917	1,250	1,210	25		15		8		124	
Year 7	1,250	886	1,250	1,325	1,250	1,500	1,250	1,980	25		15		8		124	
Year 8	1,000	702	1,250	1,052	1,250	1,479	1,250	1,600	25		15		8	1,200	124	
Year 9	900	506	1,000	759	1,250	679	1,250	897	25		15		8	1,200	124	
Year10	400	311	900	700	1,250	313	1,250	413	25	325	15	600	8	1,200	124	
Year11			500	500	1,250	306	1,250	404	25		15		8	1,200	124	
Year12			500	500			1,250	404	25		15		8	1,200	124	
Year13			500	300			1,250	300	25	625	15	600	8	1,200	124	
Year14			400	300			1,250	300	25		15		8	1,200	124	
Year15			400	300			1,250	200	25		15		8	1,200	124	
Year16							1,250	100	25	625	15	600	8	1,200	124	
Year17									25		15		8	1,200	124	
Year18									25		15		8	1,200	124	
Year19									25	625	15	1,125	8	1,200	124	
Year20									25		15		8	1,200	124	750
Year21									25		15		8	1,200	124	750
Year22									25	1,250	15	1,500	8	1,200	124	750
Year23									25		15		8	1,200	124	750
Year24									25		15		8	1,200	124	750
Year25									25	1,875	15	1,500	8	1,200	124	750

Note :

1)The number of coffee and pepper trees planted per hectare varies from 1000 - 2000 respectively, depends on farmer's decision. The maximum trees planted for kebun stage are 2000 coffee trees only or 1,333 pepper vine only (including its stand poles), and the maximum density for those two species is 2500 per hectare. The study assumed that farmers planted the same amount of coffee and pepper for their kebun. Although the number of trees (coffee and pepper) will also change over time (decreases), especially after year 7, it is not included in the calculation but its yield.

2) These trees are normally planted by farmers and are expected to be the main sources of income in the future. Number of trees of these species is varies from one plot to another. In this respect the study assumes that what was planted by farmers would bear fruits in the future.

3) Damar trees (*Sorea Javanica Spp)* as the main tree species and is expected to be the main source of daily income in the future are planted during initial kebun stage (year 2 - 6) depends on seed tree seedling availability. As it is noted that is regeneration problems of this species (de Foresta etal, 1999), not every year can be fruiting. Numbers of trees here is considered to be in the normal planting distance 9m x 9 m

The biggest parts of these expenditures are spent for labor input: 66.3% in the traditional system and 59.8% in semi-intensive system. The study revealed that most of the labor costs are spent for harvesting and its related activities that mostly done by hired laborer. Under traditional system the total expenditures spent for harvester (including post harvest activities) is estimated Rp 2.828 million or 40.6% out total cost. While in the other system, farmers spent Rp 3.491 million (37% out of total cost). Table 2.4 presents the cost structure of repong damar establishment during 25 years.

Table 2.4. Cost composition of repong damar establishment (in private prices ; discounted)

Cost Components	Traditional System		Semi-intensive System	
	Rp 000 / ha (in current term)	%	Rp 000 / ha (in current term)	%
Total cost	**6,967**	**100.0**	**9.445**	**100.0**
Tradable (purchased) inputs	**693**	**9.9**	**1,257**	**13.3**
Labor	**4,618**	**66.3**	**5,647**	**59.8**
Land clearing	*299*	*4.3*	*299*	*3.2*
Planting	*163*	*2.3*	*163*	*1.7*
Crops care	*1,055*	*15.1*	*1,421*	*15.0*
Harvesting and post harvest	*2,828*	*40.6*	*3,491*	*37.0*
Fuel wood collection	*273*	*3.9*	*273*	*2.9*
Capital (incl. Working capital)	**1,656**	**23.8**	**2,541**	**26.9**

Source: Authors' calculation

It is interesting to link those figures to the labor allocation as presented in the graphs of Figure 2.2 above. Labor inputs are increased during coffee and pepper cultures bearing high yields and decrease as those crops entering unproductive age, and then slowly increase again as the damar mature enough to be tapped. The peak time for labor allocation is occurred during year 6th to year 8th, when the two crops entering the highest yield period (*ngagung*).

What about the establishment costs to develop *repong* damar? Or in another words, how much money do farmers need to develop *repong* damar? Establishment cost here is defined as all inputs used to establish the systems, whereas the term of "establishment" is defined to be number of years to positive cash flow. (Vosti *etal*, 1998) Using these definition as basis of assessment, years to positive cash flow of the two systems to develop *repong*

damar is 4 years. The discounted establishment costs for both systems financially are ranging from Rp 2.99 million to Rp 3.86 million, and economically ranging from Rp 3.27 million to Rp 4.37. (Table 2.5).

Table 2.5. Years to positive cash flow and establishment cost

Damar Establishment Systems	Years to Positive Cash flow At private prices (Years)	Discounted Establishment Costs at private prices (Rp 000/ha)	Years to Positive Cash flow at social prices (Years)	Discounted Establishment Costs at social prices (Rp 000/ha)
Traditional System	4	2,998	4	3,267
Semi Intensive System	4	3,862	4	4,369

Sources: Authors' calculation

2.3.2. The Returns

What farmers get from *repong* damar during the first 25 years of its establishment is not only from damar trees that produced resin in year 20th or 25th (Table 2.6). From the first year they harvest series agricultural products that depend on the agricultural undertakings they implemented. In general the main products they harvest and collect, beside damar resin, are paddy and many kind of vegetables (of food crop farming), coffee, pepper, fruits (mainly *duku* and *durian*) including *pete* and other yield from trees farming, and also fuel wood. Financially, based on 1997 prices for farm budget calculations, total return (discounted) received by farmer during 25 years of damar establishments is ranging from Rp 13.637 million to Rp 18.924 million. *Kebun* stage contributes largest share compare to *darak* and *repong* stages during the first 25 years of *repong* damar establishment.

In the initial stage, depend on the land cover prior the land was converted into agricultural purposes, they might also collect timber while they are doing land clearing. The study unfortunately was not been able to get the information of the timber that was collected during land clearing process. From those who just opened new plot of land to develop *repong*

in Rata Agung, mentioned that timbers they got from land clearing was not many, and it was used as material for temporary hut or even burn[6]. Usually the trees that have high economic value were not cut and kept them grow. Therefore the study excludes timber that is collected during land clearing activities, from the analysis. The detail agricultural production harvested and collected during 25 years of *repong* damar establishment are presented in Appendix C.

Table 2.6. Returns in *repong* damar establishment by stage of development (discounted)

Stages	Yield harvested and/or collected	Traditional system			Semi intensive system		
		Year	Returns (thousand Rp)	%	Year	Returns (thousand Rp)	%
Land Clearing		0	nd	nd	0	Nd	nd
Darak Stage	Food crops	1-2	***1.281***	***9.4%***	1-2	***1,281***	***6.7%***
Kebun stage			***12,184***	***89.4%***		***17,024***	***92.3%***
	Coffee	3-10	5,187	38.0%	3-15	8,520	45.0%
	Pepper	4-11	5,461	40.1%	4-16	7,415	39.2%
	Pete	8-11	1,063	7.8%	8-16	1,063	5.6%
	Fruits	10-11	209	1.5%	10-16	209	1.1%
	Fuel wood	4-11	265	1.9%	4-16	265	1.4%
Repong stage			***172***	***1.3%***		***172***	***0.9%***
	Damar resin	20-25	52	0.4%	20-25	52	0.27%
	Pete	12-25	66	0.5%	17-25	66	0.35%
	Fruits	12-25	47	0.3%	17-25	47	0.25%
	Fuel wood	12-25	7	0.1%	17-25	7	0.04%

Source: Authors' calculation
Note: nd - no data available

2.4. Profitability Assessment

This sub-section deals with the question whether *repong* damar establishment brings positive return to farmers or in other words "is it profitable for farmers to develop *repong* damar?" Two indicators will be accounted for that: ***returns to land*** that is defined as the 'surplus' remaining after accounting for cost of labor, capital, and purchased inputs (NPV),

[6] As a matter of fact that in Rata Agung, the lands that recently cleared *repong* damar establishment were bush fallow (5-10 years old). There was no valuable timber could be exploited during land clearing.

and ***returns to labor*** - that is the wage rate that sets the NPV equal to zero (Tomich etal, 1998; Vosti etal 1997). The calculation of return to labor converts the 'surplus' to a wage after accounting for purchased inputs and the discounting for the cost of capital. Both are derived from farm budget calculation and discounted cash flow analysis of *repong* damar establishment, which is calculated at private prices (for financial profitability) and at social prices (for social profitability).

Table 2.7 presents the estimates of returns to land and returns to labor, before (July 1997) and during crisis (April 1999). The table shows that return to land and return to labor under the two systems, all has positive sign both at private prices and at social prices calculation (See the detail in Appendix D). The positive sign for both returns to land and returns to labor mean that converting forest to *repong* damar land use system through series of agricultural undertakings, as it is practiced by the Krui people, are financially and economically profitable.

Monetary crisis had significantly increased the price of any export-based agricultural product, such as coffee, peppers and damar. As seen in Table 2.7, the result of profitability assessment using macroeconomic parameter of April 1999, shows higher profitability than those calculated under July 1997. The annual prices in 1998 for all product increased by more than double the prices in 1997 (See the prices in Appendix B).

Table 2.7. Profitability matrix of 25 years *repong* damar establishment.

Damar Establishment Systems	**RETURN TO LAND (NPV)** *Rp 000 per ha*			**RETURN TO LABOR** (wage to set NPV to zero) *Rp per person day*	
	NPV at Private Prices	NPV at Social Prices	Divergences	At private prices	At Social Prices
June 1997					
Traditional Systems	6,687	9,764	(3,077)	9,029	9,876
Semi Intensive Systems	9,496	13,983	(4,487)	9,827	10,784
April 1999					
Traditional Systems	10,220	15,073	(4,853)	13,790	14,992
Semi Intensive Systems	14,427	21,608	(7,180)	14,945	16,561

Sources: Authors' calculation

Looking at the figures of returns to labor, both for July 1997 analysis and April 1999 analysis, the returns are very much higher than the wage rate of Rp 4,000/day in 1997 and Rp 6,000 per day in 1999. Returns to labor of repong damar establishments are more than double of the wage rate in Sumatra. These estimates indicate that establishing *repong* damar is very attractive for farmers to operate.

