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**ANALYSIS OF A FORESTATION CREDIT PROGRAM IN ECUADOR:
A RATIONALE FOR MODIFICATION AND AGROFORESTRY APPLICATION**

Scott E. Lampman

FPEI Working Paper No. 42



School of Forest Resources
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Office of International Cooperation and Development
Forest Service, Forestry Support Program and
Southeastern Forest Experiment Station



Supported and funded by
Bureau for Science and Technology
Agency for International Development

Southeastern Center for Forest Economics Research

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PN-ACN-005

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FPEI Working Paper Series
January 1989

Lampman, Scott E. 1989. Analysis of a forestation credit program in Ecuador: A rationale for modification and agroforestry application. Southeastern Center for Forest Economics Research, Research Triangle Park, NC. FPEI Working Paper No. 42.

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ABSTRACT

LAMPMAN, SCOTT EDWARD. Analysis of a Forestation Credit Program in Ecuador: A Rationale for Its Modification and Agroforestry Application. (Under the direction of Dr. JAN G. LAARMAN.)

In October 1985, the government of Ecuador ratified Plan Bosque, a program of subsidized forestation loans. The program offers concessionary interest rates to landowners for both forest protection and forest production. This study analyzes the efficiency and equity of Plan Bosque within the framework of a contemporary model of rural finance markets in developing economies. Coastal coffee and cacao farmers in Ecuador were surveyed as a case study of the applicability of Plan Bosque in a region dominated by small and medium agroforestry landholdings. This region is a principal wood procurement area for secondary forest industries.

Although Plan Bosque has resulted in many forest plantations nationwide, it is a relatively poor forestation incentive for small and medium agroforestry landholders. Predominant among the reasons are high loan transaction costs. Additionally, credit is not a principal limiting factor in the tree planting decision. Most landowners were found to have some form of savings that can be applied to finance forestation investments, should they desire to do so.

Plan Bosque is compared with an alternative policy of cost-sharing grants. Despite fundamental implementation problems, cost-sharing policies stand to provide improved forestation incentives to agroforestry

landowners. Advantages include the perception of lesser risk, since no debt is incurred and no loan guarantee needed. The harvest belongs entirely to the landowner, and there are no binding contracts constraining the sale of the land.

The purpose of any subsidy is not to encourage uneconomic investments but to motivate owners to devote more attention to profitable management opportunities. To do so equitably and efficiently should be the objective of public policy, and Plan Bosque could be improved on both both criteria. For coffee and cacao farmers, the two greatest incentives for the planting of timber-yielding trees are likely to be improved extension and increased market incentives.

ACKNOWLEDGEMENTS

The author expresses sincere gratitude to Dr. Jan Laarman for the guidance, encouragement, and understanding he has provided during course of this study. Dr. Laarman believed me worthy of such a challenge and has provided support and guidance regardless of the great distance of the study and without counting the costs to himself. He has been an editor, mentor, counselor and friend. My appreciation is also extended to Dr. David Adams and Dr. James Swiss for their role in the development of the thesis.

The author gratefully recognizes the generous contribution to the study by the following individuals: Ing. Jorge Montesdeoca (BNF Quito), Ing. Edgar Guillen (BNF Quito), Ing. Lino Delgado (MAG/DINAF Guayaquil), Sr. Mario Pescarolo (MAG/DINAF Quito), Ing. Franklin Rubio (MAG/DINAF Babahoyo), Lcdo. Robinson Silva (MAG/DINAF Ventanas), Sr. Santiago Camarra (MAG Ventanas), Ing. Ricardo Quimi (MAG/PNCacao Ventanas), Lcdo. Jose Munoz (MAG La Troncal), Ing. Enrique Laso (INECEL Quito), Ing. Hernan Loyola (Artepractico Cuenca), Sr. Teodoro Valdivieso (Artepractico La Troncal), Sr. Eugenio Valdivieso (La Troncal), Ing. Sotomayor (INIAP Pichilingue), Sr. Jorge Salomon (PROBAMBU Guayaquil), Sr. Alberto Vega and Sr. Carlos Zavala (CEDEGE Guayaquil), Ing. Oswaldo Guerrero (CIFOR Quito), Ing. Galo Tobar (CFA Quito), Ing. Pablo Rosero (USAID/MAG Quito), Sr. Paul

Carlson (USAID Quito), Sra. Elena Ronceros (Quito), Eco. Roque Sevilla (Fundacion Natura/Tecniseguros Quito), Sr. Fernando Montenegro (Corporacion Forestal Quito), Ing. Abel Tobar (MAG Quito), Sra. Charo Moscoso (Banco del Pacifico Cuenca), Ing. Dennis Desmond (Peace Corp Cuenca/Nabon), Sr. Francisco Garces (Peace Corps Quito), Sr. Eric Weaver and Srta. Carmen Lopez Pazmino (USAID Quito).

I owe a debt of appreciation to a number of agencies and organizations for their considerable cooperation throughout the study. These include: (i) the National Forestry Directorate of the Ministry of Agriculture (MAG/DINAF), (ii) the National Development Bank of Ecuador (BNF), (iii) the Wood Industries Association (AIMA), (iv) the National Institute for Agricultural Research (INIAP), (v) the National Cacao Program (PNCacao), (vi) the National Coffee Program (PNCafe), (vii) the United States Peace Corps, (viii) the United States Agency for International Development (USAID) and (ix) North Carolina State University (NCSU).

A very special and affectionate note of gratitude is extended to the staff of INFORDE both in Raleigh and in Quito, without whose patience and support I never would have managed to complete the task before me, and without whom it would have been far less enjoyable. These include: Sr. Vicente Molinos, Sra. Martha Bricio, Sra. Magdalena Cordova, Srta. Elena Carrera, Sr. Fernando Guerron, Sr. Bolivar Quituisaca, Dr. Doug McKinnon, Michael Mussack and Jeff Prestemon.

Finally, the author wishes to acknowledge the encouragement and love his family, especially his mother, continually provide regardless of his endeavors.

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LIST OF ABBREVIATIONS

BNF-	Banco Nacional de Fomento (National Development Bank)
C-S-	Cost-Sharing
DINAF-	Direccion Nacional Forestal (National Forestry Directorate)
FPEI-	Forestry Private Enterprise Initiative
IERAC-	Instituto Ecuatoriano de Reforma Agraria y Colonizacion (Ecuadorean Institute of Agrarian Reform and Colonization)
INFORDE-	Iniciativa Forestal Privada para el Desarrollo (Forestry Private Enterprise Initiative)
MAG-	Ministerio de Agricultura y Ganaderia (Ministry of Agriculture and Livestock)
NCSU-	North Carolina State University, Raleigh.
PNCacao-	Programa Nacional de Cacao (National Cacao Program)
PNCafe-	Programa Nacional de Cafe (National Coffee Program)
USAID-	United States Agency for International Development

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by

Scott E. Lampman

The Author--Scott E. Lampman is completing an M.S. degree in forestry with a minor in public affairs at North Carolina State University. As a recipient of sponsorship from the United States Agency of International Development under the aegis of the Forestry Private Enterprise Initiative, he studied a public sector forestation incentive policy and the nature of the rural finance markets. The work provides the basis for his M.S. thesis. Both the Ecuadorean Ministry of Agriculture and the National Development Bank provided data, but views expressed are those of the author and do not necessarily reflect positions of these Ecuadorean institutions or the United States Government.

1. INTRODUCTION

The small South American country of Ecuador is no stranger to the grave consequences of deforestation. In August of 1984 the new government of President Leon Febres Cordero took action beyond the regulatory policies of the past in an attempt to better address the problems associated with deforestation by the creation of FONAFOR, the National Fund for Forestation and Reforestation. The following year "Plan Bosque", a nationally subsidized low-interest forestation loan program, was established as a mechanism to disburse FONAFOR funds to landowners.

Highly praised in its nascent months, Plan Bosque received numerous loan applications. Nationally and internationally, journals lauded Plan Bosque with titles like "Forestry Plan in Ecuador Will Benefit the Peasants" (Collins 1986). Indeed the law promised hope for addressing the problems of both forest protection and production. Yet today, four years after the creation of FONAFOR and two and one-half years after the implementation of Plan Bosque, numerous problems plague the program. This research analyzes the performance of Plan Bosque in the context of contemporary thought on rural finance markets in developing countries. A working model to analyze Plan Bosque is derived from two sources (Adams 1977; Adams and Grahm 1980). The concept of public cost-share programs is then examined in order to demonstrate possible policy advantages over the existing subsidized loan program. Both policies are then weighed as to their effectiveness for the agroforestry sector on the Ecuadorean coast.

This analysis should be of immediate value to policymakers seated on executive planning commissions within the new Ecuadorean government of President Rodrigo Borja. Additionally, policymakers from both development aid donor and recipient governments and lending institutions may benefit from the study's implications. This is especially true where agroforestry systems predominate. Lastly, this work provides additional empirical findings within the framework evaluating rural finance markets in developing countries.

2. OBJECTIVES

Ecuador is considered a "developing country" in the common usage of the term. Yet Ecuador has benefited greatly during the past decade from petroleum export earnings. This source of public revenue has allowed Ecuador to consider policy alternatives in confronting deforestation beyond the regulatory policies common to many forest services throughout the tropics. Given that petroleum revenue is available for forestation and reforestation, the policy questions that need to be answered are: (1) How might these funds be used most equitably and cost-effectively by the government to meet the objectives of FONAFOR? (2) Has Plan Bosque proven to be an efficient and equitable policy for meeting these objectives? (3) Can a policy be developed which might best serve the interests of both public and private sectors?

A case study of coastal coffee and cacao farmers was used to address these questions. The target population from which data were collected is fairly homogeneous. Nevertheless, sufficient reference is made to the national context to permit fairly broad conclusions.

The study has the following objectives:

- 1) To analyze the performance of Plan Bosque in terms of equity and efficiency, using a contemporary model of rural finance markets in developing countries;
- 2) To profile the credit markets available to coastal coffee and cacao farmers in order to understand the implications of forestation incentive policies (a case study); and
- 3) To determine the viability of a cost-share program as an alternative to Plan Bosque (an agroforestry application).

3. METHODS

In order to qualitatively analyze the performance of Plan Bosque, a model of finance markets was selected. Adams and Graham (1980) have identified several suspect assumptions regarding the structure and performance of traditional rural finance markets in developing economies. Inferences are drawn about Plan Bosque through surveys testing the Adam's model.

Two surveys were conducted. The first interviewed the National Development Bank's (BNF) Agricultural Credit Supervisor. The second interviewed 87 coastal coffee and cacao farmers (Appendix A). The survey of these farmers was designed in conjunction with the BNF. It was then tested in the field and redesigned with the assistance of an authority on

rural extension in Latin America.¹

Two coastal regions were targeted for study: 1) the region surrounding the town of Ventanas in Los Rios Province, and 2) the region surrounding the town of La Troncal in Canar Province (Fig. 1). These areas represent primary wood procurement zones for Ecuador's largest furniture manufacturer, Artepractico. Secondly, the National Forestry Directorate of the Ministry of Agriculture (MAG/DINAF) and the United States Agency for International Development (USAID) are establishing an agroforestry project to train technicians and improve undermanaged agroforestry systems in the area. Lastly, the Forestry Private Enterprise Initiative (FPEI) recently surveyed the area's potential for roundwood production through agroforestry systems (Mussack 1988; Appendix B).

Eighty-seven interviews were completed, forty-seven from Ventanas and forty from La Troncal. This determination was established largely on the basis of Mussack's (1988) previous survey in which 40 interviews were conducted in each of three sites. All interviews were conducted by the author. However, none was attempted without an accompanying agent of the Ministry of Agriculture's National Forestry Directorate (MAG/DINAF), the National Coffee Program (PNCAFE), or the National Cacao Program (PNCACAO).

Survey sampling included coffee and cacao farmers who had come to the MAG offices in Ventanas and La Troncal (n=12). A second group of interviews was with farmers selling their products in those two towns (n=5). A third and principal source of survey information was farmers at

¹Elena Ronceros, former rural extentionist in Ayacucho, Peru.

Republic of Ecuador

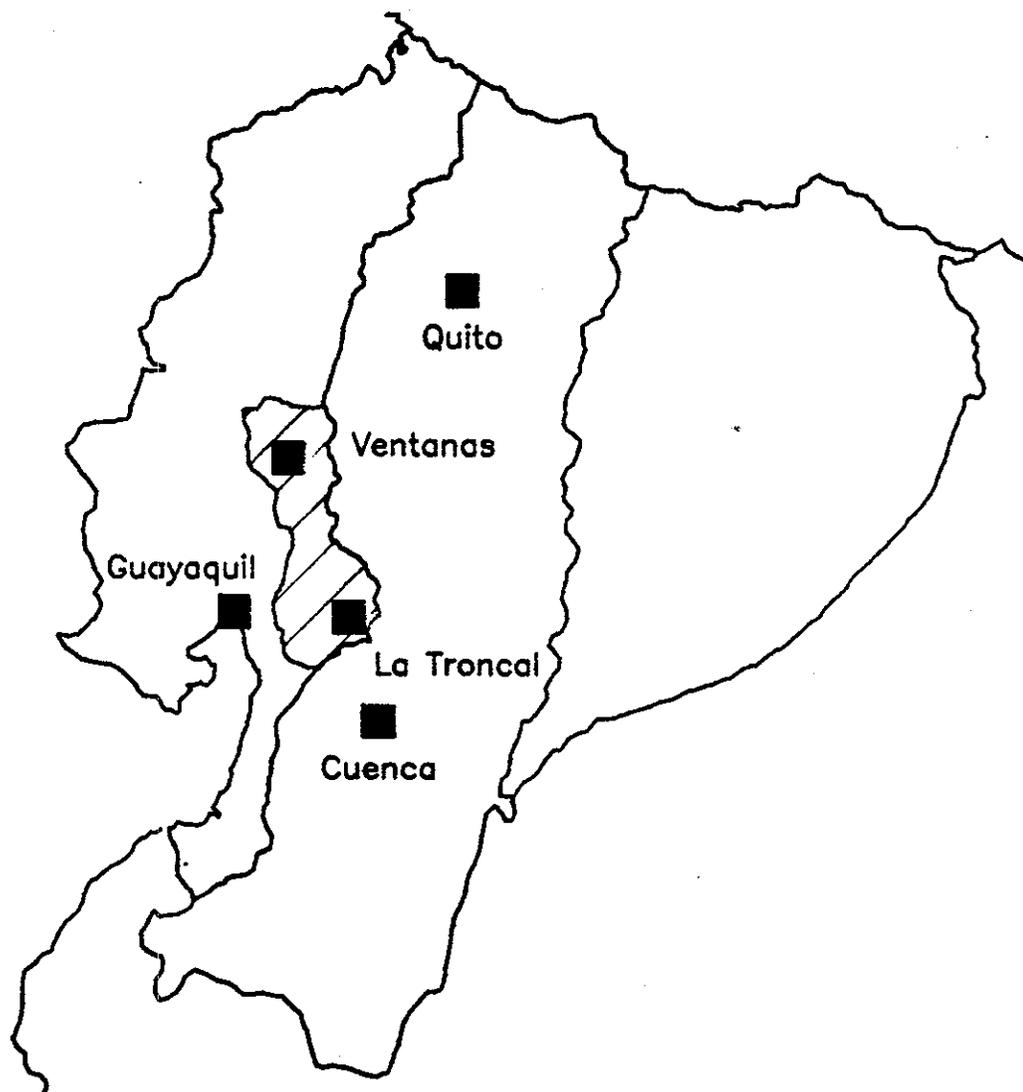


Figure 1. The Republic of Ecuador Divided into Three Principal Regions: (left to right) Coast, Sierra and Amazon. The coastal study zone is the hatched area with the town of Ventanas to the north and La Troncal to the south.

their homes (n=70).

