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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

GUATEMALA

PROJECT PAPER

SMALL FARMER DIVERSIFICATION SYSTEMS

AID/LAC/P-071

Project Number: 520-0255
Loan Number: 520-T-034

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1

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____	DOCUMENT CODE 3
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2. COUNTRY/ENTITY - GUATEMALA	3. PROJECT NUMBER <input type="text" value="520-0255"/>
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4. BUREAU/OFFICE LAC <input style="margin-left: 200px;" type="text" value="05"/>	5. PROJECT TITLE (maximum 40 characters) <input style="width: 90%;" type="text" value="Small Farmer Diversification Systems"/>
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6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY <input type="text" value="0"/> <input type="text" value="4"/> <input type="text" value="3"/> <input type="text" value="0"/> <input type="text" value="8"/> <input type="text" value="7"/>	7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY <input type="text" value="8"/> <input type="text" value="1"/> B. Quarter <input type="text" value="4"/> C. Final FY <input type="text" value="8"/> <input type="text" value="5"/>
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8. COSTS (\$000 OR EQUIVALENT \$1 = Q.1.00)

A. FUNDING SOURCE	FIRST FY <input type="text" value="81"/>			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	1,358	4,838	6,196	2,874	5,226	8,100
(Grant)	(556)	(140)	(696)	(2,072)	(528)	(2,600)
(Loan)	(802)	(4,698)	(5,500)	(802)	(4,698)	(5,500)
Other U.S.	1.					
	2.					
Host Country					6,674	6,674
Other Donor(s)						
TOTALS	1,358	4,838	6,196	2,874	11,900	14,774

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) FN	210-B	080	080			1,322	1,437	1,322	1,437
(2) FN	210-B		044				3,168		3,168
(3) FN	210-B	012	012			1,118	895	1,118	895
(4) FN	311-B	340				160		160	
TOTALS						2,600	5,500	2,600	5,500

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each) _____	11. SECONDARY PURPOSE CODE <input type="text" value="260"/>
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12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)					
A. Code	BR	BS	R/AG	LAB	NUTR
B. Amount					

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen the public agriculture sector capacity to stimulate small farm diversification from basic grains to higher value diversified crops of greater labor intensity.

14. SCHEDULED EVALUATIONS Interim MM YY <input type="text" value="1"/> <input type="text" value="1"/> <input type="text" value="8"/> <input type="text" value="4"/> Final MM YY <input type="text" value="0"/> <input type="text" value="3"/> <input type="text" value="8"/> <input type="text" value="7"/>	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify) _____
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16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY	Signature Title Eliseo Carrasco Director, USAID/Guatemala	Date Signed MM DD YY <input type="text" value="0"/> <input type="text" value="4"/> <input type="text" value="2"/> <input type="text" value="9"/> <input type="text" value="8"/> <input type="text" value="1"/>	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>
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INSTRUCTIONS

2

The approved Project Data Sheet summarizes basic data on the project and must provide reliable data for entry into the Country Program Data Bank (CPDB). As a general rule blocks 1 thru 16 are to be completed by the originating office or bureau. It is the responsibility of the reviewing bureau to assume that whenever the original Project Data Sheet is revised, the Project Data Sheet conforms to the revision.

Block 1 - Enter the appropriate letter code in the box, if a change, indicate the Amendment Number.

Block 2 - Enter the name of the Country, Regional or other Entity.

Block 3 - Enter the Project Number assigned by the field mission or an AID/W bureau.

Block 4 - Enter the sponsoring Bureau/Office Symbol and Code. *(See Handbook 3, Appendix 5A, Table 1, Page 1 for guidance.)*

Block 5 - Enter the Project Title *(stay within brackets; limit to 40 characters)*.

Block 6 - Enter the Estimated Project Assistance Completion Date. *(See AIDTO Circular A-24 dated 1/26/78, paragraph C, Page 2.)*

Block 7A. - Enter the FY for the first obligation of AID funds for the project.

Block 7B. - Enter the quarter of FY for the first AID funds obligation.

Block 7C. - Enter the FY for the last AID funds obligations.

Block 8 - Enter the amounts from the 'Summary Cost Estimates' and 'Financial Table' of the Project Data Sheet.

NOTE: The L/C column must show the estimated U.S. dollars to be used for the financing of local costs by AID on the lines corresponding to AID.

Block 9 - Enter the amounts and details from the Project Data Sheet section reflecting the estimated rate of use of AID funds.

Block 9A. - Use the Alpha Code. *(See Handbook 3, Appendix 5A, Table 2, Page 2 for guidance.)*

Blocks 9B., C1. & C2. - See Handbook 3, Appendix 5B for guidance. The total of columns 1 and 2 of F must equal the AID appropriated funds total of 8G.

Blocks 10 and 11 - See Handbook 3, Appendix 5B for guidance.

Block 12 - Enter the codes and amounts attributable to each concern for Life of Project. *(See Handbook 3, Appendix 5B, Attachment C for coding.)*

Block 13 - Enter the Project Purpose as it appears in the approved PID Facesheet, or as modified during the project development and reflected in the Project Data Sheet.

Block 14 - Enter the evaluation(s) scheduled in this section.

Block 15 - Enter the information related to the procurement taken from the appropriate section of the Project Data Sheet.

Block 16 - This block is to be used with requests for the amendment of a project.

Block 17 - This block is to be signed and dated by the Authorizing Official of the originating office. The Project Data Sheet will not be reviewed if this Data Sheet is not signed and dated. **Do not initial.**

Block 18 - This date is to be provided by the office or bureau responsible for the processing of the document covered by this Data Sheet.

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

PROJECT AUTHORIZATION

Name of Country: Guatemala
Name of Project: Small Farmer Diversification
...
Number of Project: 520-0225
Loan Number: 520-T-034

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Small Farmer Diversification project for Guatemala (the "Cooperating Country") involving planned obligations of not to exceed Five Million Five Hundred Thousand United States Dollars (\$5,500,000) in loan funds ("Loan") and Two Million Six Hundred Thousand United States Dollars (\$2,600,000) in grant funds ("Grant"), over a five year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The project ("Project") consists of the development of the institutional capacity within the Government of Guatemala to promote and support the introduction of diversified crops in the small farm sector by (i) carrying out adaptive research and development of appropriate diversified production technologies for small farm enterprises; (ii) dissemination of appropriate diversified production technologies to small farmers; and (iii) provision of short and long term credit to small farmer to finance farm improvements and production inputs required for crop diversification.

3. The Project Agreements, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Interest Rate and Terms of Repayment (Loan)

The Cooperating Country shall repay the Loan to A.I.D. in U.S. Dollars within twenty-five (25) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in U.S. Dollars interest from the date of first disbursement of the Loan at the rate of (i) two percent (2%) per annum during the first ten (10) years, and (ii) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Goods and Services (Loan)

Goods and services, except for ocean shipping, financed by A.I.D. under the Loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed

by A.I.D. under the Loan shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States or of countries that are members of the Central American Common Market.

c. Source and Origin of Goods and Services (Grant)

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

d. Condition Precedent to First Disbursement (Loan)

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(1) A financial plan detailing the Cooperating Country's annual counterpart contribution to be made in support of the Project.

(2) A detailed time-phased Plan setting forth all activities to be completed during the life of the Project including staffing, organization and other administrative arrangements required to implement the Project.

e. Condition Precedent to Disbursement for Credit Activities (Loan)

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement to finance credit activities, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(1) A trust agreement between the Ministry of Finance and the Agricultural Development Bank (BANDESA) for the transfer of no less than \$3,000,000 of Loan funds and \$2,200,000 equivalent of counterpart funds of the Cooperating Country, to finance the long and short term credit requirements and social costs of the Project.

(2) The terms and conditions for the farm improvement credit and production credit to be provided under the Project.

f. Covenants

The Cooperating Country shall covenant that, unless A.I.D. otherwise agrees in writing, it will:

- (1) Employ its best efforts to maintain the diversification credit fund at its original level for the five year period following the final disbursement of Loan funds, including providing additional financing necessary to restore any reductions in the diversification credit fund to the extent that uncollectible accounts and administrative expenses associated therewith are not covered by the income generated by the interest rate spread.
- (2) Cause BANDESA to complete a study of its interest rates within one year of the first disbursement of Loan funds.

f. Waivers (Loan)

Motorcycles financed by A.I.D. under the Project in an amount not to exceed \$70,000 may have their source and origin in countries included in A.I.D. Geographic Code 899. Exclusion of such procurement from Free World countries other than the Cooperating Country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

Edward W. Conroy

 Acting Assistant Administrator
 Bureau for Latin America
 and the Caribbean

June 19, 1981

 Date

Clearances:

GC/LAC:BVeret: 6/1* date 6/4
 LAC/CEN:MSchwartz: 6/1 date 6/4
 LAC/DR:CPeasley: 6/1 date 6/4
 LAC/DR:MBrown: 6/1 date 6/4
 GC/LAC:DAAdams:ckg:6/3/81:29183

* Provided that no obligation is made until expiration of the Congressional Notification period

* D.H.!

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Table of Contents

	<u>Page No.</u>
Face Sheet Data	
Summary and Recommendations	i.
I. PROJECT BACKGROUND	1
A. Project Setting	1
B. Government of Guatemala Rural Development Strategy	2
C. Relationship of AID Activities	3
D. Other Donor Assistance	4
E. Constraints to Expansion of Diversification	5
II. DETAILED PROJECT DESCRIPTION	9
A. Goal	9
B. Project Purpose	9
C. Project Strategy and Rationale	9
D. Project Area	10
E. Project Components	10
III. PROJECT ANALYSES	28
A. Technical Analysis	28
B. Economic Analysis	40
C. Social Soundness Analysis	46
D. Institutional Analysis	51
IV. FINANCIAL ANALYSIS AND PLAN	63
A. Project Budget and Disbursement Plan	63
B. Financial Analysis of the Small Farm Enterprise Benefitted Under the Project	67
C. Analysis of Implementing Institution Budgets	70

V. PROJECT IMPLEMENTATION

A. Administrative Arrangements and Implementation Plan

72

B. Evaluation Plan

77

ANNEXES

A. Country Checklist 5C (1)

B. Logical Framework Matrix

C. Certification Pursuant to Section 611 (e) of the Foreign Assistance Act of 1961, As Amended

D. Application Letter Ministry of Finance

E. Environmental Threshold Decision

F. Technical Analysis - MSU

G. Annex to Implementation Plan: Nutrition Baseline Study

H. Annex to Engineering Analysis

I. Annex to Economic Analysis

J. Annex to the Financial Analysis

K. Estimated Vehicle, Machinery and Equipment Requirements

L. Draft Project Authorization

M. Technical Assistance Plan

N. Draft Project Description

O. Market Demand Projections

Summary and Recommendations

A. Face Sheet Data (attached)

B. Recommendations

The following recommendations are submitted for approval:

<u>Loan:</u> (Terms: 25 years to include a ten (10) year grace period on amortization; 2% interest during the grace period and 3% thereafter)	\$ 5,500,000
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<u>Grant:</u>	2,600,000
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<u>Government of Guatemala Contribution:</u>	<u>6,700,000</u>
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Total	\$14,800,000
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Disbursement Period: 5 years

Waivers: The Mission proposes a source and origin waiver (000) for procurement of motorcycles

C. Description of the Project

1. Borrower/Grantee

The Government of Guatemala will be the Borrower/grantee. The project will be implemented by the Borrower's Agricultural Research Institute (ICTA), Agricultural Crop and Livestock Extension Agencies (DIGESA and DIGESEPE) and Agricultural Development Bank (BANDESA).

2. Project Summary

The goal of the proposed project is to improve the well-being of rural Guatemalans living in the Northwestern Highlands of Guatemala. In support of this goal, the project will strengthen public

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agricultural sector capacity to stimulate small farm diversification from basic grains to labor intensive production of higher value diversified crops.

In the Highlands, the land constraint combined with increasing population pressures has resulted in a proliferation of small farming units, i.e. minifundismo which can no longer support the traditional Indian family whose production pattern is heavily oriented towards cultivation of corn and beans. The limited land base, along with crop specialization in basic grains, has resulted in low productivity and incomes for the Highland farmer. Although there has been progress made in increasing corn and bean yields, significant improvements in small farmer incomes must come about through increased agricultural diversification. The Highland region has a comparative advantage in deciduous fruit and vegetable production which is relatively labor intensive. The project seeks to stimulate agricultural diversification into those crops including livestock systems which will increase the return to factors of production of the small farm enterprise.

To accomplish this the project will provide technical assistance, training and credit financing to the public agricultural sector in order to develop its capacity to support small farm diversification. The AID loan and complementary grant will provide assistance to the Government of Guatemala's Agriculture Science and Technology Institute (ICTA); General Directorate for Agricultural Services (DIGESA); General Directorate for Livestock Services (DIGESEPE), and the National Agricultural Development Bank (BANDESA) as well as other Government agencies in an effort directed toward: (1) an improved understanding of the small farm household production/consumption system; (2) the adaptation and generation of appropriate diversified crop /livestock technology; (3) improvement of the linkages between the research and extension institutions for a more responsive and cost-effective system of disseminating small farmer-oriented technologies; (4) dissemination of information and technical assistance geared to small farmers; (5) short-term credit to assure small farmer access to necessary agricultural inputs to support small farm diversification; and (6) long-term credit to permit necessary on-farm investments related to diversified crop/livestock production.

The applied research and technology activities under the project will be implemented by ICTA, a semi-autonomous entity within the public agricultural sector. The project will provide technical assistance

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and research training in diversified crops and livestock to be incorporated into the pragmatic research methodology already developed by ICTA. A survey will be conducted to collect socio-economic data on the small farm enterprise. This data will be used by ICTA to develop small farm models to guide research efforts and identify appropriate cropping systems. ICTA will utilize a farming systems approach in adapting and generating diversified crop technology. The testing of this technology will be conducted under controlled (research station) and variable (farm trial) conditions.

The Technology Transfer and Technical Assistance activities will be implemented by DIGESA/DIGESEPE. These institutions will provide extension support to the small farmer in diversified crop and livestock production systems. A Demonstration and Training Center will be established under the project to train extensionists in diversified crop technologies including livestock and extension methodology.

The project will establish diversification districts within Region I and assign trained extensionists to promote agricultural diversification among small farmers. They will be assisted by small farmer leaders, i.e. guías and special irrigation and soil conservation teams who will provide additional technical assistance to the farmer in the area of on-farm investment.

The project will establish a special credit fund to finance long-term farm investment (\$3.4 million) as well as provide short-term credit (\$1.8 million) for working capital needs. Small scale irrigation systems and soil conservation terracing will be financed as well as farm inputs including seed, fertilizer and other inputs.

3. Project Beneficiaries

The project will benefit small farmers living in the Northwestern Highlands of Guatemala. The total population of the project area (Region I) is 1.8 million with per capita income less than \$200. The area is characterized by a predominantly indigenous population dedicated to subsistence farming. The project will directly benefit some 5,000 small farmers and their families. The project in addition to raising small farm incomes is expected to improve the nutritional status of the rural poor.

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4. Summary Project Budget

<u>Description</u>	<u>Total</u>	<u>Loan</u>	<u>Grant</u>	<u>GOG</u>
I. Applied Research/Evaluation	4,110	1,202	1,357	1,551
II. Extension and Promotion	4,742	895	1,012	2,835
III. Credit and Social Cost Payments	5,456	3,168	-	2,288
IV. Project Coordination	231	-	231	-
V. Inflation and Contingencies	<u>235</u>	<u>235</u>	<u>-</u>	<u>-</u>
Total	14,774	5,500	2,600	6,674

D. Summary Findings

The Project Committee has reviewed the technical, economic, social and the financial aspects of the proposed project. Based on this review, supported by consultant studies, the committee recommends the authorization of a loan of \$5.5 million and a grant of \$2.6 million.

The project meets all applicable statutory criteria (see Annex A) and the Mission Director has made the certification required by Section 611 (e) of the FAA (see Annex C). The project is not expected to have a detrimental impact on the environment and a negative determination was approved by the Assistant Administrator on July 15, 1980 (see Annex E).

E. Project Development Team

1. Mission Project Development Committee:

- Clemence Weber, Office of Rural Development
- Carlos Crowe, Engineering Office
- George E. Like, IDI
- Thomas A. Totino, Controller's Office
- Donald Masters, Acting Capital Development Officer

13
14

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2. Consultants and TDY Assistance

Gerald Murray, PSC
Rodolfo Bojorge, PSC
Gustavo Gomez Casco, PSC
Nancy Ruther, PSC
Roberto Prata, PSC

3. Mission Reviewing Officer

Thomas W. Stukel, Acting Deputy Director

4. Mission Approving Officer

Eliseo Carrasco, Director

I. PROJECT BACKGROUND

A. Project Setting

As is common in many lesser developed countries, Guatemala is confronted by a series of socio-economic problems which are aggravated by unrelenting population pressures. This is particularly true for the rural areas where high population growth of over 3 percent per annum, impinges heavily on limited land resources resulting in excessive parcelization of the land and environmental degradation in the form of deforestation and soil erosion. The high man/land ratios are indicative of a proliferation in subsistence farming units, i.e. minifundismo which is associated with stagnant productivity and low rural incomes. The vast bulk of the rural population earn less than \$200 annually on a per capita basis and the prospects of income improvement depend largely on agricultural transformation. Other social indicators also confirm the low quality of life prevalent in the Altiplano region. It is estimated that roughly 80 percent of all children under five suffer from some degree of malnutrition. Moreover, the national life expectancy recently calculated at 54 years is much lower for the population of Mayan descent which forms the rural majority in the Highlands. Illiteracy among this group has been estimated as high as 90 percent. In general, cultural as well as social and economic isolation characterize the area.

Thus in the rural areas, where Guatemala's socio-economic problems are most severe, the basic factors contributing to the greater relative incidence of poverty are the limited land base available to the majority of farm families, the cultivation of traditional crops which result in low levels of net income per hectare and the lack of viable off-farm employment opportunities for subsistence farmers and landless laborers. The last agricultural census (1964), disclosed that 365,000 of the 417,000 farm units in Guatemala were seven hectares or less. More recent projections based upon this basic data indicate that this severe minifundio situation has worsened, particularly in the densely populated Western Highlands. For centuries, these small farm units have been devoted almost exclusively to production of primary subsistence crops, corn and beans. The production of these basic crops, even with application of modern technology, yield net incomes of less than \$125 per hectare. As a consequence, the typical rural family must supplement its income through part-time handicraft production or by working as migratory laborers on the large plantations of the South Coast. Other off-farm employment opportunities in the rural areas are limited to part-time employment on larger neighboring farms, or as unskilled laborers in the larger rural towns.

One of the most important factors contributing to rural poverty is the high birth rate which combined with reduced mortality rates in recent years has meant growing scarcity of arable land relative to rural population, in the target area. The indigenous target group, bound by tradition and culture to the Highlands, has resisted the idea of permanent migration. Since land itself is a fixed resource, population pressure on the land has been growing. Land that was sufficient up until a few decades ago, can no longer support the subsistence economy of the traditional Indian. The inevitable result has been a proliferation of minifundio, characterized by low productivity and gradual degradation of soil and forest resources. Moreover, due to the limited productive base associated with traditional agriculture, underemployment has reached as high as 42 percent in rural areas.

If we take as an average one acre per person in the Highlands, it is clear that farm size is too small, given present farming techniques, to provide sufficient income to meet basic family needs. Furthermore, prospects for improved agricultural incomes are limited by traditional small farm specialization in basic grains. This traditional pattern has been reinforced by a lack of adequate agronomic information and extension support to stimulate production of higher value crops such as fruits and vegetables. Finally, there has been poor commercial access to domestic marketing systems in the remote Highlands. Thus the basic alternatives facing the Altiplano farmer are: i) changes in productivity including the value of crop mix; ii) supplement income through cottage industry; iii) seasonal or permanent migration.

Given the land constraint and underemployment in the Highlands, there is a clear need for a program emphasizing agricultural diversification into higher value, labor intensive crops and livestock systems.

B. Government of Guatemala Rural Development Strategy

To achieve its development objective of improving incomes of the poorest people in the society, the GOG is concentrating its efforts on increasing agricultural productivity and decentralizing industry in rural areas where most of the poor live. The primary source of improved incomes in rural Guatemala must come from agricultural production improvements; i.e., increased value of output and lower unit costs of production. At the same time, complementary advances must be made in rural areas in development of activities not directly linked to agricultural production.

To improve on-farm incomes, the GOG 1979-82 Development Plan looks toward stimulating the production of high value labor intensive crops (and intensive livestock production) thereby diversifying production away from the traditional corn and beans. Although these crops will continue to form a part of the production pattern, the most optimistic projections of yield increases would not provide acceptable levels of income for farm families on their limited size parcels of land. Fruits, vegetables, and certain livestock activities offer greater opportunity for more intensive use of labor and greater returns per unit of land and labor employed.

Since the available productive land in the Highlands of Guatemala is insufficient to provide a diversified production solution for all the rural poor, the GOG is complementing its diversification policy by opening new lands in the Northern part of the country for colonization. This will allow a portion of the rural poor target group who have inadequate land to acquire larger farms on which to use their available labor and capital.

C. Relationship of AID Activities

The AID program is designed to assist the GOG in areas which are central to this rural development strategy. Thus, one of the major emphasis of past and ongoing AID activities is to assist the GOG in stimulating and supporting small farm diversification.

AID is presently financing pilot projects in soil conservation and small scale irrigation among small farmer groups in the AID Highlands target area. Mission evaluation of these activities indicates substantial increases in productive capacity of small land holdings. These pilot efforts demonstrate the feasibility of an agricultural diversification program through the construction of small scale irrigation projects and land terracing. In those areas where these types of on-farm investment have been made, production has more than doubled and there was often a spontaneous shift into diversified crop production. Moreover, an earlier AID supported Food Productivity and Nutritional Improvement Project has made considerable progress in increasing corn and bean yields: up to 100% in some cases. Both of these activities effectively reduce the amount of land necessary to meet subsistence needs thereby making more land available for diversified crops.

AID programs have systematically laid the ground work for this project by addressing several other important constraints. Over the past decade, AID assistance has been directed at improving public agriculture sector institutional capacity and improving small scale rural infrastructure. In addition, AID through the marketing project for diversified crops has already taken the important step of ensuring that there will be a marketing outlet for increased production stimulated under this project. Some of the projects currently underway which directly or indirectly support small farm diversification include:

1. The AID supported Small Farmer Marketing Project (Loan 520-T-030) designed to improve the market infrastructure and services required for the marketing of fruits and vegetables produced in the target area thereby alleviating the marketing constraint to increased production of diversified crops.

2. Under Loan 520-T-026, AID is supporting a pilot, labor-intensive, access road construction project in the target area to improve small farmer access to markets and services required to stimulate diversification while at the same time increase employment opportunities.

3. The Human Resources activity of the above loan provides assistance to improve the quality of human resources in the agriculture public sector through training, and also focuses on improving policy-making, planning, and coordination activities of the agricultural public sector. The development of a Sample Frame supported under this same activity and the Integrated Area Development Studies Project, also financed by AID, will provide an updated and more complete data base for planning purposes. All of this should improve planning of the infrastructure and services required to support a more extensive diversified farming effort in the target area.

D. Other Donor Assistance

The Interamerican Development Bank (IDB) has recently approved a loan for global credit (\$25.0 million) channeled through the Guatemalan Agricultural Development Bank (BANDESA). It is anticipated that at least some of this credit will be made available for short-term loans to small farmers for the purchase of seed, fertilizer and insecticides. This credit program should help relieve a serious shortage in agricultural credit which has currently been aggravated by the general liquidity situation of the Guatemalan banking system. Thus the greater availability

of short-term small farmer credit provided through IDB should complement the long term credit program of this project designed to finance small scale irrigation systems, livestock and orchard tree investments.

Currently under consideration by the public agricultural sector is a proposed IDB loan to finance an Agriculture Research and Seed Production Project. While at this point it is not clear what final form this project will take, it appears that the proposed project will further support agricultural diversification efforts. The project will upgrade the research and extension facilities at the national level and significantly increase the domestic production of certified seed. Although some support is anticipated in the area of deciduous fruits and vegetables, the main emphasis of the project will be on basic grain crops and citrus fruits. This project should help improve the research and extension capabilities of ICTA and DIGESA thereby complementing the small farmer diversification program which will focus on Agricultural Region I (AID target area).

E. Constraints to Expansion of Diversification

While the GOG has made significant progress in demonstrating the economic and technical viability of diversification for the small highlands farmer, expansion and improvement of diversification activities is presently constrained by several factors. The most critical of these are:

1. Diversification Technology

The production of diversified crops in the Highlands is already taking place on a limited scale. With the exception of irrigation and soil conservation techniques, the technologies being applied in this project were transferred and introduced without any systematic adaptive research effort. Until recently the adaptation of technologies has been done by individual producers on an ad hoc basis. It is only within the last two years that ICTA has begun to incorporate a limited number of temperate vegetable crops in its research activities. Thus in order to extract the maximum benefits from the GOG's diversification strategy a concerted adaptive research effort will be required in order to produce technologies in plant and animal production appropriate to the resource base and potential markets of Guatemala's small farm sector.

Guatemala's Institute of Agricultural Science and Technology (ICTA) has, with AID support, made considerable gains in improving potential small farmer yields in basic grains. As part of this effort, ICTA has developed a management philosophy and research methodology which is highly small farmer oriented and effective in producing technologies relevant and appropriate to the small farm enterprise. In keeping with the GOG diversification strategy, ICTA is now planning to expand its scope of research activities to place greater emphasis on a wide range of diversified crops and livestock. This will require development and expansion of ICTA's human and physical resource base to undertake such an effort.

2. Dissemination of Technology and Technical Assistance

ICTA's diversified crop research and development efforts must be accompanied by a concomitant development and expansion of the institutional capacities of the Guatemalan agencies primarily responsible for disseminating technology and providing technical assistance to small farmers, i.e. the General Directorate for Agricultural Services (DIGESA) and the General Directorate for Livestock Services (DIGESEPE).

Technology development and dissemination are inherently interrelated. For example, results of technology dissemination are an important factor in determining the effectiveness and thus the direction of the research and development function. Thus, in addition to the development of the individual capacities of the GOG research and dissemination institutions, it will be necessary to improve the linkages between these institutions in order to enhance the relevance of production technology and extension methodology in relation to the small farm sector.

The AID-financed pilot project in irrigation and soil conservation demonstrated that these elements of diversification technology are a fundamental prerequisite to an effective diversification effort. The unique importance of irrigation and soil conservation will require a special effort to expand the pilot dissemination and technical assistance effort presently being carried out by DIGESA.

