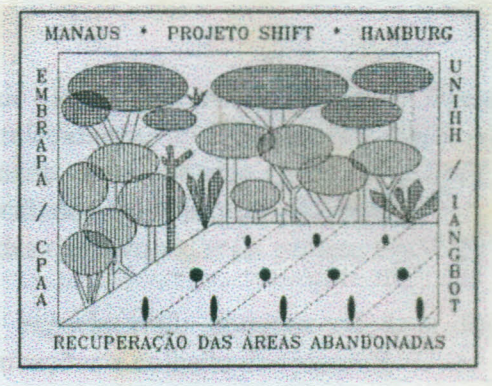

RECUPERAÇÃO DE ÁREAS DEGRADADAS E ABANDONADAS, ATRAVÉS DE SISTEMAS DE POLICULTIVO

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COST/BENEFIT ANALYSIS OF AGROFORESTRY SYSTEMS: A CASE STUDY

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1. INTRODUCTION

The loss of economic relevance of the extractive activity with prominence for rubber, brasil-nut and timber, complemented by subsistence, reshaped in the eighties, in spite of its social importance, it is attributed to the "irrationality of the exploration", as well as to the economic unfeasability of this activity, denounced by the growing costs of extraction, processing and transport of the product to the consuming centers. With relation to the slash and burn agriculture, its relative loss is explained by the lack of competitiveness in price and, mainly, the low quality of the products.Picture has been reshaped, in the recent years, by the need to conserve and to preserve the environment.

Results of agricultural research indicate that the diversification of cultivations through agroforestry systems can contribute to the farmer's economic and financial stability and, consequently, for the sustainability provide that the different crops are adjusted to the market opportunities and the environmental conditions.

This study objetive to make cost/benefit analysis of agroforestry systems indicated for the recovery of degraded areas in the Amazon.

2. METHODOLOGY

The analysis of the experimental production systems, obeyed the following procedures: a) comparison of the new production systems with the traditional system, based on coefficients of internal return rate (IRR), present value (LPV) and benefit/cost ratio (B/C); b) explication of the effects of the new production systems on the sustaintability c) sensibility analysis of those systems based on the more important variable ones more important; and d) accomplishment of simulations to evaluate the risk and the underlying uncertainty to the referred systems.

$$LPV = ILBt / (1 + i)^t$$

in that:

ILB = incremental liquid benefit;

i = market interest rate (financial analysis) or it rates of discount (economic analysis);

t = 1, 2,..., n years.

$IRR = ILBt / (1 + i)^t = 0$

$$B/C = \frac{\sum_{t=0}^{n} B_t/(1+i)^t}{\sum_{t=0}^{n} C_t/(1+i)^t} \text{ in that:}$$

Bt = incremental benefit in the year t

Ct = incremental cost in the year t.

The risk and the underlying uncertainty of the production systems, should be considered what will be made in, this research, through sensitivity analysis and probability analysis.

The basic data of this research were surveyed between December of 1996 and January of 1997, close to technicians that work in the SHIFT project.

3. RESULTS AND DISCUSSION

The analysis of the experimental agroforestry systems and to the traditional system was accomplished from its respective cash flows, in the Tables 1 and 2.

The Table 1 presents the esteemed values of the profitability coefficients IRR, LPV and the B/C ratio of the systems of experimental production and of traditional agriculture in the periods of 10 and 20 years.

Table 2, display LPV of the agroforestry experimental systems nº 2, 3 and 4, present 5% of probability of being smaller or equal the R$ 11.895,00, R$ 6.442,00 and R$ 6.442,00, respectively. There is a 90% probability of these indicators being placed between R$ 11.895,00 and R$ 12.975,00 - system nº 2, R$ 6.442,00 and R$ 7.173,00 - system nº3 and R$ 6.442,00 and R$ 7.173,00 - system nº4. These results confirm the possibility of these systems to contribute to the sustentainability of the regional agricultural activity.

Table 1 - Internal Return Rates (IRR), Liquid Present Value (LPV) and benefit/cost ratio (B/C) corresponding to the cash flows of the tradicional systems and of itinerant agriculture and of the experimental agroforestry systems. State of Amazonas, 1997.