With regard to the divergences that are all being negative value, these give the impression that under the prevailing macro economic parameter, the profit that actually received by farmers is lower than it is supposed to be. It means that the potential profitability of *repong* damar establishment is higher than the actually faced by farmers. Since there is no trade policy distortion, the divergence is partly caused by the different discount rate used in the calculation. As it is elaborated in Tomich et al. (1998), capital markets in Indonesia are fraught with imperfections – some of which have been manifested in the financial crisis.

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III. DICUSSION AND CONCLUDING REMARKS

Damar agroforest or *repong* damar in Krui is a forest-like land use system that was developed by smallholders to meet multi-dimensional objectives of the operators. Among other is to create a sustainable source of income. During 25 years of repong damar establishment there are three stages of succession of land use change: *darak*, *kebun* and *repong*. Each stage has its own role for farmers' household economy. Food crops farming in the *darak* stage provide source of subsistence needs before the main expected agricultural product can be harvested. The *kebun* stage, on which farmers are expecting to make a better livelihood, provides opportunity to make a reasonably high return from coffee and pepper farming. The ultimate stage of *repong* takes role to provide regular farm income from damar and seasonal income from fruits.

Repong damar establishment apparently creates sources of income for the operators as well as its neighborhood in harvesting the yields, especially during *kebun* stage and *repong* stage. In establishing repong damar there are conservation measures involve that also provides income-related incentives to farmers. As multi-dimensional land use activity unit, besides this economics interest for farmers, there are also social incentives take part in establishing damar agroforest, such as positive identity group, higher social status, and meeting an obligation to provide the resources as a heritage to descendants Wollenberg *et al* (1998 p. 73).

Traditionally, agricultural undertakings during repong damar establishment were done without any external farm inputs application. Since mid of 80s there have been a significant development in the kebun stage that intends to increase yield of coffee and pepper and thus increase the returns during *kebun* stage. The developments are: the use of fertilizer and herbicide for weed control and also implement more frequent tree-pruning to reduce the shade in order to prolong productive lifetime of coffee and pepper. This system is so called semi-intensive system.

Based on farm budget calculation, the study reveals that semi intensive system in managing kebun stage during repong damar establishment has higher return, employs more

labor and also more profitable than those traditional system. Efforts to prolong the kebun stage bring about significant change in the farmers' economy and the neighborhood as it creates more employment opportunity in the village.

Profitability assessment figures out that repong damar establishment both traditional system and semi-intensive system are profitable. Based on the macroeconomic parameters of on July 1997, returns to land per hectare at private prices are respectively Rp 6.987 million for traditional system and Rp 9.496 million for semi-intensive system. Economically (farm budget calculation valued at social prices), returns to land for those systems are Rp 9.764 million (traditional system) and Rp 13.983 million (semi-intensive system). Similarly, for returns to labor, both systems provide returns to labor about more than double of the wage rate in Sumatra. These estimates indicate that establishing *repong* damar is very attractive for farmers to operate.

Evaluating the systems under macroeconomic parameters of April 1999, which includes economic situation under monetary crisis, the systems even performs with better figures than the results of 1997 analysis. Hence, the returns to land increase by 46.3% to 51.9% at private prices calculation and 54.4% to 54.5% in social prices calculation. Whereas return to labor had increased about 52.7% in private prices and 51.8% to 53.6% in social prices. The prevailing monetary crisis in Indonesia had increased the systems' attractiveness, as the prices of the main agricultural product (coffee, pepper and damar) are increased along with the depreciation Rupiah against US$.

The remaining question left from the study is would the system in establishing *repong* damar remain unchanged in the future? As the study noticed from the fields work that there is a tendency among farmers to prolong the *kebun* stage, which provide a considerably highest income within the whole process. Two possibilities might occur. Firstly, by prolonging the productive lifetime of coffee and pepper, farmers might postpone the resin damar tapping. Although this will generate more income and creates more employment, it will not make any significant change in the concept of creating forest-like land use system in establishing *repong* damar. Secondly, beginning from efforts to prolong *kebun* stage, then farmers might decide to keep the land perform as *kebun* for coffee and pepper plantation, it will bring about

different direction of repong damar establishment. The function of damar tree will also change from the main source of regular income to become source of side income. Environmentally, the *repong* would never exist and replace with coffee and pepper plantation. However this need further assessment to answer whether the hypothetical type of repong damar development is more profitable than the existing repong damar at present. Hence, two profitability assessments need to be carried out : (1) a profitability assessment of mature repongs – that is the second cycle of repong damar (25-50 years old), and (2) a profitability assessment of hypothetical type of land use on which farmers would decide to keep the land perform as *kebun* for coffee and pepper plantation rather than as repong.

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APPENDIX A :

The Policy Analysis Matrix: approach of the assessment[6]

The Approach

Policy analysis matrix (PAM) is a matrix of information about agricultural and natural resources policies and factor market imperfection, that is created by comparing multi years land use system budget calculated at financial prices (reflecting actual market) and economics prices (reflecting efficiency). It composed of two set of identities – one set defining ***profitability***, and other defining the difference between private price and social values, measuring the ***effect of divergence***; as the difference between observed parameters and parameters that would exist if the divergence were removed (Monke and Pearson, 1995, pp.: 16 –19).

Profitability as the first identity of accounting matrix, is measured horizontally, across the columns of the matrix as demonstrated in Table 1.

Table 1. Policy Analysis Matrix

	Revenues	Cost		Profits
		Tradable Input	Domestic Factor	
Private prices	A	B	C	D[1]
Social prices	E	F	G	H[2]
Effect of divergences and Efficiency policy	I[3]	J[4]	K[5]	L[6]

Source: Monke and Pearson (1995, p.19)
[1] Private profit, D, equal A minus B minus C
[2] Social profit, H, equal E minus F minus G
[3] Output transfer, I, equal A minus E
[4] Input transfer, J, equal B minus F
[5] Factor transfer, K, equal C minus G
[6] Net transfer, L, equal D minus H, they also equal I minus J minus K

Ratio Indicators for Comparison of Unlike Outputs
Private cost ratio (PCR): C/(A – B)
Domestic resource cost ratio (DRC): G/(E – F)
Nominal protection coefficient (NPC)
on tradable outputs (NPCO): A/E
on tradable inputs (NPCI): B/F
Effective protection coefficient (EPC): (A – B)/(E – F)
Profitability coefficient (PC): (A – B – C)/(E – F – G) or D/H
Subsidy ratio to producers (SRP): L/E or (D – H)/E

Profits, shown in the right hand column, are found by subtraction of cost, given in two middle columns, from revenue, indicated in the left-hand column. This column constitutes *profitability identities.* There are two profitability calculations: private profitability and social profitability.

Private profitability calculation is provided in the first row. The term of *private* refers to observe revenues and cost reflecting market prices received or paid by farmers, merchant, or

[6] Summarized from Monke and Pearson, 1995

processors in the agricultural system. Private profitability calculations show the competitiveness of agricultural systems at given current technologies, output values, import cost and policy transfer. Private profits are the difference between revenues (A) and cost of input (tradable input B, and domestic factors C); all measured in actual market price: D = A-B-C.

Social profitability calculations, as indicated in the second row in Table 1, is the accounting matrix utilized social prices. These valuations measure comparative advantages or efficiency in the agricultural commodity system. Social profits H, are efficiency measures, because output E (revenue) and input (E+F) are valued in prices that reflect scarcity or social opportunity cost. Social valuation of output (E) and input (F) that internationally tradable, are given by world price: c.i.f. prices for good and services that are imported or f.o.b. export prices for exportable. Social valuation for domestic factor (G) are found by estimation of net income forgone because the factor is not employed its best alternative use or its opportunity cost (Monke and Person, 1996 p.21). In practice the valuation begins with a distinction between mobile (capital, labor and services that can move from agriculture to other sector of economy) and fixed factors (mostly land). For mobile factors, aggregate supply and demand forces determine prices. For fixed or immobile factors of production, such as land, are determined within particular sector of the economy. The value of agricultural land, for example, is usually determined only by land's worth in growing alternative crops.

The second identity of the accounting matrix is ***effect of divergences***, indicated in the third row. Although this row mainly concerns the difference between private and social valuation of revenues, costs and profits, and is measured vertically. This row constitutes the main point of the PAM approach. Any divergence between the observed private prices and the estimated social prices must be explained by the effect of policy or by the existence of market failure. *Output transfer* (I=A-E) and *input transfer* (J=B-F), arise from two kinds of policy that cause divergence between observed market prices and world product prices. Those two kind of policies are commodity-specific policies include a wide range of taxes and subsidies and trade policies, and exchanged rate policy. *Factor transfer* (K = C-G) shows how policies on factors of production and the factor market imperfection had been taking place that create a divergence between private cost (C) and social cost (G). Finally the *net transfer* (L) caused by policy and market failure is the sum of the separate effect from product and factor market (L = I-J-K). Positive entries in two cost categories J and K represent negative transfer because they reduce private profit, whereas negative entries in J and K represent positive transfer.

Data needed for Analysis

The determination of profit that actually received by farmers/households is straightforward and important initial result of the analysis. It shows which farmers are currently competitive and how their profit might change if price policies were changed. Therefore farm budget

components of the principal agriculture systems, such as farm output or revenues and input cost, are the main necessary data and information. All of these are measured in actual market price. Regarding the second row of the matrix that measures comparative advantages or efficiency in the agricultural commodity system, the valuation is given in world price. Therefore f.o.b prices data of exportable items and c.i.f. prices of importable item in farm budget are the necessary data that should be collected.