3. Credit for Diversified Production

During the intensive review two studies were commissioned to determine credit availability for diversified crop production. The first study reviewed the overall liquidity situation of the banking system

and private credit flows to the agricultural sector. The study showed that between 1975-1978 overall private sector lending in Guatemala expanded by 32 percent. However, agricultural sector lending only increased by 5.6 percent during the same period. Since then credit to the sector has tended to stagnate at the Q95 million level. Of this, fully two-thirds is used to finance export agriculture, primarily cotton and coffee. The remaining credit is absorbed by basic grains and cattle production. The study then evaluated the public sector Agricultural Development Bank, BANDESA and its lending operations in recent years. In general, BANDESA credit has been directed to basic grains production and in many cases is limited to specific farm inputs such as seed and fertilizer. By and large, almost all of the credit is short to medium term designed to cover working capital needs.

In addition, BANDESA operates a number of special lines of credit which have been established by the GOG and the various donors including AID. Unfortunately, these special credit lines are subject to certain restrictions which ensure availability of credit to intended credit recipients but limit the mobility of funds from a financial management point of view. Thus the amount of credit available from private and public sources is extremely limited for diversified crops.

The second study estimated the credit requirements or credit demand likely to be induced by the project. The credit estimates clearly indicate a need for a special credit fund which provides financial resources to small farmers who wish to diversify their production.

4. Input and Output Markets

The Mission during intensive review evaluated the farm input distribution system in the project area, i.e. Region I. The review showed that there are sufficient commercial outlets for most types of farm inputs which are likely to be used in the agricultural diversification program. The cooperative federations, such as FECOAR, have a number of warehouses and distribution points in the area which can supply both members and non-members with sufficient inputs of seed, fertilizers, pesticides and ordinary farm tools. To the maximum extent possible any technical improvements in diversified crop inputs (e.g. seeds) will be introduced through these existing private sector distribution systems.

In the area of output marketing, the project will coincide geographically with the Cooperative Marketing Association (CECOMERCA) established under AID Loan 520-T-030. This organization is planning to construct three regional centers for fresh produce collection, sorting and shipment. The first such center, established in Patzicia, has been operating successfully since mid-1980. The second regional collection center is scheduled to be established in early 1982 and will be located in the department of Quezaltenango. Estimates of production levels stimulated by the project indicate that sufficient marketing infrastructure will be in place during the project implementation period to ensure that marketing will not operate as a constraint on diversified crop production.

In terms of market demand, projections of local consumption of diversified crops indicate that the additional production stimulated by the project can easily be absorbed by the market without depressing crop prices. This is based on consumption trends since 1967 which indicate that the production stimulated by the project will account for less than ten percent of the expected increase in consumption demand (see Annex O). Moreover, it is expected that one-third of diversified crop production will be exported to the rest of the Central American Region. Currently, the Cooperative Marketing Association is expanding its export operations to include all of the Caribbean basin countries. Market prospects in this area appear to be quite favorable given the low costs of production in the Altiplano and the relative size of regional markets. Moreover, Guatemala's geographic location and proximity to Central American and Caribbean markets further adds to this comparative export advantage.

23

II. DETAILED PROJECT DESCRIPTION

A. Goal

Improve the well-being of rural Guatemalans living in the Northwestern Highlands.

Sub-Goal - Improve small farm management and increase the return to factors of production of the small farm enterprise.

B. Project Purpose

Strengthen public agricultural sector capacity to stimulate small farm diversification from basic grains to higher value diversified crops of greater labor intensity.

C. Project Strategy and Rationale

Although progress is being made towards increasing yields of basic grains, reliance on these crops for increased incomes severely limits the potential for improving family incomes. One solution is to develop and apply technology, services and information which permit the farm family to meet subsistence requirements with reduced land and family labor, yet increasing their income by applying the remaining land and labor factors to higher value crop and livestock production. This loan and complementary grant will provide assistance to the Government of Guatemala's Agricultural Science and Technology Institute (ICTA), General Directorate for Agricultural Services (DIGESA), General Directorate for livestock Services (DIGESEPE), and the National Agricultural Development Bank (BANDESA), as well as other Government agencies in an effort directed toward: (1) an improved understanding of the small farm household production/consumption system; (2) the adaptation and generation of appropriate diversified crop/livestock technology; (3) improvement of the linkages between the research and extension institutions for a more responsive and cost-effective system of disseminating small farmer-oriented technologies; (4) dissemination of information and technical assistance geared to small farmers; (5) short-term credit to assure small farmer access to necessary agricultural inputs to support small farm diversification; and (6) long-term credit to permit necessary on-farm investments related to diversified crop/livestock production.

The project strategy will aim at increasing the economic return on productive assets owned by or available to the small farmer through selective interventions. These will include management improvements and the transfer of low cost technologies designed to significantly raise productivity levels on small farm units. To achieve the project purpose, the project will strengthen and expand the institutional infrastructure and provide necessary financial and technical support to better enable the small farmer to diversify his farm household unit. Accordingly, the project will provide credit support for the construction of small scale irrigation systems and soil conservation activities designed to increase the productive capacity of small farms.

The project will combine elements of both a commodity program, i.e. vertical activity integration with a defined-area program involving a horizontal array of activities focused on a particular area, i.e. the Altiplano. Evaluation and feedback mechanisms will be built into the project to ensure necessary adjustments in programmed activities.

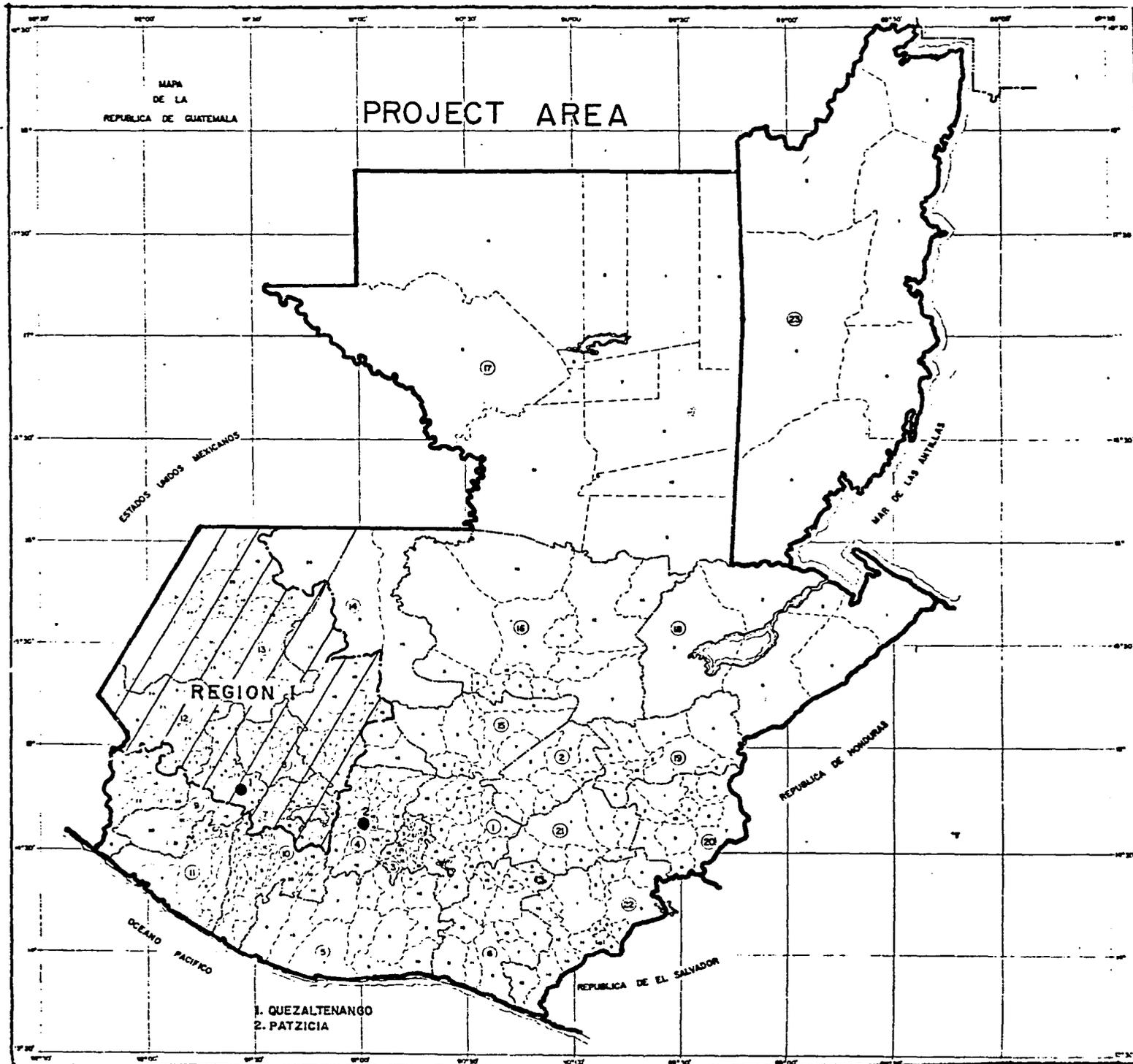
D. Project Area

The project area consists of the departments of Sololá, Totonicapán; Quiché; Quezaltenango; San Marcos and Huehuetenango located in the Northwestern area of Guatemala. (See following map.) For planning purposes, this area has been designated as Region I by the Ministry of Agriculture and lies within the AID target area, as defined in the 1983 CDSS. According to 1979 census data, Region I has a total population of approximately 1.8 million of which the vast majority are dedicated to agricultural activities. There are 215,093 farms in the region of which 205,922 or 96 percent are less than seven (7) hectares. This group of farms represents roughly two-thirds of the total arable land area within the region. The region is mainly inhabited by indigenous population and is characterized by small scale subsistence farming, although some farm diversification does exist. The region is geographically mountainous which has tended to isolate it from the rest of the country. Yet Region I with its rugged terrain and considerable differences in elevation and climate, does give the area a comparative advantage in deciduous fruit and vegetable production. Moreover, gravity fed irrigation is technically feasible in many parts of the region.

E. Project Components

1. Small Farmer Applied Research and Technology Adaptation

Activities under this component of the project will be directed towards adapting existing technology in diversified crops to



25

conditions in the Altiplano at the small farm level. The Institute of Agricultural Science and Technology (ICTA), a semi-autonomous entity within the public agricultural sector will be the principal implementing institution for this component. Within the public agricultural sector, ICTA is the public sector institution most responsible for generating and promoting the use of science and technology within the sector. The project will provide technical assistance and research training in diversified crops and livestock to be incorporated into the pragmatic research methodology already developed by ICTA. This research methodology will test diversified crop technologies under both controlled (research station) and variable (farm trial) conditions. As technologies are validated they will be systematically incorporated into a continuing program of extensionist training and small farmer orientation. Farm level testing and dissemination will be emphasized throughout the program to ensure relevance at the small farm level. Both researchers and extensionists will be involved in evaluating technologies promoted under the project. This will be an on-going process and provide essential feedback for the research and extension programs.

Under this component of the project, the following activities will be organized and implemented over the project life.

a. Small Farm Management Survey

As the initial step in its research and development activities, ICTA with assistance from DIGESA and USPA, will analyze the operations of the small farm from a socio-economic perspective in order to identify and better understand specific constraints and opportunities for diversification. The survey will treat the small farm as a family enterprise in which production and consumption decisions are interrelated. An effort will be made to better define the small farmer's management goal so that potential interventions in his method of operation will meet with greater acceptance. Thus the purpose of this activity is to increase the relevance of technological interventions and thereby, the receptivity of the small farmer to technological change implicit in diversified crop/livestock production. This will contribute to a better targeting of research efforts to address small farm constraints and improve the qualitative aspects of extension services as well.

The small farm survey will be conducted by a multi-disciplinary team whose members will be drawn from permanent ICTA and DIGESA staff supported by outside technical assistance. The survey team will include members of the ICTA socio-economic unit, DIGESA home

27

educators and short-term consultants, e.g. rural sociologist, agricultural economist and a nutritionist. In addition to short-term consultant support, the project will also provide research and extension specialists as part of the long-term technical assistance team. The later will familiarize themselves with conditions in the Altiplano and assist in data analysis and formulation of representative small farm models. Using data already available from the ICTA socio-economic unit; the USPA regional sample frame and other data sources, the team will design the questionnaire to be used in the field. A random sample of small farms, defined as seven hectares or less, will be undertaken during the first year of project implementation. The multidisciplinary team will survey the same set of farms during different periods of the year to confirm information given in the initial interview. The survey team will assess as accurately as possible the following:

- Physical characteristics of the small farm **specifically** farm size, soil quality, slope and rainfall conditions, irrigation prospects, etc.

- Current cropping patterns, yields and on-farm livestock.

- Identification of principal economic activities and their seasonal pattern for all members of the household labor force. This will involve estimates of time allocation by activity as well as observation of patterns in the household division of labor.

- An inventory of small farm tools, equipment and a description of the level of technology currently used.

- Assessment of marketing patterns including distances to markets and means of transport.

- Small farm record-keeping practices and current sources of credit, if applicable.

- Organizational ties with the rest of the community, particularly membership in rural cooperatives.

- Food consumption patterns including food availability, preparation and intra-household distribution.

- Identification of small farmers who display leadership characteristics for possible nomination as "guías" under the diversified crop extension program.

The resulting information base on small farm operations will provide the basis to determine which diversified crop/livestock systems are feasible and what the opportunity costs might be under a diversified production system. This information is important because it will indicate which technologies are indeed appropriate and whether or not the farmer is likely to accept them. In addition, the survey will serve to orient the T. A. extension specialists to the types of problems faced by the small farmer. This should ensure realism in the design of the extension approach by adding specificity and relevance to the training program for diversified crop extension agents.

Finally, it is anticipated that agricultural diversification will affect nutritional status as well as improve small farmer incomes. Accordingly, a separate evaluation component (see evaluation plan) has been included in the project in order to determine the nutritional impact resulting from changes in household food consumption patterns^{1/} in response to changes in the small farm production/consumption unit. Baseline data on household food behavior patterns will therefore be collected in conjunction with the farm management survey.

b. Analysis of Survey Results and Formulation of Representative Small Farm Models^{1/}

The multi-disciplinary team will compile and analyze the information collected in order to formulate representative farm household models. These models will then be studied by research specialists and extension specialists to determine opportunities for technological and economic improvement. This will involve an evaluation of the suitability of various kinds of diversified crops and livestock to the observed conditions and the prospects for profitable adaptation. Based on preliminary regional data, illustrative crops include: a) In the area of fruit production, apples and peaches will be stressed since they constitute the major deciduous fruits currently being grown in the Highlands. b) With regard to vegetable production, primary emphasis will likely be placed on cole crops (cabbage, broccoli and cauliflower), carrots, garlic, onions and potatoes. c) Livestock species likely to receive most attention under the project include sheep, dairy cows,

^{1/} The term "model" as used here refers to simple conceptual models which can be readily quantified using survey data and other data sources.

29

poultry and swine. Existing technology related to these crops and livestock will be thoroughly reviewed in the small farm context. Depending on the specificity of the models, simulations will be carried out by the multidisciplinary team to determine how different crop combinations might affect small farm real income. This is essentially a farm management tool and will be used in identifying crop systems most appropriate to certain types of small farms thereby incorporating technical as well as economic criteria into extension recommendations. In addition, these models will guide research efforts in the area of inter-cropping combinations which will be promoted under the extension program. This would include such aspects as the following:

i. Species combination - the inter-cropping techniques whereby fruits and vegetables can be combined with basic grains along with recommendations for crop spacing and plant densities.

ii. Agronomic aspects - soil, water and fertilizer requirements by crop and in combination with other crops.

iii. Crop rotation - optimal planting dates both from the standpoint of yield and market demand. Mulching techniques to conserve water and multiple cropping patterns.

iv. Harvesting and storage practices - low-cost farm built facilities such as root cellars and common storages which provide longer marketing periods and reduce post-harvest losses due to spoilage.

v. Plant/animal combinations - recommendations for complementary crop-animal populations based on the feeding value of residues from existing crops and/or crops introduced under the diversification program.

vi. Insect and disease control - environmentally sound recommendations, e.g. plant protection systems, etc.

c. The Diversified Crop/Livestock Research Program

Based on the simulation results of the representative models, current "state of the art" technology, and survey team recommendations, the research staff together with extension staff will identify potential areas of research and establish research priorities. The research program will concentrate research efforts on resolving constraints for those crops identified as having the greatest adaptation and commercial potential for the region. The problem solving orientation of this kind of research will ensure that technological adaptations are achieved rapidly for widespread field dissemination. The research program will be a continuous activity in which unforeseen transfer problems encountered in the field will be promptly reported to and studied by the research team through the field supervision/evaluation process.

The basic ICTA farming systems approach for technology testing and transfer will be utilized under the project. Essentially, this involves experimental testing under controlled conditions on ICTA research stations. Under this project such research will be performed at the ICTA "Labor Ovalle" Research Center located outside Quezaltenango. This will be followed by testing under variable conditions on small farms with intensive ICTA management and farm input support. The farmer provides the land and receives the harvest in return. Finally, technology validated in this manner is turned over to the farmer for the "critical test". This involves the farmer making his own test with the new technology and comparing the results with his "old" technique. ICTA's role in this final testing is limited to consultation and monitoring functions to determine if the farmer actually accepts the technology.

Under the project, grant funded technical specialists in vegetables, deciduous fruits, and livestock will complement ICTA's technical capacity in basic crop commodities and support disciplines (soils, pest control, socio-economic, etc.). Although they will work together as a team, units for specialized research will be set-up and counterpart personnel will receive in-service as well as advanced

training. For example, ICTA's entomologist will work together with the fruit and vegetable specialists to form a technical unit to test diversified crop technologies and evaluate the proper use of pesticides and other plant protection systems. The resulting recommendations concerning application procedures, dosages, frequencies, etc., will be incorporated into an extension training program.

Thus depending on the specific problem to be resolved, special units will be formed on a task force basis to carry out appropriate research as an integrated effort. In this way, crop and livestock specialists as well as the support disciplines will have an input into the continuous process of improving diversified crop technologies which are promoted through the extension system. Although ICTA's methodology has been successful in its approach to technology generation and transfer, ICTA lacks the necessary outreach capability to transfer technologies to large numbers of farmers. For this reason, formal technology dissemination under the project will be done through the DIGESA extension system.

To support the implementation of this activity, AID will grant finance technical assistance, and local costs for the farm management survey and nutritional impact study. Loan financing is provided for the purchase of vehicles, machinery and equipment, construction, academic training and local costs for logistic support of research personnel. The GOG, through ICTA, will finance personnel costs (salaries, fringe benefits, per diem, etc.), office space and related costs, land for new research facilities and other operating expenses for the expansion of the research effort.

Project Inputs for Research

(In \$ 000)

	<u>AID</u>		<u>GOG</u>
	<u>Grant</u>	<u>Loan</u>	
Long Term T.A. (11 P.Y.)	1,059		
Short Term T.A. (13 P.M.)	83		
Farm Management Survey	85		
Nutrition Impact Evaluation	130		
Construction and Supervision		189	
Vehicles, Machinery & Equipment		347	
Materials and Supplies		450	
Academic Training (6 M.S.)		216	
Project Personnel			1,263
Operating & Administrative Costs			238
Land			50
	<u>1,357</u>	<u>1,202</u>	<u>1,551</u>

(Existing GOG administrative and physical infrastructure are not considered as counterpart funding in the project budget for this or any other activity.)

2. Technology Transfer and Technical Assistance Program

The objective of this component is to improve the technical assistance support provided to the small farmer through the training of extension personnel in diversified crop/livestock technologies. The proposed extension system will be based on a network of DIGESA promoters working with progressive small farmers (guías) and cooperative extension agents. The establishment of a "Demonstration and Training Center" at the ICTA Region I Research Center will provide an important nexus for technology development and transfer activities. Mini-riego and soil conservation activities will also play a major role in this component.

a. Extension Field Organization

DIGESA extensionists trained under the project will be assigned to approximately ten pilot "diversification" districts within Agricultural Region I. Each district will have one extension specialist who will supervise and monitor extension teams in the field. The hierarchy of the system will be as follows:

District Organization

- Extension Specialist (District Supervisor)	1
- Extension Agents (Promotores)	8
- Farmer Guías	48
- Participant Farmers	480

The total outreach of each district team will be approximately 480 farmers. This is roughly equivalent to an average of

five days of direct person-to-person contact between promoter and the small farmer. This frequency of contact, with the support of the guías, should provide adequate field presence and permit sufficient consultations necessary to transfer new production techniques. Since there will be ten districts, roughly 5,000 small farmers will be reached directly under the project.

In addition, the project will assist DIGESA in organizing two mini-riego and two soil conservation teams to work in the extension districts. The program will consist of mini-riego teams working closely with farmers, extensionists and guías to promote, design, finance and construct "mini-riego" systems. This would involve the following activities:

- i. A study of the topography characteristics of the area and identification of suitable water sources.
- ii. Calculation of potential water supply and probable land use.
- iii. Investigation of water rights and land tenure practices.
- iv. Irrigation system design and determination of costs.
- v. Determination of social and economic feasibility.
- vi. Credit referral and application.
- vii. Construction Supervision.

Similarly, the soil conservation teams will advise farmers on terracing and other techniques to improve water retention and conserve valuable topsoil. This activity is highly labor intensive requiring very little capital investment. The project irrigation and soil specialist T.A. along with DIGESA staff will be responsible for execution of this important activity. Social cost payments to stimulate conservation practices will be utilized and both activities will be financed through the long-term Farm Improvement Credit Fund administered by BANDESA and participating cooperatives. Individual and group credits will be available under this program.

For the establishment and support of the mini-riego and soil conservation teams, AID will loan finance vehicles, engineering equipment, materials and supplies. The GOG, through DIGESA, will provide personnel to staff the teams, per diem, office space and other support costs. In addition, AID will grant finance the services of a soil and irrigation specialist to provide technical assistance for 3 years.

b. Diversified Crop/Livestock Demonstration and Training Center: Research-Extension Linkages

To effectively link research and extension, the project will support a series of activities which will require and encourage communication between research and extension technicians. Accordingly, the project will provide for the establishment of a "Demonstration and Training Center" at the Labor Ovalle facility outside Quezaltenango. The Center will include classroom facilities and a diagnostic laboratory financed by the project, to complement and upgrade existing ICTA facilities. The laboratory will perform basic soil and plant analyses; insect and disease identification; and nutrient analyses of feeds and forages. The Center will serve two primary functions related to research and extension. The first involves the updating of diversified technologies and the second the training of extension agents in appropriate diversified crop technologies. A data bank will be established at the Center to record crop information on productivity yields and small farmer technology acceptance. This information will be used for program analysis and project evaluation.

AID will grant finance technical assistance and loan financing will be provided for construction of the classroom facilities, vehicles and equipment, materials and supplies.

c. Extension Training Program

Based on the diversified crop/livestock systems identified during the research phase, a training program will be organized to train extensionists in diversified crop/livestock technologies. This program will include general farm management courses in the following areas:

- Basic orchard management, propagation, etc.
- Basic crop management principles especially problem solving and diagnosis.
- Insect identification and control measures which are environmentally sound.
- Principles of plant nutrition and recognition of deficiency symptoms.
- Basic principles of irrigation technology including soil and water conservation.
- Principles of crop handling and storage.

- Grass lands management.
- Parasitic disease life cycles and control.

Instructors for the training program will be primarily ICTA research and DIGESA extension specialists experienced in the course material. Grant-funded research and extension T.A. advisors will also participate in the instruction as well as in the design of course curriculum.

The extensionist training program will include classroom training and practical application both in the ICTA experiment center and small farmer fields. The course curriculum will be based on the small farm models and recommended crop combinations. This is essentially a farm management approach which organizes small farm production in such a way that inter-crop complementaries are stressed as well as diffusion of crop risk, so as to increase and stabilize small farmer incomes over time. Thus, the emphasis will be to maximize small farmer incomes rather than individual crop yields per se. The specific crop technology will be taught within the context of the representative small farm models. These technologies will be presented in the format of a training module. Moreover, as part of the in-service training program extensionists and guías will be trained in water management practices for different crops, soils, slopes, etc. so they in turn can teach farmers. Basic principles will be taught and practiced at the training center and further practiced in conjunction with on-farm experiments under the supervision of the soils and irrigation specialist.

The length of the training modules will vary somewhat depending on the complexity of the particular crop system. The training will also emphasize demonstration techniques and extension approaches most appropriate to the socio-economic background of the small farmer. Since most of the target farmers are illiterate, it will be the responsibility of the trained extensionist to fully understand the recommendations contained in the diversified farm model and transmit this information to the farmer in a comprehensible way. For this reason, the extension specialists for fruit, vegetables and livestock will work with the research staff to determine in what way technical information can best be presented to the farmer.

Approximately one hundred candidates drawn from DIGESA (80) and participating farmer cooperatives and federations (20) will participate in the training program. The training sessions will be held twice a year, each session lasting approximately three weeks. Emphasis will be placed on the demonstration of techniques learned in

the classroom. Hence the training will be essentially a work-study program. In addition, small farmer orientations will be held in limited groups throughout the year. The diversified crop/livestock orientation program for small farmers will be geared to select farmers who will act as guías working directly with extension promoters in the field. The purpose of the orientation is basically two-fold: to acquaint the small farmer with the potential for diversified crops and project-related support services. The project will also establish a rotating fund within DIGESA in order to finance 4-S youth activities in the diversified crops/livestock systems. This program will encourage and promote diversified crop production among future farmers.

Training programs will be scheduled to coincide with slack periods of agricultural activity in order to minimize the opportunity cost of class attendance both for DIGESA promoters and small farmer guías.

The AID Grant will provide \$82,000 for the 4-S club Rotating Fund.

d. In-Service and Academic Training

Staff training will be provided under the project in order to develop permanent institutional capacity within ICTA and DIGESA/DIGESEPE to carry-out a long term diversified crop program. This training will be job-specific as well as advance training in research and extension disciplines. The grant financed technical assistance team will assist in the development of curriculum and materials for the in-service training program while ICTA and DIGESA will select and assign the appropriate staff making necessary logistical arrangements. The subject matter specialists will also be assigned a counterpart staff member who will receive individualized on-the-job training in research and extension methodologies and program design.

Finally, there will be loan financing available for long term advance training for ICTA and DIGESA/DIGESEPE personnel. This training will consist of B.M.S. degrees in such areas as plant pathology, entomology and extension systems management.

e. Field Supervision and Evaluation

Periodically, specialists (supervisores) from both the research and extension teams will inspect extension results in the field. This parallel method of supervision will increase constructive communication between researchers and extensionists when confronting field problems that inevitably occur when innovations are first introduced. Technology transfer problems will be documented and referred back to the Center for further study and resolution.

f. Other Mechanisms to Link Research and Extension

The district extension (promotor) teams will regroup at the Demonstration and Training Center to exchange collective experiences and review monitoring reports filed by district supervisors. Practical areas for future research and development will be identified and further recommendations will be made to the research team. These recommendations will be incorporated into the applied research program and provide an important feedback mechanism for program adjustment. Furthermore, ICTA's technology testing teams will work in close coordination with DIGESA promoters in locating and carrying out on-farm experiments, monitoring farm trials, and organizing field days at the district level.