This sampling technique introduces correlated biases depending heavily on farmers most familiar with MAG, and farmers living closest to the main roads. However, this represents a sampling constraint imposed by the study environment. Although this is non-probabilistic sampling, it is assumed to be representative of those regional coffee and cacao farmers most likely to participate in government programs such as Plan Bosque.

Most survey results are presented as simple frequency responses. Only Table 5 incorporates the use of statistical significance in presenting data correlations. In so doing, the author recognizes the limitations of such statistical inferences.

The principal difficulty in applying tests of significance to sociological research is experimental control. "Conditions under which tests of significance may validly be used are almost impossible to fulfill in sociological research (e.g. randomization) and even when these conditions are met, the nature of the research situations faced by sociologists is such that correct inferences from the tests are equally difficult to reach" (Selvin in Morrison and Henkel 1970).

On the other hand, other statisticians claim that significance tests need not be abandoned in survey research (Beshers and McGinnis in Morrison and Henkel 1970). McGinnis writes: "we contend that a sociologist performs a valuable service, whenever he investigates relationships among sociologically important variables, even though he is able to establish only the most paltry number of controls. So long as his design is as carefully constructed as possible, his measurements as accurate as instruments permit, and his interpretations no broader than the data and

test procedures warrant, he is performing a worthwhile service." Nachmias and Nachmias (1981) add that, "even when tests of significance are not being used as a device enabling generalizations to a population, they are useful in providing a screen for results that are worth further exploration."

4. PLAN BOSQUE

4.1 The Background

The National Forestation and Reforestation Fund (FONAFOR) was created via law No. 182 (Registro Oficial 1984). The law sets aside 44 Ecuadorean sucres from the equivalent of every U.S. dollar taxed on barrels of exported petroleum as revenues for the National Participation Fund (NPF). Of the revenues accruing in the NPF, 5 percent are held in the Central Bank of Ecuador for FONAFOR. FONAFOR monies are divided equally between the Ministry of Agriculture (MAG) and the National Development Bank (BNF).

The original legislative intent was to provide equal emphasis upon the protective and productive functions of forests through the establishment of two separate accounts. However, by August 1985 the separate accounts were effectively combined due to the domination of funds solicited for forest production and the inactivity of funds earmarked for forest protection (Registro Oficial 1985a). In October 1985, MAG and the BNF signed a Contract of Cooperation and Interinstitutional Coordination for the Utilization of FONAFOR, effectively detailing Plan Bosque (Montesdeoca 1988). By January 1986, the first Plan Bosque applications were being received.

Program evaluation in early 1988 led to the most recent modifications to Plan Bosque. These permit FONAFOR funds to be used for formation and maintenance of forest tree nurseries, improved management of existing plantations, and infrastructural requirements such as access roads and fencing (ibid. 1988).

4.2 The Functioning of Plan Bosque

All natural or legalized Ecuadorean citizens, private or mixed enterprises, cooperatives and other legally constituted organizations are eligible to participate in Plan Bosque. The documentation required by MAG for application to the program includes: a copy of the land title, a certificate of the property registration with IERAC (the Agrarian Reform and Colonization Agency) and a map of the property (Montesdeoca 1988).

A maximum limit of 60 million sucres (U.S. \$120,000 in July 1988) can be received by any one entity during the life of the program. However, this maximum may require adjustments to reflect monetary inflation and other cost factors. No minimum limit is listed by Plan Bosque. Instead, the authorization of small amounts seems at the discretion of the authorizing agent of MAG on the basis of proposal feasibility.

Once application materials are received in full, both MAG and the BNF must provide site inspections and approvals. Approval by MAG requires an Investment Plan, developed by a MAG forestry technician. The Investment Plan must include plantation insurance for two years.

The applicant signs a Forestry Contract with MAG (see Appendix C). Upon approval by MAG and the BNF, the applicant receives the forestation loan in three disbursements according to a three-phase work schedule. In

addition, the applicant receives a "Property Rights Certificate", which protects the owner's property from expropriation and registers the land as a forestation investment.

The loan matures after only two years. MAG cancels the loan with the BNF (principal plus 9 percent interest compounded annually). At this point, the participating landowner transfers his or her debt obligation from the BNF to MAG. No additional interest is charged to the landowner by MAG during the remainder of the loan term. This loan term is determined in the Forestry Contract, and depends upon the rotation age of the particular species planted. At the harvest of the trees, the landowner repays MAG the principal plus the interest which MAG had paid the BNF years earlier (Appendix D).

For those landowners able to finance their own forestation projects, Plan Bosque allows for reimbursement of the investment. Providing that a Forestry Contract has been arranged in advance, MAG will reimburse the investment within the first two years of the plantation establishment.

4.3 Plan Bosque Accomplishments

The amount of revenue available to FONAFOR depends upon many interrelated variables, not the least of which are the price and volume of exported petroleum. FONAFOR revenues collected range from 11 million sucres (U.S. \$92 thousand, exchange rate in December 1984) in 1984, to 984 million sucres (U.S. \$8,200 thousand, exchange rate in December 1984) in 1985 (Munoz 1986). As of 1986, the BNF and MAG/DINAF had withdrawn 92 percent and 72 percent of available funds from their respective accounts. In May 1988, BNF officials still claimed a fund balance surplus of FONAFOR

monies (Ing. Edgar Guillen, personal communication)¹.

Table 1 presents data from the first two years of Plan Bosque as recorded by the Ministry of Agriculture (MAG/DINAF). In two years, 763 applications had been approved by MAG/DINAF nationally and sent on to BNF for bank approval and loan processing. Given the many stages of Plan Bosque processing, these data represent only a portion of the total number of loan applications. No indication is given of the number rejected. Additionally, they do not indicate the status of applications after having been sent on to the bank. Consequently, the figure of 36,343 ha. listed as the total number of loans approved may overstate actual field accomplishments to the extent that the lengthy loan approval process precedes the plantation establishment.

The average number of hectares per approved application is of particular policy interest. Figure 2 shows the distribution of landholding sizes of the surveyed farmers. Mussack (1988) states the average coastal coffee and cacao farm to be approximately 34 ha, yet the number of hectares per approved Plan Bosque coastal application is shown to be 58.7. It appears that the larger landowners (> 50 ha.) are the primary beneficiaries of Plan Bosque. This is emphasized by the fact that a landowner is not likely to forest 100 percent of the property and the 58.7 ha. average includes only the area contracted for forestation. Few communities or cooperatives have applied (Ing. Jorge Montesdeoca, personal

¹Ing. Edgar Guillen Valdivieso, Director of Agricultural Credit, National Development Bank, May 1988.

Table 1. Plan Bosque Applications Approved by the Ministry of Agriculture and Forwarded to the National Development Bank (January 1986 - January 1988)¹.

<u>Province</u>	<u>Applications</u>	<u>No. Ha.</u>	<u>Cost / Ha.</u> (sucres)	<u>Avg. Ha./applic.</u>
Sierra:				
Carchi	18	494	27,974	27.4
Imbabura	31	1,814	35,533	58.8
Pichincha	197	8,797	37,050	44.6
Cotopaxi	26	1,995	34,343	76.7
Tungurahua	11	393	25,466	35.7
Chimborazo	10	526	28,267	52.6
Bolivar	6	360	26,397	60.0
Canar	34	1,797	31,489	52.8
Azuay	43	2,673	29,430	62.1
Loja	58	1,221	32,859	21.0
Total Sierra	434	20,069	34,004	46.2
Coast:				
Esmeraldas	61	3,374	54,223	55.3
Manabi	25	582	30,329	23.3
Guayas	107	7,586	47,326	70.9
Los Rios	15	985	52,750	65.6
El Oro	16	633	46,319	39.6
Total Coast	224	13,160	48,700	58.7
Amazon:				
Napo	43	1,513	43,229	35.2
Pastaza	38	1,119	41,583	29.4
Morona Santiago	6	254	35,859	42.3
Zamora	17	185	37,696	10.9
Total Amazon	104	3,071	41,686	29.5
Galapagos	1	43	43,589	43.0
National				
Total	763	36,343	39,986	47.6

Total Program Cost : 1,453,222,782 Sucres

¹Ing. Jorge Montesdeoca Castillo, National Credit Supervisor, National Development Bank, "El Plan Bosque: Logros, Problemas, Perspectivas." Paper presented to the Second Forestry and Wood Industries Conference, Quito, Ecuador, June 14-16, 1988.

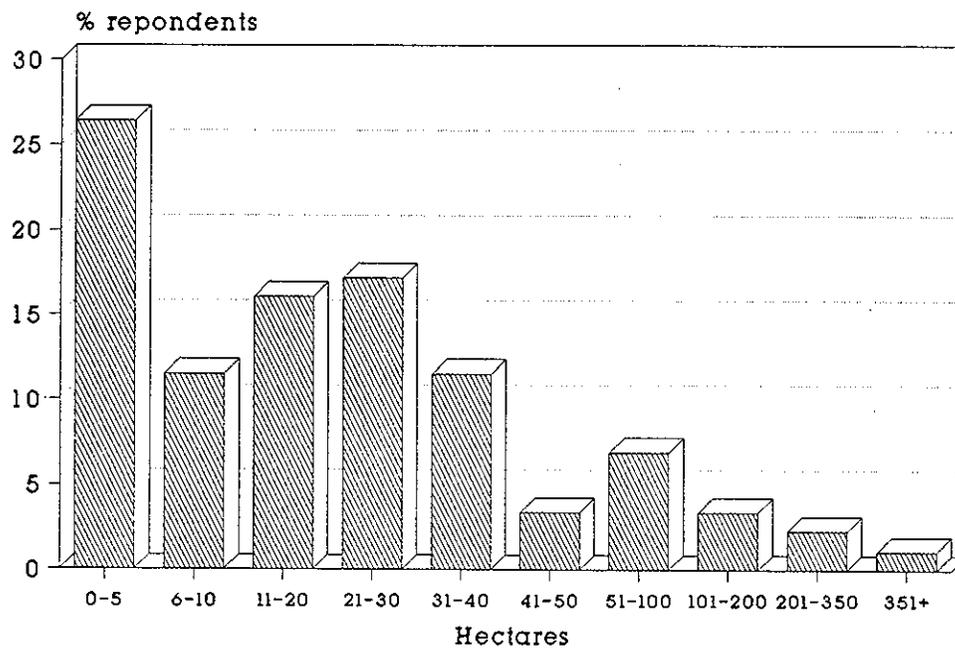


Figure 2. Landholding Size Distribution of the Primary Properties Occupied by the Surveyed Farmers (n=87).

communication).²

As of November 1987, the Ventanas bank had lent Plan Bosque funds to three persons for a total of almost four million sucres. No other applications were being processed. The La Troncal bank had lent Plan Bosque funds to one person, with two others being considered, for a total of nearly five million sucres (Table 2). Hence after nearly two years, four individuals from the combined areas of this study actually received funds from Plan Bosque. As many as 45 from the two regions had expressed early interest in the program to regional MAG technicians (Lcdo. Robinson Silva and Lcdo. Jose Munoz, personal communication).³

As of November 1987, the BNF paid Plan Bosque monies out to 280 applicants at the national level. These applicants accounted for a total of 12,671 ha. and over 509 million sucres (Table 3). An additional 62 applicants were registered as being processed by the bank, but not yet having received any monies.

The area planted to trees may be a more conservative figure than that shown in Table 3, as the loan is dispersed in three installments but not indicated as such by the existing table. Other sources claim that as of December 1987, approximately 20,000 ha. of forest plantations could be attributed to Plan Bosque.⁴

²Ing. Jorge Montesdeoca, National Credit Supervisor, National Development Bank, March 1988.

³Lcdo. Robinson Silva, MAG/DINAF forestry technician Ventanas, and Lcdo. Jose Munoz, MAG agricultural extensionist La Troncal.

⁴El Comercio (Quito) December, 1987.

Table 2. Number of FONAFOR Loans Processed, Approved, and Disbursed by the National Development Bank's Coastal Branch Offices Through November 30, 1987².