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Appendix B

B1. Domestic prices of the main agricultural product in *repong* damar establishment

B2. Parity prices at farm gate of the main agricultural products in *repong* damar establishment

B3. Prices Table

B4. Input and Output Tables for repong damar establishment (25 years)

B5. Budget Tables of Damar Agroforest Establishment

Appendix B1 : Domestic Prices of the main agricultural products harvested from repong damar

Year	CPI Bandar Lampung 1997=100[1)]	Paddy (Rp / 100kg)		Coffee (Rp/kg)		Pepper (Rp/kg)		Damar(Rp/kg)	
		Nominal	Real prices *constan price 1997*	Nominal [5)]	Real prices *constan price 1997*	Nominal [5)]	Real prices *constan price 1997*	Nominal 5)	Real prices *constan price 1997*
1989	50.4	33,303 [2)]	66,013						
1990	54.4	40,482 [2)]	74,465						
1991	64.1	41,731 [2)]	65,057	1,213	1,891	1,100	1,715	425	663
1992	68.6	39,977 [2)]	58,251	1,170	1,705	1,100	1,603	513	747
1993	74.1	33,917 [2)]	45,747	1,522	2,053	1,600	2,158	650	877
1994	79.6	39,223 [2)]	49,259	4,225	5,306	2,100	2,637	850	1,067
1995	87.4	43,720 [2)]	50,029	4,360	4,989	3,333	3,814	825	944
1996	93.8	51,780 [3)]	55,204	2,275	2,425	4,500	4,798	867	924
1997	100.0	66,420 [3)]	66,420	3,276	3,276	11,000	11,000	983	983
1998	161.5	102,000 [4)]	63,169	11,410	7,066	30,333	18,785	3,300	2,044
1999	192.6	102,000 [4)]	52,959	10,500	5,452	31,500	16,355	3,100	1,610
Annual Average up to April 1999			***58,779***		***3,796***		***6,985***		***1,095***
Annual Average up to July 1997			***58,938***		***3,092***		***3,961***		***886***

Sources :

1) Derived from many sources : BPS Lampung, Indikator Tingkat Hidup Pekerja/Karyawan Propinsi Lampung 1997, BPS (1997); CPI di Ibukota Provinsi Indonesia, 1997; CPI di Ibukota Provinsi Indonesia, 1998
2) BPS, 1986, Statistik harga produsen sektor Pertanian di Jawa 1983-1995 dan di Luar Jawa 1987-1995
3) Estimated form price of rice in Lampung (60% conversion factor)
4) Esteimated from floor price of rice Rp 1,700,-/kg
5) Field observation and pers. Communication with traders in Krui

APPENDIX B-2a
Import parity price calculation for paddy at farm gate *(constant price 1997)*

Year	X-Rate [1]	CPI Bandar-lampung 1997=100 [2]	Price of Rice (F.o.b Bangkok) [3]	Price of Rice (C.I.f. Panjang Port)		Storage, handling and marketing	Parity price at Whole sale	Processing cost and handling	Conversion allowance 40%	Parity price of paddy at Collector and/or processor	Transport, handling, processing cost and marketing margin	Import parity price of paddy at farm gate (Rp/ton)	
			US$/Mt			*10.0%*	*Rp/Mt*	*6.9%*		*Rp/Mt*			
	Rp./US$	1997=100		*US$/Mt*	*Rp/Mt*						8.5%	nominal	real price *1997=100*
1989	1,770	50.45	320.33	336.35	595,367	71,444	666,811	66,681	400,087	333,405	28,339	305,066	976,408
1990	1,843	54.36	287.17	301.53	555,657	66,679	622,336	62,234	373,401	311,168	26,449	284,719	845,671
1991	1,950	64.15	312.58	328.21	640,106	76,813	716,919	71,692	430,151	358,459	30,469	327,990	825,645
1992	2,030	68.63	287.44	301.81	612,648	73,518	686,166	68,617	411,700	343,083	29,162	313,921	738,607
1993	2,087	74.14	267.94	281.34	587,178	70,461	657,640	65,764	394,584	328,820	27,950	300,870	655,274
1994	2,161	79.63	358.03	375.93	812,313	97,478	909,790	90,979	545,874	454,895	38,666	416,229	844,059
1995	2,249	87.39	327.78	344.17	773,898	92,868	866,766	86,677	520,060	433,383	36,838	396,546	732,705
1996	2,342	93.80	338.90	355.85	833,496	100,019	933,515	93,352	560,109	466,758	39,674	427,083	735,224
1997	2,873	100.00	303.50	318.68	915,553	109,866	1,025,420	102,542	615,252	512,710	43,580	469,129	757,513
1998	10,094	161.47	304.20	319.41	3,224,125	386,895	3,611,019	361,102	2,166,612	1,805,510	153,468	1,652,041	1,652,041
Apr-99	8,626	192.60	278.70	292.64	2,524,270	302,912	2,827,182	282,718	1,696,309	1,413,591	120,155	1,293,436	1,084,372
												Annual average up to April 1999	***895,229***
												Annual average up to July 1997	***790,123***

Sources :

1) Financial Statistics Year Book 1997; and BPS 1999, Pasific Exchange Rate Service (http://www.pacific.commerce.ubc.ca/xr/)

2) 2) BPS Lampung (1998), Indikator Tingkat Hidup Pekerja/Karyawan Propinsi Lampung 1997;BPS (1997);CPI in the province capital cities of Indonesia, 1997; CPI di Ibukota Provinsi di IIndonesia, 1998

3) The World Bank, Commodity Price Data / Pinksheet (http://www.,worldbank.org/prospect/pinksheet); and BPS 1999

APPENDIX B-2b

Export parity price calculation for coffee at farm gate *(constant price 1997)*

Year	Exchange Rate (annual average)	FOB at Panjang port			Export fee to AEKI	Handling and quality control fee [1]	Bank provision and other export administration cost [2]	Processing cost and packing [3]	Allowance (7.75%)	Export parity price at exporter	Marketing cost and margin (9.8%)	Export parity price at farm gate	
			(Rp/ton)										
	(Rp/US$)	*(US$/ton)*	nominal	real (1997=100)	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*Rp/kg*
1991	1,950	867	1,690,580	2,635,546	25,000	217,403	54,750	100,000	116,920	2,121,474	207,904	1,913,569	1,914
1992	2,030	770	1,563,170	2,277,728	25,000	217,403	54,750	100,000	99,029	1,781,546	174,592	1,606,955	1,607
1993	2,087	920	1,920,216	2,589,979	25,000	217,403	54,750	100,000	114,641	2,078,185	203,662	1,874,523	1,875
1994	2,161	2,443	5,279,895	6,630,835	25,000	217,403	54,750	100,000	316,684	5,916,997	579,866	5,337,132	5,337
1995	2,249	2,525	5,677,867	6,497,161	25,000	217,403	54,750	100,000	310,000	5,790,008	567,421	5,222,587	5,223
1996	2,342	1,567	3,670,430	3,913,149	25,000	217,403	54,750	100,000	180,800	3,335,196	326,849	3,008,347	3,008
1997	2,873	1,541	4,427,501	4,427,501	25,000	217,403	54,750	100,000	206,517	3,823,831	374,735	3,449,095	3,449
1998	10,094	1,453	14,665,912	9,082,628	25,000	217,403	54,750	100,000	439,274	8,246,201	808,128	7,438,074	7,438
Apr-99	8,626	1,481	12,771,806	6,631,141	25,000	217,403	54,750	100,000	316,699	5,917,288	579,894	5,337,394	5,337
											Annual average 1991-April 1999	***3,909,742***	***3,910***
											Annual average 1991-July 1997	***3,201,744***	***3,202***

Note

1) Fumigation, phytosanitary certificate, sampling, wighing, handling, *karung* and certicate of quality
2) Provision bank, bank fee, interest rate, marketing, etc.
3) Oven and sieving, sorting and labor

Source

1) Kanwil Perindustrian dan Perdagangan Propinsi Lampung
2) AEKI Lampung, 1999
3) Mougeot and Levang, 1990
4) International Financial Statistics Yearbook 1997
5) Pink Sheet, Commodity price, The World Bank, January 1998

APPENDIX B-2c

Export parity price calculation of damar resin at farm gate *(constant price 1997)*

Year	FOB (US$/ton) 1)	X-rate annual average (Rp/US$) 2)	FOB at Panjang port (Rp/ton) nominal	FOB at Panjang port (Rp/ton) real (1997=100)	Royalti/IHH (Rp/ton) 4)	Other cost (packing and handling) (Rp/ton)	Transport Krui-Tj.Karang (Rp/ton)	Export parity price at whole saler (Rp/ton)	Sorting (Rp/ton) 3)	Convertion allowance (7%) (Rp/ton) 5)	Transporting from farm and marketing cost (6%) (Rp/ton) 3)	Export parity price at farm gate (Rp/ton)
1991	360	1,950	702,108	1,094,558	25,000	10,000	100,000	959,558	15,000	67,169	57,573	819,815
1992	412	2,030	836,369	1,218,691	25,000	10,000	100,000	1,083,691	15,000	75,858	65,021	927,811
1993	411	2,087	856,970	1,155,877	25,000	10,000	100,000	1,020,877	15,000	71,461	61,253	873,163
1994	375	2,161	810,696	1,018,124	26,250	10,000	100,000	881,874	15,000	61,731	52,912	752,231
1995	467	2,249	1,050,875	1,202,513	27,500	10,000	100,000	1,065,013	15,000	74,551	63,901	911,561
1996	603	2,342	1,412,395	1,505,794	27,500	10,000	100,000	1,368,294	15,000	95,781	82,098	1,175,416
1997	523	2,909	1,520,461	1,520,461	30,250	10,000	100,000	1,380,211	15,000	96,615	82,813	1,185,784
1998	381	10,094	3,847,156	2,382,552	30,250	10,000	100,000	2,242,302	15,000	156,961	134,538	1,935,802
Apr-99	425	8,626	3,670,232	1,905,590	30,250	10,000	100,000	1,765,340	15,000	123,574	105,920	1,520,846
											Annual average 1991-April 1999	***1,122,492***
											Annual average 1991-July 1997	***949,397***

Source :

1) Kanwil Perindustrian dan Perdagangan Propinsi Lampung, 1999
2) 1986 - 1996 (Financial statistics year book, 1997) and 1997 (EIU Country Profile 1998-1999) dan 1998 - Jan 1999 (http://www.pacific.commerce.ubc.ca/xr/)
3) Latin, Jan 1995
4) Affandi, 1998
5) Levang, 1992

APPENDIX B-2d

Export parity price of black peppers at farm gate *(constant price 1997)*

Year	FOB (US$/ton) 1)	Annual Exchange rate (Rp/US$) 2)	FOB at Panjang port (Rp/ton)	Marketing margin (Rp/ton) 3)	Export parity price at farm gate (Rp/ton)	
					Nominal	Real prices (constant prices 1997)
1991	1,543	1,950	3,008,362	558,293	2,450,069	3,819,559
1992	931	2,030	1,888,887	439,959	1,448,927	2,111,263
1993	1,141	2,087	2,382,399	492,126	1,890,273	2,549,592
1994	1,646	2,161	3,556,936	616,280	2,940,656	3,693,067
1995	2,324	2,249	5,226,200	792,729	4,433,471	5,073,204
1996	2,136	2,342	5,002,862	769,121	4,233,741	4,513,711
1997	3,567	2,873	10,247,105	1,323,461	8,923,644	8,923,644
1998	4,344	10,094	43,851,885	4,875,639	38,976,246	24,138,066
Jun-99	4,129	8,626	35,613,359	4,004,789	31,608,570	42,789,367
				Annual average 1991-April 1999		***10,845,719***
				Annual average 1991- July 1997		***4,383,434***