Finally, as part of the process of programming research activities, members of ICTA's commodity teams, technology testing teams, support disciplines as well as the technical and regional directors will hold annual meetings to discuss the past year results and plan the oncoming years research activities for the region. Under this project, the DIGESA extension specialists will also participate in these meetings to insure that the feedback mechanism (extension to research) is functioning. At a higher level, the regional directors of DIGESA, DIGESEPE, ICTA and BANDESA are members of the Region I Development Committee (COREDA) which is responsible for coordinating activities of the agricultural public sector within the region. This too will provide an additional forum for project communication and coordination.

PROJECT INPUTS FOR TECHNOLOGY DISSEMINATION(In \$000)

	Grant	Loan	GOG
- Long-Term Technical Assistance	867		
- Short-Term Technical Assistance	63		
- Vehicles and Equipment		293	
- Materials and Supplies		442	
- Project Personnel			2,468
- Operating and Administration Costs			167
- Construction and Supervision		88	
- 4-S Club Rotating Fund	82		
- Long-Term Training	—	<u>72</u>	—
Total	<u>1,012</u>	<u>895</u>	<u>2,635</u>

39

3. Small Farm Diversification Credit

The adoption of production techniques promoted under the project will necessitate long term financing of related on-farm investments as well as short term production credit. Therefore, the project will establish a special credit fund to be administered by BANDESA either directly or utilizing the cooperative federations as credit intermediaries.

a. Small Farm Improvement Fund (\$3.4 million)

A Small Farm Improvement Fund of \$3.4 million will be established in BANDESA under a special trust agreement with the GOG. The fund will be used to finance long term farm improvements that will expand the productive base of the small farmer. This will include financing of small scale gravity-fed irrigation systems; orchard crops; livestock and related on-farm infrastructure. In addition, credit will be provided for appropriate hand tools and equipment as well as on-farm collection and storage facilities. Although BANDESA has had some experience in mini-riego irrigation lending under AID Loan 520-T-026, long-term lending has not generally been a BANDESA practice. Therefore, the project will provide BANDESA with loan financed credit fund support for long term credit activities. It is anticipated that experience with this type of lending will encourage long-term credit policies in the future. A non-reimbursable fund will also be set-up to finance soil conservation activities through the social payments mechanism established under AID Loan 520-T-026 with BANDESA. The requirements for this fund are estimated at \$825,000 of which half will be financed with counterpart resources.

b. Diversified Crop/Livestock Production Credit (\$1.8 million)

In addition to the Farm Improvement Credit Fund, a Production Credit Fund of \$1.8 million will be established in BANDESA to help finance the short term credit needs of the small farmer. This will include credit for seed, feed, fertilizers, and other farm supplies. The credit may be distributed either in the form of input commodities or cash. BANDESA has the necessary financial experience in this type of lending and has been successful in ensuring that its clients receive the necessary inputs (either cash or in kind) on a timely basis. All short-term credit will be financed with GOG counterpart funds.

For the execution of this component, AID will provide loan financing for vehicles, equipment, materials and supplies to support BANDESA credit agents in the field and loan financing for the long term investment credit. The GOG, through BANDESA will finance salaries and other support costs for the credit agents as well as short-term credit needs. Both loan and GOG funds will be used to finance social cost payments. In addition, BANDESA will collaborate in an interest rate policy study to determine appropriateness of subsidized credit for small farmers and the possibilities of expanding credit availability through a higher interest rate policy.

Credit and Social Cost Payments

(In \$ 000)

	<u>AID Loan</u>	<u>GOG</u>
<u>Credit & Social Cost Payments:</u>		
Fruit Production	796	
Vegetable Production		1,615
Livestock	788	161
Mini-Riego	1,035	
Soil Conservation	<u>425</u>	<u>400</u>
Sub-Total	3,044	2,176
<u>Credit Assistance:</u>		
Vehicles and Equipment	86	
Materials and Supplies	18	
Policy study	20	
Personnel		100
Other Support Costs	<u> </u>	<u>12</u>
Sub-Total	124	112
Grand-Total	<u>3,168</u>	<u>2,288</u>

4. Project Coordinating Unit

In order to facilitate project implementation and assure achievement of project purpose, the project will establish within the Ministry of Agriculture, a special project coordinating unit. This unit will be responsible for overall project coordination as well as procurement and project reporting requirements. The unit will be staffed by a full-time project coordinator, an accountant and a secretary. The duties and responsibilities of the unit are described in detail in the project institutional analysis

	<u>AID Grant</u>
<u>Project Coordination:</u>	(In \$000)
Personnel	139
Rent/utilities	22
Materials and Supplies	55
Vehicle and Equipment	<u>15</u>
	<u>231</u>

III. PROJECT ANALYSES

A. Technical Analysis

As stated previously, the purpose of this project is to stimulate small farm diversification from basic grains to higher value, labor intensive crops and livestock systems through the adaptation, generation and transfer of appropriate diversified crop/livestock technology. In summary, this strategy has been determined to be technically feasible on the following basis:

1. The target region has sufficient variability and inherent productive capacity to permit diversification and increased productivity.
2. The conditions found in the target area are sufficiently similar to those found in the remainder of the Highlands to insure the spread of successful technologies to other areas, and vice-versa.
3. For the most part, the basic technologies to be employed or adapted have been tested and proven successful and are quite simple, relatively inexpensive, and appropriate for the target population.
4. The severe land constraint and labor underemployment prescribe the appropriateness of a program emphasizing agricultural diversification incorporating higher value, labor intensive crops and livestock systems.
5. The ICTA research methodology is technically and sociologically appropriate for technology adaptation and generation, for small farm systems.
6. The extension or transfer methodology for extending the technology to the target group has been utilized successfully within the target area.
7. Required, non-indigenous inputs are readily available in the local market and the distribution system for such inputs is adequate to serve the target group.

a. Opportunities for Diversification

i. Natural Resource Base

There is great variation in elevation in the target areas, averaging 5,000 to 8,000 feet, giving the regions a wide range of temperatures, precipitation, growing season length, and to an extent, solar radiation. In this mountainous terrain, the exposure (East vs. West) gives variation in solar radiation.

Temperatures range from lows of minus 6°C (21°F) to maximums of 32°C (90°F), and annual rainfall fluctuates between 1000 and 2000 mm. (40-80 inches).

Although some of the conditions are more favorable than others for crop growth in general, the variation resulting from the target area location permits the culture of a wide range of species of vegetables and a wide range of varieties of both fruits and vegetables. This variation also extends the growing season over several months, an important factor considering the limited marketing opportunities and resources for large-scale production over a short season.

The distinct wet-dry weather pattern, although it produces extreme stresses -- too wet to too dry for optimum production of most crops -- does offer opportunities to extend the production period by overlapping these seasons with appropriate crops.

The availability of natural water presents special problems for the small farmer. The capacity to maximize the use of his land is limited by water availability in the dry season. Only a small portion of the highland farmers have access to supplemental irrigation, but numerous opportunities to expand irrigation have been identified by the Pilot Small Scale Irrigation activity under Loan 026.

There is a fairly wide range of soils, but most Highland soils are capable of high levels of production. Although the steep slopes encountered are subject to erosion, improved management, including terracing and strip-cropping, can help preserve these sites despite intensive cropping. Increased use of fruits and livestock on the more severe slopes could lead to greater soil conservation because trees and forage can be grown without deep tillage. Appropriate soil conservation techniques and transfer methodologies have been developed and applied under the Pilot Soil

Conservation Activity of Loan 026.

At elevations above 8000 feet, the extremities of weather encountered offer opportunities for diversification through improved animal production and range improvement.

ii. Technological Base and Rationale

The basic technologies to be employed are relatively inexpensive, have already been tested and proven successful, and for the most part are simple and appropriate for the target population. The project proposes to expand the incorporation of temperate climate vegetable crops, deciduous fruits and livestock into the production systems of small farmers. All of these are already being produced with varying degrees of success on a limited scale in areas scattered throughout the Highland.

- Irrigation and Soil Conservation - Given the land constraints and the Highland Indian's cultural ties to the production of corn and beans, increasing the productive capacity of the farmer's limited land resources (to permit the production of both higher value crops/livestock and at least a portion of his family's basic corn and bean needs) is conceived as a pre-condition to acceptance of new farming systems by the target group. The primary means proposed under the project to eliminate this constraint is through the introduction of irrigation and soil/water conservation practices. Under the pilot Land Resources Improvement Activity of Loan 520-T-026, simple low cost technologies for these purposes were developed, tested and found to be readily acceptable by small farmers in the project areas. Gravity fed sprinkler irrigation systems requiring no fuel or power input and very little maintenance proved to be a most appropriate technology for the steep broken terrain. Bench terraces and contour rows constructed by farmers themselves using home-made leveling devices and hand tools were found to be the appropriate soil conservation techniques. This project will focus on the transfer of this technology to the farmer by providing technical assistance and financing to train project extensionists as well as credit funds to finance irrigation and soil conservation infrastructure.

- Vegetable Crops - Research will initially concentrate on (1) established, less perishable crops with potential for high returns per hectare and possible export market potential such as potatoes, onions, cabbage, carrots, beets and other cool season root crops; and (2) some of the more perishable crops such as cauliflower, broccoli and green beans that are currently being processed in Guatemala either for export or

45

internal markets. Research topics will include multiple cropping, plant spacing and density, planting dates, water management, (conservation and irrigation), soil management (conservation, fertility and organic matter), plant protection (environmental impact, application methods, and materials), and; post-harvest operations (harvest, handling and storage.)

ICTA and CATIE, under the Regional Small Farm Production Systems Project, have obtained some outstanding results from their investigations into cropping systems, both mixed and multiple. These experiments have resulted in improved fertilizer use; yield-increasing, plant spacing and density practices; and introduction of better adapted varieties. This project will build on these lessons.

- Fruit Crops - Apples, peaches, pears, avocado and plums have been selected as the fruit crops for primary emphasis under this project. These crops are presently being produced as cash crops by both large and small producers. Guatemalan fruit growers range from the small grower with a dozen trees to the large commercial producer with a hundred or more acres of orchards replete with complex technology such as air circulating propellers for frost protection.

The latter has demonstrated that it is not only technically feasible but also very profitable to produce certain deciduous fruits in the target area. The former has little or no knowledge of modern fruit, production techniques, makes little effort to "cultivate" these crops, and seldom seeks what limited technical assistance is available.

All of the crops mentioned above except for avocado, are introduced crops. While the large producers have carried out some adaptive research on their own, much of the technology for growing them commercially has not been introduced or developed. Crops and the technology for growing them must be adapted to the conditions of the new environment through research and development in the country. For deciduous fruits, the necessary development of improved cultivation techniques and cultivars has not taken place, especially that pertaining to the small producer.

It is recognized that the process of adaptation and development of technology for deciduous fruits is necessarily a long term one with as much as 15 to 20 years required for the testing of genetic material. However, deciduous fruit production is not new to the target area

and some lessons have been learned which can be readily applied and built upon. This project will begin the research program with a thorough review of both past experiences and existing technology which may have applicability for the small producer. Primary emphasis will be placed on adapting cultural practices with short term payoffs and transferring these techniques to the small producer.

Research with apple and peach trees will be emphasized in view of the current importance of these species. Some research will also be devoted to pear, plum, and blackberry which are also presently being produced in the area. On farm research will stress cultural practices with primary emphasis on training and pruning, insect and disease control and intercropping. The latter is of particularly importance since no net cash income can be expected from these crops until the fifth or sixth year after establishment. (*) Of secondary emphasis will be fertilization, pollination, rest breaking methods, water conservation and irrigation, and testing of new species and cultivars. Progressive growers will be recruited as cooperators to research the cultural practices. Rootstock and variety trials for new species and cultivars will be carried out on the ICTA substations.

- Livestock - Animal husbandry plays a key role in the farming systems of the target group. Studies designed to define this role indicate that as much as 30-40% of net cash income is derived from livestock sources. Poultry are most numerous in the area followed by sheep, swine and cattle. The primary constraints to increasing animal production are food supply and animal disease. Research and extension efforts under this project will focus on reducing these constraints.

The feeding/nutritional levels for livestock are marginal and are affected by seasonal availability of natural forage. Overgrazing, the lack of animal population control on communal grazing in the high plateaus, has a negative effect on both range stability and animal growth and productive performance. Storage of forages for off season is not commercially practiced. There is some evidence that trace elements deficiencies may occur in certain soils. This kind of soil deficiency can adversely affect animal performance through its effect on plant composition. Only 8% of the livestock producers use trace mineralized salt. Composition

(*) For this reason the project does not propose that farmers change from their traditional system to sole reliance on growing fruit crops. What is proposed is diversification, a natural tendency for the small farmer.

of by products feedstuffs varies widely, making it difficult to develop feeding programs.

Animal diseases are prevalent in the animals of the Altiplano. Diseases transferable to man (tuberculosis, brucellosis, and cysticercus) are all known to exist. Hog cholera is present, though vaccination programs are being promoted throughout the Region by DIGESEPE. Parasites exist in most species and responses in animal performance would result from a management program with parasite control. The low reproductive rates of the herds and flocks is suggestive of a combined problem of reproductive tract diseases and low nutritional levels. Major losses occurred in swine from cholera, in sheep with liver fluke (fasciola) and other internal parasites and from mastitis in cattle.

There appears to be little justification to alter the genetic base now in existence in the area, particularly until there is improvement in the feeding supply, disease control and management. These, along with high altitude, are deterrents to the introduction of animals of new types and breeds. While some new breeds have been introduced which show higher wool or milk yields, they also have greater feed requirements and show greater disease susceptibility. For example, artificial insemination has been used for herd improvement of dairy cattle; however, low average lactation levels of 3 liters per day clearly suggest that feed supply and management are greater limiting factors than genetic potential.

Therefore, research under this project will focus on improving nutrition through increasing feed supply and balancing diets. Specific research targets are: 1) determine feeding requirements for various species of local animals to facilitate the planning of animal carrying capacities, 2) determine the feeding values of residues from existing crops and those to be introduced in the diversification program, 3) establish animal/crop interactions which will increase animal output with balanced animal/feed rations and 4) test legumes and grasses in cropping areas (to protect terraces, provide living barriers, etc.) which will enhance soil conservation while supplying forage.

The management practices and preventative medicine required to control the prevalent diseases are known. Thus, the project will focus its extension support toward alleviating this constraint. Extensionists will be trained in these fields and provided the support required to introduce the small producer to these techniques. Extensionist will also be trained to identify constraints to the farmers acceptance of these practices.

- Environmental Impact-Based on the Initial Environmental examination, the Assistant Administrator for Latin America and the Caribbean on July 15, 1980, approved a Negative Determination regarding the effect of the proposed project on the human environment. (See Annex E).

iii) Human Resource Base

The Region I area covers about 5,918 square miles and will have about 1,586,000 inhabitants by 1982 or about 267 per square mile. Based on 1973 census data, about 80 percent of the population of the target area is Indian and the remaining 20 percent Ladino. The Indian population can be broken down into various subgroups who speak different dialects, but are composed principally of groups who speak Mam (San Marcos) and those who speak Quiché (El Quiché). These two characteristics will need to be taken into consideration in refinement of the implementation strategy of the project.

Of the 1,586,000 inhabitants of the project area about 28 percent are considered to be economically active. Of the economically active portion about 68% are employed in agriculture. However, the amount of labor available greatly exceeds the amount required in all stages of the production process for the traditional systems resulting in inefficient employment of labor. Recent data (1975) indicate that agricultural production activities in the region absorbed only about 28% of the total labor available and that only an additional 39% was employed outside the sector. In other words, measurable unemployment amounted to one-third of the work force equivalent to about 25 million work days.

Migratory labor statistics for the same period indicate that only about 1.1 million work days of labor from the region were absorbed in the harvest of south coast export crops during the December-February period. Comparing this figure with the approximately 25 million man-days of overall unemployment in the region seems to leave little doubt as to the availability of labor for diversification.

In terms of rough averages, the labor requirement for the production of one hectare of the proposed vegetable crops is about 150 man-days per crop cycle. Assuming that the project reaches its goal of 1500 hectares with 2 crops per year of vegetables in addition to the milpa, labor requirements would be increased by about 450,000 man-days per year (1500 ha. x 2 x 150/ha.). Though significant, it is still well under the estimated unemployment figure. Again, this would indicate that there should be an ample supply of labor available to fulfill the requirements of the project.

b, Research Methodology

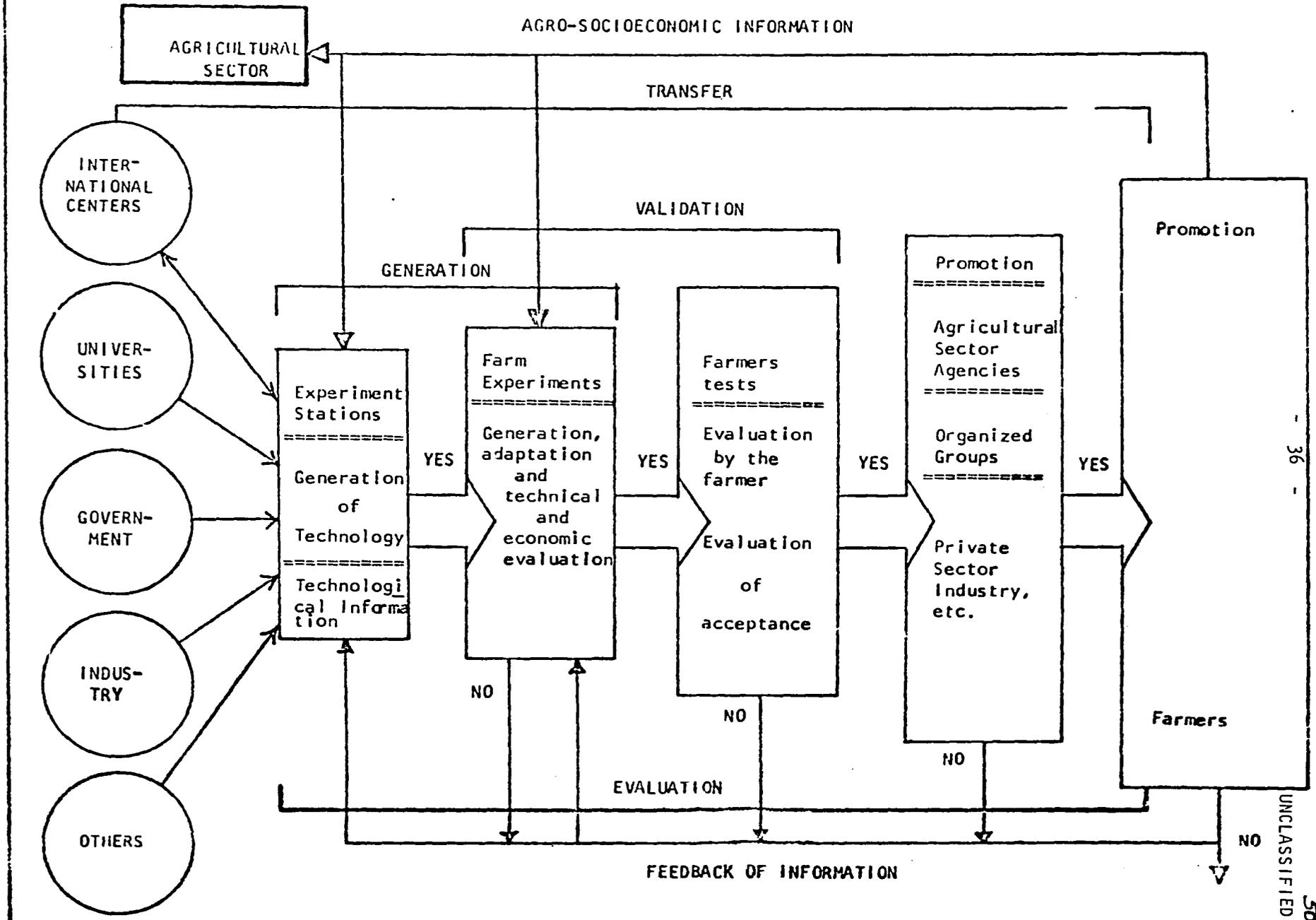
It is now technically possible to develop entirely new diversified cropping systems incorporating the higher value crops recommended by this project which could replace the small farmers existing systems. However, even though these new systems would provide the farmer with a significantly larger income, it would be extremely difficult to persuade the farmer to accept such drastic change. On the other hand, there is sufficient historical evidence to indicate that the highland farmer has incorporated new elements into his "traditional" technology in order to cope with the economic stresses which have affected the highlands in recent decades. But these changes have come about gradually, perhaps more out of necessity than choice. For this reason, the research component of this project will have to seek modifications to existing small farmer systems which will be both acceptable to the farmer and gradually incorporate higher value, labor intensive crop and livestock components.

The Guatemalan institution charged with the task of agricultural research, ICTA (Instituto de Ciencia y Tecnología Agrícola) is recognized as a leading example of a farming systems research institution. It is one of the pioneers in the development of "farming systems research" which has been an important factor in its growing popularity.

In the past, ICTA has not aimed at developing alternative systems. Rather it deals with existing farming systems and makes efforts to understand the farmer i.e. his system of farming and tests innovation within that system. ICTA's research work will modify systems, but will do so gradually.

The ICTA research methodology starts with a socio-economic and agricultural information gathering activity designed to help the research technicians know the farmer, his environment, what he is doing and understand why he does it. This information is used to decide what "problem" to focus on and the type of work to do. In the process, international agricultural science institutions, and other national institutions are drawn upon for information. If the innovation decided upon has to do with genetic adaptation, the next step will be basic breeding work carried out at the production center (research station). However, if the innovation has to do with farming practices, experimentation is likely to begin in a farmer's field. The next phase, after station and on-farm experimentation have indicated that a new technology will be useful, is on-farm testing by the farmer under farm conditions. Once it has passed this test, the technology is ready to be turned over to the extension system for massive transfer.

TECHNOLOGICAL SYSTEM FOR AGRICULTURE



In conclusion, the ICTA research methodology is technically sound as a tool to carry out the type of adaptive research called for in this project.

c. Extension Methodology

The project proposes to rely on the established DIGESA extension methodology for technology transfer. DIGESA's extension program is conducted in four principal stages of activity by field technicians called "promotores" (Extension and Home Demonstration Agents). These stages are:

Motivation - This stage includes the training of rural primary school teachers, children through the sixth grade and youth through the teenage years via 4-H type clubs (homemaking craft, crop and livestock projects).

Formation - Agents work with farmers and homewives in groups who work together learning general agricultural technology (production to marketing) and homemaking skills (food, diet, health). Local training centers and mobil teaching units are utilized in this stage to some degree. The purpose of this level of activity is to orient those who have not been previously trained. After a person has received adequate assistance at this stage he can graduate to the Promotion stage.

Promotion - Only the farmer is included in this phase. A promotor different from those who oriented him in the formation phase assists in the development of a credit program and arranges for a loan through BANDESA.

Follow-up or Monitoring - Conceptually, this is the last phase of the DIGESA training approach, from children to adults, which directly provides assistance for application and management of agricultural technology. On farmer request, the Promotor provides occasional assistance and technology updating; i.e., the farmer is somewhat self-sufficient and requires less than continuous guidance.

All of these extension activities are designed to provide a variety of information and services to the farmer and the farmer family unit.

DIGESA relies primarily on the National Agricultural Technology School, which provides a three-year secondary school education, as a source

of promoters. Agricultural technology, communications and extension processes are emphasized. Each graduate, hired by DIGESA as a promotor, attends an extension methodology course. In-service training courses "as needed" are provided at regional training centers.

In order to expand the support base for the promoters, DIGESA uses its regional training centers to provide instruction to local farmer leaders called "guias agrícolas". The better guias are considered for employment as paid assistants for the promoters. Regardless, each farmer leader can return home and is well equipped to introduce relevant technology on his farm. This introduction can serve as a demonstration for neighboring farmers. Also the guia has been taught the skills necessary to assist his neighbors in their attempts to upgrade their production systems. The guia will be a crucial component in this project as a catalyst for change in order to achieve the desired spread effect. He can identify with his neighbors and they with him. He speaks their language in more ways than dialect.

Finally, DIGESA has recently added to its system the Technical Assistance Unit. As conceived, this unit would be staffed on a regional basis with an array of specialists in such fields as engineering, soils, irrigation, entomology, etc. In actuality, this staffing has occurred on a very limited basis. However, with the support provided under Loan 520-T-026, DIGESA has staffed this office with technicians in soil conservation and irrigation in Region I and V.

The concept of the DIGESA extension program appears to be technically sound. The multi-phase, broad educational and support system approach offers an opportunity for meeting the farmers assistance needs. However, in practice, the level of accomplishment of current activities has been something less than satisfactory. There appear to be at least two basic causes of this low level of successful transfer. One is inadequate logistic and programatic support (to be discussed in the institutional analysis). The other is not having suitable recommendations to offer the farmer.^{1/}

In the past the latter could be blamed on the fact that the research institute wasn't developing appropriate technology. However, since ICTA has geared-up to the task, this is no longer the case. The real problem now lies in the linkage between the two institutions - research and extension (ICTA-DIGESA). This fact has been recognized by

^{1/} The successful transfer of small scale irrigation and soil conservation technology under Loan 026 attests to the fact that the DIGESA system does work if these two conditions are fulfilled.

many for sometime and efforts are being made to resolve it. This project will devote considerable resources to the strengthening of this linkage, particularly in the area of diversified cropping systems technology. This support, primarily in the form of in-service training, is defined in the project description and institutional analysis sections.

B. Economic Analysis

The project has been evaluated in terms of the benefits and costs resulting from agricultural diversification. Project benefits have been defined as improvements in net real income accruing to small farmers through the creation of permanent on-farm employment opportunities. The costs of doing the project include private costs such as the purchase of farm inputs and public costs which are related to diversified crop research and extension support. The discounted stream of benefits and costs indicate that the project is economically viable; the internal rate of return for the project as calculated below is 65%.