<u>Branch</u>	<u>No./ Process</u> (sucres in thousands)		<u>No./ Approval</u> (sucres in thousands)		<u>No./ Disbursal</u> (sucres in thousands)		<u>No./ Total</u> (sucres in thousands)	
Esmeraldas	9	30,866	-	-	3	2,820	12	33,686
Limonas	-	-	-	-	5	9,666	5	9,666
Quininde	-	-	-	-	5	9,893	5	9,893
St. Dom.	3	3,259	1	606	8	14,273	12	18,138
Los Bancos	1	2,575	1	1,397	17	13,328	19	17,300
Portoviejo	-	-	1	926	11	5,934	12	6,860
Bahia	-	-	-	-	2	1,438	2	1,438
Chone	-	-	-	-	1	281	1	281
Jipijapa	-	-	-	-	2	2,515	2	2,515
Quevedo	2	10,756	-	-	1	1,843	3	12,599
Vinces	-	-	-	-	3	7,223	3	7,223
Ventanas	-	-	-	-	3	3,731	3	3,731
Guayaquil	6	8,938	9	16,931	19	54,783	34	80,652
Daule	1	3,426	-	-	-	-	1	3,426
Pedro Carbo	-	-	-	-	13	61,352	13	61,352
Balzar	-	-	-	-	3	7,536	3	7,536
St. Elena	1	1,610	1	1,128	3	44,862	5	47,601
La Troncal	2	3,358	-	-	1	1,539	3	4,897
Machala	1	1,482	-	-	3	9,225	4	10,707
Pinas	-	-	-	-	3	1,629	3	1,629
Galapagos	-	-	-	-	1	1,874	1	1,874
Coastal Total	26	66,270	13	20,987	107	255,746	146	343,004

²Ing. Jorge Montesdeoca Castillo, National Credit Supervisor, National Development Bank, "El Plan Bosque: Logros, Problemas, Perspectivas." Paper presented to the Second Forestry and Wood Industries Conference, Quito, Ecuador, June 14-16, 1988.

Table 3. Status of Plan Bosque Applications by Region at the National Development Bank (January 1986 - January 1987)³.

<u>Region</u>	<u>In Process</u>			<u>Approved</u>		
	No.	Ha.	Amount (thous. sucres)	No.	Ha.	Amount (thous. sucres)
Sierra	12	893	53,927	3	135	4,554
Coast	26	1,405	66,270	13	445	20,987
Amazon	4	83	3,392	4	73	2,968
National Total	42	2,381	123,590	20	653	28,510

<u>Region</u>	<u>In Disbursal</u>			<u>Total</u>		
	No.	Ha.	Amount (thous. sucres)	No.	Ha.	Amount (thous. sucres)
Sierra	136	5,982	202,049	151	7,010	260,531
Coast	107	5,420	255,746	146	7,270	343,004
Amazon	37	1,269	51,939	45	1,425	58,300
National Total	280	12,671	509,734	342	15,705	661,835

³ Ing. Jorge Montesdeoca Castilla, National Credit Supervisor, National Development Bank, "El Plan Bosque: Logros, Problemas, Perspectivas." Paper presented at the Second Forestry and Wood Industries Conference. Quito, Ecuador, June 14-16, 1988.

A study by McCormick (1987) asserts that, given certain assumptions, Plan Bosque can make forest plantations a more attractive land use alternative by increasing the internal rates of return of forestry investments. However, the data from Table 1 seem to indicate the average size of landowner benefiting from Plan Bosque remains relatively large. Additionally, Table 3 indicates that the actual area planted by the program is relatively modest.

5. PLAN BOSQUE IN THE CONTEXT OF RURAL FINANCE MARKETS

5.1 The Adams Model

Examining Plan Bosque in light of contemporary macroeconomic thought on rural finance markets (RFMs) allows for some qualitative comparisons. The importance of doing so is to examine how Plan Bosque and the RFM at the study sites compare with the model and to consider the possible policy implications this may provide.

As a result of perceived failings of "conventional" approaches to the development of RFMs in attaining their social and economic objectives, many challenges have surfaced. Dr. Dale W. Adams (State University of Ohio) is the economist frequently accredited with fathering a "new consensus" toward RFMs in developing economies. In reviewing the literature written on the subject over the last decade, Dr. Adams' contributions appear representative of a generally accepted trend in development economics.

Ideas pertinent to Plan Bosque and its application in Coastal Ecuador have been selectively extracted from Dr. Adams' writings to create

what will be referred to as the "Adams Model". Dr. Adams believes that many of the problems associated with the performance of RFMs in developing economies are due to poor financial policies based upon **suspect assumptions**. Some of these questionable assumptions include the following (Adams 1977; Adams and Graham 1980):

A. Assumptions About Saver/Borrower Behavior

1. The rural poor face credit shortages.
2. The rural poor cannot save and therefore will not respond to incentives or opportunities to save.
3. Loans are used for purposes for which they are allocated.
4. Interest charges make up the bulk of the borrowing costs for most farmers and therefore loan demand among most farmers, especially small farmers, is interest-rate elastic.
(Borrowing Costs = Interest Costs + Transaction Costs)
5. The majority of agriculturalists need loans at concessional interest rates and supervision before adopting new technologies or undertaking land improvement investments.

B. Assumptions About Lender Behavior

1. Informal lenders provide the majority of loanable funds in most low-income countries.
2. The rural poor cannot receive formal loans because formal lenders (i.e. banks) are excessively risk-averse.
3. The majority of informal lenders practice usury, charging interest rates which generate monopolistic profits and do not provide legitimate economic services.
4. Formal lenders should issue credit only for production (not consumption), and loans should be offered in conjunction with "packets" of technology (i.e. tied to inputs).

Dr. Adams finds that finance policies based upon these suspect assumptions have contributed to the generally poor performance of rural finance over the years. The meaning of "poor performance" is reflected in the following "new consensus" concerning RFMs in developing economies (Adams 1977, Adams and Graham 1980):

1. Negative real rates of interest caused by concessionary interest rates in the face of high inflation distort the demand for loans and produce unintended income transfers.

2. Low rates of interest in real terms seriously distort the supply side of the financial system. Savers will minimize the amounts they hold in savings accounts.
3. Because funds borrowed in government programs are not mobilized locally, the borrowers feel less obligated to repay the loans.
4. Microeconomic forces (i.e. risks and marginal costs of loaning to the rural poor) make lending institutions reduce the repayment period and shift loanable funds to a more concentrated and less risky clientele.
5. The borrower's loan transaction costs are much more important than interest rates in determining loan demand by medium and small landowners. Consequently, informal lenders provide a valuable service whose costs could be less than those of loans from formal lenders offering concessionary rates.
6. Interest rates and credit supervision have a weak effect over the decision as to whether to adopt new technologies or to invest in land improvement. Product prices and input costs are the most potent incentives for adopting new technologies.

7. Like other market rationing measures, tying loans to packets of technologies or to input requirements takes away from the useful property of financing, its fungibility⁵.

Suggestions on improving RFM policies are specific to the circumstances of each situation. Nonetheless, some key policy elements emerge from these views. Predominant among them is the maintenance of flexible interest rates on both credit and deposits with the intent of establishing positive real rates of interest. With improved rates, the mobilization of local savings should increase. This is concept is fundamental to the sustainability of the system.

5.2 Rural Finance Markets in the Survey Region

Financial information is not readily offered by rural farmers, particularly to a foreign researcher. Consequently, in testing for rural finance market information, actual monetary amounts were never requested. Instead, the formal and informal markets were characterized qualitatively using references to both the form of savings and to sources of available credit. The following frequency responses are organized in response to the suspect assumptions outlined earlier in the Adam's model (A.1 - B.4). In that the model identifies the following as "suspect" assumptions, an indication that the statement is "false" agrees with the model that the assumption is questionable for the surveyed region.

⁵ "The quality of being interchangeable." i.e. converted into any good or service in the market.

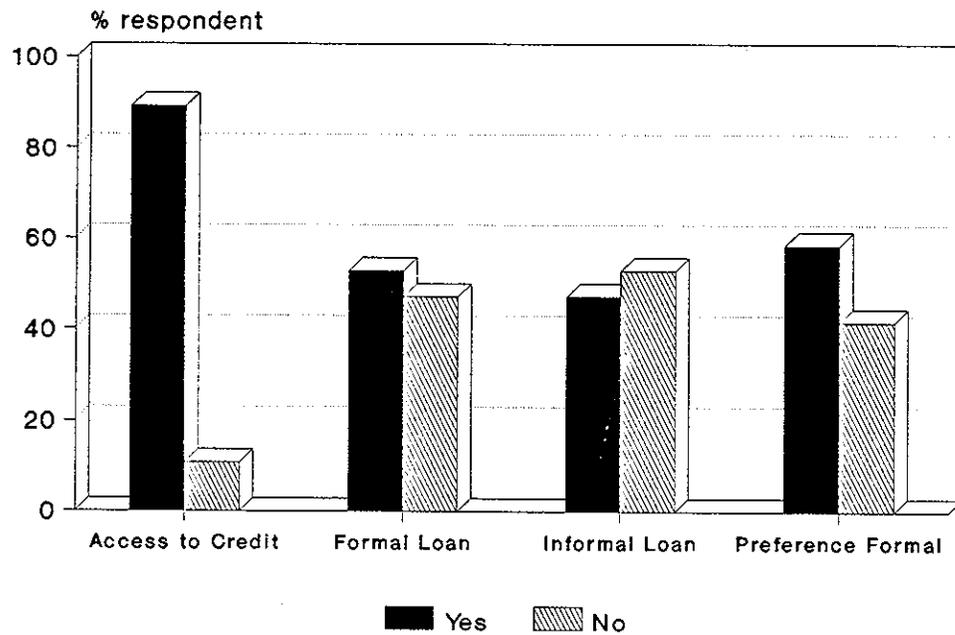
(A.1.) "The rural poor face credit shortages".

This is generally false for the sample population. Seventy four of 83 respondents (89 percent) claimed to have access to credit from some source for agricultural production. Asked if they had ever applied for a bank loan, 46 of 87 farmers (53 percent) responded affirmatively. When asked if the farmers had ever solicited credit from an informal source, 41 of the 87 (47 percent) replied affirmatively (Figure 3).

(A.2.) "The rural poor cannot save and therefore will not respond to incentives or opportunities to save".

This is quantitatively false for the sample population. The issue of savings was approached from four types of questions, two of which implicitly assumed the existence of savings. The results of each are listed in Table 4. As many as 26 of 58 farmers (45 percent) indicated that they have a savings account in the bank, and 12 of 58 (20 percent) have checking accounts. Combining two of the questions on savings from Table 4 gives a range of 15 to 28 farmers (19-28 percent) claimed to have no savings whatsoever, while 43 of 78 (55 percent) identified themselves as having "limited" savings. These limited savings are likely to have a seasonal component to their definition.

The concept of livestock as a form of savings for contingencies was recognized by 19 of 79 farmers (24 percent). Additionally, because dried cacao and coffee beans are mistakenly perceived to store well by a few farmers, these also were identified as sources of savings. The literature indicates that dried home storage of cacao and coffee will reduce the quality of the product (Opeke 1982).



Percent of Sample Which:

	Have access to credit. (n=83)	Applied for a Formal Loan. (n=87)	Solicited Credit From an Informal Source. (n=87)	Prefer a Formal Credit Source. (n=65)
Response				
Yes	89.2	52.9	47.1	58.5
No	10.8	47.1	52.9	41.5

Figure 3. Survey Findings Regarding Rural Finance Market Access and Preferences.

Table 4. Survey Findings Regarding
Agriculturalists' Savings Behavior.

<u>Statement</u>	<u>Response</u>	<u>Percent of Total</u>
Preferred form of maintaining one's savings (n=79).	1. No savings.....	27.8
	2. Savings account.....	34.2
	3. Checking account.....	12.7
	4. Goods (livestock, stored crops, etc.).....	24.0
	5. Cooperative.....	1.3
The reason the loan was required was because savings were limited or used for other purposes (n=78).	1. No savings.....	19.2
	2. Limited savings.....	55.1
	3. Other ends.....	25.7
Possession of a savings and/or checking account (n=58).	1. None.....	34.5
	2. Savings Account.....	44.8
	3. Checking Account.....	20.7
Funds available to participate in a cost-share plan (n=70).	1. No.....	55.7
	2. Yes.....	44.3

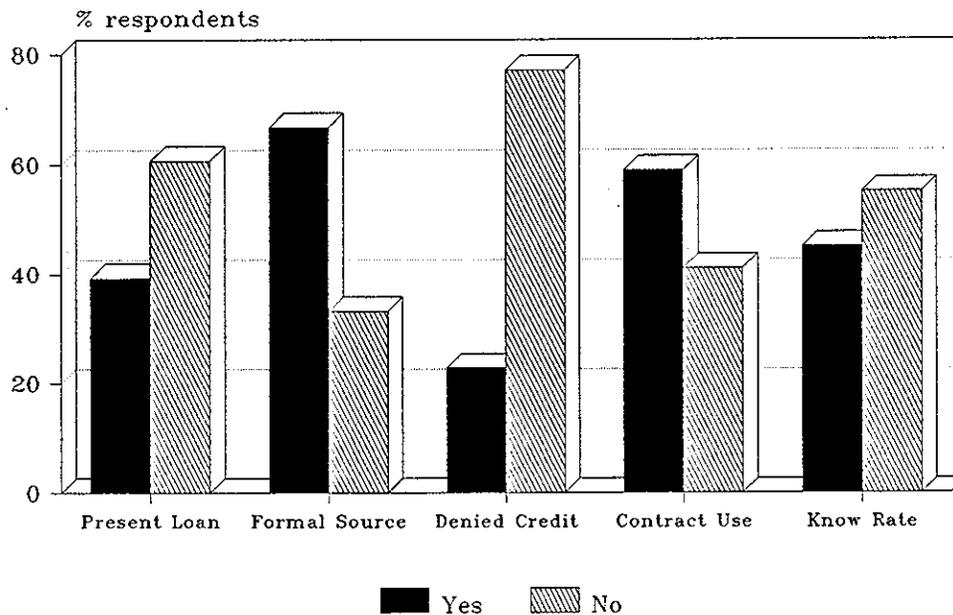
(A.3.) "Loans are used for the purposes for which they are allocated".

This is also a quantitatively false statement for the region. When asked about the sensitive issue of use of the loan monies (fungibility), as many as 23 of 56 farmers (41 percent) stated that they do not use all loan monies for the purposes for which they are allocated (Figure 4). Results also demonstrate that formal loans are more likely to be used for the purposes allocated than are informal loans. This could be a result of the high usage of mortgages as loan guarantees in the formal market, which is also correlated with using the loans for the purposes allocated (Table 5).

(A.4.) "Interest charges make up the bulk of the borrowing costs for most farmers, and therefore loan demand among most farmers, especially small farmers, is interest-rate elastic".
(Borrowing Cost = Interest Rate + Transaction Costs).

The statement is quantitatively false for the region. Identification and quantification of loan transaction costs is not easy. The survey attempted to identify transaction costs for participants in Plan Bosque.