Source :

(1) Kanwil Perindustrian dan Perdagangan Propinsi Lampung, 1999

(2) 1986 - 1996 (Financial statistics year book, 1997) and 1997 (EIU Country Profile 1998-1999) and 1998 - Jan 1999 (http://www.pacific.commerce.ubc.ca/xr/)

(3) Mauludi dan Yuhono, (1996) mentions that the marketing margin comprises of cost margin 13,03% and profit margin of 10,18%. It need to note that since 1987 there is no export tax for this product

APPENDIX B3-1

Prices Table

Repong Damar Establishment 97-B97(Traditional System)

IO items	unit	Private Prices		Social Prices
TRADABLE INPUT				
Tools				
Hoe	Rp/unit	20,000		20,000
Axe	Rp/unit	30,000		30,000
Ladder	Rp/unit	20,000		20,000
Golok (machete)	Rp/unit	10,000		10,000
Sabit (Sickle)	Rp/unit	10,000		10,000
Alit (rope made of rattan)	Rp/unit	5,000		5,000
Patil (small axe for damar tapping)	Rp/unit	8,000		8,000
Babalang ("back pack" made of rattan)	Rp/unit	22,000		22,000
Planting material (seed and seedlings)				
paddy gogo (Oriza sativa)	Rp/kg	5,000		5,000
coffee	Rp/kg	3,092		3,092
dadap (Erythrina fusca Lour)	Rp/stumps	100		100
lada (black pepper)	Rp/vines	0		0
duku (*Lansium domesticum*)	Rp/seedlings	300		300
durian (*Durio zibethinus*)	Rp/seedlings	300		300
damar (*Shorea javanica)*	Rp/seedlings	500		500
pete (*Parkia speciosa*)	Rp/seedlings	300		300
LABOR				
Land clearings				
slashing (ngusi)	Rp/ps-d	5,000	1)	5,000
tree cutting (nuar)	Rp/ps-d	5,000	1)	5,000
first burning and cleaning	Rp/ps-d	4,000	2)	4,000
second burning (bakar perun) and cleaning	Rp/ps-d	4,000	2)	4,000
Planting annual crop				
paddy (*Oriza sativa*)	Rp/ps-d	4,000		4,000
vegetables (?)	Rp/ps-d			
Planting tree crop				
dadap (Erythrina fusca Lour)	Rp/stumps	100		100
coffee	Rp/ps-d	4,000		4,000
lada (*black pepper*)	Rp/ps-d	4,000		4,000
duku (*Lansium domesticum*)	Rp/ps-d	4,000		4,000
durian (*Durio zibethinus*)	Rp/ps-d	4,000		4,000
damar (*Shorea javanica*)	Rp/ps-d	4,000		4,000
pete (Parkia speciosa)	Rp/ps-d	4,000		4,000
Crop care				
Paddy (weeding)	Rp/ps-d	4,000		4,000
Coffee				
weeding	Rp/ps-d	4,000		4,000
prunning	Rp/ps-d	4,000		4,000
replanting coffee	Rp/ps-d	4,000		4,000
Black peper				
black pepper (prunning dadap)	Rp/ps-d	4,000		4,000
replanting	Rp/ps-d	4,000		4,000
damar (*Shorea javanica*)				
cleaning before harvesting	Rp/ps-d	4,000		4,000
Harvesting				
paddy	Rp/ps-d	4,000		4,000
coffee	Rp/ps-d	7,397	3)	7,413
lada *(black pepper)*	Rp/ps-d	4,753	3)	4,786
duku (*Lansium domesticum*)	Rp/ps-d	18,375	4)	18,375
durian (*Durio zibethinus*)	Rp/ps-d	9,000	5)	9,000
pete (*Parkia speciosa*)	Rp/bunches	4,000	6)	4,000
Pepat damar (making holes for damar tapping)	Rp/ps-d	10,000	7)	10,000
damar (*Shorea javanica*)	Rp/ps-d	11,000	8)	11,000
Post harvest actvities				
Coffee (drying)	Rp/ps-d	4,000		4,000
Pepper (drying)	Rp/ps-d	4,000		4,000
Pepper thrashing	Rp/ps-d	4,000		4,000
collecting fuel wood	Rp/ps-d	4,000		4,000

APPENDIX B3-1

Prices Table

Repong Damar Establishment 97-B97(Traditional System)

IO items	unit	Private Prices		Social Prices
LAND				
CAPITAL				
Coffee hulling services (paid in kind; 4% of yield)	Rp/kg	3,092		3,099
Transport services				
coffee marketing	Rp/kg	200		200
pepper marketing	Rp/kg	200		200
YIELD				
Food crop and vegetable				
Paddy rice	Rp/kg	543		457
vegetables (?)	Rp/kg			
coffee	Rp/kg	3,092		3,099
lada (*black pepper*)	Rp/kg	3,961		3,988
pete (*Parkia speciosa*)	Rp/bunches	700		700
Fruits				
duku (*Lansium domesticum*)	Rp/kg	500		500
durian (*Durio zibethinus*)	Rp/unit	600		600
damar resin (*Shorea javanica*)	Rp/kg	886		916
Fuel wood	Rp/pods	2,000		2,000
Timber *)				
bayur (*Pterespermum javanicum*)	Rp/cu-m	400,000		nd
medang (*Lauraceae spp*)	Rp/cu-m	650,000		nd
durian (*Durio zibethinus*)	Rp/cu-m	400,000		nd
damar (*Shorea javanica*)	Rp/cu-m	400,000		nd
etc	Rp/cu-m	100,000		nd

Note:

*) These prices are the present local market prices. Since there were no timber harvested during the first 25 years, the prices here is not taken into account in the calculation; nd = no data available

1) Slashing and tree cutting are ususally done by group of 5-10 people who intend to establish repong damar (gotong royong way) in the same block. To calculate the cost, the study uses the cost if this work is done on contractual basis Recently, cost of slashing and tree cutting on contractual basis is Rp 200,000 / ha. It needs 10 ps-days work for slashing and 30 ps-days work for tree cutting. Base on that, cost of labor for slashing and tree cutting is Rp 5000,-

2) First burning and second burning are mostly done by the owner and family. The cost of labor for this particular activities is same as labor wage rate in Lampung.

3) Coffee and pepper harvesting are done by laborer that is paid on a contractual basis. There are two ways of payment are applied : (a) *bawonan,* harvester are paid in kind : (1:10) one kg yield given to harvester for every ten kg yield harvested. (b) paid in cash : Rp 5000 - Rp 6000 per 20 kg fresh yield. Bawonan is more common than the second. The study uses the first way to calculate cot for harvesting coffee and pepper. The study assumes that in average productivity of harvester is 104 kg fersh coffee bean or 16 kg frsh pepper yield. To determine cost of harvesting (coffee and pepper), the yield per person-day of harvester is converted into its market quality and times to curent market price.

4) Duku harvesting mostly done by laborer that is paid under contractual basis : Rp 175/kg includes transporting the duku to the nearest settlement. Assuming that the harvester productivity is 105 kg per person-day, cost of hevester per ps day is Rp 175 x 105 = Rp 18,375.

5) Same as duku, durian harvesting is done by laborer and is paid in contractual basis : Rp 125/durian. In average the productivity durian harvester is 60 durian per person day. So, cost of labor for durian harvesting is Rp 7500 / ps-day.

6) Pete harvesting is mostly done by the owner and family. The study uses market labor wage for this particular activity.

7) *Pepat damar* (making holes in damar tree to tap the resin in the first time) is done when the tree is already 20 years of age. Cost of labor for this particular activity is Rp 40/hole and in average the labor productivity is 250 holes per day. So that cost of pepat damar per day is Rp 10,000/ps-day.

8) Cost of resin damar tapping that is done mostly by laborer, in early 1999 is Rp 550/kg. The productivity of resin damar tapper is 20 kg per person day (from 40 tree with 0.5 kg per tree). Based on that, cost of damar tapper per day is Rp 11,000/ps-day.

APPENDIX B3-2

Prices Table :

Repong Damar Establishment 97-B97 (Semi Intensive system)

IO items	unit	Private Prices		Social Prices
TRADABLE INPUT				
Fertilizers				
TSP	Rp/kg	507		797
Urea	Rp/kg	338		446
Chemicals				
Gramason ™	Rp/lit	12,113		12,113
Paracol ™	Rp/lit	15,842		15,842
Silado ™	Rp/lit	13,001		13,001
Tools				
Hoe	Rp/unit	20,000		20,000
Axe	Rp/unit	30,000		30,000
Ladder	Rp/unit	20,000		20,000
Golok (machete)	Rp/unit	10,000		10,000
Sabit (Sickle)	Rp/unit	10,000		10,000
Alit (rope made of rattan)	Rp/unit	5,000		5,000
Patil (small axe for damar tapping)	Rp/unit	8,000		8,000
Babalang ("back pack" made of rattan)	Rp/unit	22,000		22,000
Planting material (seed and seedlings)				
paddy gogo (Oriza sativa)	Rp/kg	5,000		5,000
robusta coffee	Rp/kg	3,092		3,092
dadap (Erythrina fusca Lour)	Rp/stumps	100		100
lada (black pepper)	Rp/vines	0		0
duku (*Lansium domesticum*)	Rp/seedlings	300		300
durian (*Durio zibethinus*)	Rp/seedlings	300		300
damar (*Shorea javanica)*	Rp/seedlings	500		500
pete (*Parkia speciosa*)	Rp/seedlings	300		300
LABOR				
Land clearings				
slashing (ngusi)	Rp/ps-d	5,000	1)	5,000
tree cutting (nuar)	Rp/ps-d	5,000	1)	5,000
first burning and cleaning	Rp/ps-d	4,000	2)	4,000
second burning (bakar perun) and cleaning	Rp/ps-d	4,000	2)	4,000
Planting annual crop				
paddy (*Oriza sativa*)	Rp/ps-d	4,000		4,000
vegetables (?)	Rp/ps-d			
Planting tree crop				
dadap (Erythrina fusca Lour)	Rp/stumps	100		100
coffee	Rp/ps-d	4,000		4,000
lada (*black pepper*)	Rp/ps-d	4,000		4,000
duku (*Lansium domesticum*)	Rp/ps-d	4,000		4,000
durian (*Durio zibethinus*)	Rp/ps-d	4,000		4,000
damar (*Shorea javanica*)	Rp/ps-d	4,000		4,000
pete (Parkia speciosa)	Rp/ps-d	4,000		4,000
Crop care				
Paddy (weeding)	Rp/ps-d	4,000		4,000
Coffee				
prunning	Rp/ps-d	4,000		4,000
spraying	Rp/ps-d	4,000		4,000
replanting coffee	Rp/ps-d	4,000		4,000
Black peper				
black pepper (prunning dadap)	Rp/ps-d	4,000		4,000
fertilizing	Rp/ps-d	4,000		4,000
replanting	Rp/ps-d	4,000		4,000
damar (*Shorea javanica*)				
cleaning before harvesting	Rp/ps-d	4,000		4,000
Harvesting				
paddy	Rp/ps-d	4,000		4,000
coffee	Rp/ps-d	7,397	3)	7,413
lada *(black pepper)*	Rp/ps-d	4,753	3)	4,786
duku (*Lansium domesticum*)	Rp/ps-d	18,375	4)	18,375
durian (*Durio zibethinus*)	Rp/ps-d	9,000	5)	9,000
pete (*Parkia speciosa*)	Rp/bunches	4,000	6)	4,000
Pepat damar (making holes for damar tapping)	Rp/ps-d	10,000	7)	10,000
damar (*Shorea javanica*)	Rp/ps-d	11,000	8)	11,000
Post harvest actvities				
Coffee (drying)	Rp/ps-d	4,000		4,000