Project Benefits - The project will stimulate agricultural diversification by providing diversified crop research, extension and credit support to small farmers. The economic analysis shows that small farmers who participate in the project will substantially increase their net incomes and be more fully employed on a year round basis. Thus for purposes of this analysis, direct project benefits have been defined as increases in net small farmer incomes and higher levels of on-farm employment. The project will stimulate the production of some twenty diversified crops cultivated on roughly 2,000 hectares of land. The project is expected to reach some 5,000 small farmers thereby benefitting a rural population of approximately 30,000. Project benefits have been calculated using technical (agronomic) and economic data. A simple linear production function was used to estimate input requirements corresponding to an average diversified crop yield per hectare of land. 1/ Labor inputs (jornales) were calculated for each crop and multiplied by the rural minimum wage rate of \$3.20 per day. This was done in order to shadow price the value of farm family labor and to ensure that labor would be available during those times of the year when alternative employment opportunities might exist in the commercial agricultural sector. The relevant amount and cost of physical inputs were estimated for each crop and included seed, fertilizers and pesticides. A credit cost was also included on the assumption that credit would be made available at 8% for the purchase of farm inputs.2/ In addition, the fixed cost investment of a small scale irrigation system was included with payments amortized over ten years. The total cost was then deducted from total revenue taken as the product of average farm gate price and expected yields. To control for the effects of inflation all prices are in constant 1980 dollars, based on the assumption that relative input/output prices would remain constant over a ten year period. Diversified crop net revenue was then adjusted to reflect the possibility of two harvests a year instead of one through "mini-riego" irrigation and soil conservation practices. Finally, the opportunity cost of taking land out of corn production and substituting into diversified crop production was taken

1/ Yield projections are based on current estimated small farmer yields. Potential yield increases resulting from project research and development activities were not considered.

2/ As shown in Annex I credit costs are relatively small compared to total costs.

into account by deducting the economic value of corn from the net revenue of production per diversified hectare. Net revenue or income projections over project life were estimated based on the rate of project implementation and corresponding land under cultivation for each crop. The crop mix for the project is illustrative but does not reflect market absorptive capacity and is consistent with stable market prices. A similar methodology was used for fruit trees and livestock "models". In the case of fruit trees, cash flows were calculated over a ten year period in order to take into account the long gestation period associated with this type of agricultural investment. Once again costs of production were estimated on the basis of agronomic data and output was valued at current (1980) farm gate prices. The livestock "models" were based on land requirements to adequately support a given number of animals. These models took into account residues from vegetable production which could serve as feed for livestock. The cash flows were calculated for each model or type of livestock and projected over a ten-year period. The Annex to the Economic Analysis shows the detailed calculations used in estimating improvements in net small farmer income. Net income projections for the project as a whole are summarized in Table 1. Due to the short production cycle for vegetables, income increases are substantial even in the first year and continue to grow throughout the period of analysis. The production of fruit trees, however, displays a long gestation period in which net income is negative through the fifth year of the project. Therefore, credit for this activity will of necessity have to be long term and include adequate grace periods. Finally, livestock shows negative net income in the first year only and generates a positive income flow thereafter. Thus, diversification into vegetable, fruit and livestock systems generates for the individual farmer and the project as a whole, a steadily increasing income stream over the period of analysis.

On the employment side, there is a growth in permanent employment which parallels the growth in production and income. By the end of the project (year 5) the level of permanent employment generated by the project is estimated to be 534,618 workdays equivalent to 1,782 years of full employment. As can be seen in Table 2 employment generation is greatest for vegetables followed by livestock and fruit tree activities.

Indirect Benefits - The project will generate indirect benefits which are not easily quantifiable and for this reason have not been included in the benefit calculations. The main indirect benefits of the project might be identified as follows:

1. Improved research and extension capability within the public sector resulting in technical improvements over time;

2. Improvement of natural resource base through soil conservation practices;
3. Improvements in the nutritional status of the rural poor.

The project will significantly upgrade the public agriculture sector capability to raise productivity levels in agriculture Region I (target area) and other areas of the country. This represents a social overhead investment which will benefit many farmers not directly reached under this project. However, due to the difficulty in estimating the rate of technical progress that can be attributed to research and development activities as well as tracing ultimate beneficiaries, this benefit can be identified but not quantified. Improvements in soil conservation present similar problems due to their externality effects which greatly complicate benefit calculation. In the case of nutritional improvements, the project includes a baseline study which will allow these benefits to be estimated after the project is completed. It is believed that the "cash income" effect of the project will significantly improve rural household access to food and improve dietary patterns.

Project Costs - Since private costs were included in deriving the net income benefits of diversification, the cost estimates shown in Table 1 refer only to public sector costs. The costs include expenditures covered by the AID Loan/Grant as well as counterpart resources. A simplifying assumption used in the Economic Analysis is that counterpart resources since they are primarily operating costs are allocated and expended evenly throughout project life. This represents a "neutral" assumption in so far as the discounted cost flow is concerned. In year six (6) it is assumed that vehicles will have to be replaced at counterpart expense as well as maintaining normal staff and supplies through year ten (10).

57

Table 1
SUMMARY OF PROJECT BENEFITS AND COSTS
(Constant 1980 Prices)

Project Year	1	2	3	4	5	6	7	8	9	10
A. Diversified Crop Net Income:										
1. Vegetables:										
Cabbage	\$ 245,236	\$ 546,810	\$ 874,896	\$1,256,006	\$1,640,430	\$1,640,430	\$1,640,430	\$1,649,430	\$1,640,430	\$1,640,430
Potatoes	58,412	128,850	206,160	295,496	386,550	386,550	386,550	386,550	386,550	386,550
Broccoli	134,159	320,815	513,304	740,791	962,445	962,445	962,445	962,445	962,445	962,445
Cauliflower	102,672	227,664	361,584	517,824	669,600	669,600	669,600	669,600	669,600	669,600
Onions	122,060	274,635	439,416	634,712	823,905	823,905	823,905	823,905	823,905	823,905
Beets	19,371	44,025	70,440	102,138	132,075	132,075	132,075	132,075	132,075	132,075
Carrots	76,200	171,450	274,320	396,240	514,350	514,350	514,350	514,350	514,350	514,350
Stringbeans	69,318	154,040	246,464	354,292	462,120	462,120	462,120	462,120	462,120	462,120
Subtotal	827,428	1,868,289	2,986,584	4,297,499	5,591,475	5,591,475	5,591,475	5,591,475	5,591,475	5,591,475
2. Fruit Trees										
Apple	(46,487)	(56,544)	(66,667)	(75,647)	(84,793)	(48,673)	36,997	142,946	302,042	516,771
Peach	(30,396)	(35,196)	(40,848)	(12,690)	15,348	102,402	165,018	247,902	295,854	343,680
Pear	(13,086)	(14,409)	(17,301)	(20,094)	(22,299)	(2,607)	6,906	20,334	35,811	54,555
Prune	(7,870)	(8,667)	(10,255)	(8,873)	(7,138)	2,393	5,544	11,717	15,474	19,216
Avocado	(46,267)	(51,216)	(55,493)	(60,280)	(54,197)	3,637	23,806	50,423	91,061	135,035
Subtotal	(144,106)	(166,032)	(190,564)	(177,584)	(153,079)	57,152	239,171	473,322	740,242	1,069,307
3. Livestock										
Bees	(228)	171	1,065	2,745	4,668	4,668	4,668	4,668	4,668	4,668
Poultry	1,199	6,236	13,912	27,583	46,056	46,056	46,056	46,056	46,056	46,056
Cattle	(5,705)	(2,560)	2,210	25,745	32,720	32,720	32,720	32,720	32,720	32,720
Goats	(6,110)	(85)	14,355	34,698	69,218	69,218	69,218	69,218	69,218	69,218
Rabbits	(190)	960	1,600	4,805	8,250	8,250	8,250	8,250	8,250	8,250
Sheep	(13,663)	(11,454)	(9,175)	1,088	16,684	16,684	16,684	16,684	16,684	16,684
Pork	(530)	10,798	1,000	52,734	94,662	94,662	94,662	94,662	94,662	94,662
Subtotal	(25,227)	4,066	24,967	149,398	272,258	272,258	272,258	272,258	272,258	272,258
Total Benefits:	<u>658,095</u>	<u>1,706,323</u>	<u>2,820,987</u>	<u>4,269,313</u>	<u>5,710,654</u>	<u>5,920,885</u>	<u>6,102,904</u>	<u>6,337,055</u>	<u>6,603,975</u>	<u>6,933,040</u>

B. Project Costs:

Loan (less loan Grant fund)	1,094,000 <u>696,000</u>	693,000 <u>702,000</u>	469,000 <u>702,000</u>	301,000 <u>403,000</u>	323,000 <u>97,000</u>					
AID	1,790,000	1,395,000	1,171,000	704,000	420,000					
GOG (less loan fund)	891,000	1,034,000	1,174,000	893,000	907,000	1,180,000 ^{1/}	880,000	880,000	880,000	880,000
Total Costs	<u>\$2,681,000</u>	<u>\$2,429,000</u>	<u>\$2,345,000</u>	<u>\$1,597,000</u>	<u>\$1,327,000</u>	<u>\$1,180,000</u>	<u>\$ 880,000</u>	<u>\$ 880,000</u>	<u>\$ 880,000</u>	<u>\$ 880,000</u>

C. Discounted Net Benefits:

Present Discount Value of Benefits ^{2/} :	\$25,494,640	(ten years)
Present Discount Value of Costs ^{2/} :	\$14,552,041	(ten years)
Net Present Value of Project	\$10,942,599	
Internal Rate of Return (IRR)	65%	

^{1/} Includes \$300,000 for replacement of vehicles

^{2/} Discounted at 10 percent

59
60

Table 2

LEVEL OF PERMANENT EMPLOYMENT BY END OF PROJECT (YEAR 5)

Diversified Crop	Hectares	Labor ^{1/} Coefficient	Employment ^{3/} (Work Days)
Cabbage	495	158	156,420
Potatoes	225	160	72,000
Broccoli	165	131	43,230
Cauliflower	150	131	39,300
Onions	135	424	114,480
Beets	75	127	19,050
Carrots	135	139	37,530
Stringbeans	120	82	19,680
Apple	55.5	63	3,497
Peach	40.5	77	3,119
Pear	30	14	420
Prune	15	14	210
Avocado	9	18	162
	(Models)		
Bees	15	^{2/} 1	60
Poultry	12	91	1,092
Cattle	100	^{2/} 50	5,000
Goats	135	^{2/} 50	6,750
Rabbits	40	^{2/} 23	920
Sheep	176	^{2/} 50	8,800
Pork	63	^{2/} 46	2,898
Total:			534,618 ^{4/}

^{1/} Per hectare/model^{2/} USAID Mission estimates.^{3/} Two (2) crop cycles per year for vegetable crops.^{4/} Equivalent to 1,782 years of full employment.

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Net Project Benefits - The analysis of discounted project benefits and costs over a ten year period used a discount rate of 10 percent per annum which reflects a real return to investment capital since all calculations are in constant (1980) prices. This rate was chosen because domestic capital markets in Guatemala are subject to interest rate ceilings making them a poor indicator of social time preference. The ten (10) percent rate, on the other hand, is used in the evaluation of all U.S. Federal Government projects and is in line with nominal international rates of interest when adjusted for inflation.

The overall internal rate of return (IRR) over the ten (10) year period is 65 percent.

Conclusion - The project was found to be economically viable based on a series of conservative assumptions concerning project benefits and costs. Due to the conservative bias given to the calculations, it was not considered necessary to perform extensive sensitivity analysis. The relatively high internal rate of return and Benefit/Cost ratio indicates that project benefits are sufficiently buoyant to withstand most types of unforeseen events. The technical data on which the analysis is based is believed to be sound and accurately reflects the current "state of the art" in diversified crop production. Hence, the project will improve economic productivity in the target area and increase both employment and incomes of the small farmer.

C. Social Soundness Analysis

1. Social Structure Overview of Target Population

Of particular importance in the Guatemala Highlands is the distinction between "Indian" and "Ladino". In the towns this tends to be a cultural, rather than a racial distinction. An Indian is one who speaks some non-Hispanic mother tongue, speaks Spanish generally with phonological and syntactic interference from the indigenous language, wears clothing (especially the women) which is distinctive, and adheres to numerous group-specific domestic, social, and religious patterns. A Ladino, in contrast, speaks accent-free Spanish as sole (or dominant) language, wears western style clothing, and adheres to the generalized Hispanic domestic, social, and religious institutions relevant throughout Latin America. The Ladinos have traditionally occupied the positions of economic and political power in the cities and towns. Due to the traditionally lower status of "Indio", socially as well as economically, there has been a process of transition especially in the towns, whereby individuals acquire and pass on to their children the cultural traits which will allow them to define themselves, and be defined, as Ladinos. The absence of racial barriers to this transition has facilitated the process; the shift is cultural, not racial, in character.

However in the rural areas, the Ladino/Indian distinction was found to be somewhat more rigid and more closely connected to phenotype. There are, in the project region, important pockets of traditional Ladino peasants of predominantly Caucasian stock. Some of them live in ethnically segregated communities. But others have expanded into formerly indigenous communities and have acquired land there and live completely interspersed among indigenous neighbors. Though they belong to the same small land holding class as the Indians and may be members of the same cooperatives, there are tensions between the two groups. Thus the social organization of the project area is characterized by many communities in which two distinct groups of peasants live and work side by side on a somewhat competitive basis. The Ladinos, because of their monolingual command of Spanish and their greater ease of interaction with the Ladino extension agents, are generally more receptive to change. Moreover, the indigenous social organization lacks a suitable "delivery system" to promote crop diversification. The most common organizational unit in Indian communities is the cluster of patrilineally related households, formed by the process of adult sons building houses with their wives in proximity to the house of the man's father. There is no particularly strong cooperation between the households in these clusters; economic individualism is rather the rule. Finally, the traditional cofradías in Indian communities have a religious focus which emphasizes consumption rather than investment and production.

2. Direct Beneficiaries and Spread Effect

The direct beneficiaries of this project will be rural households who fall into the category of small scale cultivators, a category which has been operationally defined as a farm family with a land holding of 10 manzanas (7 hectares) or less. The vast majority of rural households in the Central and Western Highlands fall into this category. In addition, it is anticipated that the project will focus on, though not necessarily be restricted to, that subset of the rural population which is defined as "Indian". Though this category constitutes at least 85% of the highland rural population, observations have revealed the presence of a socially important though numerically small group of "Ladino" peasants. The project will make special efforts to direct its services toward the Indian population at least to a degree consistent with their majority status in the project area.

In addition to the benefits accruing to early participants in the project, it is envisioned that once the feasibility and profitability of agricultural diversification has been demonstrated in the context of small scale cultivation, other members of the community will follow the lead of the original diversifiers. This spread effect will occur partially through the extension program itself and partly through the "demonstration effect" of successfully diversified holdings in the communities themselves. The "first wave" of diversifiers will probably be cultivators with access to at least one hectare of land and/or those with access to gravity fed sprinkler irrigation systems.

In addition, diversification will indirectly benefit other members of the community. Of particular importance will be the increased opportunities for local agricultural wage labor. Diversified farming is substantially more labor intensive than traditional corn and wheat growing. Therefore increased employment opportunities are anticipated due to the project.

3. Role of Women

The introduction of vegetable growing into communities formerly restricted to basic grains cultivation will lead to a restructuring of female economic roles. It is principally in vegetable growing communities of the Highlands that women have active roles. In corn and wheat growing communities marketing tends to be done more by males. As these communities shift to vegetable growing, women can be expected to play a greater role in marketing activities.

Finally research done in communities already growing vegetables indicates that in such communities the diet of the population becomes more diversified, though the staple may continue to be corn. Thus the project will probably have a positive nutritional impact especially on children and lactating mothers.

4. Non-Constraints and Stereotypes

Diversification is by no means a new concept in the Guatemalan Highlands. There are already strong precedents for a shift from basic grains to vegetables and tree crops. The project is an effort, not to impose a new process on the region, but rather to facilitate and augment a process that has been underway for decades.

A question sometimes posed is whether or not there are elements in the Indian culture which militate against the type of entrepreneurial risk-taking which the project will entail. There is considerable information which indicates that even in traditional economic life Indian communities have had a strong cash-generating orientation. They are responsive to opportunities and have transformed their technology whenever resources have been available -- as seen in the vegetable growing and potato growing highland communities. Furthermore, even grain-growers are increasingly taking the risk of going into debt for fertilizer, a shift largely made possible by the development of the cooperative movement. The best contemporary example of "risk-taking" behavior is the buying of fertilizer on credit. The large numbers of highland farmers that are "in debt" give evidence of a high quotient of risk-takers is to be found in this cultural setting.

While it is true that most rural families in the Highlands continue to have a "subsistence orientation" e.g. producing "milpas" for own consumption; highland families appear determined to make at least Q200-Q300 in gross annual cash income. Much of their economic lives is dedicated to the search for this cash income. The most desirable method of earning this income is through the cultivation of a cash crop for sale in the market. The most preferred cash crops are generally vegetables. But if these are not feasible, then the small farmer will grow wheat. Wheat is widespread, however even with fertilizer induced yields, it is difficult to gross more than Q400 per manzana. Given the costliness of fertilizer this generally means a very modest net return to the small farmer.

Finally, a family without access to sufficient land either to grow its own food or to generate the additional Q200 of cash income will seek off-farm income. In some areas handicrafts and cottage industries provide some economic opportunity but the major source of cash income of the highland family is wage labor. This can either be local or -- as is frequently the case -- entire families will spend months performing wage labor on the sugar, cotton, or coffee plantations of the south coast. Labor migration is synchronized with the local milpa cycle so that families generally have

planted and weeded their milpa before leaving for the south coast and return in time for the harvest.

In sum, the project provides families with a preferable alternative to migration to the southern coast. It meshes well with the already pre-existing cash orientation which characterizes the typical highland family.

5. Technological Bases for Diversification

Both Ladino and Indian peasants practice the same type of cultivation, one that in most areas is restricted to the production of the basic grains -- corn, beans, and wheat. Corn and beans are generally grown for home-consumption purposes and are intercropped with squash on the family "milpa". Wheat, in contrast, will be grown on separate plots of ground and is not generally intercropped. Some rotation is practiced between corn and wheat plots but in general better land is allocated to the milpa.

With respect to adaptability and technological change that will be required for diversification into other crops, even the "traditional milpa technology" is the result of recent technological adaptations on the part of the rural population. As land holdings have shrunk, traditional fallow practices were abandoned and land was placed under more continuous cultivation. Livestock began to be corraled rather than kept in open pasture and some five decades ago people began collecting and using manure as organic fertilizer. This has now become a virtually universal practice in the highlands and demonstrates that traditional farmers are able and willing to adopt new practices.

Even more recently the highland population has turned to the use of chemical fertilizer and it appears that in most regions people are now purchasing this input even for growing their home-consumed corn. The use of chemical fertilizer has involved farmers even more deeply in the money economy. Now they are obliged to acquire cash to purchase commercial inputs. As fertilizer prices have risen, farmers have found themselves searching for sources of credit for fertilizer. The cooperatives have been very instrumental in this respect, and much of the success of the cooperative movement is related to the credit access which they give to poor and middle farmers for fertilizer. In summary, the prevailing technology of "traditional" farmers has incorporated new elements as an adaptation to the economic stresses which have come to dominate the highlands in recent decades.

6. Organizational Bases for Diversification

Although there are no indigenous organizations suitable for implementing a project of this nature, there are formal institutions which are effective at the rural community level. These include public agricultural sector entities as well as the cooperative movement. These institutions are widely recognized and generally accepted by the inhabitants of the Altiplano. Agricultural research carried out by ICTA on small farm plots has met with considerable success. ICTA efforts to date have focused on basic grains improvement and rainfall dependent farming. ICTA owes part of its success to its pragmatic research methodology whereby small farmers accept ICTA innovations on a selective basis. DIGESA on the other hand, has the responsibility for formal extension work and has achieved some notable successes through the mini-riego and soil conservation activities promoted under another AID project. Language does not appear to be a barrier to effective extension work since most small farmers speak Spanish and at least some DIGESA promoters are bilingual.

The cooperatives also play a potentially important role by providing credit and agricultural inputs to local members. In addition, coops sometimes hire their own extension agents who provide technical assistance to coop members. In recent years the principal cooperative federations, FENACOAC and FECOAR, have been active in organizing entirely new local cooperative movement in general and is a major factor in organizing small farmers at the local level and possibly an important conduit in the dissemination of information concerning agriculture diversification.

D. Institutional Analysis

1. Government of Guatemala

Introduction - The detailed project description and implementation plan sets forth the roles and responsibilities of the several implementing institutions involved in the project. Primary emphasis here will be placed on organization, capacity to carry out roles, coordinating mechanisms and linkages required for effective project implementation.

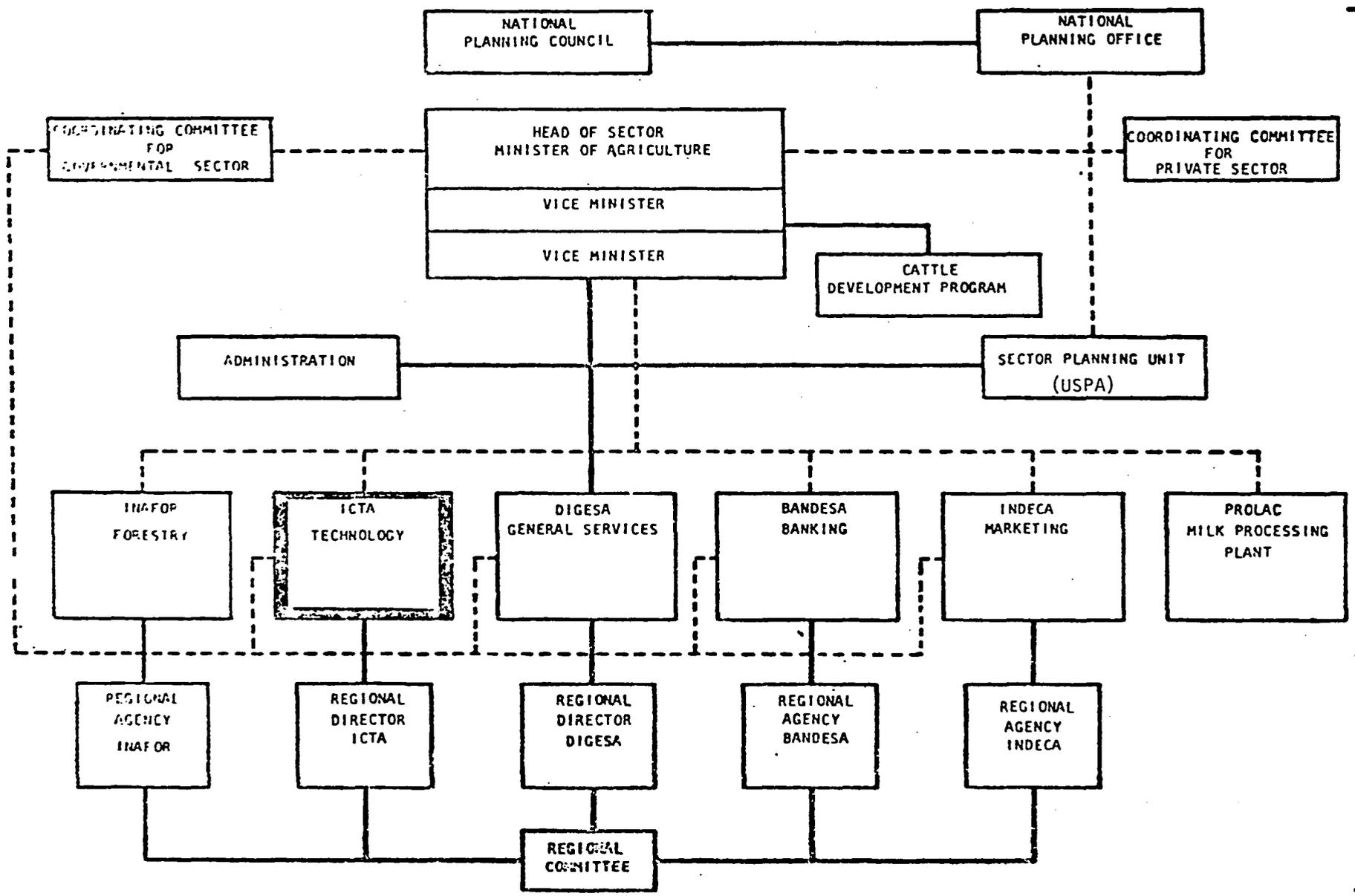
All project implementing institutions are part of the agricultural public sector which is presided over by the Ministry of Agriculture. These institutions include: (1) the Institute of Agricultural Science and Technology (ICTA); (2) the General Directorate for Agricultural Services (DIGESA); (3) the General Directorate for Livestock Services (DIGESEPE); (4) the National Agricultural Development Bank (BANDESA); and (5) the Agricultural Sector Planning Unit (USPA).

The reorganization of the Ministry during the 1970's (supported by a series of AID projects) was accompanied by a trend toward decentralization in all sector institutions. This trend continues as indicated by recent shifts of staff to the regional programs, the budgetary process which is allocated on a regional basis and increased administrative responsibility assigned to regional directors. Parallel with this decentralization trend in operations is increased coordination of agricultural sector development programs through the strengthening of USPA. Regionalization has important implications for implementation at the field level. The overall coordination to be provided by USPA on this project will facilitate administrative aspects such as annual budgets, evaluations and reprogramming.

a. ICTA will be primarily responsible for implementation of the applied research and technology adaptation component. This includes full responsibility for the fruit, vegetable and livestock research components. ICTA will have primary responsibility for coordinating and implementing the Farm Management Survey and development of representative farm models. ICTA will also have shared responsibility for training DIGESA promotores and guias in diversified crop technology through the in-service training program.

ICTA is organized according to the agricultural public sector regionalization scheme wherein the administrative and executive units are centralized, i.e. located in Guatemala City while the technical staff is located in the regions (see diagram).

PUBLIC AGRICULTURAL SECTOR (PAS)



To implement its concept of systems research, ICTA is organized along three lines. The first is made up to technology testing teams; the second consists of national commodity programs, and the third consists of support disciplines.

The technology testing teams (farming systems teams) work in areas within regions where they are responsible for implementing all on-farm experiments and farm trials. ICTA has active commodity programs covering corn, beans, wheat, sorghum, rice, horticulture and sesame. The commodity teams, though officed in the central ICTA facilities, have country-wide responsibility for research involving their commodity. They are responsible for programming, coordination and evaluation of research at the production centers, on-farm experiments and farmer trials. Technology testing and commodity teams are supported by units in soils, socio-economics, training, laboratory analysis, etc. (see diagram).