None of the applicants to Plan Bosque responded affirmatively to a series of questions identifying the following possible loan transaction costs: (i) paying bank employees or non-bank employees for loan services, (ii) paying bank costs other than interest, (iii) paying interest in advance, (iv) paying bribes, and (v) making compensatory deposits. Bribes, however, were recognized as costs to small farmers not having access to the formal credit market.



Percent of Sample Which:					
Response	Presently Has a Loan. (n=84)	Presently Has a Loan From a Formal Source. (n=33)	Has Been Denied Formal Credit. (n=48)	Use the Loan as Contracted. (n=56)	Know Interest Rate on Their Bank Account. (n=40)
Yes	39.3	66.7	22.9	58.9	45
No	60.7	33.3	77.1	41.1	55

Figure 4. Survey Findings Regarding Present Loan Sources, Risk of Formal Loan Denial, Fungibility, and Knowledge of Interest Rates.

Table 5. Chi-square Statistical Correlations of Selected Survey Variables.

Variables	(n)	Chi-square probability	Contingency Coefficient	(d.f.)
<u>Landholding size versus:</u>				
Legal Tenure	86	.019	.29	2
Education Level Attained	87	.002	.40	4
Formal Credit Preference	87	.000	.42	2
<u>Land Tenure versus:</u>				
Education Level Attained	86	.032	.27	2
Formal Credit Preference	86	.04	.22	1
<u>Tree Planting Behavior versus:</u>				
Tree Selling Behavior	87	.78	.03	1
Knowledge of Tree Value	87	.33	.10	1
Access to Credit	83	.39	.09	1
<u>Tree Selling Behavior versus:</u>				
Knowledge of Tree Value	87	.001	.34	1
<u>Fungibility versus:</u>				
Credit Source Used	50	.005	.37	1
Guarantee Used For Loan	32	.10	.36	2

¹ This category indicates that farmers with informal sources of credit and farmers with no loan guarantee are more likely to use the loan monies at their own discretion (as opposed to spending them for the stated purpose of the loan).

The opportunity cost of time was identified as the greatest transaction cost to participants of Plan Bosque. An average of 20 days was invested by the applicants in the loan process, and applicants waited from three to twelve months for a loan disbursement (Table 6).

(B.1.) "Informal lenders provide the majority of loanable funds in most low-income countries."

Within the surveyed region, this appears to be a false statement. As indicated earlier, 46 of 87 respondents (53 percent) had applied for bank loans, versus 41 of 87 (47 percent) who applied for loans from informal sources. In addition, when asked which of these two credit sources they preferred, 38 of 65 (59 percent) claimed to prefer the formal source of loans (Figure 3). Reasons given in order of decreasing frequency include: (i) low interest rates, (ii) annual rather than monthly compounding interest, (iii) extended repayment periods, (iv) larger quantities available, (v) government loan programs, (vi) use of specific loan guidelines, and (vii) relational problems created by borrowing from friends. On the other hand, reasons given for preferring the informal credit sources include: (i) fewer lender demands, (ii) no delays, (iii) no obstacles due to lack of a land title, (iv) less risk, (v) low interest, and (vi) reduced time and effort to secure an informal loan.

Only 33 of 84 respondents (39 percent) of the surveyed farmers presently have a loan, and two-thirds of these are from a bank (Figure 4). This demonstrated preference for bank loans and the comments that greater quantities of money are available from banks indicate that the majority of loanable funds are from formal sources.

Table 6. Survey Findings Regarding Familiarity With Plan Bosque and the Time Frame Within Which It Has Functioned.

<u>Statement</u>	<u>Response</u>	<u>Percent of Total</u>
Familiarity with Plan Bosque (n=85).	1. None.....	48.2
	2. Heard of it, but no understanding.....	16.5
	3. Understand that it is a forestation loan program.....	35.3
Duration of the loan process up to the present status (n=7).	1. 3 months.....	14.3
	2. 4 months.....	14.3
	3. 6 months.....	14.3
	4. 8 months.....	14.3
	5. 9 months.....	14.3
	6. 12 months.....	28.6
Present loan processing status (n=7).	1. MAG approval step #1.....	14.3
	2. BNF approval step #1.....	42.9
	3. Received first disbursement.....	28.6
	4. Received all three disbursements.....	14.3
Estimation of the borrower's opportunity cost of time of pursuing Plan Bosque (n=7).	1. 0 - 10 days.....	14.3
	2. 11 - 20 days.....	42.9
	3. 21 - 30 days.....	14.3
	4. greater than 30 days.....	28.6

(B.2.) "The rural poor cannot receive formal loans because formal lenders are excessively risk-averse.

This is true. In an economy of high inflation rates, only the government development bank (BNF) is providing concessionary interest rates. However, the BNF is also risk-averse.

Eleven of the 48 farmers (23 percent) who had applied for formal credit had been denied credit at least once (Figure 4). Reasons given for refusal included: (i) lack of title to the land, (ii) lack of other documents, (iii) unwillingness to pay a bribe, and (iv) the fact that the bank had exhausted its funds in a particular program budget.

The lack of legal land tenure is particularly important, as 28 of 39 respondents having bank loans (72 percent) required the use of a mortgage as a loan guarantee (Figure 5). Thirty seven of 86 respondents (43 percent) possessed no legal title to their land (Figure 6). Not surprisingly, there is a statistically significant correlation between the farmers receiving formal credit and those with title to their land, such that farmers with relatively large landholdings received more formal credit than other farmers (Table 5).

The many bureaucratic transactions in Plan Bosque demonstrate an aversion to risk by the government. The BNF is safeguarded at least twice, first by the loan guarantee and secondly by the forest plantation insurance.

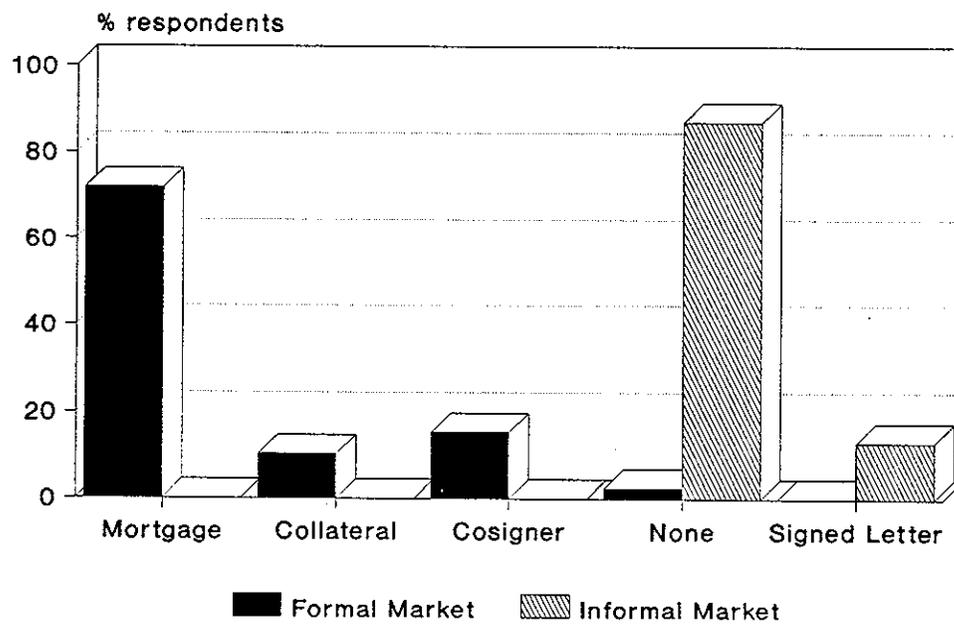


Figure 5. Survey Findings Regarding Loan Guarantees Used in Both the Formal (n=39) and Informal (n=15) Credit Markets.

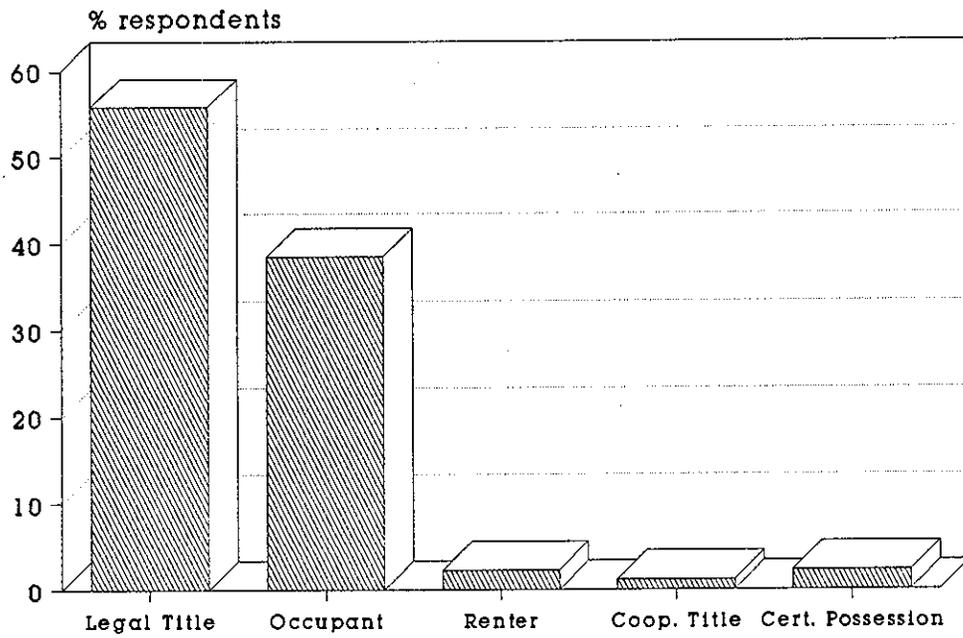


Figure 6. Land Tenure Status of the Primary Properties Occupied by the Surveyed Farmers (n=86).

(B.3.) The majority of informal lenders practice usury and charge interest rates which generate monopolistic profits, and do not provide legitimate economic services.

This is also quantitatively false. Interest rates charged in the informal market varied tremendously (Figure 7). Nine of 39 informal lenders (23 percent) charged no interest at all. At other extreme, 6 of 39 informal lenders were charging usurious rates of 15 to 20 percent per month (effective rates of over 215 percent per year).

The repayment periods are "indefinite" in the informal market, compared with terms of 6 months to 10 years under formal credit. Regarding guarantees, banks required (in order of decreasing preference) mortgages, collateral, or cosigners. Informal lenders, on the other hand, either required no guarantee or a signed letter of debt obligation (Figure 5). One informal loan source of special note is the local purchaser of commodities who provides advance payments to farmers promising to sell the buyer their coffee, cacao, or bananas.

A final note on the functioning of the informal market is the number of repeat borrowers. Of the farmers having applied for a bank loan, 35 of 46 (76 percent) were repeat borrowers. This contrasts with 31 of 32 (97 percent) repeat borrowers of informal credit markets (Figure 8).

5.3 Survey Findings Regarding Plan Bosque

Of the total sample population, nearly half (48.2%) had not even heard of Plan Bosque (Table 6). Only seven surveyed individuals had at some time applied to the program.

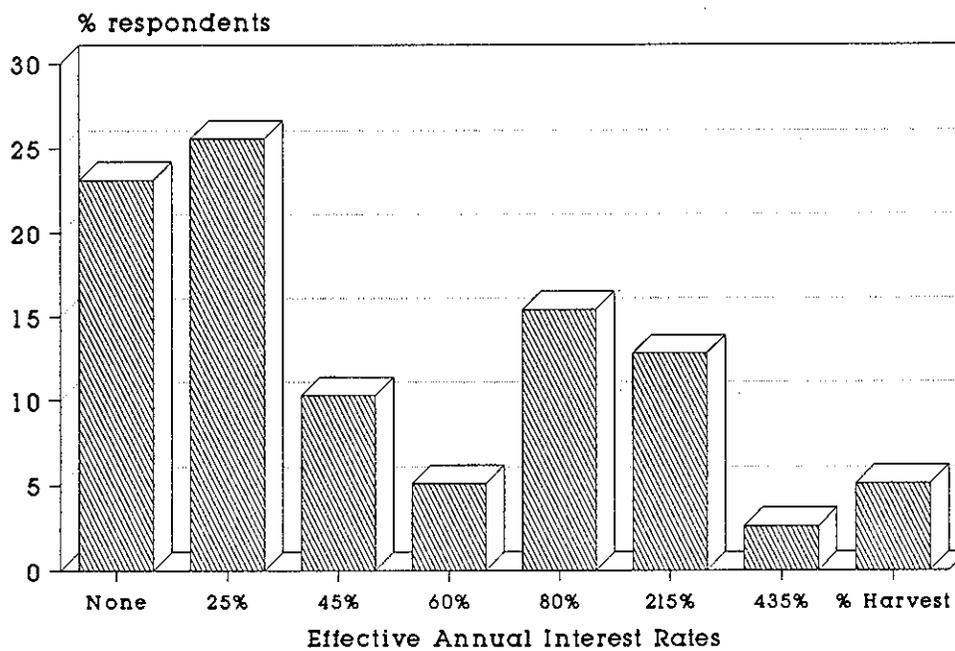
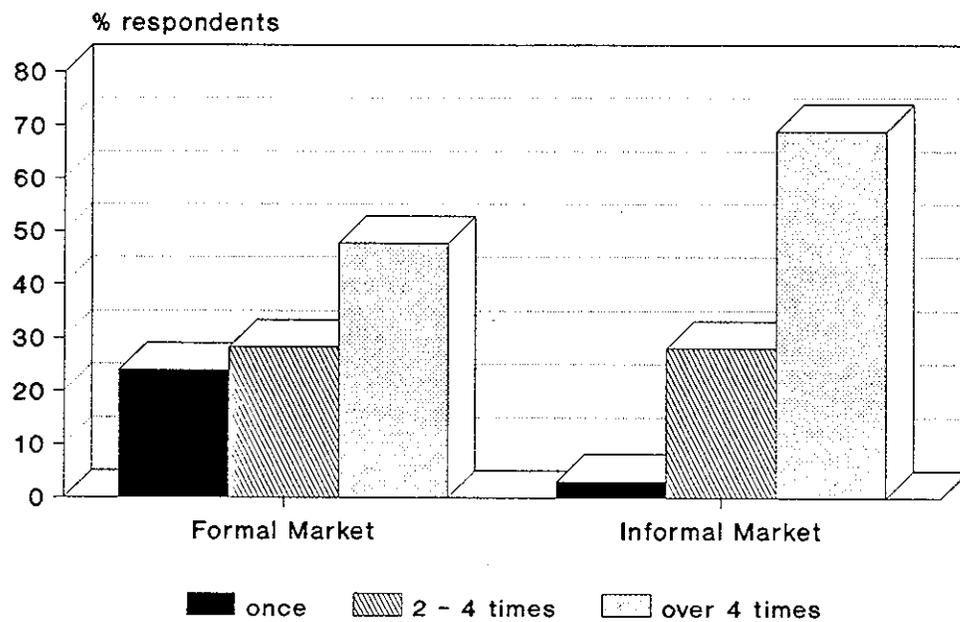


Figure 7. Effective Annual Interest Rates in the Informal Credit Market (n=39).