APPENDIX B3-2

Prices Table :

Repong Damar Establishment 97-B97 (Semi Intensive system)

IO items	unit	Private Prices		Social Prices
Pepper (drying)	Rp/ps-d	4,000		4,000
Pepper thrashing	Rp/ps-d	4,000		4,000
collecting fuel wood	Rp/ps-d	4,000		4,000
LAND				
CAPITAL				
Coffee hulling services (paid in kind; 4% of yield)	Rp/kg	3,092		3,099
Transport services				
coffee marketing	Rp/kg	200		200
pepper marketing	Rp/kg	200		200
YIELD				
Food crop and vegetable				
Paddy rice	Rp/kg	543		457
vegetables (?)	Rp/kg			
coffee	Rp/kg	3,092		3,099
lada (*black pepper*)	Rp/kg	3,961		3,988
pete (*Parkia speciosa*)	Rp/bunches	700		700
Fruits				
duku (*Lansium domesticum*)	Rp/kg	500		500
durian (*Durio zibethinus*)	Rp/unit	600		600
damar resin (*Shorea javanica*)	Rp/kg	886		916
Fuel wood	Rp/pods	2,000		2,000
Timber *)				
bayur (*Pterespermum javanicum*)	Rp/cu-m	400,000		nd
medang (*Lauraceae spp*)	Rp/cu-m	650,000		nd
durian (*Durio zibethinus*)	Rp/cu-m	400,000		nd
damar (*Shorea javanica*)	Rp/cu-m	400,000		nd
etc	Rp/cu-m	100,000		nd

Note:

*) These prices are the present local market prices. Since there were no timber harvested during the first 25 years, the prices here is not taken into account in the calculation; nd = no data available

1) Slashing and tree cutting are ususally done by group of 5-10 people who intend to establish repong damar (gotong royong way) in the same block. To calculate the cost, the study uses the cost if this work is done on contractual basis Recently, cost of slashing and tree cutting on contractual basis is Rp 200,000 / ha. It needs 10 ps-days work for slashing and 30 ps-days work for tree cutting. Base on that, cost of labor for slashing and tree cutting is Rp 5000,-

2) First burning and second burning are mostly done by the owner and family. The cost of labor for this particular activities is same as labor wage rate in Lampung.

3) Coffee and pepper harvesting are done by laborer that is paid on a contractual basis. There are two ways of payment are applied : (a) *bawonan,* harvester are paid in kind : (1:10) one kg yield given to harvester for every ten kg yield harvested. (b) paid in cash : Rp 5000 - Rp 6000 per 20 kg fresh yield. Bawonan is more common than the second. The study uses the first way to calculate cot for harvesting coffee and pepper. The study assumes that in average productivity of harvester is 104 kg fersh coffee bean or 16 kg frsh pepper yield. To determine cost of harvesting (coffee and pepper), the yield per person-day of harvester is converted into its market quality and times to curent market price.

4) Duku harvesting mostly done by laborer that is paid under contractual basis : Rp 175/kg includes transporting the duku to the nearest settlement. Assuming that the harvester productivity is 105 kg per person-day, cost of hevester per ps day is Rp 175 x 105 = Rp 18,375.

5) Same as duku, durian harvesting is done by laborer and is paid in contractual basis : Rp 125/durian. In average the productivity durian harvester is 60 durian per person day. So, cost of labor for durian harvesting is Rp 7500 / ps-day.

6) Pete harvesting is mostly done by the owner and family. The study uses market labor wage for this particular activity.

7) *Pepat damar* (making holes in damar tree to tap the resin in the first time) is done when the tree is already 20 years of age. Cost of labor for this particular activity is Rp 40/hole and in average the labor productivity is 250 holes per day. So that cost of pepat damar per day is Rp 10,000/ps-day.

8) Cost of resin damar tapping that is done mostly by laborer, in early 1999 is Rp 550/kg. The productivity of resin damar tapper is 20 kg per person day (from 40 tree with 0.5 kg per tree). Based on that, cost of damar tapper per day is Rp 11,000/ps-day.

IO Table : REPONG DAMAR ESTABLISHMENT - Traditional System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Tools																										
Hoe	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	unit	1	0	1	1	2	3	2	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Golok (machete)	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	unit	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Alit (rope made of rattan)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Patil (small axe for damar tapping)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Babalang ("back pack" made of rattan)	unit	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
Planting material (seed and seedlings)																										
paddy gogo (Oriza sativa)	kg/ha	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	kg/ha	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	stumps/ha	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	vines/ha	0	1,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	seedlings/ha	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	seedlings/ha	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	seedlings/ha	125	12	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	seedlings/ha	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	ps-d/ha	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	ps-d/ha	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	ps-d/ha	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	ps-d/ha	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (Oriza sativa)	ps-d/ha	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables *)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	ps-d/ha	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	ps-d/ha	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	ps-d/ha	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	ps-d/ha	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	ps-d/ha	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	ps-d/ha	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	ps-d/ha	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
weeding	ps-d/ha	0	0	15	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
prunning	ps-d/ha	0	0	15	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting coffee	ps-d/ha	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap)	ps-d/ha	15	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	ps-d/ha	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)																										
cleaning before harvesting	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Harvesting																										
paddy	ps-d/ha	60	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	0	0	3	33	75	98	64	50	36	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	ps-d/ha	0	0	0	3	16	75	122	120	55	25	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	ps-d/ha	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	6	0	0	11	0	0	14	0	0	14
durian (Durio zibethinus)	ps-d/ha	0	0	0	0	0	0	0	0	0	5	0	0	10	0	0	10	0	0	10	0	0	21	0	0	31
pete (Parkia speciosa)	ps-d/ha	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Pepat damar (making holes for damar tapping)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
damar (Shorea javanica)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	37	37	37	37	37
Post harvest actvities																										

Coffee (drying)	ps-d/ha	0	0	4	40	90	118	77	61	44	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper (drying)	ps-d/ha	0	0	0	1	5	24	40	39	18	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper thrashing	ps-d/ha	0	0	0	2	8	35	57	56	26	12	8	0	0	0	0	0	0	0	0	0	0	0	0	0
collecting fuel wood		0	0	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
LAND																									
CAPITAL																									
Coffee hulling services (paid in kind; 4% of yield)	kg/ha	0	0	2	18	41	54	35	28	20	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport services **)																									
coffee marketing	Rp	0	0	9,200	92,000	207,000	271,400	177,100	140,300	101,200	62,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp	0	0	0	8,222	40,000	183,330	300,000	295,833	135,833	62,500	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0
YIELD																									
Food crop and vegetable																									
Paddy rice	kg/ha	2,000	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables *)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	kg/ha	0	0	46	460	1,035	1,357	886	702	506	311	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	kg/ha	0	0	0	41	200	917	1,500	1,479	679	313	200	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	bunches/ha	0	0	0	0	0	0	0	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
Fruits																									
duku (Lansium domesticum)	kg/ha	0	0	0	0	0	0	0	0	0	600	0	0	600	0	0	600	0	0	1,125	0	0	1,500	0	0	1,500
durian (Durio zibethinus)	unit/ha	0	0	0	0	0	0	0	0	0	325	0	0	625	0	0	625	0	0	625	0	0	1,250	0	0	1,875
damar resin (Shorea javanica)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	750	750	750	750	750
Fuel wood	pods/ha	0	0	0	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Timber ***)																									
bayur (Pterespermum javanicum)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (Lauraceae spp)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
etc	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note

*) Neglectable amount

**) Transport services constitute carrying out the coffee and pepper from the field to the place where this product are sold (can be intermediaries or village market).