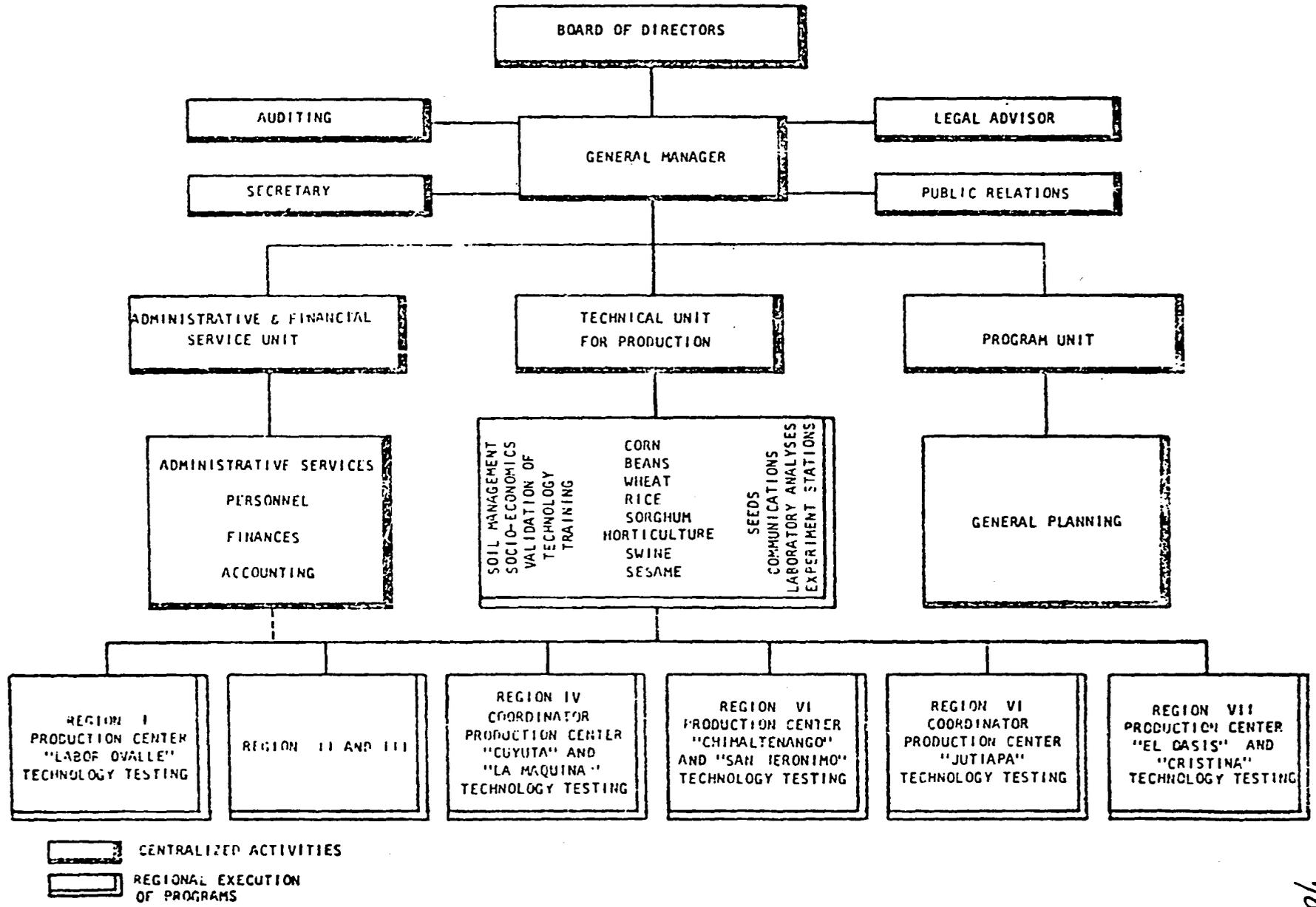
All of this work comes under the supervision of the technical director, head of the Technical Production Unit.

In Region I, which covers the proposed project area, ICTA's technical production unit has three commodity coordinators (corn, wheat, potatoes), one coordinator of technology testing, and a technical and auxiliary staff of about 30 persons responsible for on-farm testing and technology verification. Additional personnel assist in the operation of the Region I experiment station, field work, maintenance and clerical roles. Total staffing is 41, including the Regional Director who is responsible for all technical and administrative aspects of ICTA's operations.

Evaluations in conjunction with past AID projects have consistently shown that ICTA has been efficient in the job administration of project resources. In recent year, ICTA's budget has kept pace with inflation, and its administrative and technical procedures have become more efficient. ICTA now has both the administrative responsibility and capacity to expand its operations in the area of diversified crops.

This project provides resources to permit ICTA to add technicians to its staff so that it can establish and support commodity programs in vegetables, fruits and livestock in Region I and technology testing teams to work in the specified project areas (2 teams in San Marcos and one in Quiché). ICTA clearly has the administrative capacity and organization required to effectively incorporate and utilize these resources in a manner which will contribute to achievement of project objectives.

ORGANIZATION OF ICTA



ICTA's socio-economic unit is experienced in survey methodology designed to gather information which will help the researcher and extensionist know the farmer, his environment, and his constraints. It is this kind of experience combined with inhouse expertise that ensures that ICTA has the capacity to determine what is technically and economically feasible and acceptable for the small farmer. For this reason, ICTA has been selected to implement the Farm Management Survey and is also assigned primary responsibility for development of the representative farm models and model farm production plans.

b. DIGESA will be responsible for project activities involving the transfer of agricultural technology (extension) for crop production. This includes training of farmers in appropriate technology, especially technology developed and adapted under the project as well as the promotion of soil conservation practices. Moreover, DIGESA is responsible for the promotion, design, credit arrangements and supervision of the construction of irrigation projects. Finally, DIGESA will participate with ICTA and USPA in the Farm Management Survey including the development of the related materials, and assist with the training of extensionists and guias. DIGESA will have the primary responsibility for informing ICTA of field results in order to alert ICTA to possible need for modifications of technologies (Feedback).

DIGESA is a direct line agency of the Ministry of Agriculture (see diagram) charged with a wide range of activities from seed certification to aquaculture. This activities are conducted through three technical directorates: Agricultural Development (Extension), Renewable Natural Resources and Agriculture Education and Training (DECA). Frequently the work of these technical divisions overlap. All divisions are supported by administrative, planning, programming, technical and legal sections. In accordance with the regionalization scheme, the administrative functions are centralized in Guatemala City while the majority of the technical staff operate in the regions.

Of primary importance to this project is DIGESA's organization and administrative capacity in relation to training, extension and technical assistance. Within the DIGESA concept, training, extension and technical assistance are considered to be different functions.

Training - DECA's sector training function includes the administration of the Technical Aquacultural School (ITA) from which DIGESA draws most of its promotores (extensionists), along with six regional and one central training centers for in-service training. AID has provided support for the development of these in-service training facilities under previous

projects and at present they are adequately equipped to provide training for agriculture sector employees. However, the central facility and, more importantly, the Region I facility are presently being utilized at or near capacity.

To overcome the problem of lack of additional capacity at the DECA facilities in Region I, classroom facilities for the Demonstration and Training Center will be constructed at ICTA's Region I Research Station. This location of the classroom facilities was selected in lieu of expanding DECA facilities since much of the training will be based on practical experience, observation, and demonstrations performed on plots at the ICTA production center. Also, it is expected that ICTA technicians will provide the bulk of the training in diversification technology. This arrangement also serves to strengthen the institutional link between the research and dissemination functions. The project budget includes funding for the construction and operation of this facility.

Extension and Technical Assistance - DIGESA's organization and methodology for extension and technical assistance is described in detail in the Technical Analysis Section. The specific organization and staffing requirements for project implementation are fully described in the Project Description.

It was pointed out in the Technical Analysis that past deficiencies in the dissemination of technical information have been largely due to inadequate logistic and programatic support. The lack of adequate logistic support in turn has been primarily due to inadequate budgeting. This does not necessarily reflect on DIGESA's or USPA's budget planning capacities, more often it is in the result of arbitrary changes made in the budgets presented at levels beyond their control. However, recent improvements in USPA's capacity to prioritize activities within the sector has enabled the Ministry to better justify and defend budgets for agricultural sector institutions. All funding required for logistic support of the necessary staff for project implementation is contemplated in the project budget.

The fact that this project involves only one of the Ministry's regions and is fully operational at that level should facilitate the provision of adequate and timely logistic support through regional budgeting and programming of activities.

Concerning DIGESA's responsibilities for implementation of the soil conservation and small scale irrigation components, the required

administrative capacity was developed through the experience obtained under Loan 520-T-026. Although it took sometime to work out satisfactory administrative procedures for handling the social cost payments, the processing of both social costs payments and loans for mini-riego projects is now being efficiently managed by DIGESA.

c. BANDESA will be responsible for administration of the small farmer diversification investment fund, i.e., provision of credit and social costs payments to finance investments in diversified farming infrastructure.

BANDESA is a semi-autonomous division of the Ministry of Agriculture which was established in 1971 as the principal credit agency for the agricultural public sector. According to its charter "BANDESA" is the financial institution responsible for the promotion and administration of credit for the country's agricultural activities oriented fundamentally to small and medium sized farmers.

The current organization has its central offices in Guatemala City and serves national needs through seven regional districts, including one in Region I. Thirty-five sub-regional agencies (six in Region I) have been established to serve agricultural credit needs. Each sub regional office is able to develop, approve (up to established limits), and monitor loans made to farmers. Indicative of BANDESA's decentralized organization is that only ten percent of its roughly seven hundred staff reside in the capital city. In addition, BANDESA operates about 30 warehouses, six in Region I, for storage and distribution of farm inputs, primarily fertilizer which it purchases in large quantities for use by credit program clients.

The DIGESA program prepares farmers for supervised credit administered by BANDESA and provides follow-up technical assistance. Once the credit plan has been written by the DIGESA promotor in collaboration with the BANDESA credit agent, and has been approved by BANDESA, the financial aspects are monitored and supervised by the Bank. This system has been criticized from the standpoint that the responsibility of DIGESA promotors for development of credit plans detracts from their role of providing technical assistance, particularly in regard to farm activities not related to credit. This problem has been recognized by both DIGESA and BANDESA and efforts are being made to relieve DIGESA extensionists of credit supervision responsibilities.

In line with the basic objective of BANDESA to contribute to rural development by providing timely credit on favorable terms to the small and medium farmer, BANDESA's programs do provide incentives to investment through low interest rates and repayment schedules which fit the production/marketing cycle.

Under Loan 520-T-026, the administrative procedures required to make loans to finance small scale irrigation systems and to make social costs payments to stimulate soil conservation were developed. While some problems were encountered initially, these have since been resolved and the system is now functioning smoothly.

BANDESA thus far has had limited experience in making loans for diversified crops, including vegetables and deciduous fruits as well as livestock loans.

Therefore, AID loan financing includes resources necessary to provide field support to BANDESA staff who will administer the investment fund. With this additional support, plus a commission fee paid by the Central Government to BANDESA for administering the loan agreement trust agreement, it is believed that BANDESA will have sufficient administrative capacity and resources to effectively carry out its specific role in project implementation.

d. DIGESEPE is a recently created division of the Ministry of Agriculture which has responsibility for the development of livestock programs. The Director General reports to a vice-minister and directs the program by collaborating with sections of other agencies. DIGESEPE is regionalized along the same lines of the other agricultural institutions with its administrative headquarters located in Guatemala City. It generally shares regional offices with DIGESA from which its technicians carry out the extension responsibilities.

DIGESEPE will be responsible for the livestock extension activities of the project which will focus primarily on improving management practices related to disease/parasite control and nutrition/feed supply. This role will tie into its present programs which emphasize disease control/treatment, nutrition and management. DIGESEPE is currently working with INCAP in a sheep production program that focuses on problems related to mineral nutrition and nutrient distribution in high altitude range areas.

In its brief existence as a separate institution, DIGESEPE has wisely concentrated its efforts on the transfer and application of proven technology for disease control and treatment. Its level of effort and accomplishments have been quite evident in the field. As a result it has earned a reputation as an efficiently administered public sector agency.

With the technical and financial support to be provided under the project, DIGESEPE will have the institutional capacity to perform its role in project execution.

e. USPA is the Ministry of Agriculture's unit for sector planning and coordination. It reports directly to the office of the Minister of Agriculture and is responsible for the following activities:

- Gathering, processing and analysis of data for policy formulation and establishment of priorities.
- Program and budget resources in accordance with established priorities.
- Assist the Minister in the coordination of all sector programs and,
- Evaluate sector activities in a systematic fashion to provide guidance for future planning and programming.

The organization of USPA includes functional and/or technical divisions for carrying out these tasks. Basically they consist of divisions for policy analysis, programming and budgeting, studies and projects, and technical specialists.

With support from the Office of the Minister and support provided under the Small Farmer Development Project, USPA has grown from approximately ten technical employees in 1971 to more than forty, working full-time as permanent or contracted employees. Construction of the Area Sample Frame, nearing completion, will give the agriculture sector a reliable data base for the first time. USPA's computerized matrix prioritization system for allocation of public sector resources is firmly established and strengthens the Agriculture Minister's hand in annual budget negotiations.

USPA's responsibilities under this project will be (1) to assist ICTA and DIGESA in carrying out the Farm Management Survey and development of the related technical plans, (2) assure that annual budgets for the implementing institutions are funded in accordance with project requirements, and (3) overall coordination and evaluation of the activities of the participating public sector institutions. The capacity to carry out responsibilities (1) and (2) are found in USPA's program analysis and budgeting division. To assist USPA with the overall coordination and evaluation of the project, funding is provided for the establishment of a unit for Project Coordination. The organization and responsibilities of this unit is described in the following section.

f. Project Coordination. Coordination requirements for the project can be divided between that required at the regional (field) level and the national (central) level. Coordination at the field level will be necessary to assure that project inputs and outputs by the various implementing institutions are properly phased and integrated to achieve project objectives.

At the national level, activities to be coordinated will include action by central administrative units of PAS institutions, other GOG institutions and AID.

For field level coordination, the project will depend on the Ministry's established mechanisms for coordination of agricultural development activities i.e. the regional committee and backstopping by USPA through the Project Coordination Office.

Upon signature of the grant agreement, USPA will utilize funds provided therein to set up the Project Coordination Unit. This office will be staffed by a Project implementation coordinator, a bookkeeper/accountant and a secretary, all on a full time basis. This office will be responsible for the following:

(i) Advise the regional directors of the implementing institutions regarding all administrative and procedural requirements established under the project and make appropriate recommendations on how they can best be met.

(ii) Under the guidance of the USPA Director and in close consultation with USAID/Guatemala, train staff of implementing institutions in project implementation methodology, explain and interpret the

administrative and procedural requirements of the loan and grant agreements related to AID regulations, and assist GOG staff in developing their capacity to prepare responses to such requirements.

(iii) Prepare a handbook for GOG agency use which explains the administrative and procedural requirements of the loan and grant and the mechanisms available for addressing these requirements.

(iv) Train and familiarize GOG staff regarding the financing and reimbursement mechanisms established under the loan and grant as well as the preparation of the required documentation and other supporting materials (Vouchers and Fiscal Reports, etc.)

(v) Familiarize GOG staff members with the full range of requirements established in the standard provisions annex of the loan and grant agreements and implementation letters.

(vi) Assist the respective GOG agencies in the preparation and updating of implementation, evaluation and financial plans and other analytical/technical documentation (RFP's, PIO's, etc.), that are required to disburse funds for the various subactivities programmed under the loan and grant.

(vii) Make sure that the GOG agencies are informed with regard to reporting requirements, and report on a timely basis. Consolidate reports from individual agencies for purpose of meeting reporting requirements for overall project.

(viii) Inform USPA on a timely basis as to budget requirements, both loan and counterpart funds, for the upcoming fiscal year.

(ix) Monitor implementation at the field level, troubleshoot any apparent bottlenecks, and take appropriate action to alleviate such constraints.

At the regional level the principal coordinating mechanism for the agricultural public sector is the Regional Agricultural Development Committee (COREDA). This committee consists of the Regional Directors of each of the agricultural public sector institutions and is headed by the

Regional Director of DIGESA. The COREDA meets regularly and its primary responsibility is to see that the activities of institutions they direct are carried out in a complimentary manner so as to maximize their contribution to development of the region. To the extent possible they also coordinate their activities with other public sector institutions and the private sector. This organization extends on down to the sub-region level. It is through these entities that joint action of governmental institutions with responsibility for overall project implementation will be achieved at the field level.

Each regional director will be responsible for effective implementation of the sub-activities for which his institution is designated the implementing unit. Also the regional program and administrative units of each institution will elaborate and/or collaborate in financial and programatic evaluations of the project.

Conclusion - The implementation of this project will not require any new organization nor will it require any major modifications in existing institutions. Instead, it is designed to take advantage of and expand upon existing institutional capacities within the sector. Proposed modifications are intended to improve technical quality of the services offered by the institutions involved and expand their coverage. Since additional staffing requirements, logistic support, materials and supplies, etc., required for project implementation are contemplated in the project financial plan. Project Implementation therefore should not burden the existing administrative capacity of the GOG implementing institutions.

IV. FINANCIAL ANALYSIS AND PLAN

A. Project Budget and Disbursement Plan

The proposed total cost of the project is \$14.8 million. AID's contribution will comprise 55% of the total project budget of \$14.8 million and will consist of \$2.6 million in grant funds and \$5.5 million of loan funds for a total of \$8.1 million. The remaining 45% of the total budget or \$6.7 million will be contributed by the Government of Guatemala. The project's life is estimated to start January 1, 1982 and end on December 31, 1986, for a total of 60 months.

AID grant funding will be provided in fiscal years 1981 through 1985 as presented in Table 1. Total loan funds of \$5.5 million will be obligated in Fiscal Year 1981.

The GOG Fiscal Year runs from January through December. With prompt obligation of loan and grant funds, the GOG will have sufficient leadtime to program AID and counterpart funding into the calendar fiscal year GOG budget. This will ensure the timely availability of both AID and GOG project funding for project implementation.

Table
Obligation Schedule
Amounts in US\$000's

<u>Fiscal Year</u>	<u>Grant</u>	<u>Loan</u>
1981	696	5,500
1982	702	-
1983	702	-
1984	403	-
1985	<u>97</u>	<u>-</u>
	<u>2,600</u>	<u>5,500</u>

The financial plan, including estimated costs and funding sources is shown in Table II below. For more detailed project costs of each project component, refer to Annex J.

Table
Financial Plan
Amount in US\$000's

<u>Project Component</u>	<u>A I D</u>		<u>Coun- terpart</u>	<u>Total</u>
	<u>Grant</u>	<u>Loan</u>		
I. Applied Research and T.A. Adapta- tion (ICTA)	1,197	1,202	1,551	3,950
II. Extention and Promotion (DIGESA & DIGESEPE & 4-S Clubs)	1,012	678	2,835	4,525
III. Credit and Social Cost Payment (BANDESA)	-	3,044	2,177	5,221
IV. In-Service Training (DECA)	-	217	-	217
V. Credit Assistance (BANDESA)	-	124	111	235
VI. Project Coordination (USPA)	231	-	-	231
VII. Nutritional Impact Evaluation	160	-	-	160
VIII. Inflation and Contingencies	-	235	-	235
Total	<u>2,600</u>	<u>5,500</u>	<u>6,674</u>	<u>14,774</u>

The high GOG contribution to this project in the form of counterpart reflected in the Table above, is indicative of the level of interest and support of the host country.

The projection of project expenditures by implementation year for grant and loan funds is shown in the table below:

Table
Projection of Expenditures by Fiscal Year
(US\$000)

<u>Project Year</u>	<u>AID Funds</u>	
	<u>Grant</u>	<u>Loan</u>
1	696	1,525
2	702	1,278
3	702	1,260
4	403	668
5	97	759
Total	<u>2,600</u>	<u>5,500</u>

The breakdown of AID contributions by Foreign Exchange and Local Currency by funding source is shown below.

Table
AID Grant Fund Inputs
US\$000's

	<u>Total</u>	<u>Fx.</u>	<u>Lc.</u>
Technical Assistance	2,072	2,072	-
Project Management & Coordination	231	-	231
Other Costs	<u>297</u>	<u>-</u>	<u>297</u>
Total	<u>2,600</u>	<u>2,072</u>	<u>528</u>

Table
AID Loan Financed Inputs

US\$000's

<u>Input Description</u>	<u>Total</u>	<u>Fx.</u>	<u>Lc.</u>
Construction	315.5	-	315.4
Commodities	1,437.0	550.4	886.6
Credit and Social Cost Payment	3,044.0		3,044.0
In-Service Training	216.6		216.6
Academic Training	252.0	252.0	
Contingency	<u>235.0</u>	<u> </u>	<u>235.0</u>
Total	<u>5,500.0</u>	<u>802.4</u>	<u>4,697.6</u>

Inflation and Contingencies

Inflation and contingency factors for the grant portion of budgeted project costs were included in individual line items. Grant financed technical assistance was increased by 12% per annum.

Of the total loan amount of \$5.5 million, \$3.0 million will be placed in a credit fund and does not require an inflation factor since it is a fixed amount. The remaining amount, \$2.5 million contains a total inflation and contingency factor which averages 10.5% on the total loan amount before inflation and contingencies.

B. Financial Analysis of the Small Farm Enterprise Benefitted under the Project

In calculating improvements in the small farmers' cash income position, a number of assumptions were made. First, a 20% rate of return was assumed to be sufficient to overcome most farmers' aversion to risk especially since our farm models allowed at least two-thirds of one hectare (1 manzana) to remain in corn and bean production to cover direct family consumption needs. The second assumption is that small scale irrigation and soil terracing will be done in the first year although double cropping does not take place until the second year. Finally, all prices and costs were calculated in constant 1980 dollars.

Farm Model No. 1 (one hectare farm)

In this model we assume that one-third of a hectare (.5 manzana) is diversified and dedicated to any one of the following crops: carrots; cabbage; onions; broccoli; cauliflower. The small farmer is likely to choose one of these crops since they are relatively easy to grow and not considered high-risk with respect to market price fluctuations or natural hazards. A proforma income statement has been prepared for each crop showing the expected income stream over ten years and the internal financial rate of return as well as present value of each crop (Tables 1 thru 5 in the financial annex J). A small loss of roughly \$300 is shown for the first year, however, incomes increase very substantially thereafter. The financial results are summarized below:

<u>Crop (1/3 hectare)</u>	<u>Present Value^{1/}</u>	<u>Financial Return</u>
Carrots	\$3,646	64%
Cabbage	3,403	67%
Onions	6,754	95%
Broccoli	6,120	99%
Cauliflower	4,611	81%

The above rates of return took into consideration interest costs on borrowing, farm inputs, irrigation/terracing but excluded rental value of land and family labor as an expense.^{2/} However, in the case of onions, hired labor was included because labor requirements for this crop exceeded what could normally be supplied by family labor alone.

Farm Model No. 2 (three hectare farm)

In this model, the crop mix was assumed to be the following:

^{1/} Discounted at 20 percent per annum.

^{2/} Rental value of land would be roughly equivalent to net value of corn production per hectare or \$60.

<u>Crop</u>	<u>Area</u>
a) Cabbage	1 hectare
b) Broccoli	1 hectare
c) Corn/beans	<u>1</u> hectare
	3 hectares

A loss of \$637 was realized the first year, however, annual cash income rapidly rises to roughly \$10,000 thereafter. The present value or net worth of this crop combination discounted at 20% over 10 years equals \$36,257. (See Table 6).

Farm Model No. 3 (four hectare farm)

In this model, the size of the farm was such that fruit tree cultivation was considered feasible. Accordingly, the following crop mix was considered:

<u>Crop</u>	<u>Area</u>
a) Peach	1 hectare
b) Cauliflower	1 hectare
c) Onions	1 hectare
d) Corn/beans	<u>1</u> hectare
	4 hectares

A net loss was incurred the first year amounting to \$4,944 due primarily to the high initial cost of fruit tree cultivation. However, the net income cash flow becomes positive by year two and ascends to roughly \$25,000 annually by year eight. The present value of this crop combination discounted at 20% over 10 years equals \$54,924. (See Table 7).

Farm Model No. 4 (five hectare farm)

For this model, the farm size was such that a long term investment in apple trees was considered feasible. Thus, the crop mix might be the following:

<u>Crop</u>	<u>Area</u>
a) Apples	1 hectare
b) Onions	1 hectare
c) Broccoli	1 hectare
d) Cabbage	1 hectare
e) Corn/beans	<u>1</u> hectare
	5 hectares

85

An initial loss of \$4,417 was incurred in year one. The net income cash flow rises to \$18,704 in year two but drops slightly until year seven when it increases to \$24,595 reaching \$36,304 by year ten. The discounted value for this crop combination is \$64,533. (See Table 8).

Although these calculations are purely illustrative they demonstrate the financial viability and attractiveness of agricultural diversification for the small farm. In addition, crop diversification implies spreading risk over a greater number of crops, the result is a stabilization of incomes at a higher level over time.

C. Analysis of Implementing Institution Budgets

The implementing institutions - ICTA, DIGESA, DIGESEPE and BANDESA -- are governmental institutions. Their operating budgets are provided through the annual public sector budget. BANDESA receives revenue independently as well, but remains dependent upon allocations of public funds. Comparative annual budgets are outlined below:

Table
Implementing Institutions Budgets

	<u>US\$ Millions</u>		
	<u>1978</u>	<u>1979</u>	<u>1980</u>
DIGESA	7,900	8,300	9,800
DIGESEPE	-	1,900	1,900
BANDESA	84,100	78,100	79,000
ICTA	3,100	2,800	3,500

The above annual budgets, which in the case of BANDESA includes both independent revenue and GOG budgetary allocations through the Ministry of Agriculture, are relatively constant and we see no reason to anticipate any significant reduction. In any event, the financial resources provided for the implementation of this project are additive to and not dependent upon other budgetary resources of the concerned institutions.

The table below illustrates the budgetary revenue of the implementing institution derived from the overall Ministry of Agriculture Budget.

Table
Implementing Institution Budgets Provided
Through the Ministry of Agriculture
US\$000's

	<u>1979</u>		<u>1980</u>		<u>1981</u>	
	\$	%	\$	%	\$	%
Total Ministry of Agriculture Budget	<u>57,243</u>	100	<u>72,618</u>	100	<u>66,280</u>	100
Total Funds Assigned to:						
<u>DIGESA:</u>						
Operating Budget	7,589		9,638		10,225	
Capital Budget	<u>690</u>		<u>185</u>		<u>169</u>	
Total DIGESA	8,279	14	9,823	14	10,394	16
 <u>DIGESEPE :</u>						
Operating Budget			<u>1,903</u>	3	<u>1,734</u>	3
			(3%)		(3%)	
 <u>BANDESA:</u>						
	<u>2,057</u>	4	<u>2,057</u>	3	<u>2,057</u>	3
 <u>ICTA:</u>						
	<u>2,815</u>	5	<u>3,540</u>	5	<u>3,610</u>	5

V. PROJECT IMPLEMENTATION

A. Administrative Arrangements and Implementation Plan

The project will be implemented by Guatemalan public agriculture sector institutions which report directly to the Minister of Agriculture. The Minister of Agriculture, unless otherwise delegated, will approve the creation of all new positions necessary to implement the project as well as financial programming of Loan and counterpart resources in accordance with GOG fiscal year requirements. The Minister, as legal representative under the Loan, will also approve all reimbursement requests for AID funding. Furthermore, it is anticipated that the Minister of Agriculture and the Minister of Finance will be signatories to a trust agreement which will formally transfer AID loan funds for the Credit Fund to BANDESA. The Public Agriculture Sector Planning Unit (USPA) will advise the Minister periodically of project progress and be responsible for overall project coordination and detailed fiscal programming. In addition, AID will contract with INCAP to perform the institution baseline study in collaboration with ICTA, USPA, and DIGESA.