Response	Number of times a bank loan has been requested by those known to use this credit source. (n=46) In Percentages	Number of times an informal loan has been requested by those known to use this credit source. (n=32)
Once only	23.9	3.1
2 - 4 times	28.3	28.1
over 4 times	47.8	68.8

Figure 8. Survey Findings Regarding the
Frequency of Rural Credit Market Usage.

Reasons given by the seven respondents for participating in the plan in order of decreasing frequency include: (i) having available land, (ii) profitability, (iii) an extended grace and repayment period, (iv) low interest, (v) environmental benefits, (vi) the Certificate of "Property Rights", and (vii) awareness of a market for timber. Those uninterested in Plan Bosque noted: (i) lack of motivation, (ii) delay, (iii) considerable paperwork, (iv) the long investment period, (v) the small amount of money provided under the program, (vi) leaving debt to the family, (vii) adding to their debt, (viii) no land available, and (ix) the fact that other crop programs disallowed or discouraged trees of wood value.

Two of the 7 participants in the survey had lost interest and dropped from the program. Only one had received all three loan disbursements, while two had received the first disbursement only. The others were in some stage of loan approval. All three individuals who had received Plan Bosque monies had invested their own funds into the plantation. Hence, the loan installments were reimbursement payments.

Although 5 of the 7 identified the local branch bank of the BNF as the source of greatest difficulty in the loan process, confusion arose as to where the paperwork was delayed. The "delay" from loan application to the present stage of the application varied with the individual and the region, but ranged from three to twelve months (Table 6). Largely as a result of this delay, only 2 of the 7 viewed Plan Bosque to be a well-conceived program.

5.4 Discussion

Plan Bosque is designed as a forestation incentive using concessionary interest rates and supervision to attain its objectives. The Adams' RFM "model" is considered appropriate to evaluate Plan Bosque because of the design and assumptions upon which Plan Bosque is based.

However, Adams does not specify what is meant by the "rural poor". Esman (1978) indicates that imprecise catch-all terms like the "rural poor" or "small farmers" conceal the many specific differences which distinguish rural household by asset position, occupation, income, and ethnicity. These terms lead to stereotypes and continued neglect of those in the lower strata of society.

The poor majority in rural Ecuador cannot be characterized as "small farmers". Included are heterogenous groups of landless workers, tenants and sharecroppers, marginal cultivators, and poor artisans and laborers. However, this study uses the "rural poor" in the general sense (Adams 1977; Adams 1979; Adams and Graham 1980).

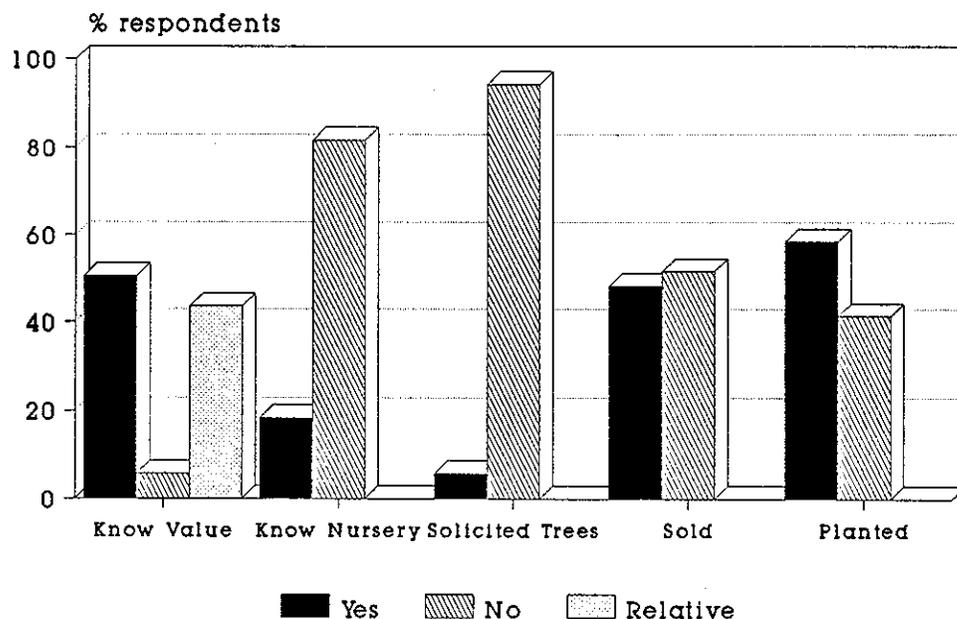
Although all farmers interviewed occupied some land, a complete evaluation of rural poverty in any area would necessarily entail: "productive assets controlled by the household, a matrix of factors such as income, security, consumption patterns, and access to public services" (Esman 1978). For simplicity, this study assumes "rural poverty" to be correlated with landholding size, which in turn is shown to be correlated with education, land tenure and the preferred source of credit (Table 5). In other words, small landowners are less educated, less likely to have

legal title to the land and less likely to draw credit from formal financial markets. These same conclusions are supported by contrasting the data from the two survey regions.

Appendix E indicates the reasons given by landowners in the case-study region for not choosing to plant trees of timber-yielding species. In that savings and credit are generally available, access to credit is not identified as a principal limiting factor in the planting decision. Nor is access to credit statistically correlated with a farmer's tree planting behavior (Table 5). Hence, the concessionary interest rates and credit supervision offered by Plan Bosque have a weak effect over the decision to plant trees in the surveyed region.

Neither have timber market prices served as a forestation incentive. In a perfect market where the value of goods (as measured by price) is common knowledge, product prices are important incentives for production. However, given that relatively few farmers plant timber-yielding species, either timber prices are too low to serve as a planting incentive or the commercial value of timber is not common knowledge.

In the surveyed region, 44 of 87 farmers (50.6%) know the commercial value of the primary timber species, and 38 others (43.7%) know at least the relative values of the species as compared with one another (Figure 9). Farmers who know the commercial value of trees are more likely to have sold trees, but neither variable (tree sales or knowledge of their value) is correlated with tree planting behavior (Table 5). In fact, only 16 of the 87 farmers (18 percent) know of an available tree nursery and only 5 of 87 (6 percent) have ever solicited seedlings (Figure 9). Consequently, present timber prices appear to be an inadequate tree



Percent of Farmers Who Have:

	Knowledge of Commercial Timber Values. (n=87)	Knowledge of an Available Tree Nursery. (n=87)	Solicited Nursery Trees. (n=87)	Sold Trees. (n=87)	Planted Trees. (n=87)
Response					
Yes	50.6	48.3	58.6	18.4	5.8
No	5.7	51.7	41.4	81.6	94.2
Relative knowledge of value as compared to other species.	43.7	-	-	-	-

Figure 9. Survey Findings Regarding the Knowledge of Local Nurseries and Commercial Timber Values, Tree Selling, Planting and Seedling Purchasing Behavior.

planting incentive.

Perhaps the most surprising finding in the study was the demonstrated preference for participation in formal financial markets rather than the informal alternatives. This preference is revealed both by borrowing behavior and by the relatively high number of savings accounts in banks (Table 4). This is unusual in the face of negative real rates of interest which provide weak incentives for households to postpone consumption.⁶

Gillis and others (1988) state that "because farmers' incomes are more variable than those of urban wage earners, there is a strong tendency around the world for rural households to save higher fractions of their incomes than urban households with comparable incomes." This may account for the demonstrated interest in saving. Unfortunately, few investment alternatives exist for successfully hedging inflation, particularly among the small landowners.

In an environment of negative real rates of interest, the concessionary interest rates offered under Plan Bosque are particularly attractive to the borrower. Unintended income transfers (the reinvestment of low-interest loans into higher yielding but unauthorized alternative investments) are not easily identified or quantified under Plan Bosque but are known to exist (Ing. Jorge Montesdeoca, personal communication)⁷. The rigor of loan approval and payment under Plan Bosque is intended to

⁶Ecuador had an 80 percent inflation rate and approximately 35 percent interest rate on Certificate of Deposit savings accounts in private banks. El Comercio (Quito) dated 29 June, 1988.

⁷Supervisor of Agricultural Credit, National Development Bank of Ecuador. February 1988.

minimize the possibilities of income transfer. Unfortunately, the resulting increase in the number of transaction costs virtually precludes the smaller landowner from participation and is exacerbated by the fact that 71 of the 87 surveyed farmers (82 percent) have a sixth grade education or less and may have difficulties with the required paperwork (Figure 10).

Industrial participants in Plan Bosque incur more paperwork than farmers, however, most industries already have an existing infrastructure for loan applications (i.e. accounting departments, business records, political contacts, etc.). The small landowner, on the other hand, faces additional transaction costs such as trips to the city, extensive queuing time, legal and title fees, hosting multiple site inspections, contracting a cartographer, paying bribes, and time lost from work to deal with these demands. Even when the basic requirements of the loan can be met (e.g. land title), many small landowners elect not to participate in such rigorous loan programs. A few farmers commented, "it is easier to plant trees without Plan Bosque". In fact, 42 of 49 (86 percent) of the farmers who had planted trees did so without credit, and all but one of these (98 percent) intercropped the trees.

In addition to the heavy paperwork demands, the risk of being denied formal credit (i.e. Plan Bosque) is a disincentive for program participation. A farmer denied formal credit who then has to return to an informal source may incur greater borrowing costs than if he/she had never solicited a formal loan (Appendix F). Hence, the risk of formal loan denial excludes many potential program participants.

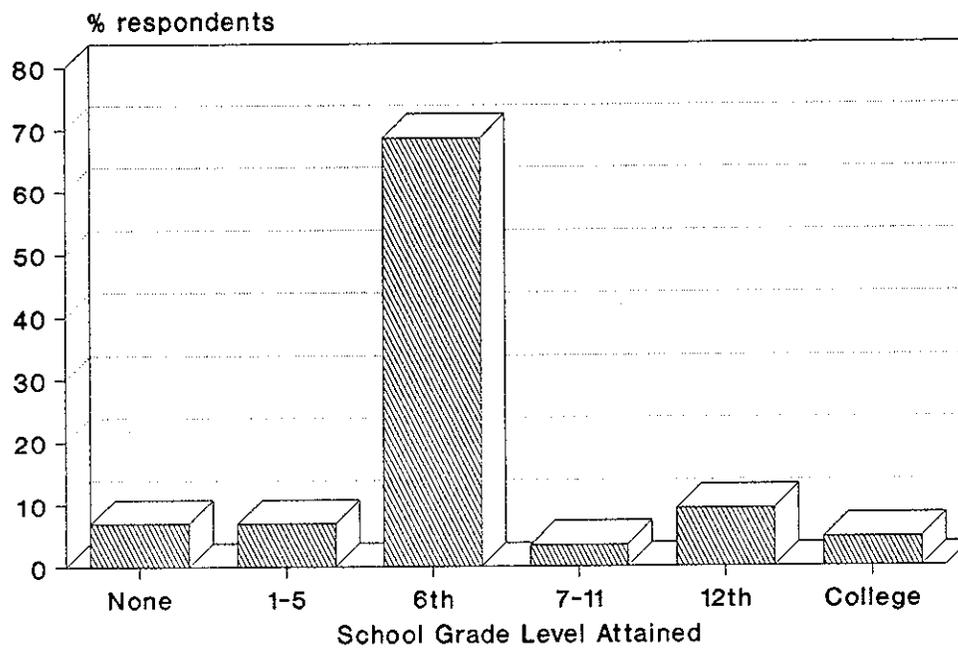


Figure 10. Highest Educational Level Attained by the Surveyed Farmers (n=86).

Transaction costs are but a portion of the borrowing costs. Interest rates are also important ($BC = TC + IR$). Survey evidence indicates that the farmers are more sensitive to interest rates on loans than is suggested by the Adams model. However, when farmers were asked about interest rates on their savings accounts, 22 of the 40 respondents (55%) did not know the rate they were earning (Figure 4).

The banks also face transaction costs. In processing loans, the small first-time borrower with no credit history will realistically cost the bank more than a regular client. Consequently, loanable funds are often transferred to a more concentrated, less risky, and less costly clientele. Survey results have illustrated that, in fact, the highly risk-averse BNF behaves in this manner. Another of the bank's alternatives to reducing risk, shortening repayment periods, is limited under Plan Bosque by the plantation rotation age determined by MAG/DINAF.

Despite the perceived risk by banks, some literature suggests that small borrowers (particularly women) are some of the least risky loan clients in developing countries (Hatch 1987). In the surveyed region, all farmers interviewed expressed an awareness of the need to have funds available for repayment when the loans matured, regardless of the use they made of the loan monies. All reported a serious obligation to repay loans.

Lastly, it is noteworthy that the three interviewed farmers who have received Plan Bosque monies in the region had already invested their own monies and planted rather than awaiting the loan monies to plant. This alone indicates that the loan was not necessarily needed in order to finance the plantation. More importantly, the reimbursements have been issued in accordance with the three-stage loan disbursement arrangements

and not according to the lump sum reimbursement policy in the original Plan. This and several other substantive and procedural problems of Plan Bosque are addressed in Appendix G.

6. A COST SHARE ALTERNATIVE TO PLAN BOSQUE

The policy makers who designed Plan Bosque did consider alternative forestation incentive policies, including cost-share policies of the types used in both the United States and Chile (Chilean Forestry News 1986). The concept of sharing costs between the public and private sectors is not a new one, and many variations on the theme exist. Several possible advantages of cost sharing as a forestation incentive are worthy of mention.