***) Only the dominant trees species

APPENDIX B4-2

IO Table : REPONG DAMAR ESTABLISHMENT - Semi-intensive System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Fertilizers																										
TSP	kg/ha	0	0	83	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urea	kg/ha	0	0	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals																										
Gramason ™	ltr/ha	0	0	15	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracol ™	ltr/ha	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0
Silado ™	ltr/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tools																										
Hoe	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	unit	1	0	1	1	2	3	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Golok (machete)	unit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	unit	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Alit (rope made of rattan)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Patil (small axe for damar tapping)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Babalang ("back pack" made of rattan)	unit	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
Planting material (seed and seedlings)																										
paddy gogo (Oriza sativa)	kg/ha	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
robusta coffee	kg/ha	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	stumps/ha	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	vines/ha	0	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	seedlings/ha	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	seedlings/ha	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	seedlings/ha	125	12	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	seedlings/ha	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	ps-d/ha	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	ps-d/ha	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	ps-d/ha	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	ps-d/ha	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (Oriza sativa)	ps-d/ha	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables *)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	ps-d/ha	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	ps-d/ha	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	ps-d/ha	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	ps-d/ha	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	ps-d/ha	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	ps-d/ha	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	ps-d/ha	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
prunning	ps-d/ha	0	0	15	15	15	15	15	15	15	10	10	10	5	5	5	0	0	0	0	0	0	0	0	0	0
spraying	ps-d/ha	0	0	12	12	12	12	12	12	12	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0
replanting coffee	ps-d/ha	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap)	ps-d/ha	15	30	60	60	60	60	60	60	60	30	30	30	15	15	15	0	0	0	0	0	0	0	0	0	0
fertilizing	ps-d/ha	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	ps-d/ha	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)																										
cleaning before harvesting	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Harvesting																										
paddy	ps-d/ha	60	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	0	0	3	33	75	98	55	51	51	34	24	24	10	14	14	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	ps-d/ha	0	0	0	4	18	85	139	112	63	29	28	28	21	21	14	7	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	ps-d/ha	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	6	0	0	11	0	0	14	0	0	14

APPENDIX B4-2

durian (Durio zibethinus)	ps-d/ha	0	0	0	0	0	0	0	0	0	5	0	0	10	0	0	10	0	0	10	0	0	21	0	0	31
pete (Parkia speciosa)	ps-d/ha	0	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Pepat damar (making holes for damar tapping)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0
damar (Shorea javanica)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	37	37	37	37	37
Post harvest actvities		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee (drying)	ps-d/ha	0	0	6	60	135	177	100	92	92	61	43	43	26	26	26	0	0	0	0	0	0	0	0	0	0
Pepper (drying)	ps-d/ha	0	0	0	1	7	32	53	43	24	11	11	11	8	8	5	3	0	0	0	0	0	0	0	0	0
Pepper thrashing	ps-d/ha	0	0	0	2	10	46	75	61	34	16	15	15	11	11	8	4	0	0	0	0	0	0	0	0	0
collecting fuel wood		0	0	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
LAND																										
CAPITAL																										
Coffee hulling services (paid in kind; 4% of yield)	kg/ha	0	0	12	40	52	60	68	60	52	40	28	20	12	12	4	0	0	0	0	0	0	0	0	0	0
Transport services **)																										
coffee marketing	Rp	0	0	13,800	138,000	310,500	407,100	230,000	210,450	210,450	140,000	100,000	100,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp	0	0	0	10,853	52,800	241,996	396,000	320,000	179,300	82,500	80,850	80,850	60,000	60,000	40,000	20,000	0	0	0	0	0	0	0	0	0
YIELD																										
Food crop and vegetable																										
Paddy rice	kg/ha	2,000	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables *)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	kg/ha	0	0	69	690	1,553	2,036	1,150	1,052	1,052	700	500	500	300	300	300	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	kg/ha	0	0	0	54	264	1,210	1,980	1,600	897	413	404	404	300	300	200	100	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	bunches/ha	0	0	0	0	0	0	0	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	1,200
Fruits		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (Lansium domesticum)	kg/ha	0	0	0	0	0	0	0	0	0	600	0	0	600	0	0	600	0	0	1,125	0	0	1,500	0	0	1,500
durian (Durio zibethinus)	unit/ha	0	0	0	0	0	0	0	0	0	325	0	0	625	0	0	625	0	0	625	0	0	1,250	0	0	1,875
damar resin (Shorea javanica)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	750	750	750	750	750
Fuel wood	pods/ha	0	0	0	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Timber ***)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
bayur (Pterespermum javanicum)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (Lauraceae spp)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (Durio zibethinus)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (Shorea javanica)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note

*) Neglectable amount

**) Transport services constitute carrying out the coffee and pepper from the field to the place where this product are sold (can be intermediaries or village market).

***) Only dominant trees species

APPENDIX 5 - 1a

Budget Table in Private Prices

DAMAR ESTABLISHMENT UNDER Traditional System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Tools																										
Hoe	Rp/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	Rp/ha	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	Rp/ha	20,000	0	20,000	20,000	40,000	60,000	40,000	20,000	20,000	0	20,000	0	20,000	0	0	0	0	0	0	0	0	0	0	0	0
Golok (machete)	Rp/ha	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	Rp/ha	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0
Alit (rope made of rattan)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000	5,000
Patil (small axe for damar tapping)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,000	0	0	8,000	0	0
Babalang ("back pack" made of rattan)	Rp/ha	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000
Planting material (seed and seedlings																										
paddy gogo (Oriza sativa)	Rp/ha	175,000	175,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	9,277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	Rp/ha	150,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	4,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	7,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica)*	Rp/ha	62,500	6,000	3,000	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	Rp/ha	2,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	Rp/ha	50,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	Rp/ha	225,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	Rp/ha	44,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	Rp/ha	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (*Oriza sativa*)	Rp/ha	40,000	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	Rp/ha	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	116,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	Rp/ha	0	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa	Rp/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	Rp/ha	160,000	160,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
weeding	Rp/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
prunning	Rp/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting coffee		20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap	Rp/ha	60,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	Rp/ha	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)																										
cleaning before harvesting	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	0	0	0	0
Harvesting																										
paddy	Rp/ha	240,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	0	0	24,497	244,973	551,188	722,669	470,418	373,494	269,292	248,523	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada *(black pepper)*	Rp/ha	0	0	0	15,880	77,257	354,106	579,425	571,313	262,363	120,713	77,257	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	0	0	0	0	0	0	0	0	0	105,000	0	0	105,000	0	0	105,000	0	0	196,875	0	0	262,500	0	0	262,500
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	48,750	0	0	93,750	0	0	93,750	0	0	93,750	0	0	187,500	0	0	281,250
pete (*Parkia speciosa*)	Rp/ha	0	0	0	0	0	0	0	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Pepat damar (making holes for damar tapping	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130,000	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409,200	409,200	409,200	409,200	409,200	409,200
Post harvest actvities																										
Coffee (drying)	Rp/ha	0	0	16,000	160,000	360,000	472,000	308,000	244,000	176,000	108,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper (drying	Rp/ha	0	0	0	4,385	21,333	97,776	160,000	157,778	72,444	33,333	21,333	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper thrashing	Rp/ha	0	0	0	6,265	30,476	139,680	228,571	225,397	103,492	47,619	30,476	0	0	0	0	0	0	0	0	0	0	0	0	0	0
collecting fuel wood	Rp/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
LAND		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAPITAL																										
Coffee hulling services (paid in kind; 4% of yield)	Rp/ha	0	0	5,690	56,896	128,017	167,844	109,525	86,767	62,586	38,405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport services																										

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
coffee marketing	Rp/ha	0	0	9,200	92,000	207,000	271,400	177,100	140,300	101,200	62,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp/ha	0	0	0	8,222	40,000	183,330	300,000	295,833	135,833	62,500	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
working capital (incremental)	Rp/ha	520,000	(40,000)	(164,613)	609,234	826,650	993,534	(75,765)	(206,158)	(911,670)	(428,268)	(825,878)	(169,066)	198,750	(198,750)	0	198,750	(198,750)	0	290,625	268,575	(150,000)	450,000	(450,000)	0	(537,200)
YIELD																										
Food crop and vegetable																										
Paddy rice	Rp/ha	1,085,232	542,616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	0	0	142,241	1,422,407	3,200,415	4,196,100	2,738,133	2,169,170	1,564,647	960,124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	Rp/ha	0	0	0	162,829	792,142	3,630,586	5,941,066	5,858,551	2,689,983	1,237,722	792,142	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	Rp/ha	0	0	0	0	0	0	0	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000
Fruits																										
duku (*Lansium domesticum*)	Rp/ha	0	0	0	0	0	0	0	0	0	300,000	0	0	300,000	0	0	300,000	0	0	562,500	0	0	750,000	0	0	750,000
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	195,000	0	0	375,000	0	0	375,000	0	0	375,000	0	0	750,000	0	0	1,125,000
damar resin (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	664,810	664,810	664,810	664,810	664,810	664,810
Fuel wood	Rp/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Timber *)																										
bayur (*Pterespermum javanicum*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (*Lauraceae spp*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
etc	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 5 - 1b

Budget Table in Social Prices

DAMAR ESTABLISHMENT UNDER Traditional System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Tools																										
Hoe	Rp/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	Rp/ha	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	Rp/ha	20,000	0	20,000	20,000	40,000	60,000	40,000	20,000	20,000	0	20,000	0	20,000	0	0	0	0	0	0	0	0	0	0	0	0
Golok (machete)	Rp/ha	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	Rp/ha	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0
Alit (rope made of rattan)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000	5,000
Patil (small axe for damar tapping)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,000	0	0	8,000	0	0
Babalang ("back pack" made of rattan)	Rp/ha	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000
Planting material (seed and seedlings)																										
paddy gogo (Oriza sativa)	Rp/ha	175,000	175,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	9,277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	Rp/ha	150,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	4,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	7,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica)*	Rp/ha	62,500	6,000	3,000	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	Rp/ha	2,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	Rp/ha	50,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	Rp/ha	225,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	Rp/ha	44,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	Rp/ha	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (*Oriza sativa*)	Rp/ha	40,000	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	Rp/ha	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	116,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	Rp/ha	0	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	Rp/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	Rp/ha	160,000	160,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
weeding	Rp/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
prunning	Rp/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting coffee		20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap)	Rp/ha	60,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	Rp/ha	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)																										
cleaning before harvesting	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	0	0	0	0
Harvesting																										
paddy	Rp/ha	240,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	0	0	24,552	245,521	552,422	724,287	471,472	374,331	269,895	249,079	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada *(black pepper)*	Rp/ha	0	0	0	15,990	77,791	356,557	583,435	575,267	264,180	121,549	77,791	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	Rp/ha	0	0	0	0	0	0	0	0	0	105,000	0	0	105,000	0	0	105,000	0	0	196,875	0	0	262,500	0	0	262,500
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	48,750	0	0	93,750	0	0	93,750	0	0	93,750	0	0	187,500	0	0	281,250
pete (*Parkia speciosa*)	Rp/ha	0	0	0	0	0	0	0	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Pepat damar (making holes for damar tapping)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130,000	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409,200	409,200	409,200	409,200	409,200	409,200
Post harvest actvities																										
Coffee (drying)	Rp/ha	0	0	16,000	160,000	360,000	472,000	308,000	244,000	176,000	108,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper (drying)	Rp/ha	0	0	0	4,385	21,333	97,776	160,000	157,778	72,444	33,333	21,333	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pepper thrashing	Rp/ha	0	0	0	6,265	30,476	139,680	228,571	225,397	103,492	47,619	30,476	0	0	0	0	0	0	0	0	0	0	0	0	0	0
collecting fuel wood	Rp/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
LAND																										
CAPITAL																										
Coffee hulling services (paid in kind; 4% of yield)	Rp/ha	0	0	5,702	57,024	128,303	168,220	109,771	86,961	62,726	38,491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport services																										
coffee marketing	Rp/ha	0	0	9,200	92,000	207,000	271,400	177,100	140,300	101,200	62,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp/ha	0	0	0	8,222	40,000	183,330	300,000	295,833	135,833	62,500	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Working capital (incremental)	Rp/ha	520,000	(40,000)	(164,546)	609,952	827,920	995,923	(74,901)	(206,482)	(914,096)	(429,349)	(826,821)	(169,601)	198,750	(198,750)	0	198,750	(198,750)	0	290,625	268,575	(150,000)	450,000	(450,000)	0	(537,200)