1. Pre-Implementation Activities

Following the signing of the Grant and Loan Agreements, preparatory actions will be taken which will parallel the GOG loan ratification process and provide the basis for project implementation. These actions are primarily procedural in nature and relate to satisfaction of conditions precedent under the Loan (and Grant) as well as procurement planning. Pre-implementation activities include:

- a. Ratification procedures for the AID Loan such as Council of State Approval and GOG Congressional Ratification.
- b. Programming of Loan and counterpart funds in the 1982 GOG Budget.
- c. Satisfaction of initial condition precedent to disbursement.
 - i. Legal opinion
 - ii. Nomination of legal representatives
 - iii. Trust agreement approval.
- d. Counterpart purchase of land for research experimentation facilities.

- e. Preparation of Invitations for Bid (IFB) for procurement of vehicles and other equipment.
- f. Creation of new positions within the implementing institutions and assignment of GOG personnel to the project.
- g. Selection of a Title XII University to provide the technical assistance team as well as organize the academic training program.
- h. Design of on-farm management survey including nutrition data and organization of grant financed survey activities.

2. Implementation Arrangements by Activity

a. Farm Management Survey. ICTA will be the lead institution and have primary responsibility for the collection of basic data. Data will be collected by means of repeated visits during the year to interview the farmer and his family as well as first-hand observation of production/consumption behavior. Members of ICTA technology testing teams and DIGESA promotores (primarily women home educators) assigned to the project area will be utilized for this purpose. They will be guided and supported by ICTA's socio-economic unit which in turn will be advised by the agricultural economist and the sociologist/anthropologist of the T.A. team.

AID will contract with INCAP to assist ICTA in the collection of nutrition baseline data as outlined in the project evaluation plan.

USPA will be responsible for overall coordination of inputs for each institution. In addition USPA's analytical unit will assist in the analysis of the farm survey and nutrition data.

b. Research and Technology Adaptation

ICTA will have the main responsibility for design and implementation of the diversified crops research program. However, ICTA will be assisted by AID financed subject matter specialists. DIGESA and DIGESEPE will actively participate in the design and periodic updating of the research program.

ICTA will contract for the construction of the additional research facilities (greenhouse, laboratory and fruit tree sub-station

buildings) and be responsible for procurement of land for the sub-stations as well as vehicles and other required commodities. ICTA will also hire the additional technical personnel required to establish commodity programs in horticulture, deciduous fruits and livestock and for the technology testing teams to service the project area.

c. Extension and Technology Transfer

DIGESA/DIGESEPE will provide the extension services for diversified crops and livestock systems. DIGESA will be primarily responsible for transfer of technology related to crops and DIGESEPE that relate to livestock. They will be advised by the AID financed T.A. team in extension methodologies as well as subject matter specialists in plant protection; irrigation systems; water management and soil conservation, etc. Both will be responsible for hiring the additional staff required for this purpose as well as procuring the vehicles, motorcycles and other commodities required for supporting field activities.

DIGESA, through DECA, will also have primary responsibility for the in-service training activities. This includes construction, staffing and equipping of the classroom facilities for the demonstration training center, organization and administration of the training programs for extensionists, guias and other DIGESA, ICTA and DIGESEPE technicians.

DIGESA will also administer the rotating fund for financing 4-S (4-H) club projects involving diversified crops and livestock along with its normal responsibility for organizing and assisting 4-S clubs.

d. Mini-Riego and Soil Conservation

DIGESA will staff and organize two mini-riego teams and two soil conservation teams to support the extension staff in implementation of these two activities. DIGESA will procure the vehicles, engineering equipment and other commodities required to support the teams. The mini-riego teams will be responsible for provision of the technical assistance to interested groups for the design, cost estimates, credit applications, and construction supervision of irrigation systems. They will also have primary responsibility for training/advising farmers in regard to operation of the systems, including water management. The soil conservation teams will provide technical assistance to extensionists and guias in the promotion and establishment of soil conservation structures and techniques. They will also work closely with BANDESA in the implementation of the social cost payment program.

e. Credit and Social Cost Payment Fund

BANDESA will be responsible for administration of this fund. This will include making the necessary administrative arrangements (establishment of Trust Fund and Credit Policy) as well as routine functions of reviewing and approving credit applications, disbursement of credits, supervision, and collection. For the latter purposes, BANDESA will expand its staff in the project area and provide them with vehicles, office equipment and other necessary support. BANDESA will also work with cooperative organizations as channels for credit to farmers. In addition, BANDESA will contract for the services of a financial consultant to review and evaluate current BANDESA interest rate policy.

The following implementation plan summarizes the key implementation activities and indicates the responsible entities as well as the corresponding time frames. Furthermore, as a condition precedent to disbursement under the loan, detailed implementation and financial plans will be required for each activity. These plans will be updated annually by the project coordinating office, USPA and the respective implementing institutions.

ACTIVITY	Responsible Entities	1981				1982				1983	1984	1985	1986
		J	A	S	D	1	2	3	4				
A. General - Administrative													
1. Approval by COFE/MinFin	USPA/SCNPE												
2. Signature of Loan	MinAg/MinFin/AID												
3. Approval by Council of State	USPA/MinAg/AID												
4. Ratification by Congress	MinAg/MinFin												
5. Budget of funds for 1982	USPA/MinAg/PICO												
6. Staffing for COG. Institutions	USPA/MinAg/PICO												
7. Satisfaction Initial CP's	MinAg/MinFin/AID												
a. Legal opinion	" "												
b. Legal Representative(s)	" "												
c. Bandesa Trust Agreement	" "												
8. Signing of Grant Agreement	MinAg/AID												
9. Project Imp. Coord. Off. (PICO)	USPA/AID												
10. Selection & Contracting of T.A.	USPA/AID/MinAg												
11. Preparation of IFS's													
a. Vehicles													
b. Machinery and Equipment													
12. Satisfaction Secondary CP's	PICO/Imp.Units/AID												
13. LCP Detailed Imp. Plans and Financial Plans	" "												
B. Farm Management Survey													
1. Contract with INCAP	ICTA/USPA/DIGESA/INCAP (INCAP/AID/PICO)												
2. Design of Survey	ICTA/USPA/DIGESA/INCAP												
3. Collection of Data	" "												
4. Analysis of Data	" "												
a. Formulation of Model Farms	" "												
b. Simulation Analysis	(USPA)												
c. Technology Packages	" "												
d. Food Behavior	(INCAP)												
C. Research and Technology Adaptation													
1. Purchase of Land for Fruit Station	ICTA												
2. Construction	" "												
a. Fruit Research Station Buildings	" "												
b. Laboratory	" "												
c. Greenhouse	" "												
3. Purchase Lab. Equipment	" "												
4. Staff Lab.	" "												
5. Staff Fruit, Hort. & Livestock Programs	" "												
6. Staff technology testing teams	" "												
7. Conduct Field Research	ICTA/DIGESA/DIGESEPE												
8. Train DIGESA/DIGESEPE Ext.	" "												
9. Annual Evaluation of Results	" "												
10. Annual Research Plan Development	" "												
D. Extension / Technology Transfer													
1. Hiring of Promoters (Extensionists)	DIGESA/DIGESEPE												
2. Construction of Training Center	" "												
3. Staffing & Equipping Center	" "												
4. Identification & Selection of Guías	DIGESA/ICTA												
5. Training of Promoters	DIGESA/ICTA/DIGESEPE												
6. Training of Guías	DIGESA/ICTA/DIGESEPE												
7. Extension Activities	DIGESA/DIGESEPE												
E. Mini-Riego and Soil Conservation													
1. Select and Hire T. A. Teams	DIGESA/BANDESA												
2. Train in established Guidelines	DIGESA												
3. Promote and construct Soil Conservation and Mini-Riego Infrastructure	DIGESA/BANDESA												
4. Train in Irrigation Practices	DIGESA												
F. Diversification Investment Fund													
1. Establish Credit & Social Cost Payment Patticles	BANDESA/DIGESA/DIGESEPE												
2. Hire Credit Agents	BANDESA/MinAg/AID												
3. Assist Farmers with Credit and Social Cost Payment Applications	BANDESA												
4. Process and Disburse Loans and Social Cost Payments.	DIGESA/DIGESEPE/BANDESA												
5. Monitor (Service) Loans	BANDESA												

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B. Evaluation Plan

To insure proper resource allocation and to achieve project objectives, two major types of evaluations will be needed, those which are continuous and integrated into project activities and those which are planned on a periodic basis.

The first element in this evaluation strategy will be an emphasis on continuous self-evaluation by the collaborating institutions. An assumption of the project is that evaluation is an on-going, formative process which provides timely and relevant data to the project coordinator. ICTA, through its research activities and DIGESA, through its extension work and contact with target area farmers will be able to provide information on the ongoing achievements and problems of the project to allow timely decision making and constant adjustment of project activities in keeping with these evaluation results. DIGESA agents trained in part by ICTA will be familiar with ICTA's research methodology and will be able to provide appropriate input into the technology development efforts assuring that techniques and systems developed in the research phase are adequate to the needs and desires of small farmers. ICTA's socio-economic unit will in the course of its duties, gather data on the target area which will provide an input into decision making.

The second element in this process will be scheduled, periodic evaluations. These formal evaluations will provide baseline and end of project status data on such aspects as: (a) socio-economic conditions of small farmers living in the project area; (b) local agricultural practices; (c) agricultural outputs as well as other economic factors influencing food availability; and (d) food consumption and anthropometric measurements.

The planned evaluations are: annual internal evaluations; two external evaluations; and a nutritional evaluation. Two baseline studies are planned to provide a basis for measuring project accomplishments.

Periodic Evaluations

At the end of each project year, the principal advisor in cooperation with the implementation committee will prepare an internal evaluation report on the project for presentation to the Government of Guatemala and AID. These yearly evaluations will be used to measure actual project progress against output targets as well as the following end of project status (EOPS) objectives:

1. Numbers of small farmers producing higher value crops (project target: 5,000).
2. The area dedicated to higher value crops by small farmers will have increased by 2,000 hectares.
3. The net value of total production (output) of small farm crops will have increased from \$500,000 to \$6,000,000.
4. 2,000 person/years of permanent employment opportunities will have been generated for small farmers.

The initial evaluations will concentrate on implementation and achievement of outputs. Later evaluations will place greater emphasis on the project purpose and progress towards EOPS. The evaluations will also identify major changes in the project setting with reference to Government of Guatemala priorities impacting on the project.

The measures of progress toward these objectives will be obtained from required reports from each implementation unit and from field observations. The information from the yearly evaluations will be presented in the Project Evaluation Summary (PES) format. The PES will be used by AID to measure project progress, identify problem areas and, if appropriate, develop problem solutions.

Preliminary to the annual evaluations, the project will develop the necessary baseline data against which to measure project progress.

The first year of project implementation will focus on the Small Farm Management Survey which will be conducted by ICTA. This study will provide baseline data on small farmer production/consumption systems and identify constraints to diversified crop and livestock production.

USPA conducts yearly Regional Sample Surveys as part of their normal activities. These surveys provide information on land use, tenancy patterns, total agricultural production and general farm

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profiles. During the first project year, the Region I Sample Survey will be expanded to provide baseline information on nutrition and food expenditures. At the end of the project, this expanded survey will be updated to show average changes in the project area exclusive of overall regional trends.

These surveys will be used for determining various aspects of project progress in the annual and external evaluations.

External Evaluations

The first of two reviews to be performed by a team of external consultants will take place at the end of the third project year. The purpose of this evaluation will be to examine the project participants, their activities in the project and achieved (as compared to estimated) project outputs. In addition, this evaluation will determine the project impact on the environment of the target area. Included in this review will be any changes, as a result of this project, in the quality of water, soil, local flora and fauna. This review will also evaluate pesticide procurement and field use in the project area.

Based upon findings, a report which will include appropriate recommendations will be made to the Government of Guatemala and AID. These recommendations will be used for any mid-project decisions which could alter the role of the participating agencies or use of any input so that final project objectives will be met.

At the end of the project, a second external review will take place to determine overall achievements of the project. Recommendations will be offered for subsequent actions by AID and the Ministry of Agriculture concerning needed actions for consolidating project gains. The team for both external evaluations will consist of one agricultural economist, one nutritional economist and one statistician. In addition, the first external evaluation team will include an environmental specialist.

Special Nutrition Evaluation

To determine nutritional impact, a special evaluation will be conducted on this specific aspect of the project. With minor modifications

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- 80 -

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to the Small Farmer Management Survey, additional baseline data on food production and consumption will be collected at the outset of the project. This data will include food production and consumption patterns in the project area and will provide the base against which achievement of project objectives will be measured. In addition, a 24-hour recall survey of dietary intake will be performed to provide an accurate description of food types and amounts consumed over a 24-hour period.

The nutrition evaluation will determine both the pre and post-project nutritional status of the most-at-risk groups, i.e., women and children. INCAP will be contracted to conduct this evaluation which will also include anthropometric-cultural data. A sample of those participating in the Nutrition and Food Expenditures Survey will be used in this evaluation.

The data gathering and processing of the information obtained from the studies and evaluation described will be coordinated by a steering committee comprised of representatives from ICTA, DIGESA, USPA, INCAP and AID. Short-term advisors will be required to assist in data processing and statistical analysis.

The total costs of all planned surveys and evaluations are outlined in Table 1.

BEST COPY AVAILABLETABLE 1SMALL FARMER DIVERSIFICATION PROJECT
EVALUATION REQUIREMENTS

<u>I T E M</u>	<u>COST</u> <u>(\$000)</u>
A. <u>Farm Management Survey and Food Consumption Analysis</u>	<u>18.0</u>
(1) Half-time ICTA/Socio-economic professional - \$20,000/yr. for 4 years	40.0*
(2) Technician for registry maintenance \$4,000/yr. for 4 years	16.0*
(3) Home Educator (full-time during farm management survey) - \$12,000/yr. for one year	12.0*
(4) Special analysis and reports mid-project, and at end of project	8.0*
(5) Transportation for fieldwork for farm management survey and registries	8.0*
(6) ST/TA Ag. Economist (3 months)	18.0
B. <u>Nutrition and Food Expenditures Survey</u>	<u>29.0</u>
(1) Analysis of 1979 population data	9.0
(2) ST/TA statistician (2 months)	12.0
(3) Additional analyses and sub-sample designs for food expenditure and diversified crop components	10.0
(4) Extra transportation costs for fieldwork	8.0
C. <u>Nutritional Evaluation</u>	<u>99.0</u>
(1) Half-time professional for nutritional advice in all aspects of evaluation; to design, manage and analyze food recall and expenditure data - \$30,000/yr. for four years	60.0

* These costs are assumed to be covered in the funding already provided by the project for the Small Farm Management Survey.

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- 82 -

UNCLASSIFIED

98

<u>I T E M</u>		<u>COST</u> <u>(\$000)</u>
(2) Food Recall Study design, data collection and analysis (paired sample 500 families; anthropometry; individual basis)	30.0	
(3) Tutorial training of agricultural personnel from ICTA, DIGESA and USPA. Approximately 8 months at \$150/month	2.0	
(4) Analysis of food expenditure data for final report	3.0	
(5) Final report and seminar	4.0	
D. <u>Mid-Project External Review</u>		<u>14.0</u>
(1) One ST/TA Ag. Economist (2 weeks)	3.5	
(2) One ST/TA Nutritional Economist (2 weeks)	3.5	
(3) One ST/TA Statistician (2 weeks)	3.5	
(4) One ST/TA Environmental Specialist	3.5	
E. <u>Final Project External Review</u>		<u>30.0</u>
(1) One ST/TA Ag. Economist (4 weeks)	10.0	
(2) One ST/TA Nutritional Economist (4 weeks)	10.0	
(3) One ST/TA Statistician (4 weeks)	10.0	
TOTAL		190.0
Plus 5% for contingencies		<u>9.5</u>
GRAND TOTAL		<u>199.5</u>

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ANNEX A
Page 1 of 11

5C(1) - COUNTRY CHECKLIST

listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 416. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?
Project will benefit needy rural poor.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?
Guatemala does take adequate steps to prevent narcotics traffic.
3. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?
Yes.
4. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?
No, as far as is known.
5. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?
No.

6. FAA Sec. 620(a), 620(f); App. Sec. 107, 111. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam, Cambodia, Laos, Cuba, Uganda, Mozambique, or Angola? No.
7. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.
8. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? No.
9. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? N/A.
10. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters, N/A.
- a. has any deduction required by Fishermen's Protective Act been made?
- b. has complete denial of assistance been considered by AID Administrator?
11. FAA Sec. 620(q); App. Sec. 503. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default? No.
12. FAA Sec. 620(s). "If contemplated assistance is development loan (including Alliance loan) or security supporting assistance, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems?" (An affirmative answer may refer to the record of the taking into account, e.g.: "Yes as reported in annual report on implementation of Sec. 620(s)." This report is prepared at the time of approval by the Administrator of the Operational Year Budget. Yes. The Administrator has approved the Operational Year Budget which has been forwarded to Congress, and in so doing has taken into account the relevant questions regarding military expenditures.

101

A12

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Upward changes in the Sec. 620(s) factors occurring in the course of the year, of sufficient significance to indicate that an affirmative answer might need review, should still be reported, but the statutory checklist will not normally be the preferred vehicle to do so.)

- 13. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
- 14. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? Country is not delinquent.
- 15. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? No.
- 16. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.
- 17. FAA Sec. 669, 670. *Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977 although not a "nuclear-weapon State" under the nonproliferation treaty?* No.
- 18. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate? No.

B. FUNDING CRITERIA FOR COUNTRY

Development Assistance Country Criteria

a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

Analysis has been performed by Mission and taken into account in its planning.

b. FAA Sec. 104(d)(1). If appropriate, describe the extent to which the country has implemented or plans to implement programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, and assistance to urban poor?

c. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:

- (1) Making appropriate efforts to increase food production and improve means for food storage and distribution.
- (2) Creating a favorable climate for foreign and domestic private enterprise and investment.
- (3) Increasing the public's role in the developmental process.
- (4) (a) Allocating available budgetary resources to development.

(b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.
- (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.
- (6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

d. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made?

e. FAA Sec. 11F. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, has Congress specifically authorized such use of funds, or is assistance for population programs, humanitarian aid through international organizations, or regional programs?

Yes, this project is designed to modify conditions supportive of large families, by improving agricultural practices, as well as by increasing the nutritional status of the rural poor.

The Government of Guatemala is now implementing several new programs to increase food production and improve storage facilities and internal distribution. GOG projects in agricultural research, agricultural cooperatives, grain storage and processing are being supported with AID loan funds.

The GOG encourages foreign investment and through two private financial institutions (FIASA and FIGSA), demonstrates its support for private enterprise.

The objective of this project is to support the GOG's efforts in rural agricultural development allowing small farmers to increase their participation in development.

The GOG is allocating a significant portion of its national budget to activities related to development. Additional emphasis is being placed by the GOG on the accelerating development of the rural population.

The GOG does not appear to be diverting resources for unnecessary military expenditures nor is it intervening in the affairs of other free and independent nations.

With the assistance of two AID loans the GOG is making substantial improvements on the collection of tax revenues and has initiated a commission to improve land tenure in the rural areas. The GOG is supporting several programs which recognize the importance of individual freedom, initiative and private enterprise, Guatemala is considered to have a free press.

GOG efforts in this respect are described at length in the sections on Social and Economic Analysis.

Yes.

No.

103

B

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2. Security Supporting Assistance Country Criteria

N/A.

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section?

b. FAA Sec. 531. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance?

c. FAA Sec. 533(c)(2). Will assistance under the Southern African Special Requirements fund be provided to Mozambique, Angola, Tanzania, or Zambia? If so, has President determined (and reported to the Congress) that such assistance will further U.S. foreign policy interests?

d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

e. App. Sec. 113. Will security assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?

f. FAA Sec. 620B. Will security supporting assistance be furnished to Argentina after September 30, 1978?

5C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds; second, project criteria applicable to individual fund sources: Development Assistance (with priority for criteria applicable only to IDA); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b); Sec. 671

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure

Included in Congressional Presentation.

Yes.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

On the basis of previous good performance by the GOC and the controls to be built into the Loan Agreement, including annual review of project progress, it is anticipated that Borrower will carry out its required budget actions so as to permit orderly accomplishments of the purposes of the Loan.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per *the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973*?

N/A.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

N/A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?

No; N/A.

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- 7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusion whether project will contribute to efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
- 8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- 9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.
- 10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?
- 11. ISA 14. *Are any FAA funds for FY 78 being used in this Project to construct, operate, maintain, or supply fuel for, any nuclear powerplant under an agreement for cooperation between the United States and any other country?*

The project will improve the technical efficiency of agriculture through the introduction of diversified crops, improved cultural practices and improved access to agricultural inputs.

U.S. private trade will be indirectly supported by procurement of U.S. goods and services.

Guatemala is providing a substantial contribution to the project in local currency. See Project Paper Financial Plan. No U.S.-owned foreign currencies are available for utilization in this project.

No.

No.

8. FUNDING CRITERIA FOR PROJECT

- 1. Development Assistance Project Criteria
 - a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

The project will insure wide participation of the poor in development by extending access to improved agricultural practices and increased agricultural extension services at the local level. The rural poor will be aided in their self-help efforts by enabling them to diversify their agricultural production and increase their incomes.

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

The project will increase agricultural productivity and incomes of the rural poor through the introduction of non-traditional crops, improved livestock husbandry and by insuring an increased flow of agricultural inputs. Agricultural research will be directed toward analyzing current small farmer practices and to determine optimum crop/livestock/management combinations for the Guatemalan Highlands.

(2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;

N/A.

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

N/A.

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

N/A.

(a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(b) to help alleviate energy problem;

(c) research into, and evaluation of, economic development processes and techniques;

(d) reconstruction after natural or manmade disaster;

(e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

107

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(5) [107] by grants for coordinated private effort to develop and disseminate in developing countries appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

Yes. The GOG will commit itself to provide at least 25% of the costs of the project by signing the Project Agreement. Past practice indicates they will honor such a commitment.

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

The project seeks to improve the ability of Guatemalan small farmers to meet that country's food needs by promoting and introducing diversified agricultural food products.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project recognizes the economic necessity and the desire of the people to diversify agricultural production, will encourage institutional development of the Ministry of Agriculture and will provide information and the means by which small farmers will be able to change their agricultural output.

B1

g. FAA Sec. 201(e); Sec. 211(a)(1)-(3) and - (3). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

The activity gives reasonable promise of contributing to self-sustaining economic growth by increasing the quantity of agricultural food products. Yes. Yes.

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

Project is not expected to adversely effect U.S. economy.

2. Development Assistance Project Criteria (Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

Financing for this activity is not available from other free-world sources including private sources within the U.S.

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

It appears reasonably certain that Guatemala will repay the Loan. The country's foreign exchange position warrants the conclusion that dollars will be available as needed for repayment of this Loan.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

The activity has been found economically and technically sound. A formal application has been received. Satisfactory assurances have been received that Loan funds will be used in an economically and technically sound manner.

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between immediate objectives of the project and overall economic development?

Yes.

109
110

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e. FAA Sec. 202(a): Total amount of money under loan which is going to be lent to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

The National Bank of Agricultural Development (BANDEF) will administer \$1,000,000 of loan funds under this project. This money will be used to provide credit to target area farmers for fruit crops, livestock and irrigation systems. Approximately 30 vehicles from private sources in the U.S. will be imported and financed with loan funds.

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

N/A.

Project Criteria Solely for Security Supporting Assistance

N/A.

a. FAA Sec. 531. How will this assistance support promote economic or political stability?

b. FAA Sec. 533(c)(1). Will assistance under the Southern African Special Requirements Fund be used for military, guerrilla, or paramilitary activities?

Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

Yes. Project will not have a direct effect upon economic integration.