PARAMETERS	Traditional Systems	Experimental Agroforestry Systems			
		1	2	3	4
IRR - 10 years	-1	(-)	16%	23%	35%
IIR - 20 years	1%	(-)	26%	28%	39%
LPV - 6% - 10 years	R$ 9.031,1	(R$ 2.933,04)	R$ 1.938,31	R$ 1.971,99	R$ 3.476,76
LPV - 6% - 20 years	R$ 13.675,8	(R$ 2.782,14)	R$ 11.416,85	R$ 6.196,29	R$ 8.109,56
Ratio B/C - 10 years	1,19	(-)	1,57	1,65	1,71
Ratio B/C - 20 years	0,98	0,57	2,55	2,49	2,32

Table 2 - Distribution of accumulated probability of IRR, LPV and relationship B/C, of the agroforestry systems of numbers (1), (2), (3) and (4), in the 20 year-old horizon.

Parameters	*EXPERIMENTAL AGROFORESTRY SYSTEMS*											
	1			2			3			4		
	IRR	LPV	Ratio B/C	IIR	LPV	Ratio B/C	IRR	LPV	Ratio B/C	IRR	LPV	Ratio B/C
Minimum =	-	(2,815)	0.57	26%	11,477	2.97	27%	6,142	2.47	27%	6,142	2.47
Maximum =	-	(2,594)	0.63	29%	13,501	3.26	33%	7,439	2.71	33%	7,439	2.71
Mean =	-	(2,699)	0.60	27%	12,405	3.10	30%	6,800	2.61	30%	6,800	2.61
Std Deviation =	-	46	0.01	1%	344	0.05	1%	222	0.04	1%	222	0.04
Mode =	-	(2,687)	0.60	27%	12,211	3.10	30%	6,593	2.59	30%	6,593	2.59
5% Perc =	-	(2,786)	0.58	26%	11,895	3.02	28%	6,442	2.54	28%	6,442	2.54
10% Perc =	-	(2,752)	0.58	27%	12,007	3.03	29%	6,544	2.55	29%	6,544	2.55
15% Perc =	-	(2,745)	0.58	27%	12,089	3.05	29%	6,575	2.57	29%	6,575	2.57
20% Perc =	-	(2,740)	0.59	27%	12,147	3.06	29%	6,619	2.58	29%	6,619	2.58
25% Perc =	-	(2,732)	0.59	27%	12,185	3.07	29%	6,641	2.58	29%	6,641	2.58
30% Perc =	-	(2,728)	0.59	27%	12,212	3.07	30%	6,683	2.59	30%	6,683	2.59
35% Perc =	-	(2,719)	0.59	27%	12,243	3.08	30%	6,707	2.59	30%	6,707	2.59
40% Perc =	-	(2,713)	0.59	27%	12,255	3.08	30%	6,737	2.59	30%	6,737	2.59
45% Perc =	-	(2,707)	0.60	27%	12,336	3.09	30%	6,755	2.60	30%	6,755	2.60
50% Perc =	-	(2,702)	0.60	27%	12,375	3.09	30%	6,783	2.61	30%	6,783	2.61
55% Perc =	-	(2,693)	0.60	27%	12,422	3.10	30%	6,796	2.61	30%	6,796	2.61
60% Perc =	-	(2,687)	0.60	27%	12,472	3.11	30%	6,844	2.61	30%	6,844	2.61
65% Perc =	-	(2,681)	0.60	27%	12,531	3.11	31%	6,892	2.62	31%	6,892	2.62
70% Perc =	-	(2,678)	0.60	27%	12,548	3.12	31%	6,921	2.63	31%	6,921	2.63
75% Perc =	-	(2,672)	0.61	28%	12,614	3.13	31%	6,943	2.64	31%	6,943	2.64
80% Perc =	-	(2,667)	0.61	28%	12,670	3.14	31%	6,971	2.65	31%	6,971	2.65
85% Perc =	-	(2,644)	0.61	28%	12,698	3.15	32%	7,005	2.66	32%	7,005	2.66
90% Perc =	-	(2,634)	0.62	28%	12,820	3.16	32%	7,083	2.67	32%	7,083	2.67
95% Perc =	-	(2,626)	0.62	28%	12,975	3.17	32%	7,173	2.69	32%	7,173	2.69

4. SUMMARY AND CONCLUSIONS

Among the results of the study, a substantial contribution come out of the agroforestry systems for the sustainability of the agricultural activity.

The reach of this goal requests more biological researche to fill the gaps of knowledge of the potential of the region, on one side; and socioeconômic research, that can offer subsidies for the consolidation of the alternatives of development of systems that provide larger economic and social benefit to the farmers. The accomplishment of investments in the improvement of the human resources, in order to enable them to use the compatible channels of information within the demands of the global market is also an acute.