A subsidized loan program like Plan Bosque is a loan, while a cost-share is a grant not to be repaid. A common reaction in Ecuador when cost-sharing is mentioned is that there are a lack of monies for such public largess. Yet with high rates of inflation and Plan Bosque's long interest-free repayment period, the existing policy can be shown to "lose" much more than a cost-share policy might (Appendix D). The question becomes which policy meets national objectives with greater equity and efficiency.

The cost-share (C-S) scheme offers some immediately recognizable, although theoretical, advantages over Plan Bosque. Many of these proposed "advantages" are based upon the premise that a C-S program would entirely eliminate the need for the intervention of the development bank (no loan is given).

First, in an environment of high rates of inflation, the C-S policy might provide a greater return to government per sucre invested. This, of course, depends upon both the cost-share ratio and the inflation rate. The higher the rate of inflation, the more the government "loses" by offering loans at concessionary interest rates with long repayment periods. Consequently, in developing an equivalent cost-share program (same internal rate of return), the higher the rate of inflation the more the government could afford to raise its portion of the cost-share (e.g. from 50:50 to 75:25).

Additionally, it is conceivable that the FONAFOR funds no longer would need to be divided between the BNF and MAG/DINAF because no credit is involved. This would eliminate loan delinquency and diminishes moral hazard. The surplus MAG funds could then be invested in priority activities, such as improving tree nursery production and extension.

The removal of the BNF from the program potentially reduces the transaction costs (including paperwork) for all parties concerned. The Pichincha College of Forestry Engineers has identified 57 specific steps which must be taken in order to complete a plantation using Plan Bosque (Appendix H). Approximately half of these steps would be eliminated by the removal of the BNF, particularly those functions which are duplicated by MAG (i.e. site inspections).

In addition to the preceding advantages, perhaps the most significant contributions of a C-S policy would be sociological⁸. The

⁸Some of the most successful contemporary examples of forestry development programs have been designed in conjunction with anthropologists and sociologists (i.e. PanAmerican Development Foundation's Agroforestry Outreach Project in Haiti).

landowners' perceived risk would be reduced by the fact that no debt or obligation need be incurred, nor would the harvest earnings need to be divided with anyone. Equally important is the fact that the landowner is under no contractual obligation preventing the sale of his/her land or to do so according to government terms, as is the case under Plan Bosque. Additionally, farmers maintain an incentive to care for the seedlings due to their part of the shared investment.

Two additional potential benefits depend a good deal upon the specifics of the cost-share policy design: 1) dispensing with mortgage guarantee from landowners, and 2) maintaining fungibility. In order to reach the maximum number of landowners with a program, no mortgage should be required. In the case of Plan Bosque, the mortgage guarantee is to cover the loan monies, and is retained until the loan matures. Conversely, in the case of a cost-share grant, if a guarantee were required, it would be a short-term guarantee to insure the monies where used to plant trees.

The possible advantage of grant fungibility is less clear. The Adams model implies that development banks traditionally offer production loans, and tie these loans to input requirements under heavy supervision in order to avoid "misuse" of the monies. Plan Bosque most certainly fits this model, even to the extreme of having three loan disbursements and eight site inspections! Not unlike Plan Bosque, C-S grants are also fungible additions to purchasing power. However, in that grants need not be monitored or guaranteed over a period of years, grants may permit greater fungibility than loans.

In deliberating the specifics of a C-S policy, many of the same administrative questions are encountered which confront Plan Bosque. These

include: determining whether to require a guarantee, which paperwork to require of the landowner (e.g. land titles), the choice of a reimbursement plan versus a prepaid plan, and how to replace or modify Plan Bosque accordingly.

Cost-share policies can either function on a reimbursement basis⁹ or on a prepayment basis (before the planting) for those who do not have sufficient funds for plantation establishment. Survey results indicate that savings and credit are generally available, and that investment in the tree component of integrated cropping systems is relatively modest. Hence the logistically simpler C-S reimbursement plan might be appropriate in the region. Its acceptability was tested in the survey questionnaire.

Three survey questions dealt specifically with a hypothetical cost-share policy. When asked which of the two programs (Plan Bosque or C-S) seemed more favorable to the farmers, 44 of 79 (56 percent) selected the cost-share program. Reasons given emphasized the avoidance of further debt, the ownership of the complete harvest and the recognition of favorable program terms. It is interesting to note that should the government "forfeit" an equal amount of money under the two programs, the majority of the public perceives greater benefits in the initial cost-share payments rather than in the governments loss due to the time value of money, as under Plan Bosque. This program "perception" could be an important political consideration in the selection of a policy.

Thirty-one of 70 farmers interviewed (44 percent) claimed to have sufficient funds to participate in a 50/50 cost-share forestation

⁹This is the mechanism of the Forestry Development Program in North Carolina and the Forestry Incentive Program at the U.S. federal level.

incentive¹⁰. This question is yet another indirect way of discovering farmers' savings behavior.

Lastly, those farmers which expressed an interest in the C-S program were asked if they would remain favorable to the program if it were a reimbursement program. This would entail the government reimbursing 50 percent of the landowner's investment after having confirmed that the seedlings were planted. Only 12 of the 38 farmers (32 percent) responded affirmatively to this idea, and these 12 tended to be larger landowners.

Because of its potential advantages, a cost-share policy may serve as an acceptable alternative to Plan Bosque. However, it may also have at least two strong disadvantages: 1) due to the reduction in monitoring and control it may be more subject to graft, and 2) it may face considerable constraints in implementation. The largest constraint is the lack of sufficient institutional capacity within MAG itself. Ironically, the high transaction costs of Plan Bosque may have limited prospective applicants to a serviceable number. Should a more popular program be implemented, the MAG may not have personnel and other resources to accommodate increased demand.

The reasons given for favoring Plan Bosque over the cost-share alternative include: (i) suspicion of the motives behind sharing costs, (ii) lack of savings to "share", (iii) a belief that cost-sharing would not provide incentives for seedling care, and (iv) a sociological belief that the the farmers would not share costs for such a program.

¹⁰Stated investment of 15,000 sucres per ha. This rough figure was estimated from data from coastal Plan Bosque Investment Plans. Intercropping trees with coffee and cacao orchards at a prethinning spacing of 10 X 10 m.

7. CONCLUSIONS

7.1 Plan Bosque and the Adams Model

In conclusion, Adams (1977) questioned the assumptions upon which most RFM projects are designed, and has challenged researchers to test them. Admittedly, each case study will be unique. By and large, the findings of this analysis of Plan Bosque confirm generalizations outlined by the model developed from Adams' "new consensus". The landowning "rural poor" in coastal Ecuador do not face credit shortages and generally have some form of savings. Although they are more sensitive to interest rates than the Adams model suggests, transaction costs still constitute the bulk of their borrowing costs.

Contrary to the Adams model, the formal financial market is preferred over informal alternatives by the majority of surveyed coffee and cacao farmers, despite high transaction costs common to most bank loans. Informal lenders do not provide the majority of loanable funds, but have shown themselves to be a legitimate credit alternative to the banks. Usury appears to be limited to those "isolated" borrowers with few alternatives.

Adams and Graham (1980) suggest ways that RFM policies can be redesigned to realize the goals of efficiency, equity and capital formation. Prominent among their suggestions is that interest rates be made more flexible. "Nominal rates of interest must be flexible so that they rise and fall with inflation. Interest rate policies on both credit and deposits should be aimed at maintaining relatively stable and positive

real rates of interest. Lenders (banks and savers) must expect to receive positive real returns from their financial transactions if RFMs are to function equitably and efficiently."

Two additional recommendations follow logically if positive real rates of returns can be assured. These are: 1) encouraging local savings mobilization, and 2) providing proper incentives for lenders to perform in "socially desirable" ways. Specifically, this means inducing RFMs to better service the credit and deposit needs of a broader clientele in rural areas, and reducing the total social costs of financial intermediation.

Perhaps the greatest social costs of financial intermediation resulting from Plan Bosque are the inefficiencies and inequalities created by high transaction costs to all parties. The effect has been to preclude the small and middle-sized landowners from participation in the program.

7.2 Applications in Agroforestry

Given the heterogeneous nature of Ecuadorean biosystems and cultures, policy development to fulfill the broad objectives of Plan Bosque is complex. Production of timber trees for commercial activity clearly is a different objective than production for home consumption. Plantations in the Sierra and in the lowland tropics require different inputs. Similarly, timber production from pure plantations versus intercropped systems may require different incentives and financing.

McGaughey and Gregersen (1988) advocate different incentives and financing packages for distinct program objectives such as growing wood for commercial activity versus home consumption. They suggest that "each

country needs a clear, working project classification of forestry investment types, based on its experience. Financing packages (which include technical assistance) can then be designed specifically for each project type and institutional situation."

In Ecuador, there are problems when recommending additional policies for every program objective. Institutional capacity is limited, and additional bureaucracy is not needed. The point is simply to recognize the differing requirements for timber planting incentives and financing in agroforestry systems compared with industrial forestry systems.

Cost-share is an alternative forestation incentive policy to Plan Bosque which was examined for agroforestry application. It is a new concept to most agriculturalists, yet the concept seems attractive to a number of them. Cost-sharing policies have several substantive and procedural merits when contrasted with subsidized loan programs like Plan Bosque. These advantages are compounded in light of the survey results strongly supporting the main tenets of Adams' model. For example, the larger the ratio of borrowing cost to loan principal, the less of an incentive Plan Bosque becomes. Consequently, cost-share programs may better serve as a forestation incentive to agroforestry systems, where establishment costs per hectare are generally lower than establishment costs for pure plantations. In spite of the several program benefits proposed by a cost-share program, serious questions remain as to social acceptance and to institutional capacity for successful implementation.

Other creative policy alternatives exist. The challenge suggested by Adams and others (Schultz 1977) is to increase market incentives, thereby limiting direct and costly government intervention. Improved

forestry extension is another area which would appear to facilitate Plan Bosque's forestation objectives.

Plan Bosque represents a demonstrated commitment to the management of natural resources by the Ecuadorean government. Thus the program should be recognized as a significant precedent. Yet more efficiency and equity could be achieved, and must be considered an essential element in public policy. The importance of the agroforestry sector as a source of forest products must be recognized and special consideration given to its forestation incentives.

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APPENDICES

APPENDIX A

11. Of these sources of credit, which do you prefer to use?
 Formal Informal Why?
12. Do you presently have a loan?
 No Yes Formal Informal
 Purpose of loan (production/consumption)
 Interest rate
 Loan term
 Guarantee used
13. Do you use the loan monies for the purposes received, or have you had to use the loan monies in different manners?
 Purpose Received Different Manner (Formal / Informal)
14. Do you prefer to participate in credit programs (ie. FOPINAR, Plan Bosque, FODERUM (Fondo de Desarrollo Rural para Zonas Marginales)) or to apply for credit directly?
 Programs Direct
 Why?
15. Did you have to solicit a loan because your savings are limited or because they are destined towards other ends?
 There are none. Limited. Other ends.
16. How do you prefer to maintain your savings?
 there are none.
 savings account. Interest rate?
 checking account.
 goods. (pigs, cows, trees, etc...) specify _____
 other.
17. Do you have trees on your land?
 No Yes (natural or planted)

18. Do you allow naturally regenerated wood valuable species to grow?

Yes No Why not?

19. Do you sell or have you sold trees?

No Yes

20. Do you know the commercial value of the distinct species?

Yes No Relative

21. -----

22. Have you planted trees?

No Yes In pure stands or in agroforestry schemes?

Did this planting require a loan or did you
simply utilize your own resources?

Loan Own resources

23. Are you familiar with a forest tree nursery available to
serve you?

No Yes Where?

24. Are you familiar with the prices charged for seedlings at
this forest tree nursery?

No Yes

25. Have you ever solicited seedlings from a forest tree nursery?

No Yes Have your requests been fully attended?

Yes No Why not?

II. Data About Plan Bosque

1. Are you familiar with Plan Bosque?

Loosely No Yes Where did you become informed about
(to sec. III) the Plan?

Have you solicited funds from Plan
Bosque?

No Why are you not interested in participating?

(a sec. III)

Yes Why are you interested in participating?

2. Had you planted trees before participating in Plan Bosque?

No Yes Where they of the same species as those planted
below Plan Bosque?

No Yes

3. In what stage of the loan processing are you presently?

Application

Development of the Investment Plan

In authorization stage Ministry Bank

Land Inspection # 1 # 2 # 3

Loan Installment # 1 # 2 # 3

Other.

Did you lose interest in the Program during the processing?

No Yes Why?

4. Which stage of the loan proceedings presented the greatest
difficulties? (None, Ministry, Bank, IERAC, other)

5. How long did the proceedings take from application to
the first installment of funds (or until your present step)?

6. Do you believe that Plan Bosque is well formulated or do you see some problems in it?

Well formulated Problems What problems??

7. In order to participate in Plan Bosque did you have to:

- | | | | |
|----|---|----------|-----------|
| a) | Pay a bank employee to process materials? | No | Yes |
| b) | Pay a non-bank employee to process materials? | No | Yes |
| c) | Cover bank costs apart from interest? | | |
| | | Services | No Yes |
| | | Fines | No Yes |
| d) | Pay interest in advance? | No | Yes |
| e) | Pay bribes? | No | Yes |
| f) | Make compensation deposits? | No | Yes |
| g) | Resolve land tenure problems? | No | Yes |
| h) | Solicit a land inspection? | No | Yes |

Many times?

By whom?

8. How much work time do you calculate having invested in Plan Bosque (interviews, visits, title clarification, trips, contacts, etc...)?

9. Under Plan Bosque do you feel the risk of not owning the trees?

No Yes

10. Does there exist a management plan for your planting?

No Yes

III. Cost Sharing Alternative

1. For the planting of trees (whatever area), which seems more favorable to the farmer, a loan program like Plan Bosque, or working under a Cost-Sharing Plan?

What is a Cost-Sharing Plan? It is a plan in which you would pay say 50% and the Ministry of Agriculture would pay the other 50% of the costs of a plantation, without any subsequent obligation. For example, say you had 3 hectares available for forestation at a total cost of 100,000 sucres. In this case, you would pay \$/. 50,000 and the Ministry of Agriculture would pay \$/. 50,000. In this way, the Ministry would fulfill its goals of promoting forestation and you would benefit from the trees planted (100% of the harvest).