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

N/A.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Small Farmer Diversification Systems 520-0255

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project: From FY 81 to FY _____
Total U.S. Funding: 8,100,000
Date Prepared: May 21, 1981

UNCLASSIFIED
ANNEX B
Page 1 of 7

PAGE 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1) Goal: Improve the well-being of rural Guatemalans living in the Northwest Highlands</p>	<p>Measures of Goal Achievement: (A-2)</p> <ol style="list-style-type: none"> Increase in incomes of small farmers producing diversified crops and livestock. Increase in labor incomes of rural inhabitants employed in the production, processing, and marketing of products from diversified crops and livestock. Improved health due to better nutrition. 	<p>(A-3)</p> <ol style="list-style-type: none"> Small Farm Management Survey & USPA Regional Sample Frame CECOMERCA records of value of production & value added. ICTA, INCAP, & DIGESA Surveys. See Annex C "Nutrition Survey" 	<p>Assumptions for achieving goal targets: (A-4)</p> <ol style="list-style-type: none"> GOG has expanded diversification system to other regions. GOG continues to place high priority on agricultural sector development. Increased income is used for purchase of food by small farmers.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: _____

PAGE 2

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p> <p>PURPOSE: Strengthen public agricultural sector capacity to stimulate small farm diversification from basic grains to higher value diversified crops of greater labor intensity.</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <ol style="list-style-type: none"> 1. The institutions responsible for the project implementation are providing adequate and timely logistical support thru regional budgeting and programing activities. 2. BANDESA is implementing long-term lending as well as providing short term production credit for diversification crops. 3. <ol style="list-style-type: none"> a. 5,000 small farmers are producing higher value crops. b. 2,000 hectares dedicated to 20 diversified high value crops by small farmers. c. Net value of total production of small farm crops will have increased from \$500,000 to \$6,000,000. d. 2,000 person/years of permanent employment opportunities will have been generated for small farmers. 	<p>(B-3)</p> <ol style="list-style-type: none"> 1, 2, 3. Annual Reports of ICTA, DIGESA, DIGESEPE, BANDESA, and USPA. 	<p>Assumptions for achieving purpose: (B-4)</p> <ol style="list-style-type: none"> 1. Free market pricing for diversified crops. 2. Diversified crops meet export quality standards. 3. Marketing infrastructure provided under loan T-030 is in place. 4. Small farmers remain receptive to diversified cropping systems.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

AID 1020-20 (11-73)
SUPPLEMENT 1

Project Title & Number: _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>1A. Research and Technology</p> <p>1. Small Farm Management Survey</p> <p>2. Representative Small Farm Models.</p> <p>3. Diversified crop technology appropriate to conditions on the small farm.</p> <p>1B. Technology Transfer</p> <p>1. Extension Personnel</p> <p>2. Guias trained</p>	<p>Magnitude of Outputs: (C-2)</p> <p>For project Timing of Outputs, see page 76 of Project Paper, "Implementation Plan."</p> <p>1 and 2A - See page 76</p> <p>3A. 1) Fruit tree cultivation techniques utilizing improved seedlings and rootstocks (approximately 50,000 trees planted).</p> <p>2) Vegetable production techniques utilizing improved varieties and seeds (approximately 1,500 hectares planted).</p> <p>3) Livestock breeding and feeding techniques improved (approximately 100,000 new animals)</p> <p>4) Introduction of gravity fed irrigation systems (introduced to 5,000 farmers)</p> <p>5) Soil conservation practices (introduced to 5,000 farmers)</p> <p>1B. Improved quality and quantity of extension services</p>	<p>(C-3)</p> <p>For all outputs:</p> <p>ICTA data bank and extension reports.</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>1. Small farmers willing to work with the guias and extension agents.</p>

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

AID 1020-20 (11-73)
SUPPLEMENT 1

Project Title & Number: _____

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>3. Promotores trained</p> <p>4. Soil Conservation and Mini riego teams.</p> <p>5. Demonstration and Training Center</p> <p>6. Farm Visits</p> <p>2. Training</p> <p>A. Extension Training Program</p> <p>1. DIGESA</p> <p>2. Cooperatives and Federations</p> <p>3. Training Seminars</p> <p>4. 4-S Club Rotating fund.</p>	<p>Magnitude of Outputs: (C-2)</p> <p>1) better trained and informed extension agents (100 trained)</p> <p>2) 480 trained guias</p> <p>3) 80 promotores trained</p> <p>4) two teams each (i.e. soil conservation and mini riego) in field</p> <p>5) demonstration and training Center built</p> <p>6. increased frequency of on-farm visits and consultation (1:60 ratio equivalent to 5 days a year.</p> <p>2A.</p> <p>1. 80 persons trained</p> <p>2. 20 persons trained</p> <p>3. Biannual seminar for extension</p> <p>4. \$82,000 in active use</p>	<p>(C-3)</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>2. Personnel trained will continue to work with their respective agencies</p>

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115

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

AID : 520-28 (1-73)
SUPPLEMENT 1

Project Title & Number: _____

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>2B In-service and Academic Training Masters Degree awarded</p> <p>3. Credit</p> <p>A. Diversified Crop and Livestock Production Credit established</p> <p>B. Small Farm Improvement Fund Operating</p>	<p>Magnitude of Outputs: (C-2)</p> <p>2B 8 MS degrees in agricultural research and extension disciplines.</p> <p>3. Improved finance services to small farmers with credit terms appropriate to diversified crop production</p> <p>A. Short-term credit for vegetable and livestock (approximately 10,000 new loans)</p> <p>B. Long-term investment capital for on-farm improvements (approximately 10,000 new loans)</p>	<p>(C-3)</p> <p>Credit:</p> <p>A and B BANDESA and DIGESA records</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>Extension and research efforts create demand</p>

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

AID 1020-20 (11-72)
SUPPLEMENT 1

Project Title & Number: _____

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs: (D-4)
1. Technical Assistance	1A. Research Technical Assistance inputs:	AID disbursement records	Title XII university participation to provide technical assistance and training inputs.
A. <u>Research Technical Assistance</u>			
1. Vegetable Research Specialist	1. Vegetable Specialists 3P.Y		
2. Fruit Research Specialist	2. Fruit Specialist 3P.Y		
3. Livestock Research Specialist	3. Livestock Specialist 3P.Y.		
4. Plant Protection Specialist	4. Plant Protection 6P.M.		
5. Agriculture Specialist	5. Data Collection/Analysis 1P.Y..		
6. Rural Sociologist/Anthropologist	6. Data Collection/Analysis 1P.Y.		
7. Nutrition Specialists	7. Data Collection/Analysis 4P.M..		
8. Statistician	8. Data Collection/Analysis 3P.M.		
To design and help implement diversified crop research program			
B. Extension and training technical Assistance	1B.. Extension Technical Assistance Inputs:		
1. Soils and irrigation Specialist	1. Soil/Water Management 3P.Y.		
2. Crop Protection	2. Plant Protection 3P.Y.		

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

UNCLASSIFIED
ANNEX B
Page 7 of 7

11/11

Project Title & Number: _____

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs: (D-4)
3. Livestock Extension Specialist 4. Various Specialties To design extension service program for diversified crops and train extensionists	3. Animal Husbandry 3P.Y		
2. <u>Training</u> a. Academic b. In-service	2. see "Implementation Plan".		
3. <u>Commodities</u> a. Machinery and equipment b. Vehicles c. Laboratory equipment	3. see "Implementation Plan".		
4. <u>Credit Fund Resources</u> a. \$3,400 for long-term investment b. \$1,800 short-term production credit			

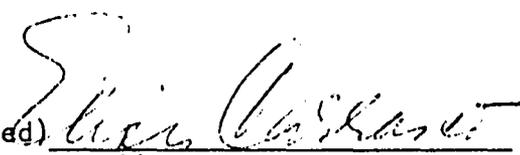
119
120

UNCLASSIFIED
ANNEX C.
Page 1 of 1

CERTIFICATION PURSUANT TO
SECTION 611 (e) OF THE
FOREIGN ASSISTANCE ACT OF 1961,
AS AMENDED

I, Eliseo Carrasco, the principal officer of the Agency for International Development in Guatemala, certify that to the best of my knowledge and belief Guatemala possesses both the financial capability and human resources to effectively maintain and utilize the proposed Small Farmer Diversification Systems. This project will stimulate small farm diversification from basic grains to the production of fruits and vegetable crops of higher value and greater labor intensity in the Guatemalan Highlands.

This judgment is based primarily on the facts developed in the Project Paper for the proposed loan of \$5.5 million U.S. dollars and proposed grant of \$2.6 million U.S. Dollars and takes into account, among other things, the maintenance and utilization of projects in Guatemala previously financed or assisted by the United States.

(Signed) 
Eliseo Carrasco
Director
USAID/Guatemala

(Date) April 29, 1981



21

MINISTERIO DE
FINANZAS PUBLICAS

GUATEMALA, C. A.

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UNCLASSIFIED
ANNEX D
Page 1 of 2

Guatemala, 28 de abril de 1981

Señor Director de la
Agencia para el Desarrollo Internacional
Don Eliseo Carrasco
Ciudad de Guatemala

Señor Director:

Tengo el agrado de dirigirme a usted con el propósito de hacer referencia al proyecto denominado "Diversificación de Cultivos del Altiplano", cuya elaboración ha sido recientemente concluida por consultores de AID, contando para el efecto con la colaboración de Técnicos del Sector Público Agrícola -SPA-.

La ejecución de dicho proyecto, al más corto plazo posible, reviste significativa importancia para el Gobierno de la República, en razón de que a través del mismo se atenderán las urgentes necesidades del pequeño agricultor de gran parte de la zona más poblada y de menores ingresos del país.

En virtud de lo expuesto y en representación del Gobierno, manifiesto a usted nuestro interés en obtener de la AID, asistencia financiera en condiciones favorables, recomendando la consideración del financiamiento a través de préstamo, donación y contrapartida nacional.

Paralelamente a esta gestión, el Ministerio de Agricultura presentará oficialmente el proyecto a la consideración y dictamen de la Secretaría General del Consejo Nacional de Planificación Económica, y posteriormente será conocido por la Comisión de Financiamiento Externo -COFE-, a fin de que se pronuncie sobre la solicitud definitiva de los recursos y su correspondiente negociación y contratación.

Al agradecer a usted realizar las acciones del caso ante las autoridades de AID en Washington, a efecto de que analicen la fac-

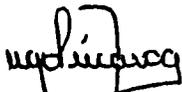


MINISTERIO DE
FINANZAS PUBLICAS

GUATEMALA, C. A.

Segunda Hoja
Señor Director de AID
Don Eliseo Carrascó
28 de abril de 1981

tibilidad de otorgar el financiamiento para el citado proyecto, aprovecho la oportunidad para reiterarle las muestras de mi consideración y estima,


Hugo Julio Bizarro Garcia
MINISTRO DE FINANZAS



cc: Sr. Ministro de Agricultura
MRF/sgdn.

LAC/DR-IEE-80-30

ENVIRONMENTAL THRESHOLD DECISION

Location : Guatemala Altiplano
Project Title : Small Farmer Diversification Systems, 520-0255
Funding : Loan - \$5.5 million
Grant- \$2.5 million
Life of Project: Four years

Mission Recommendation:

Based on the Initial Environmental Examination, the Mission has concluded that the project will not have a significant effect on the human environment and therefore recommends a Negative Determination.

The Development Assistance Executive Committee of the Bureau for Latin America and the Caribbean has reviewed the Initial Environmental Examination for this project and concurs in the Mission's recommendation for a Negative Determination.

AA/LAC Decision:

Pursuant to the authority vested in the Assistant Administrator for Latin America and the Caribbean under Title 22, Part 216.4a, Environmental Procedures, and based upon the above recommendation, I hereby determine that the proposed project is not an action which will have a significant effect on the human environment, and therefore, is not an action for which an Environmental Impact Statement or an Environmental Assessment will be required.

Edward W. Green
Assistant Administrator for
Latin America and the Caribbean

Jul 15 1980
Date

Clearances:

IAC/DR:Environmental Advisor: R. Otto RO

DAEC Chairman: M. Brown MB

INITIAL ENVIRONMENTAL EXAMINATION

PROJECT LOCATION: Guatemala Altiplano

PROJECT TITLE: Small Farmer Diversification Systems

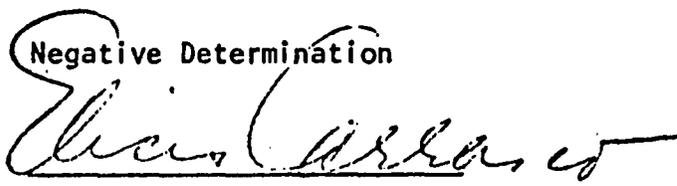
PROJECT NUMBER: 520-0255

LIFE OF PROJECT:

IEE PREPARED BY: E. E. Trujillo, RPMS/ROCAP

DATE: May 14, 1980

ACTION RECOMMENDED: Negative Determination

CONCURRENCE: 
Eliseo Carrasco, Director
Guatemala AID

DATE: July 2, 1980

125

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I. Project Description

The project goal is to increase the cash incomes and quality of life of the rural poor living in the Altiplano region of Guatemala (elevation: 1500-2500 meters). This will be accomplished by promoting agricultural diversification from basic grains to higher value fruits and vegetables of greater labor intensity. Project activities will include applied research in diversified crop adaptation and the dissemination of appropriate cultivation technologies. Integrated pest management techniques will be developed and promoted through the project research and extension programs.

Grant financed agricultural consultants will advise the Instituto de Ciencia y Tecnología Agrícola (ICTA) and Dirección General de Servicios Agrícolas (DIGESA) in research and extension activities related to the crop diversification program. An increased institutional awareness of the environmental effects of alternative agricultural practices is anticipated due to the project.

II. Project Area

In general, farms in the Altiplano region are small, less than 4 hectares, devoted basically to subsistence farming. There are 250,168 farms in the region of which 187,469 are less than 3.5 hectares and of these 56,496 are under 0.7 hectares. The Altiplano area represents some 3,279,300 hectares of which only 203,600 hectares have a slope of less than 4 percent. Soils vary from those easily eroded to those more resistant to erosion. Climatic characteristics depend to a large extent on elevation ranging from mediterranean to temperate. Precipitation is highly seasonal and average rainfall varies according to area from 150 cm to 230 cm annually. Irrigation is being developed to supplement the availability of water during the dry season. Mini-irrigation efforts will be expanded under the project to further stimulate crop diversification. Dry season harvests usually benefit from more favorable off-season prices domestically while Guatemala's comparative advantage in temperate fruits and vegetables offers the prospect of exports to regional and world markets.

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Impact
Identification
Evaluation 1/

Impact Areas and Sub-Areas

A. LAND USE

- | | |
|--|----------|
| 1. Changing the character of the land through: | |
| a. Increasing the population _____ | N _____ |
| b. Extracting natural resources _____ | N _____ |
| c. Land clearing _____ | N _____ |
| d. Changing soil character _____ | N _____ |
| 2. Altering natural defenses _____ | N _____ |
| 3. Foreclosing important uses _____ | M+ _____ |
| 4. Jeopardizing man or his works _____ | N _____ |
| 5. Other factors | |
| _____ | _____ |
| _____ | _____ |

B. WATER QUALITY

- | | |
|---|---------|
| 1. Physical state of water _____ | I _____ |
| 2. Chemical and biological states _____ | N _____ |
| 3. Ecological balance _____ | N _____ |
| 4. Other factors | |
| _____ | _____ |
| _____ | _____ |

1/ We use the following symbols:

- | | |
|-----------------------------------|----------------------------------|
| N = No environmental impact | U = Unknown environmental impact |
| I = Little environmental impact | + = Beneficial impact |
| M = Moderate environmental impact | - = Negative impact |
| H = High environmental impact | |

129

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IMPACT IDENTIFICATION AND EVALUATION FORM

UNCLASSIFIED
ANNEX E
Page 5 of 8

ATMOSPHERIC

- 1. Air additives _____ N _____
- 2. Air pollution _____ L _____
- 3. Noise pollution _____ N _____
- 4. Other factors _____
- _____
- _____

D. NATURAL RESOURCES

- 1. Diversion, altered use of water _____ N+ _____
- 2. Irreversible, inefficient commitments _____ N _____
- 3. Other factors _____
- _____
- _____

E. CULTURAL

- 1. Altering physical symbols _____ N _____
- 2. Dilution of cultural traditions _____ N _____
- 3. Other factors _____
- _____
- _____

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns _____ N+ _____
- 2. Changes in population _____ N _____
- 3. Changes in cultural patterns _____ N _____
- 4. Other factors _____

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

- 1. Changing a natural environment _____ N
- 2. Eliminating an ecosystem element _____ N
- 3. Other factors
Provide more ^{balanced} balance nutrition _____ H+
- _____
- _____

H. GENERAL

- 1. International impacts _____ N
- 2. Controversial impacts _____ N
- 3. Larger program impacts _____ N
- 4. Other factors

I. OTHER POSSIBLE IMPACTS (not listed above)

- 1. Introduction of new plant species _____ N
- 2. Agricultural chemicals _____ H+
- 3. Other factors

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IV. Discussion of Impacts

Currently, pesticides are already being used in the Altiplano by farmers engaged in vegetable production. Due to market incentives there has been a secular trend towards agricultural diversification which this project will undoubtedly accelerate. Hence, the project presents an opportunity to develop appropriate pest control systems and encourage the proper use of pesticides among small farmers.

The project will establish a pest management unit within ICTA which will carry-out research in pest control and incorporate this information into the diversified crop technical packages. These packages will be tested under controlled conditions and supplemental safeguards will be added, if needed. This could involve recommended inter-cropping patterns; use of natural predators; physical barriers and other environmentally sound control techniques. The project will also train DIGESA extension agents in the crop technologies promoted under the project which in turn will be taught to the small farmer. Thus proper pesticide use will be incorporated as part of the extension service. Finally, pesticide use may be controlled through more formal safeguards as well. This may take the form of a covenant in the AID Loan Agreement or certain conditions precedent to disbursement limiting, for example, project credit to only those pesticides considered safe for the human and natural environment.

Since the pest control measures promoted under the project will obviously depend on the characteristics of each crop and the local environment; it is recommended that an environmental review be carried-out, as part of the project, to evaluate pesticide procurement and field use.

A. Land Use

The change from the present corn-bean extensive cropping system to a more intensive vegetable-fruit system will create an enduring change in agricultural patterns, which will enhance the quality of the environment. A vegetable farmer with 3.5 hectares may not need to cultivate all his land at the same time as is the case in a corn-bean cropping system. Permanent orchards will prevent soil erosion and a section of the land can be green manured to increase soil fertility. The soil conservation emphasis that may be possible with the shift in agricultural emphasis will be a highly beneficial impact.

B. Water Quality

To the extent that pesticides will be used, water quality should not be affected in higher elevations. On the other hand, the establishment of permanent orchards in the more erodible sites may enhance water quality at the lower elevations, reducing siltation.

C. Atmospheric

Increased use of pesticides may affect air quality due to accidental pesticides drift. However, intensive education and practical demonstration through agricultural extension can minimize this risk.

D. Natural Resources

The project will expand the mini-riego and soil conservation activities to include 2,000 hectares of land. The availability of irrigation water during the months of dry season will have a sizeable impact on agricultural production. Mini-riego will help to create greenery during the dry season which in turn will benefit man and his environment.

E. Socio-Economic

The crop diversification of the Altiplano will provide new employment opportunities at the farm level as well as at processing plants where vegetables will be graded and packed for export.

Income at the farm level is expected to increase significantly. This will result in a more affluent rural economy which will be highly beneficial to the economic growth of the country.

F. Health

A shift from corn-bean cropping systems to diversified vegetable-fruit systems will provide a wide variety of vitamin-rich foods that may be consumed by the rural poor. A more balanced nutrition definitely will have a beneficial impact on the young and old sectors of the population in general.

G. Other Possible Impacts

The production of vegetables and fruits of export quality calls for an increased use of agricultural chemicals. The rural population lacks adequate education and training to handle highly toxic pesticides. This program will keep in mind the educational level of the farm sector that will be involved and that the chemicals selected should be those which are toxic only by ingestion and not those highly toxic by absorption through the skin or respiratory system. Liquid formulation and emulsifiable concentrates should be selected in favour of wettable powders or dusts. The negative impacts of pesticide use in the altiplano are definitely overshadowed by the positive effects on agricultural development of the region. New crops of high cash value will eventually replace the corn-bean systems which will create new jobs and will provide an overall improvement in the diet, resources and economic base of the rural poor, thereby enhancing the quality of life.

TECHNICAL ANALYSIS - MSU

IV.A. BASIS FOR CROP DIVERSIFICATION - Part 1Technical Analysis

The primary bases for the selection of an expanded system of extension and technology transfer are:

- (1) The technology to be employed is relatively inexpensive, it has been tested and proven successful elsewhere.
- (2) The technology to be extended is very simple and appropriate for the target population.
- (3) The target region has sufficient variability and inherent productive capacity to permit diversification and increased productivity.
- (4) There are two types of technology involved here--that which already exists and the new technology that is described as being appropriate. Any program in the Altiplano will have to work with both if it is to have impact.

1. The basis for diversification

(a) The elevation ranges from 5000-8000 feet in the Altiplano, giving the region a wide range of temperatures, growing season length, and to a limited extent, solar radiation. The exposure (east vs. west) gives variation in solar radiation. Although some of the conditions are more favorable than others for crop growth in general, the variation resulting from the Altiplano location makes possible the culture of a wide range of species of vegetables and a wide range of varieties of both fruits and vegetables. This variation also extends the growing season over several months, an important factor considering the limited marketing opportunities and resources for large-scale production over a short season.

Furthermore, diversification has taken place in the highlands and in some cases has developed to a high degree.

The distinct wet/dry weather pattern, although it produces extreme stresses--too wet in the middle of the wet season and too dry in the middle of the dry season for optimum crop production does offer opportunities for extending the production season by properly overlapping these seasons with appropriate crops.

The extremities of weather encountered at elevations above 8000 feet open opportunities for regional diversification through improved animal production and range improvement.

(b) The availability of natural water presents special problems. For the small farmer, the capacity to maximize the use of his land is limited by water availability during the dry season. No more than 5% of the highland small farmers have availability to supplemental irrigation. There are opportunities to expand irrigation since water is available in several areas and is not being utilized.

(c) Although there is a fairly wide range of soils, most of the Altiplano soils are capable of high levels of production. Generally, the steep slopes frequently encountered are somewhat resistant to erosion. Improved management, including terracing and strip-cropping, can help to preserve these sites despite intensive cropping. Increased use of fruits on the more severe slopes could lead to greater soil conservation because of the ability to grow

trees without deep tillage. Animal production will interact with increases in crop residues suitable for feeding purposes.

(d) The number of landless workers and owners of land requiring off-farm income is adequate to support the added labor requirements of even the most optimistic projections of increased plantings.

(e) The limited capability to store produce over an extended period results in significant waste, substandard quality, and often the inability to supply the market when prices are best. The proposed studies in post harvest handling should yield significant savings or increased income.

(f) Food preservation techniques are not widely used by farm families. This results in great seasonal variation in the dietary pattern, affecting nutritional problems, especially among young children. The dietetic/human nutrition component may significantly influence the dietary patterns as influenced by diversification.

(g) Commercial vegetable processing is conducted on a limited scale. One U.S. processor involved is a quality-conscious firm, and it is generally pleased with the quality received from its contract farmers in Guatemala, proving that small farmers can meet high quality standards usually required for export. There is a need for increased competition so that a fair price can be maintained.

(h) Perhaps the most shaky assumptions which have been made when estimating potential income increases due to diversification with fruits and vegetables are those which assume a rapidly increasing demand. Without increased exports, internal production cannot increase at a rate much greater than the population growth without saturating the local markets. The uncertainty of the El Salvador currency threatens that rather significant market outlet. The small farmer marketing project must address produce marketing in greater depth and be a component of this project.

There appear to be opportunities for cooperative marketing of milk and meat products in the highlands, and this will provide an opportunity for this project to collaborate with cooperatives in getting badly-needed animal management information to small farm animal producers.

(i) The area rural infrastructure is influenced significantly by various cultural factors. Certain of these will be important in determining how best to extend information. Certain preconceived notions about extension or promotion must be overcome. There were numerous indications that the indigenous population wants help as much as it obviously needs it.

Technical analysis (cont'd)

Animal populations are lowering, though population alone is not indicative of animal product output.

The major constraints to animal herd outputs are:

1. Inadequacy of feeds of higher nutritional value, and a low level of feed availability during the verano.
2. Higher losses in young animals (56% mortality in sheep in Region I).
3. Disease/parasitism levels are substantial in all species.

Since reproductive rate and growth performance is highly related to feeding and management levels, emphasis placed upon a systematic program of matching the animals' feed needs with available and newly-available feed sources will be most productive.

The impact which can be made with animal production will be dependent to a large degree upon the quantity and quality of the crop residues generated by the crop diversification efforts. It will also have to be carefully programmed with the nutritional groups to insure net gains in human diet quality as animals enter the human food chain.

The extension component can interact with DIGESEPE in a program to minimize zoonoses incidents.

Technical Analysis of present technology transfer and extension systems

There is some degree of technology transfer and extension within ICTA and DIGESA. This analysis of these existing systems is based upon their relationship to the long-range goals of the model proposed in this project.

As the target population is the small farmer in the Altiplano of 10 manzanas or less, there will have to be different field transfer programs to those which exist within ICTA. This analysis is directed toward this problem.

(1) Technology Development

ICTA currently has full responsibility for technology development and appears to be functioning effectively. There are program gaps relative to development of technology aimed at diversification of Altiplano farmers through increased use of fruits, vegetables, and animals. One feature of the ICTA structure which appears to limit its capability to produce results is the concentration of large amounts of resources in its administrative structure.

(2) Technology Testing

Technology testing is conducted within ICTA at experiment stations. The basis for proposed farms will be to

more nearly represent farmer conditions and will be located so as to be available for the pilot extension groups. Current ICTA farms are not located in less productive farming sites. They are generally on flat sites with fertile soil.

(3) Farmer Tests

The ICTA model for technology development includes as an integral part a strong emphasis on farmer tests. This represents a first step in technology transfer. It involves introduction of pieces of technology, but not complete packages. These tests are generally in cooperation with good farmers, an important factor since these are the farmers who are leaders in their locality. The ICTA model functions effectively to this point.

(4) Transfer to Promotores

At this point, there is a breakdown in continuity of the above model. Linkages between ICTA and DIGESA are generally

very weak and there is no mandate from Ministry of Agriculture for joint action comparable to that which exists within the U.S. Department of Agriculture and U.S. Land Grant Institutions between extension and research. The concept of joint research/extension appointments does not exist in the Guatemalan system. There does appear to be ICTA/DIGESA interaction within Region IV.

Although DIGESA has been identified as the agency responsible for technology transfer, it has a large number of promoters in the field, their role in technology transfer is not strong. Some of the field staff appear to be reasonably well qualified and properly motivated but lack an organized program. There is a strong feeling among farmers and this Project Team that DIGESA is not in touch with the farmers in the highlands relative to the solution of their problems. It appears that the DIGESA administration is largely assigned to work in Guatemala City out of contact with the problems of farmers.

(5) Demonstration and Farmer Promotion
was

This/carried on in certain of the ICTA farmer tests but there is no organized program for this activity. It is a serious gap in the ICTA model.

(6) Adoption by Farmers

The measure of success of any technology development and transfer program is the adoption of new technology by farmers. Because of the two gaps mentioned, Guatemala farmers in the highlands have not widely adopted new technology. In this respect the Ministry of Agriculture has failed by not providing a functional system. One of the major goals of this project is to establish a system to maximize the probability of adoption of new and existing technology.

A vast majority of the impact of extension programs is a result of assisting farmers with simple problems unrelated to new technology. This is clearly an extension responsibility which has not been effectively addressed by DIGESA in the highlands.

(7) Problem Solving and Farmer Education by Promotores

Although DIGESA has people in place to potentially solve problems "in the spot" these promotores are not generally adequately trained and technically supported so that they can address farmer problems with confidence.

This is especially true regarding fruits, vegetables and livestock. This project addresses this serious gap in these areas. The gap will still remain unless a national program is developed to correct it.

The ICTA model does not include a provision for extension activities in the broad sense. Their activities en^l with the transfer of ICTA technology to a limited number of farmers. It appears that the ICTA administration is satisfied with this interpretation of extension which places extension in a position beneath research rather than at an equal level.

(8) Follow-up with Receptive Farmers

Although farmer adoption of new technology has been slow, it appears that the DIGESA promotores, through their activities on behalf of BANDESA, have established effective contacts with progressive, credit-worthy farmers. However, few of the small farmers are granted credit and the system has failed to reach the target audience of this project.

(9) Formation;

The DIGESA system of formation among youth and homemakers appears to be an effective program with a national scope. This has a/ potential effect on diversification ^{and} on dietary patterns.

(10) Motivation

The DIGESA system of motivation for youth, likewise, appears to be an effective program with national scope. It is not anticipated that the diversification project will be linked directly at this level.

(11) Training

ICTA has participated at the regional and sub-regional level in training of DIGESA promotores. There is no formal continuing program for this function. This lack of continued training is one of the principal causes of the gaps pointed out in (4) and (7) above.

(12) Technical support from the specialists in ICTA for the promotores in DIGESA is minimal. The support for the promotion program in DIGESA indicated in the Project Model would be new and relative to changes in family dietary patterns due to diversification. The technical support component of the ICTA model is not clearly defined.