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
YIELD																										
Food crop and vegetable																										
Paddy rice	Rp/ha	913,791	456,896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (2)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	Rp/ha	0	0	142,559	1,425,591	3,207,580	4,205,494	2,744,263	2,174,027	1,568,150	962,274	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	Rp/ha	0	0	0	163,956	797,625	3,655,717	5,982,190	5,899,104	2,708,603	1,246,290	797,625	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	Rp/ha	0	0	0	0	0	0	0	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000
Fruits																										
duku (*Lansium domesticum*)	Rp/ha	0	0	0	0	0	0	0	0	0	300,000	0	0	300,000	0	0	300,000	0	0	562,500	0	0	750,000	0	0	750,000
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	195,000	0	0	375,000	0	0	375,000	0	0	375,000	0	0	750,000	0	0	1,125,000
damar resin (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	687,249	687,249	687,249	687,249	687,249	687,249
Fuel wood	Rp/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Timber *)																										
bayur (*Pterespermum javanicum*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (*Lauraceae spp*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
etc	Rp/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 5 - 2a

Budget Table in Private Prices

DAMAR ESTABLISHMENT UNDER Semi-intensive System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Fertilizers																										
TSP	kg/ha	0	0	42,251	42,251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urea	kg/ha	0	0	11,277	11,277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals																										
Gramason ™	ltr/ha	0	0	181,698	181,698	181,698	181,698	181,698	181,698	181,698	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracol ™	ltr/ha	0	0	0	0	0	0	0	0	0	79,209	79,209	79,209	79,209	79,209	79,209	0	0	0	0	0	0	0	0	0	0
Silado ™	ltr/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tools																										
Hoe	unit	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	unit	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	unit	20,000	0	20,000	20,000	40,000	60,000	40,000	20,000	20,000	0	20,000	0	20,000	0	20,000	0	0	0	0	0	0	0	0	0	0
Golok (machete)	unit	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	unit	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0
Alit (rope made of rattan)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000	5,000
Patil (small axe for damar tapping)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,000	0	0	8,000	0	0
Babalang ("back pack" made of rattan)	unit	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000
Planting material (seed and seedlings)																										
paddy gogo (Oriza sativa)	kg/ha	175,000	175,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
robusta coffee	kg/ha	9,277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	stumps/ha	150,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	vines/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	seedlings/ha	4,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	seedlings/ha	7,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	seedlings/ha	62,500	6,000	3,000	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	seedlings/ha	2,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	ps-d/ha	50,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	ps-d/ha	225,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	ps-d/ha	44,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	ps-d/ha	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (*Oriza sativa*)	ps-d/ha	40,000	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	ps-d/ha	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	116,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	ps-d/ha	0	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	ps-d/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	ps-d/ha	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	ps-d/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	ps-d/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	ps-d/ha	160,000	160,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
prunning	ps-d/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	40,000	40,000	40,000	20,000	20,000	20,000	0	0	0	0	0	0	0	0	0	0
spraying	ps-d/ha	0	0	48,000	48,000	48,000	48,000	48,000	48,000	48,000	16,000	16,000	16,000	16,000	16,000	16,000	0	0	0	0	0	0	0	0	0	0
replanting coffee	ps-d/ha	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap)	ps-d/ha	60,000	120,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	120,000	120,000	120,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0
fertilizing	ps-d/ha	0	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	ps-d/ha	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)																										
cleaning before harvesting	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	0	0	0	0
Harvesting																										
paddy	ps-d/ha	240,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	0	0	24,497	244,973	551,188	722,669	408,288	373,583	373,583	248,523	177,516	177,516	73,965	106,510	106,510	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	ps-d/ha	0	0	0	18,055	87,833	402,559	658,745	532,320	298,265	137,239	134,494	134,494	99,810	99,810	66,540	33,270	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	ps-d/ha	0	0	0	0	0	0	0	0	0	105,000	0	0	105,000	0	0	105,000	0	0	196,875	0	0	262,500	0	0	262,500
durian (*Durio zibethinus*)	ps-d/ha	0	0	0	0	0	0	0	0	0	48,750	0	0	93,750	0	0	93,750	0	0	93,750	0	0	187,500	0	0	281,250
pete (*Parkia speciosa*)	ps-d/ha	0	0	0	0	0	0	0	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Pepat damar (making holes for damar tapping)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130,000	0	0	0	0	0
damar (*Shorea javanica*)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409,200	409,200	409,200	409,200	409,200	409,200
Post harvest actvities		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee (drying)	ps-d/ha	0	0	24,000	240,000	540,000	708,000	400,000	366,000	366,000	243,478	173,913	173,913	104,348	104,348	104,348	0	0	0	0	0	0	0	0	0	0
Pepper (drying)	ps-d/ha	0	0	0	5,788	28,160	129,064	211,200	170,667	95,627	44,000	43,120	43,120	32,000	32,000	21,333	10,667	0	0	0	0	0	0	0	0	0
Pepper thrashing	ps-d/ha	0	0	0	8,269	40,229	184,378	301,714	243,810	136,610	62,857	61,600	61,600	45,714	45,714	30,476	15,238	0	0	0	0	0	0	0	0	0
collecting fuel wood		0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
LAND																										
CAPITAL																										
Coffee hulling services (paid in kind; 4% of yield)	kg/ha	0	0	37,106	123,688	160,794	185,531	210,269	185,531	160,794	123,688	86,581	61,844	37,106	37,106	12,369	0	0	0	0	0	0	0	0	0	0
Transport services																										
coffee marketing	Rp/ha	0	0	13,800	138,000	310,500	407,100	230,000	210,450	210,450	140,000	100,000	100,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp/ha	0	0	0	10,853	52,800	241,996	396,000	320,000	179,300	82,500	80,850	80,850	60,000	60,000	40,000	20,000	0	0	0	0	0	0	0	0	0
Working Capital (incremental)	Rp/ha	695,000	(40,000)	67,629	766,222	908,350	1,209,794	(165,081)	(381,856)	(581,732)	(859,083)	(377,960)	(24,738)	(201,644)	(166,205)	(103,912)	(338,860)	(277,925)	0	290,625	268,575	(150,000)	450,000	(450,000)	0	(537,200)

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
YIELD																										
Food crop and vegetable																										
Paddy rice	kg/ha	1,085,232	542,616	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	kg/ha	0	0	213,361	2,133,610	4,800,622	6,294,149	3,556,017	3,253,755	3,253,755	2,164,532	1,546,094	1,546,094	927,657	927,657	927,657	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	kg/ha	0	0	0	214,935	1,045,628	4,792,373	7,842,207	6,337,137	3,550,777	1,633,793	1,601,117	1,601,117	1,188,213	1,188,213	792,142	396,071	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	bunches/ha	0	0	0	0	0	0	0	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000
Fruits																										
duku (*Lansium domesticum*)	kg/ha	0	0	0	0	0	0	0	0	0	300,000	0	0	300,000	0	0	300,000	0	0	562,500	0	0	750,000	0	0	750,000
durian (*Durio zibethinus*)	unit/ha	0	0	0	0	0	0	0	0	0	195,000	0	0	375,000	0	0	375,000	0	0	375,000	0	0	750,000	0	0	1,125,000
damar resin (*Shorea javanica*)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	664,810	664,810	664,810	664,810	664,810	664,810
Fuel wood	pods/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Timber *)																										
bayur (*Pterespermum javanicum*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (*Lauraceae spp*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
etc	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 5 - 2b