This is already being done in other countries like Chile.

Plan Bosque

Cost-Sharing

2. Would you still have an interest in cost-sharing if you were responsible for 100% of the plantation costs and later after the Ministry confirmed the planting, would then reimburse their 50% of the costs?

No Why not?

Yes How long would you be willing to wait for the reimbursement?

3. Do you have funds to undertake a Cost-sharing plan?

No Yes (50% of costs being about 15,000 sucres/ha.)

APPENDIX B

**APPENDIX B: COFFEE AND CACAO FARMS AND
SECONDARY FOREST INDUSTRY IN THE SURVEY REGION**

The region studied includes the stretch of foothills and inland coastal plain approximately 60 kms. wide from the town of Quevedo in the north to La Troncal to the south. An interface of two forest types predominate: the Seasonally Humid Tropical Forest (0-500 m. above sea level) and the Low Montane Forest (500-1000 m.a.s.l.). The dry summer months extend from May to November, while the wetter winter months extend from December to April. The area averages from 1,500 mm to 2,000 mm of precipitation per year unevenly distributed between seasons and the temperature varies relatively little with an average of 24.7 degrees Centigrade (Mussack 1988).

A. COFFEE AND CACAO

Coffee and cacao orchards represent over 60 percent of the land use in the region (ibid. 1988), and few other crops offer such opportunity for intercropping shade trees of the species and sizes desired by the forest industry. In general, a reciprocal relationship exists between the number of orchard management inputs (i.e. irrigation, fertilizers, herbicides, etc.) and the number of shade trees required in both coffee and cacao production. Coffee and cacao seedlings require shading while the shade requirements of a mature orchard vary by management regime. The

fewer shade trees, the greater the fertilization and irrigation demands. The resulting unshaded orchard will likely be more productive, but at the expense of a reduction in the orchard's life expectancy (Giron 1987). "Undermanaged" low input systems predominate the study region with roughly 30 percent shading of mature crops (about 25 trees/ha) recommended by the national cacao program for producers with few available capital resources for alternative production inputs. Many of the present orchards, particularly in the Ventanas region, were established beneath a selectively thinned existing forest canopy. *Coffea canephora* (Robusta Coffee) and *Theobroma cacao* (L.) of a hybrid variety (Trinitario group X Forastero Amazonia group) are common to the majority of orchards in the area (Opeke 1987). Neither is the highest quality varieties found on the world markets, nor is production per hectare of land very efficient as compared with other world producers. Nonetheless, coffee and cacao combined represent approximately 25 percent of the Ecuador's export revenues (U.S. \$204 million) and rate behind only bananas in terms of importance of agroindustrial exports (Mussack 1988).

Ecuador's share of the world production of cacao dropped from 7.1 percent in 1985 to 5.8 percent in 1986 which is representative of a downward trend which began in the early 1970's. Market prices for both commodities have also plummeted in recent years, yet land area planted to the crops has continued to increase. By 1986, the land planted to coffee and cacao was greater than 740,000 hectares (ibid. 1988).

Other agricultural activities represented in the region include: oil palms, pastures (cattle), fruit trees, corn, rice, soy, bananas and sugar cane. The oil palms and fruit trees are more common to the north of the study range, while bananas, cattle and sugar cane occur with greater frequency in the southern portion. Despite the prevalence of export agriculture, it is calculated that excluding land currently under rice, corn and bananas, as much as 82 percent of the cultivated surface area in the region could be available for wood production within the existing agroforestry systems (ibid. 1988).

B. FOREST INDUSTRY

Since the collapse of the Andean common market in the early 1980s, many secondary forest industries have been working at less than the capacity for which they were constructed. Consequently, in a collaborative industry effort, the Wood Industries Association (AIMA) has actively pursued external markets in the U.S.A., Europe and Asia with relative success.

Availability of raw materials for these firms is now of genuine concern. Unless alternative sources of roundwood can be identified by secondary forest industry, some effective incentive policy must be developed to induce the planting behavior by "non-industrial private landowners". The situation in Ecuador is analogous to that faced by forest industry in the Southeastern United States, but much more urgent in terms of the time horizons of roundwood supply projections.

Most forest industries in the Southeastern United States depend upon non-industrial lands for approximately 50 percent of their procurement needs (Healy 1985). In Ecuador, Artepractico, one of the leaders in the industry, depends upon the non-industrial private lands for over 80 percent of its procurement needs (Ing. Hernan Loyolla personal communication)¹ In as much, the Ecuadorean firms are increasingly confronting procurement policy shifts, including consideration of landowner assistance programs. Agroforestry systems are instrumental to these policy considerations.

The private sector cannot afford a unilateral effort to confront the problems encountered in raw material deficits, and the Ecuadorean government has good justification for intervention with incentives of its own. Consequently, Plan Bosque was designed to address forest production and protection alike. These dual policy objectives are naturally served by traditional agroforestry systems, and in fact, agroforestry is specifically mentioned in the law as viable and desirable use for FONAFOR funds (Registro Oficial 1985b).

Despite the desirability and qualification of agroforestry systems within the legislative intent of the Plan Bosque, relatively few monies have been allocated towards these ends. No exact figures exist, nor do either of the administering public agencies keep these statistics. Yet in spite of official claims of never having disbursed Plan Bosque funds for

¹ Manager at Artepractico, Cuenca Ecuador 6/88.

agroforestry systems (Ing. Jorge Montesdeoca, personal communication)², the author visited two such intercropped system financed by Plan Bosque in the province of Los Rios. Despite the lack of data, it can be safely stated that a negligible amount of Plan Bosque funds have been authorized for agroforestry systems.

Why does Plan Bosque receive such poor marks thus far in its application to agroforestry systems? There are any number of quite legitimate responses to this question. First and foremost, it seems that Plan Bosque's priority has been focused upon productivity in larger scale plantation systems. Consequently, the extension and promotion efforts have not catered to the generally smaller scale and highly integrated planting systems found in the agroforestry sector.

Not only is the "supply-side" (BNF) not oriented towards the agroforestry systems, but also the demand for participation by agroforesters themselves has not developed. Several disincentives to participation in Plan Bosque are identified in the text. In addition, a number of non-credit related "limiting factors" to the tree planting decision are identified in Appendix E.

Financing for coffee and cacao programs frequently covers any expenditure for shade trees. With natural regeneration providing a plentiful source of seedlings for many species and the inherent lower costs of stocking trees in agroforestry systems, a separate credit source

²Ing. Jorge Montesdeoca Castillo, National Credit Supervisor, National Development Bank, Quito, March 1988.

for the tree component of the systems was not a salient issue. The greatest gains stand to be made not through credit, but through coordinated extension efforts.

Examining the previous FPEI (Forestry Private Enterprise Initiative) survey reveals some interesting data. In both surveys the largest number of landholdings were within the 11-50 Ha. category, labeled the mid-sized landholdings (mean 34 Ha.). These mid-sized landholdings are not only predominant in their relative numbers, but also in their relative annual income made from the sale of trees. Nevertheless, the sale of wood still only represents 2.3 percent of the total area farm income (Mussack 1988).

Despite the fact that these mid-sized landowners predominate and are slightly more active in the sale of wood, none of the landholding sizes represent "saturated markets" for incentive policies. Potentially the greatest gains to industry may be made by tailoring such policies toward the mid and larger sized clientele. However, equity should not be sacrificed to efficiency in such a policy design.

Thus far, the forest industry has provided little extension of its own. Improved public and private sector forestry extension and research could represent the least costly and most effective policy alternative to date. In the longer run, improved market incentives (i.e. higher product prices, lower cost of inputs, improved communication exchange) will provide the stimulus to timber production in intercropped systems.

APPENDIX C

**APPENDIX C: A PLAN BOSQUE FORESTRY CONTRACT
REGISTER OF TECHNICAL INSPECTION**

Application Number #

Province:
Parish:

Precinct:
Site:

A. General Property Information

- 1) Name of the Property:
- 2) Name of the Landowner or the Legal Representative:
- 3) Land Tenure:
- 4) Surface of the area to be planted (has.):
- 5) Bordering Properties:
(North, South, East, West)
- 6) Access Routes and Distance to the Nursery (kms):
(by Vehicle, Horse, Boat, Other.)
- 7) Cartographic elements of the Property:

Type:

Scale:

Topographic

Planimetric

Other

B. Biophysical Characteristics of the Property

- 1) Climatic and Topographic Data
 - a) Maximum altitude (meters above sea level)
 - b) Minimum altitude (m.a.s.l.)
 - c) Topography: Flat, Hilly, Irregular, Discontinuous
 - d) Slope:

	Percent (%)	Surface area (has.)
--	-------------	---------------------
 - e) Mean Annual Percipitation (mm)

	Wet Season	
	Dry Season	
 - f) Mean Annual Temperature (Centigrade)
 - g) Frequency of frosts (months)
 - h) Presence of Fog (months)
- 2) Ecology:

Life zone:
- 3) Soils:
 - a) Texture
 - b) Structure
 - c) Effective Depth
 - d) Drainage
 - e) Percent Rocks
 - f) Humidity
 - g) Erosion
- 4) Present Use of the Soil to be Planted

Category:	Surface Area
Annual Crops	
Perennial Crops	
Pasture	
Natural Vegetation	
Other	

5) Agronomic Classification and Use Capacity

Class	Use Capacity	Surface Area

I-IV	Unrestricted Forest	
V	Forest with Few Restrictions	
VI	Forest with Moderate Restrictions	
VII	Forest with Severe Restrictions	
VIII	Protection Forest	

C. Vegetative Material Information

1) Tree Species to be Planted

Species	No. of Plants
---------	---------------

2) Seedling Source

Nursery Location	Nursery Ownership Bare Root/Bags
------------------	-------------------------------------

3) Expected performance of the species in the region

Form No.2 , Plan Bosque

**Investment Plan
(Establishment Costs)**

Application No. _____ Code _____ (Province,
Parish)

- 1) Species
- 2) Planting System (i.e. hedgerows)
- 3) Planting Density (plants/ha)
- 4) Spacing (m x m)
- 5) PLANTATION:

<u>Stage One</u>	<u>Laborers/ha.</u>	<u>Daily Wage</u>	<u>Total Cost</u>
a) Marking			
b) Site Prep.			
c) Hole Prep.			
Technical Assistance (4%)			
Insurance (9%)			Subtotal
<u>Stage Two</u>			
d) No. Plants			
e) Transportation			
f) Planting			
g) Pest Control			
Technical Assistance (4%)			
Insurance (9%)			Subtotal
<u>Stage Three</u>			
h) Replanting			
i) Irrigation			
j) Maintenance			
k) Pest Control			
Technical Assistance (4%)			
Insurance (9%)			Subtotal
			Total Gross Costs
			Net Costs/ha.
			Total Net Costs _____ ha.

Forest Inspector (signature)
 Technician (signature)
 Revision and Approval/ Quito, MAG (signature)
 Autorization MAG, Quito (signature)
 Time and Place

APPENDIX D

**APPENDIX D: CASH FLOW OF PLAN BOSQUE:
AN EXAMPLE**

A. Procedural Flowchart of Plan Bosque

Year 0 : Bank ----- \$ -----> Farmer

Year 2 : Bank <----- \$ ----- MAG

(the Ministry of Agriculture cancels the
farmer's loan principal plus 9% interest
compounded annually)

Years 3 through 14, no interest
is charged the farmer by MAG.

Year 15 : MAG <----- \$ ----- Farmer

(At harvest time, the farmer repays MAG
exactly what the MAG had paid the
bank 13 years earlier, without adjusting
for inflation.)

B. Example of Cash Flow

	<u>LANDOWNER</u>	<u>BANK</u>	<u>MAG</u>
	Nominal Rates		
Year 0	+ 60,000,000	- 60,000,000	0
Year 2	0	+ 71,286,000	- 71,286,000
Year 15	- 71,286,000	0	+ 71,286,000

ASSUMPTIONS³

Opportunity Cost of Capital is 35% , however Plan Bosque is a subsidy whereby the government is willing to receive only 9% for two years and no interest (0%) from year two till the harvest of the trees. A subsidy being the willingness of the government to receive less than the optimal opportunity cost of its capital.

Inflation: 40%

Real Discount Rate from year 0 - 2 :

$$1.09 / 1.40 - 1 = - 0.22$$

Real Discount Rate from years 2 - harvest:

$$1.00 / 1.40 - 1 = - 0.29$$

³These assumptions are considered conservative given Certificate of Deposit Savings rates of 35 percent (180-359 day deposit, 6/88) and an average rate of inflation of 45 percent since January of 1986, El Comercio (Quito) dated 29 June, 1988.

APPENDIX E

APPENDIX E: TREES IN THE COFFEE AND CACAO ORCHARDS**A. PRINCIPAL DESIRABLE CHARACTERISTICS OF SHADE TREES
INTERCROPPED WITH COFFEE AND CACAO ORCHARDS⁴
(age dependent)**

- 1) Adapted to climates and soils common to coffee and cacao
- 2) Rapid Growth
- 2) Profound radical root system
- 3) Extended branching pattern
- 4) Perennial foliage cover
- 5) Medium diameter bole
- 6) Regenerative capacity
- 7) Permits an "adequate" level of solar radiation to reach the crop below.
- 8) Serves multiple purposes (i.e. nitrogen fixing capacity, provision of fruit or wood).
- 9) Supplies sufficient organic material to the soil.

⁴For a thorough review of the topic see:

Beer, John. 1987. Advantages, disadvantages and desirable characteristics of shade trees for coffee, cacao and tea. Agroforestry Systems 5 (1): 3-13.

B. TIMBER-YIELDING TREES COMMONLY INTERCROPPED WITH
COFFEE AND CACAO IN THE SURVEYED REGION

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>FAMILY</u>
Amarillo	<u>Persea rigens</u>	Lauraceae
Balsa	<u>Ochroma pyramidele</u>	Bombacaceae
Cedro	<u>Cedrela odorata</u>	Meliaceae
Fernan Sanchez	<u>Triplaris cumingiana</u>	Polygonaceae
Guachapeli	<u>Albizzia guachapele</u> (H.B.K.) Dugand	Leguminosae- Mimosoideae
Guayacan	<u>Tabebuia chrysantha</u>	Bignoniaceae
Laurel blanco	<u>Cordia alliodora</u> (R. & P.) Oken	Boraginaceae
Maranon	<u>Anacardium excelsum</u> (Bert. & Balb.) Skeels	Anacardiaceae
Moral fino	<u>Chlorophora tinctoria</u> (L.) Gaud.	Moraceae
Pachaco	<u>Schizolobium parahybum</u> (Vell.) Blake	Leguminosae- Caesalpinioideae
Palo prieto	<u>Erythrina fusca</u> Loureiro	Leguminosae- Papilionoideae
Saman	<u>Pithecellobium saman</u> (Jacq.) Benth	Leguminosae- Mimosoideae
Tambor	<u>Erythrina poeppigiana</u> O.F. Cook (Walp)	Leguminosae- Papilionoideae
Teca	<u>Tectona grandis</u> L.F.	Verbenaceae

**C. LIMITING FACTORS IDENTIFIED WITH LANDOWNER
DECISIONS TO INTERCROP TIMBER-YIELDING TREES
WITH COFFEE AND CACAO**

- 1) The perception of low rates of return relative to alternative investments.
- 2) The long rotation ages for most timber-yielding tree species.
- 3) Instead of perceiving trees to be an investment for their childrens' future, landowners often select not to leave their "debts" for their children (in this case, the debt incurred by the plantation costs).
- 4) The National Coffee, Cacao and Banana Programs, which combined represent over 90% of the agricultural extension in the region, recommend against planting the species desired by forest industry.
- 5) Landowners prefer multipurpose trees, like fruit trees or nitrogen fixing trees.
- 6) Trees are relatively non-liquid assets compared to alternative investments (i.e. livestock).
- 7) There exists a real lack of extension on the part of forest industry itself.
- 8) Many landowners did not recognize available lands for the planting of trees, which represents a lack of agroforestry research and extension (27% of landowners own second properties).
- 9) The agriculturalist may not have access to sufficient credit.
- 10) The harvest of the trees within the orchard can be uneconomical, as the tree is of less value than the potential damage to the crops below.
- 11) The perception of high risks and uncertainty about forest investments.
- 12) The belief that natural regeneration is quite sufficient in the production of trees.
- 13) The observation of high seedling mortality in neighboring plantations.

APPENDIX F

**APPENDIX F: A HYPOTHETICAL EXAMPLE OF BORROWING COSTS
USING THREE SCENARIOS, INCLUDING PLAN BOSQUE**

In some instances, it may be less expensive to seek loans from informal sources than from formal sources. This point is illustrated by adapting an illustration by Adams (1977) to Plan Bosque. In the figure, Option I depicts a new borrower who can obtain a loan for 100 units of money for a plantation from an informal lender, incur little or no transaction costs, be absolutely sure he will get the loan requested, and pay an interest rate of 48 percent per year for the loan (the effective rate of roughly 3.3 percent per month).

Alternatively, the same individual may choose to seek a loan for the same amount from the BNF under Plan Bosque. Before the loan application is approved or rejected, the borrower must visit the MAG and the BNF several times, fill out papers, host site inspections and possibly pay a bribe. The applicant may experience loan transaction costs equal to 15 units of money prior to having his application either approved or rejected. Suppose, for example, that only half of the applicants are approved. If the applicant's loan is approved, the borrower goes on to pay a concessional 9 percent interest rate and incurs loan transaction costs of an additional 15 units of money. On an annual basis a successful applicant for formal credit would pay annualized borrowing costs of about 39 percent.

Because only half the applicants for Plan Bosque are approved (an example), the rejected half of the applicants must return to informal sources to obtain a loan. Their borrowing costs amount to 63 percent (48 + 15) on an annual basis. The expected borrowing costs of acquiring credit if one first chooses to apply for formal credit via Option II is 51 percent, given the assumptions used in the example. Where these conditions exist, there is little wonder that small and new borrowers often opt for informal loans. Their informal costs of borrowing may be equal to, or less than, similar costs incurred in trying to obtain "inexpensive" formal loans like Plan Bosque.

FIGURE A: HYPOTHETICAL BORROWING COSTS FROM PLAN BOSQUE
AND INFORMAL SOURCES⁵

OPTION I

Request Loan From an Informal Lender
Lender

Assumptions:

- | | | |
|------------------------------------|---|--------|
| 1. Amount of Loan | - | \$100 |
| 2. Interest Rate | - | 48% |
| 3. Transaction Costs | - | 0 |
| 4. Loan Term | - | 12 mo. |
| 5. Probability of Getting the Loan | - | 1.0 |
| 6. Annual Costs of Borrowing | - | 48% |

OPTION II

Request Loan from a Formal Lender

Assumptions:

- | | | |
|---|---|--------|
| 1. Amount of Loan | - | \$100 |
| 2. Interest Rate | - | 9% |
| 3. Transaction Costs to Get a Yes or No Decision. | - | \$15 |
| 4. Loan Term | - | 12 mo. |
| 5. Probability of Getting the Loan | - | .5 |
| 6. Transaction Costs After Yes Decision | - | \$15 |
| 7. Annual Cost of Borrowing | - | 39% |

OPTION III

Request Informal Loan
After a Loan Refusal in Option II

- | | | |
|-----------------------------|---|-----|
| 1. Annual Cost of Borrowing | - | 63% |
|-----------------------------|---|-----|

Expected Annualized Borrowing Costs of Using Option II

$$E_i = \frac{39 + 63}{2} = 51.0$$

⁵Adapted from: Dale W. Adams, "Policy Issues In Rural Finance and Development," Paper No. 1, Conference on Rural Finance Research, San Diego, California. July 28-August 1, 1977.

APPENDIX G

**APPENDIX G: SUBSTANTIVE
AND PROCEDURAL PROBLEMS IDENTIFIED WITH PLAN BOSQUE**

SUBSTANTIVE

- 1) Lack of a National Agenda.

Only recently (1988) has Ecuador begun to develop a comprehensive national policy for its natural resources under the FAO Tropical Forestry Action Plan (Food and Agriculture Organization 1987). The objectives of FONAFOR (production and protection) are potentially contradictory and are not based upon comprehensive national policy objectives (i.e. paper production).
- 2) Loan Ranking.

Plan Bosque is not a prioritized loan. By prioritizing Plan Bosque the loan application procedures could be streamlined.
- 3) Normalization of Procedures.

Arbitrary rulings and loan delays could be ameliorated by publication of normalized regulations and price listings for Plan Bosque services nationwide (i.e. labor, species, zones). Site inspections would similarly benefit from such published guidelines.
- 4) Adequacy of Funds.

Despite the official claim that Plan Bosque covers 100 percent of plantation expenses, no reviews of plantation establishment costs are scheduled. Cost coverage offered under Plan Bosque often lags behind real costs.
- 5) Centralization.

All BNF and MAG/DINAF approvals presently require transactions in Quito. Coastal and Amazon provinces often feel that the centralized decision-making is out-of-step with local realities.

6) Geopolitical Heterogeneity.

Provincial authorization by MAG/DINAF requires site inspection by the provincial Forestry Director. Often a province may span a wide range of life zones and altitudes unfamiliar to a forest technician specializing in only one region. This provincial centralization is also cause for lengthy delays.

7) Insurance Coverage.

Insurance covers the bank's risk and not the farmer's (the loan process receives coverage, not the trees themselves). The insurance begins with the first loan disbursement, while the seedlings are not planted until after the second disbursement. Also, the rates and the burden of proof for plantation failure are questioned by those with the farmer's interest mind.

8) Emergency Decree No.4.

In 1985 the Emergency Decree No. 4 was ratified (Registro Oficial 1985b) The decree combined FONAFOR funds into a single account rather than two separate accounts for forest protection and production. A disproportionate amount of funds are used for forest production.

9) IERAC.

Some rural farmers are apprehensive of the Ecuadorean Institute of Agrarian Reform and Colonization (IERAC) and would therefore avoid participation in Plan Bosque. Also, the larger landowners stand to gain more from the Certificate of Property Rights offered by Plan Bosque due to the "use it or lose it" policies of IERAC.

10) Cooperative and Community Involvement.

Few cooperatives and communities have participated in Plan Bosque. No special effort is made to include communal lands in the Plan Bosque forestation effort.

11) Fines.

Fines imposed by the bank on the farmer can result from delinquent payments even when the delinquency is caused by the Ministry of Agriculture.

PROCEDURAL

1) Reimbursement Oversight.

Reimbursement under Plan Bosque is not written to be implemented in three disbursements like the loan itself. Nevertheless, many participating landowners invest their own monies and receive three loan payments, rather than a less onerous and more timely compensation.

2) Qualified Technicians.

Not only are the bank's site inspectors not agriculturalists or foresters, but many MAG/DINAF technicians authoring the investment plans can be undertrained. This site inspection is an unnecessarily duplicated function, and mutual data banks could save time and effort.

3) Program Implementation.

The Official Register identifies priority watersheds nationwide to be protected under Plan Bosque. These directives have seemingly been ignored. Also ignored as directives are the Investment Plans themselves, which should serve to establish work and loan disbursement scheduling.

4) Timing.

Loan disbursement delays can result in the loss of a planting season or unnecessarily high mortality rates. Hired labor peaks in planting season, and Plan Bosque wage rates often cannot compete with alternative offers. Nursery production also needs to be coordinated with the planting season and expected demands (seedling numbers and species).

5) Nurseries.

There remains some question as to the adequacy of the number and location of available nurseries. Variety of species (natives and exotics) and seedling quality also are of some concern. In addition, by the governments subsidizing the production of trees and underproducing, an unsatisfied demand for seedlings can develop, yet private entrepreneurs cannot afford to compete in seedling production.

6) Institutional Capacity,

Communication, both vertical and horizontal, are in great need of improvement within and between all agencies implementing Plan Bosque. Additionally, underbudgeting severely restricts the extension and research capabilities (many extensionist have no transportation).

APPENDIX H

**APPENDIX H: PROCEDURES FOR
OBTAINING AND UTILIZING A FORESTATION LOAN UNDER PLAN BOSQUE
(Guerrero 1987)**

- 1) Presentation of an application at MAG/DINAF.
- 2) Contracting technical assistance.
- 3) Determining a date for a site inspection by MAG/DINAF.
- 4) Site inspection by MAG/DINAF.
- 5) Elaboration of a Technical Register (plantation costs).
- 6) Approval of the Technical Register with the Department of Production Records, Quito.
- 7) Elaboration of the Forestry Contract.
- 8) Endorsement of the Forestry Contract by the landowner.
- 9) Endorsement of the Forestry Contract by the MAG/DINAF director, Quito.
- 10) Send the Forestry Contract and the Technical Register to the Assistant Manager of Agricultural Credit of the BNF, Quito.
- 11) Send the Forestry Contract and the Technical Register to the BNF branch bank nearest to the plantation site.
- 12) Presentation of the documentation to the Ecuadorean Institute of Agrarian Reform and Colonization (IERAC) for a ruling on the "Property Rights Certificate".
- 13) Endorsement of the Property Rights Certificate by the Executive Director of IERAC.
- 14) Presentation of the application for credit to the National Development Bank (BNF) at the respective branch bank.
- 15) Determination of a date for a site inspection by the BNF.

- 16) Inspection of the site by the BNF.
- 17) Send the BNF inspector's report to the Technical Registration and Inspection Department of the BNF.
- 18) Examination of titles by the Legal Department. In the case of property acquired through intermediation by IERAC, authorization is needed for mortgaging the property.
- 19) Entry of the credit application with complete documentation onto the agenda of the Credit Committee.
- 20) Loan approval by the Credit Committee.
- 21) Draft a contract to mortgage the property with the BNF. In the case of an agricultural or industrial loan collateral, the value of the collateral must be assessed (set a date, and inspection).
- 22) Endorsement of the contract with the BNF by the landowner.
- 23) Endorsement of the contract by the Credit Manager of the BNF.
- 24) Accounting of credit.
- 25) Submit an request (from the branch bank) for the first disbursement of funds to the Assistant Manager of Finances of the BNF.
- 26) Transfer of funds from Quito to the branch bank.
- 27) Payment of the first quota of funds corresponding to the first stage of work: marking, clearing and digging of holes.
- 28) Execution of the work corresponding to the first stage.
- 29) Notification of the completion of work to MAG/DINAF.
- 30) Establishment of a date for the site inspection by MAG.
- 31) Site inspection by MAG.
- 32) Report the approval of the successful completion of work to MAG/DINAF.
- 33) Remission of the report from MAG to the BNF.
- 34) Site inspection by the BNF of the completion of stage one.

- 35) Completion of a inspection report and approval by the BNF for passage to stage two.
- 36) Application for the remission of the second stage of funds to the Assistant Manager of Records, Quito.
- 37) Submission of the request for funds corresponding to stage two by the branch bank to the Assistant Manager of Finances at the BNF.
- 38) Disbursement of the second quota of funds to the landowner for the execution of the second stage of work: acquisition of seedlings, planting, irrigation and pest control.
- 39) Execution of the work corresponding to stage two.
- 40) Notification of the completion of work to MAG/DINAF.
- 41) Site inspection by MAG/DINAF.
- 42) Report of approval by the district forester.
- 43) Submission of the district forester's report to the branch bank of the BNF.
- 44) Site inspection by the BNF for confirmation of the proper investment of funds.
- 45) Report of approval by the BNF to begin the third stage.
- 46) Application for the remission of the third stage of funds to the Assistant Manager of Records, Quito.
- 47) Submission of the request for funds corresponding to the third stage of work to the Assistant Manager of Finances at the BNF, Quito.
- 48) Disbursement of the quota of funds corresponding to the third stage of work: replanting, maintenance, irrigation and competition control.
- 49) Execution of the work corresponding to stage three.
- 50) Notification to MAG/DINAF of the completion of the work corresponding to stage three.
- 51) Site inspection by MAG/DINAF.

- 52) Report of plantation approval by MAG/DINAF at 22 months with 90% survival. Landowner is held financially responsible for mortality greater than 90%.
- 53) Notification to the Department of Forestry Production/MAG about the plantation approval.
- 54) Notification to the BNF of approval by MAG/DINAF.
- 55) Inspection by the BNF to record the investments of the third stage of the plantation.
- 56) Cancellation of the loan by MAG/DINAF with the BNF at the loan maturity of two years. (Principal plus 9% simple annual interest).
- 57) Return of the mortgage or collateral.