Budget Table in Social Prices

DAMAR ESTABLISHMENT UNDER Semi-intensive System

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
TRADABLE INPUT																										
Fertilizers																										
TSP	kg/ha	0	0	66,397	66,397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urea	kg/ha	0	0	14,865	14,865	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals																										
Gramason ™	ltr/ha	0	0	181,698	181,698	181,698	181,698	181,698	181,698	181,698	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracol ™	ltr/ha	0	0	0	0	0	0	0	0	0	79,209	79,209	79,209	79,209	79,209	79,209	0	0	0	0	0	0	0	0	0	0
Silado ™	ltr/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tools																										
Hoe	unit	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Axe	unit	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ladder	unit	20,000	0	20,000	20,000	40,000	60,000	40,000	20,000	20,000	0	20,000	0	20,000	0	20,000	0	0	0	0	0	0	0	0	0	0
Golok (machete)	unit	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sabit (Sickle)	unit	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0	10,000	0	0	0	0
Alit (rope made of rattan)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000	5,000
Patil (small axe for damar tapping)	unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,000	0	0	8,000	0	0
Babalang ("back pack" made of rattan)	unit	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000	0	22,000
Planting material (seed and seedlings)																										
paddy gogo (Oriza sativa)	kg/ha	175,000	175,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
robusta coffee	kg/ha	9,277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
dadap (Erythrina fusca Lour)	stumps/ha	150,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (black pepper)	vines/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	seedlings/ha	4,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	seedlings/ha	7,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	seedlings/ha	62,500	6,000	3,000	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	seedlings/ha	2,400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LABOR																										
Land clearings																										
slashing (ngusi)	ps-d/ha	50,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tree cutting (nuar)	ps-d/ha	225,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
first burning and cleaning	ps-d/ha	44,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
second burning (bakar perun) and cleaning	ps-d/ha	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting annual crop																										
paddy (*Oriza sativa*)	ps-d/ha	40,000	40,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting tree crop																										
dadap (Erythrina fusca Lour)	ps-d/ha	1,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	116,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	ps-d/ha	0	60,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	ps-d/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	ps-d/ha	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	ps-d/ha	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pete (Parkia speciosa)	ps-d/ha	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crop care																										
Paddy (weeding)	ps-d/ha	160,000	160,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coffee																										
prunning	ps-d/ha	0	0	60,000	60,000	60,000	60,000	60,000	60,000	60,000	40,000	40,000	40,000	20,000	20,000	20,000	0	0	0	0	0	0	0	0	0	0
spraying	ps-d/ha	0	0	48,000	48,000	48,000	48,000	48,000	48,000	48,000	16,000	16,000	16,000	16,000	16,000	16,000	0	0	0	0	0	0	0	0	0	0
replanting coffee	ps-d/ha	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black peper																										
black pepper (prunning dadap)	ps-d/ha	60,000	120,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	120,000	120,000	120,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0
fertilizing	ps-d/ha	0	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
replanting	ps-d/ha	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)																										
cleaning before harvesting	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	0	0	0	0
Harvesting																										
paddy	ps-d/ha	240,000	120,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	ps-d/ha	0	0	24,552	245,521	552,422	724,287	409,202	374,420	374,420	249,079	177,914	177,914	74,131	106,748	106,748	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	ps-d/ha	0	0	0	18,179	88,441	405,346	663,305	536,004	300,330	138,189	135,425	135,425	100,501	100,501	67,001	33,500	0	0	0	0	0	0	0	0	0
duku (*Lansium domesticum*)	ps-d/ha	0	0	0	0	0	0	0	0	0	105,000	0	0	105,000	0	0	105,000	0	0	196,875	0	0	262,500	0	0	262,500
durian (*Durio zibethinus*)	ps-d/ha	0	0	0	0	0	0	0	0	0	48,750	0	0	93,750	0	0	93,750	0	0	93,750	0	0	187,500	0	0	281,250
pete (*Parkia speciosa*)	ps-d/ha	0	0	0	0	0	0	0	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Pepat damar (making holes for damar tapping)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130,000	0	0	0	0	0
damar (*Shorea javanica*)	ps-d/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	409,200	409,200	409,200	409,200	409,200	409,200
Post harvest actvities																										
Coffee (drying)	ps-d/ha	0	0	24,000	240,000	540,000	708,000	400,000	366,000	366,000	243,478	173,913	173,913	104,348	104,348	104,348	0	0	0	0	0	0	0	0	0	0
Pepper (drying)	ps-d/ha	0	0	0	5,788	28,160	129,064	211,200	170,667	95,627	44,000	43,120	43,120	32,000	32,000	21,333	10,667	0	0	0	0	0	0	0	0	0
Pepper thrashing	ps-d/ha	0	0	0	8,269	40,229	184,378	301,714	243,810	136,610	62,857	61,600	61,600	45,714	45,714	30,476	15,238	0	0	0	0	0	0	0	0	0
collecting fuel wood		0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
LAND																										
CAPITAL																										
Coffee hulling services (paid in kind; 4% of yield)	kg/ha	0	0	37,189	123,964	161,154	185,947	210,740	185,947	161,154	123,964	86,775	61,982	37,189	37,189	12,396	0	0	0	0	0	0	0	0	0	0
Transport services																										

IO items	unit	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12	year 13	year 14	year 15	year 16	year 17	year 18	year 19	year 20	year 21	year 22	year 23	year 24	year 25
coffee marketing	Rp/ha	0	0	13,800	138,000	310,500	407,100	230,000	210,450	210,450	140,000	100,000	100,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0
pepper marketing	Rp/ha	0	0	0	10,853	52,800	241,996	396,000	320,000	179,300	82,500	80,850	80,850	60,000	60,000	40,000	20,000	0	0	0	0	0	0	0	0	0
Working Capital (incremental)	Rp/ha	695,000	(40,000)	95,501	767,034	881,868	1,212,412	(163,956)	(382,864)	(583,407)	(860,560)	(378,221)	(24,793)	(202,171)	(166,132)	(104,198)	(339,357)	(278,155)	0	290,625	268,575	(150,000)	450,000	(450,000)	0	(537,200)
YIELD																										
Food crop and vegetable																										
Paddy rice	kg/ha	913,791	456,896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vegetables (?)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coffee	kg/ha	0	0	213,839	2,138,387	4,811,370	6,308,241	3,563,978	3,261,040	3,261,040	2,169,378	1,549,556	1,549,556	929,733	929,733	929,733	0	0	0	0	0	0	0	0	0	0
lada (*black pepper*)	kg/ha	0	0	0	216,422	1,052,866	4,825,546	7,896,491	6,381,003	3,575,356	1,645,102	1,612,200	1,612,200	1,196,438	1,196,438	797,625	398,813	0	0	0	0	0	0	0	0	0
pete (*Parkia speciosa*)	bunches/ha	0	0	0	0	0	0	0	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000	840,000
Fruits																										
duku (*Lansium domesticum*)	kg/ha	0	0	0	0	0	0	0	0	0	300,000	0	0	300,000	0	0	300,000	0	0	562,500	0	0	750,000	0	0	750,000
durian (*Durio zibethinus*)	unit/ha	0	0	0	0	0	0	0	0	0	195,000	0	0	375,000	0	0	375,000	0	0	375,000	0	0	750,000	0	0	1,125,000
damar resin (*Shorea javanica*)	kg/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	687,249	687,249	687,249	687,249	687,249	687,249
Fuel wood	pods/ha	0	0	0	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000
Timber *)																										
bayur (*Pterespermum javanicum*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
medang (*Lauraceae spp*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
durian (*Durio zibethinus*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
damar (*Shorea javanica*)	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
etc	cu-m/ha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C

Yields Estimate of the main Agricultural Products during repong damar establishment

1. UNDER SEMI INTENSIVE SYSTEM

	Paddy rice	**Coffee**	**Lada** *(black pepper)*	**Petai** *(Parkia speciosa)*	**Duku** *(Lansium domesticum)*	**Durian** *(Durio zibethinus)*	**Damar resin** *(Shorea javanica)*	**Fuel wood**
	kg/ha	kg/ha	kg/ha	bunches/ha	kg/ha	unit/ha	kg/ha	pods/ha
year1	2,000	-	-	-	-	-	-	-
year2	1,000	-	-	-	-	-	-	-
year3	-	69	-	-	-	-	-	-
year4	-	690	54	-	-	-	-	48
year5	-	1,553	264	-	-	-	-	48
year6	-	2,036	1,210	-	-	-	-	48
year7	-	1,150	1,980	-	-	-	-	48
year8	-	1,052	1,600	1,200	-	-	-	48
year9	-	1,052	897	1,200	-	-	-	48
year10	-	700	413	1,200	600	325	-	48
year11	-	500	404	1,200	-	-	-	48
year12	-	500	404	1,200	-	-	-	48
year13	-	300	300	1,200	600	625	-	48
year14	-	300	300	1,200	-	-	-	48
year15	-	300	200	1,200	-	-	-	48
year16	-	-	100	1,200	600	625	-	48
year17	-	-	-	1,200	-	-	-	48
year18	-	-	-	1,200	-	-	-	48
year19	-	-	-	1,200	1,125	625	-	48
year20	-	-	-	1,200	-	-	750	48
year21	-	-	-	1,200	-	-	750	48
year22	-	-	-	1,200	1,500	1,250	750	48
year23	-	-	-	1,200	-	-	750	48
year24	-	-	-	1,200	-	-	750	48
year25	-	-	-	1,200	1,500	1,875	750	48

2. UNDER TRADITIONAL SYSTEM

	Paddy rice	**Coffee**	**Lada** *(black pepper)*	**Pete** *(Parkia speciosa)*	**Duku** *(Lansium domesticum)*	**Durian** *(Durio zibethinus)*	**Damar resin** *(Shorea javanica)*	**Fuel wood**
	kg/ha	kg/ha	kg/ha	bunches/ha	kg/ha	unit/ha	kg/ha	pods/ha
year1	2,000	-	-	-	-	-	-	-
year2	1,000	-	-	-	-	-	-	-
year3	-	46	-	-	-	-	-	-
year4	-	460	41	-	-	-	-	48
year5	-	1,035	200	-	-	-	-	48
year6	-	1,357	917	-	-	-	-	48
year7	-	886	1,500	-	-	-	-	48
year8	-	702	1,479	1,200	-	-	-	48
year9	-	506	679	1,200	-	-	-	48
year10	-	311	313	1,200	600	325	-	48
year11	-	-	200	1,200	-	-	-	48
year12	-	-	-	1,200	-	-	-	48
year13	-	-	-	1,200	600	625	-	48
year14	-	-	-	1,200	-	-	-	48
year15	-	-	-	1,200	-	-	-	48
year16	-	-	-	1,200	600	625	-	48
year17	-	-	-	1,200	-	-	-	48
year18	-	-	-	1,200	-	-	-	48
year19	-	-	-	1,200	1,125	625	-	48
year20	-	-	-	1,200	-	-	750	48
year21	-	-	-	1,200	-	-	750	48
year22	-	-	-	1,200	1,500	1,250	750	48
year23	-	-	-	1,200	-	-	750	48
year24	-	-	-	1,200	-	-	750	48
year25	-	-	-	1,200	1,500	1,875	750	48

APPENDIX D: NPV PAM Tables

1. NPV PAM Repong damar establishment – assessed under macroeconomic parameters of July 1997

1.1. Traditional Damar System

	Revenues	Total cost			Profits
		Tradable inputs	Domestic factors		
			Labors	Capitals	
Private prices	13,654,763	693,220	4,618,068	1,656,140	6,687,335
Social prices	18,400,945	767,310	5,931,900	1,937,219	9,764,515
Effects of divergences	(4,746,182)	(74,090)	(1,313,832)	(281,079)	(3,077,180)

1.2. Semi-intensive system

	Revenues	Total cost			Profits
		Tradable inputs	Domestic factors		
			Labors	Capitals	
Private prices	18,941,294	1,257,184	5,646,508	2,541,458	9,496,145
Social prices	25,889,772	1,526,472	7,340,369	3,039,655	13,983,276
Effects of divergences	(6,948,478)	(269,288)	(1,693,861)	(498,197)	(4,487,131)

2. NPV PAM Repong damar establishment – Assessed under macroeconomic parameters of April 1999

2.1. Traditional Damar System

	Revenues	Total cost			Profits
		Tradable inputs	Domestic factors		
			Labors	Capitals	
Private prices	19,795,930	694,979	6,840,326	2,041,066	10,219,558
Social prices	27,009,563	769,443	8,809,216	2,358,125	15,072,779
Effects of divergences	(7,213,634)	(74,464)	(1,968,890)	(317,059)	(4,853,221)

2.2. Semi-intensive system

	Revenues	Total cost			Profits
		Tradable inputs	Domestic factors		
			Labors	Capitals	
Private prices	27,332,723	1,428,068	8,388,022	3,089,369	14,427,265
Social prices	37,889,490	1,695,393	10,935,119	3,651,313	21,607,665
Effects of divergences	(10,556,767)	(267,324)	(2,547,098)	(561,944)	(7,180,400)

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