(13) Credit

Credit availability for and eligibility by small farmers is a vital component of diversification. Presently agricultural credit is being administered largely through DIGESA. This has replaced an extension function. Since conventional systems for credit eligibility evaluation eliminate the small farmer, DIGESA promotores are not getting small farmer contact and possibly are thus losing their acceptance by this group. By performing legitimate extension activities, the promotores of DIGESA could assist in increasing the credit access of small farmers. Thus, this project will emphasize farm management/credit programs being linked to the extension program.

(14) Farmer Feedback for Changing Technology and Priority Setting for New Technology

Within the ICTA farm test system there are adequate means for farmers to suggest improvements upon the technology they are testing. Farmers can suggest new research areas but it appears that such involvement is minimal.

There is no provision for DIGESA field staff or farmers not involved with ICTA directly to provide suggestions for changes in technology or areas for new research. This is a result of the lack of formal linkage between ICTA and DIGESA at most levels outside of Guatemala City.

There is no provision within the DIGESA model for extension to formally involve small farmers in the setting of program priorities. The proposed model would provide for farmer advisory councils, utilizing farmers recognized as leaders in innovation and adoption.

144

Specific Bases for Crop Diversification

Vegetable production, especially if irrigated, on farms less than one hectare can generate sufficient cash to negate the necessity for off-farm income. It is generally agreed, however, that in the highlands, as farm size increases there is a greater tendency to diversify with horticultural crops. The tendency for the small farmers to grow only corn and beans is apparently centered in the socio-economic system where each family produces its own supply of basic grains (corn and beans).

Four geographical areas in the highlands (Regions I and V) will be selected that are representative of four microclimatic zones in terms of elevation and water availability. Elevation is an important consideration in vegetable production because of its relation to daytime temperatures, and length of effective growing season. Water availability

Water Management

Water availability, as related to both soil-moisture characteristics and annual rainfall distribution, is probably the greatest single factor limiting crop yields, number of crops per year, and vegetable quality. Inherent soil-moisture characteristics are associated with water-holding capacity and water movement upward in the soil profile. Since the majority of the area in the highlands is not readily accessible to irrigation water, the inherent capacity of a soil to store and provide water in times of drought will be a critical factor in promoting vegetable production in the highlands.

Planting Dates

In areas where irrigation is not available, planting dates are associated closely with the rainfall patterns. Work should be done, in combination with mulching techniques, to obtain the best planting dates. Studies on planting dates will produce crops at times of low supply in both internal and external markets.

With careful selection of producing areas, it should be possible to produce quality warm-season vegetables such as cantaloups, watermelons, tomatoes, peppers, eggplant, cucumber, etc. Many of the cool-season crops, however, are biennials which require a prolonged cold period (45° F or less, for 1-2 months) to induce adequate flowering and therefore good seed production. This chilling is usually lacking in Guatemala and therefore seed yields of these biennial crops are quite low. Before initiating a large seed-production program of biennial crops, a potential for success should be studied carefully. Since Irish potatoes and garlic are asexually propagated and require no chilling period, efforts to promote improved "seed" should be a part of this project if the IDB project will not include these crops. ICTA has been doing work in cooperation with CIP and the Swiss Government in production and promotion of seed potatoes.

Apparently, most Guatemalan potato growers normally save their own potato seed or buy it from their neighbors. This can be a self-defeating process since, once a plant is infected with a virus, its progeny are normally contaminated resulting in serious yield

reductions. Potato seed production is a specialized business requiring strict control of insect vectors that spread virus diseases and control of certain bacterial and fungal diseases that can be transmitted through the tubers.

The intensive nature of crop production among the small farmers in Guatemala and the climatic conditions allowing virtually year-around vegetable production provide many multiple-cropping combinations and methods for maximizing profits per unit area of land.

a. Varietal Testing and seed Production - Testing new varieties at different elevations and under different fertilizer regimes appears to be an important method of rapidly increasing vegetable profits.

(1) Soil Conservation. Terraces are being established to promote vegetable and fruit production. DIGESA is having good acceptance by the farmers. Terracing is improving soil conservation .

Crop Mixes

Most of these cropping systems are compatible with animal production, farm size being the important factor. Vegetables offer an advantage in terms of forage, for many of the plant parts which otherwise might be wasted--leaves and stalks of cauliflowers and broccoli, for example have good feeding value.

Several crop mixes are evident in the Altiplano. At the highest elevation, grass is almost the only crop, and is used

to support sheep and a few goats. At lower elevations, wheat is a principal crop and is often interplanted with broad beans (Vicia faba). Corn and beans (milpa) is the other major crop mix, completely replacing wheat at the lowest elevations. Vegetables and fruits are grown in localized areas, apples and peaches being interplanted with corn. ICTA is encouraging the planting of vegetables or potatoes between rows of corn, and this system has promise for increasing production of cash crops without reducing the supply of corn and beans available for home consumption. In a few local areas, e.g., Almolonga, vegetables are a main crop, some farmers are growing no corn for home use.

The combination of corn and potatoes appears to be especially promising.

Organic Matter. Because several crops (up to four) per year can be grown in the highlands with irrigation, soil organic-matter depletion can be a serious problem. In the Quezaltenango area, the vegetable growers purchase forest residues at a high price to supplement the organic matter of the soil. Animal manures and composts are important to alleviate cash draw for fertilizer.

Post-production operations.

(1) Storage. With certain crops such as garlic, onions, and potatoes, storage needs considerable attention. ICTA has done some work on storage of these crops. ICTA has not worked with sprout-inhibitor testing and design of inexpensive storage facilities for small and medium-sized farmers.

(2) Harvesting, handling, and marketing. This project is to a very large extent dependent upon the small-farm marketing project to provide inputs in harvesting, handling, and marketing. However, to assure adequate attention to this critical component, it is recommended that a team of experts be developed in this project to interface and support the small-farm marketing project and provide valuable assistance and backstopping to the extension aspects of the diversified production work.

Spacing and plant density. Modern vegetable production involving large machinery automatically places some constraints on plant spacing designs. The intensive, hand-labor systems of the small highland farmer overcomes these limitations and allows practically any spacing combination. In certain areas such as Almolonga, the small farmer is using high-density plantings. Based on the success in Almolonga, plant density studies should be a valuable means of increasing vegetable yields in the highlands.

Technical Assistance and Support. Technical support will be absolutely essential to the success of this project. Assistance in all areas of plant protection (insects, nematodes, diseases, and weed control) is particularly important to the research efforts in pest control as well as the training and development of local GOG experts. Other areas of important will be soil conservation, irrigation, seed production, and post-harvest handling of horticultural crops. In most instances, an expert in any one area

149

listed above will be able to handle problems in both fruit and vegetable production.

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Animal Production

Analysis of the Existing System

Animals play a strong supporting role in the Altiplano as sources of organic fertilizer, as income earners, and as sources of meat, milk, and fiber.

Approximately 35% of the land area is involved in the production of livestock. Data on net farm income from animal products on small farms is shown in the following table. This represents comparison of members of independent cooperatives and farmers receiving loan assistance from Fundacion Centavo.

	Fundacion Centavo		Cooperativas Indep.*	
	Members	Non-Members	Members	Non-Members
Net Farm Income	27.5	25.5	25.9	14.9
Total Land (M2)	2.8	2.6	4.3	3.8

It is obvious that livestock contribute substantially to this very small farmer income.

Farmers having livestock have higher earnings than those without.

	Average Earning/Manzana
No livestock	71.26
One type of livestock	106.56
Two or more livestock	119.03
Owning work animals	119.31

*Source: Rural Cooperatives in Guatemala III

151

The output efficiency of the various species systems is low, although when viewed from the standpoint of the animals' role as a scavenger, this is to be expected.

There are higher mortality level estimates in ovinos juvenes (56%) than with other species bovinos 10%, caprinos 17%, porcinos 12%.

Calving rate in cattle is low (51%) and there are also low lambing rates in sheep (54%). This may well be a basic contributing factor to the overgrazing patterns seen on the open ranges, as is necessary to maintain greater numbers of mature females to get adequate output of progeny.

The goat shows relatively high birth rates, strengthening its role as potential species for increased milk and meat yield.

Region I which will comprise the major target area had 92% of Guatemala's sheep population, 8% of the cattle, 37% of the swine, 46% of the national goat herd (1964).

Milk yield per cow is estimated at 2.7 liters per day. Raw milk is priced on a butterfat and bacterial content level at the Xelac Cooperative. Prices range from 29¢ per liter for 4.6% butterfat to 20¢ for 2.9% Bf. pr. type A (lower bacterial content level) low-milk. Type B raw milk ranges 1¢ lower per liter per B.F. level.

Wool clip average 1.16 Kg/animal (2.516) and prices range from 36¢ for crillo coarse type fiber to 50¢ for finer crimp fleece from the medium type wool breeds (Corriedale Dorset).

The animal production sector in the Altiopiano consists of two majors types. These are:

A. The small farm system in which animals exist around farm compounds. The animals are usually restrained and exist on crop residues and non-croppable grazing areas. Corn leaf and vegetable residues are important feedstuffs and trading streams exist in these commodities.

B. Specific animal production schemes. These are:

1. Sheep high range grazing systems exist at Sierra Los Cuchumatanes and the San Marcos area. These flocks utilize communal grazing lands and there is little supplemental feeding or feed reserve for verano seasonal losses in range forage.

These pastures are composed of mixtures of trifolium amabili perennial grasses petochaithuim timileriatum, muklenbergia pajon and the annual grasses Festuca tertonesis, Festuca megiliera Mucklenberghia ramulosa.

2. Dairy schemes in the Quezaltenango area, San Marcos San Pedro Sacatepequez areas.

These schemes are for the most part associated with cooperatives. The Xelac coop in Quezaltenango has 200

members with a total of 600 cows. Total raw milk production averages 2000 l. per day. The Xelac coop has complete provision capability for production of fluid milk, cheese, butter, etc., and has a complete supply component for feeds, medicines, etc. It has a strong program for market development.

3. The rabbit production cooperative in the _____ area has a 1000 head operation. This unit has had financial problems of market pricing and has based its program on purchased concentrates. There is a need to develop rational alternatives.

Animal production in the Altiplano is highly dependent upon pasture and forage.

The reports on yield of dry forage matter vary widely from 200 Kg. per hectare per year to 25,000 Kg. when irrigated and fertilized with 450 Kg. N/Ha.

There are, however, rather widespread problems with low soil fertility and highly acid soils in regions of natural pasture.

Animals can serve as an alternative marketing outlet for stressed or surplus unmarketable crops. The feeding values and feeding programs for these feedstuffs is known. Using them usually requires a wet or dry storage system in order to balance a regular daily consumption level by the animal with the irregular occurrence of crop residues.

Examples of the composition of these various feedstuffs provides an insight into the potential of this technology.

Feedstuff	% Crude Protein	% Total Digest. Nutr.
Corn leaves - mature-dry	5.3	58.1
Orchard grass hay	8.4	49.8
Potato tuber (wet basis 78% H ₂ O)	2.6	18.0
(dry basis)	11.4	79.4
Potato silage (.72% H ₂ O)	1.5	25
Sweet potato vine (green)		
(78% H ₂ O)	2.8	12.3
Cabbage leaves (wet basis 80% H ₂ O)	2.4	14.0
Cabbage whole (81% H ₂ O)	2.6	9.7
Lupine postbloom-green (85% H ₂ O)	2.3	8.5
Celery leaves (dry bases)	27	---

It also suggests that alternate animal species shifts may be possible (rabbit, milking-type goat) which can effectively use these residues in producing substantially higher human dietary levels.

155

Constraints to increasing Animal Production yield.

1. Feed supply

The feeding/nutritional levels for livestock is marginal and is adversely affected by seasonal availability of natural forage.

Overgrazing, the lack of animal population control on communal grazing in the high plateaus has a negative effect on both range stability and animal growth and reproductive performance. Toxic plant occurrence (Helenium hoopesia) causes losses with sheep when grass is scarce.

Soil in the Serchil area is acid (ph5) and phosphorus availability levels are consequently low.

Storage of forages for off season is not commercially practiced.

There is some evidence that trace elemental deficiencies may occur in certain soils. This kind of soil deficiency can adversely effect animal performance through its effect on plant composition. Only 8% of the livestock producers use trace mineralized salt.

Composition of byproducts feedstuffs varies widely, making it difficult to develop feeding programs.

Animal Disease

Zoonoses (diseases transferable to man) are prevalent in the animals of the Altiplano. Tuberculosis, brucellosis, and cysticercus are all known to exist. Hog cholera is present, though vaccination programs are being promoted throughout the Region by DIGESEPE.

Parasites exist in most species and though low levels may actually be necessary to maintain challenge, responses in animal performance would result from a management program with parasite control.

The low reproductive rates of the herds and flocks is suggestive of a combined problem of reproductive tract diseases and low nutritional levels.

Estimates of animal losses from diseases in 1977 were Q915,000. Major losses occurred in swine from cholera, in sheep with fluke (fasciola) and internal parasites and from mastitis in cattle.

Specific Technologies and Strategies for the Animal Production Sector

Animal production programs must be organized in cooperation with the resources and programs of DIGESA and INCAP.

Type A diversified, animal coexistence systems with minifundios

This sector will respond to increases in feedstocks from plant residues and forage legume introduction in terraces.

In order to know the optimum balance which can be obtained between feed supply and animal type species, number, etc., it will be necessary to know the estimated feeding value/composition of the various residues at the stage at which they are normally used for animal feed. It will also be necessary to know just what feeding levels for the criollo animal allow it to be most economically/biologically efficient for its role in the minifundia. This suggests that there are co-efficients of animal performance other than high biological efficiency, high rate of gain, etc., which are more compatible with the low cash availability, lot input patterns for animals in the minifundios.

Increased reproduction rates of females will be a high value co-efficient, considering the low reproduction rate in cattle and sheep, the the response potential is high.

Specific emphasis should be placed on seeking information on the feed yield from terraces and legume plantings in other non-arable areas. It is worthwhile to encourage soil improvement and conservation efforts by using the animal as the economic justification for doing so.

It is difficult to form quantitative estimates on the above as such will result from the research program.

Breed and species selection

There is little justification to alter the genetic base now in existence in the Altiplano, particularly until there is improvement in feeding supply, disease control, and management. High altitude will be a deterrent factor to the introduction of adult animals of new types or breeds.

The Corriedale sheep in the station at Serdil show higher wool yields of a finer crimp quality, but they do have greater feed requirements per animal and are showing greater disease susceptibility.

Artificial insemination services are available to the dairy farmer involved in the cooperatives. However, low average lactation levels of 3 liters per day clearly suggest that the other limiting factors of feed supply and management stress are prevalent.

It will be essential to maintain the adapted criollo type animal base that exists in the minifundios.

Crop residue accumulation, storage and forage storage

Though there will be general increases in vegetable crop residues which have higher feeding values for animals, the real matter to be tackled is where the material will be available, how much, and when. The specific marketing practice will determine whether the broccoli, cauliflower, cabbage leaves and stems will remain at the farm site or will be transported to a primary or even market center. This amounts to up to 50% of the plant.

This factor will determine just how efficient a use can be made of the crop residue production by an organized animal system:

It may be necessary to have animals located near the points in the marketing chain at which the leaf, stem waste is removed. It may be necessary for a cooperative or other group action structure to be formed where by the minifundio farmers can indirectly use these wastes.

It will be important to study alternative methods of marketing which encourage the retention of vegetable crop residues at the farm level. These materials, have both animal and _____ human food value.

Specific feed trials can be established with the rabbit to develop rations which are composed of various local forages crop residues. etc., supplemental lower cost protein, mineral sources can then be provided to attain economical performance if necessary. This should be targeted toward the one or two _____ package units that can be sustained by the small farmer. Such a research component will be relatively low cost and if effective could yield a high benefit/cost factor.

Commercial Ration Development

There is variation in the composition of commercially available feedstuffs. Harnia de algodón is priced at 5.40Q per cwt. but protein composition varies, with values of 20% being established in comparison to the 38-40% established in standardized quality controlled product. INCAP is committed to a program of animal nutrition improvement through by product utilization. It is essential though that a collaboration program be organized with INCAP to develop standardized feedstuffs program particularly in providing low-cash supplemental packages which are in small quantity "packages" useable by small farms. It will be necessary to tie this in with the research on feeding value of crop residues.

IMPLEMENTATION PLAN: NUTRITION BASELINE STUDY

- 1: Set-up Joint Activity: Review project and evaluation objectives and tools of analysis including "sondeo", farm records, and land-use sample survey in order to determine their appropriateness and specific function within the overall project analyses and the consumption evaluation.
- State specific working hypotheses for small farm management survey, for food behavior models analysis, regional land-use survey and paired-sample dietary recall with anthronometry study.
 - Identify key variables and measurements to include in data gathering activities at different stages of the project.
 - Determine methods of collection and analysis for each phase of project analyses and evaluation.
 - Develop full implementation plan for these activities including institutional responsibilities, financial requirements, schedule of events.

PARTICIPANTS: ICTA, DIGESA, USPA, INCAP, ST/TA of Ag. Economist, USAID Project Manager, ST/TA of Statistician.

TIMING: 4-6 months prior to Small Farm Management Survey.

DURATION: Approximately four weeks of intense effort plus preparation and follow-up work by individual participants (seminar and/or small group workshop format may be most appropriate for this effort).

- 2: ACTIVITY: Collect data in project area; Analyze it and specify household model types according to criteria in #1; refine farm/household record-keeping technique to coincide with Regional Survey forms and amplify as necessary and feasible.

PARTICIPANTS: ICTA with DIGESA including Home Educators for data collection and analysis; ICTA for analysis and model specification; INCAP for technology advise; ST/TA of Ag. Economist

TIMING: Data collection coincides with SF Management

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Survey; completion prior to initiation of extension activities under the project.

DURATION: Continuous for one year; 4 weeks of ST/TA twice during that year.

3. ACTIVITY: Select sample of SF households to participate in "records" maintenance; initiate food behavior records in project area.

PARTICIPANTS: ICTA and DIGESA, including the Home Educators; participation of INCAP.

TIMING: To coincide with the initiation of extension activities.

DURATION: Throughout the project, i.e. four years.

4. ACTIVITY: Analyze the Household Food Behavior models in terms of data generated from Household records and other sources of price data; Tabulate and present data from Household Records.

PARTICIPANTS: ICTA with assistance from INCAP

TIMING: Tabulation should be done monthly and summarized annually; Analysis should be done annually.

DURATION: One month for complete analysis.

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5. ACTIVITY: Review Household Model Types and information being collected in the "Records" in order to determine their consistency with initial objectives in light of changes in the project; Revise sample, models and/or records as necessary.

PARTICIPANTS: ICTA, INCAP, DIGESA including the Home Educators, ST/TA of Ag. Economist.

TIMING: After two years of field experience or earlier as the need arises.

DURATION: Roughly one month depending on the changes required.

6. ACTIVITY: Final analysis of Household Food Behavior Models to determine changes in the production consumption system and "how" these changes came about in the project area.

PARTICIPANTS: ICTA, INCAP, DIGESA including the Home Educators.

TIMING: Last year of project implementation.

DURATION: Two to six months depending on depth of analysis done.

7. ACTIVITY: Final analysis of all analytical information pertinent to the nutrition evaluation; Seminar to present results and agree upon conclusion and recommendations to be made by project implementing agencies; Final report integrating results of the three major evaluation components.

PARTICIPANTS: All implementing and advisory agents; to be organized by INCAP.

TIMING: Upon project completion.

DURATION: Two to three months for analysis; three day seminar; two to three months to generate final report.

165

Draft 4/21/81
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Engineering Analysis

The Project will finance five (5) main construction subprojects, all located in the western highlands of Guatemala. One Diagnostic Laboratory, two Farm Research and Storage Buildings, One Greenhouse and One Training Center.

The facilities will be designed in modules that will allow future expansion and all buildings will be one story high and seismic resistant.

Costs have been calculated for construction in place and exclude land, equipment and furnishings.

The buildings are envisioned to consist of the following components:

a) <u>Diagnostic Laboratory 1/</u>	<u>M²</u>
Main Laboratory	57
Equipment Storage	19
Supply and Sample Storage	19
Library and Conference Room	19
Covered Corridor	55
Sample and Preparation Room	10
Incubating Room	19
Microscope Room	19
Director's Office	16
Main Office	14
Kjeldahl	10
Foyer and Restroom	<u>16</u>
Total Area	273 M²

The average cost of this building is based on current unit prices for buildings of this type in Guatemala.

Total area, 273 M² x \$125M² = \$34,125

Engineering, Supervision
Contingencies and Inflation
(30%) = \$10,238

Total Cost \$44,363

b) <u>Farm Research and Storage Building</u>	<u>M²</u>
Pesticide Storage	17
Restroom	6
Laboratory	14
Seed, Fertilizer Storage	28
Heavy Equipment Storage	65
Covered Corridors	137
Office	<u>9</u>
Total Area	276M ²

The cost of this building is estimated as follows:

<u>ITEM</u>	<u>Area M²</u>	<u>\$/M²</u>	<u>Total \$</u>
Main Building	276	115	31,740
Urbanization and Parking	130	30	3,900
Landscaping	100	5	500
Control Gate	7	200	<u>1,400</u>
			37,540

Engineering, Supervision
Contingencies and Inflation
(30%) \$11,262

Total Cost per
Building \$48,802

Total Cost for
2 Buildings \$97,604

c) Greenhouse 1/ M²
Main Building 120

The cost of this building is estimated at \$125 per M² for a total cost of \$15,000

Engineering, Supervision
Contingencies and Inflation
(30%) \$4,500

Total Cost \$19,500

1/ This building will be located at Labor Ovalle, Quezaltenango where there are existing facilities such as parking, landscaping, control gates, etc., thus no cost is being included for these components.

d) Training Center M²
Classroom (3) 192
Restroom 36
Warehouse 12
Lounge/Snack Bar 64
Covered Corridor 116
Total Area 420M²

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The cost of this building is estimated as follows:

<u>ITEM</u>	<u>Area M²</u>	<u>\$/M²</u>	<u>Total \$</u>
Classrooms	192	160	30,720
Restroom	36	200	7,200
Lounge/Snack Bar	64	160	10,240
Warehouse	12	160	1,920
Covered Corridor	116	130	15,080
Urbanization and Landscaping	<u>100</u>	30	<u>3,000</u>
	520 M ²		68,160
Engineering, Supervision Contingencies and Inflation (30%)		<u>\$20,448</u>	
	Total Cost	<u>\$88,608</u>	

The construction of all buildings will be contracted through public bidding procedures, complete plans together with bid documents, technical and general specifications will be prepared by a consulting engineering firm which will also provide technical supervision and certification of payments.

Proposed layouts and buildings specifications are included in
ANNEX _____

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Technical Engineering Analysis

Introduction

The construction component of this loan is divided into five major activities.

1. A diagnostic laboratory located at an existing MOA facility, with capabilities for basic soil and plant analysis, insect and plant disease, nematode identification plus nutrient analysis of foods and feeds.
 2. Two Farm Research and Storage Buildings located each at different sites in the western highlands of Guatemala. These buildings will provide facilities for basic laboratory analysis in addition to the storage of seeds, fertilizer, pesticides, light and heavy farm equipment.
 3. A Greenhouse located at the same existing MOA facilities of building 1 above, consisting of a building suitable for growing fruits and vegetables indoors.
 4. A Training Center for approximately 100 students with three classrooms, restrooms, warehouse and a lounge/snack bar.
- The total cost of these construction activities, including engineering design, construction supervision, contingencies, inflation of about 1% per month is estimated at U.S.\$250,075. This cost excludes land and equipment costs. Construction has been estimated to take place during 1983.

The MOA will support this project through its existing contract

and regional executing units which will provide other technical and administrative support for the execution of the project; similar construction activities have been built in the past under AID loan (520-L-018) thus USAID believes that the MOA can carry out the activities as planned.

Construction design and supervision will be contracted out to qualified independent engineering consultants. The construction of the various buildings will be advertised for bids among interested contractors following AID and GOG regulations.

Design Considerations:

Basic layouts for all buildings are illustrated in drawings 1-4 attached.

a) Diagnostic Laboratory

This structure will be built with prefabricated steel structures covered with asbestos roofing and non bearing block walls. A cement tile floor will be built right on the ground. This building will be designed in modules that will provide for future expansion and all areas will be connected by an inside covered corridor.

The building will be constructed at existing facilities of the MOA, Labor Ovalle near Quezaltenango, the second largest City in Guatemala, thus adequate supply of construction materials and sufficient unskilled and skilled labor will be available during construction, in addition this building will not require any investment in parking area, landscaping, watchman's area, etc.

since these facilities are already built.

No major earthwork is anticipated since the land is virtually flat and surface drainage is adequate. Public services such as water and electricity are already available at the site and connections will be made to this building.

The construction cost of this building was calculated based on current unit prices for work in place and consideration was made for the inflationary trend suffered by the construction industry in Guatemala.

<u>ITEM</u>	<u>Area M²</u>	<u>\$/M²</u>	<u>Total \$</u>
Laboratory Building	273	125	\$34,125
Engineering, Supervision Contingencies & Inflation (30%)			<u>\$10,238</u>
		Total	\$44,363

The costs have been calculated for construction to take place in 1983.

b) Farm Research and Storage Building

There will be two of these buildings at different locations, one in the department of El Quiché and one in the department of San Marcos.

The type of structure will be prefabricated steel, asbestos roofing, concrete slab floor, non-bearing block walls and outside covered corridors, windows and doors will be framed with wire mesh except in the laboratory and restroom. Although no

land site has yet been obtained by the GOG, it is anticipated that this should not present a problem and that a fairly flat tract of land will be available at each sited before construction begins sometime in 1983.

Also, availability of construction materials as well as unskilled and skilled labor should not be a problem since both sites are near the department cities of Santa Cruz and San Marcos and both sites will be accesible through paved highways. Since most of this building will be use for storage of fertilizer, pesticides, light and heavy equipment, provisions will be made to design the floor slab for those live loads and to provide adequate in and out access for the equipment. Provisions have also been made to have parking, landscaping and gate control at each site.

Costs were calculated taking into account same factors of building a) above.

<u>Item</u>	<u>Area M²</u>	<u>\$/M²</u>	<u>Total \$</u>
Main Building	276	115	31,740
Urbanization (Parking)	130	30	3,900
Landscaping	100	5	500
Control Gate	<u>7</u> 500	200	<u>1,400</u> \$37,540
Engineering, Supervision Contingencies and Inflation (30%)			\$11,262
Total Cost per building			\$48,802
Cost per 2 Buildings			\$97,604 *****

c) Greenhouse

A greenhouse will be built at the existing facilities of the MOA in Quezaltenango and location of building a) above.

The structure will be of light prefabricated steel profiles, the roof will be of corrugated plastic sheeting with manually operated vents to control temperature and humidity and the walls to window sill will be of exposed concrete blocks from where framed glass will cover the rest of the wall to the roof height.

The floor for the most part will be concrete slab with provisions for drainage. Electricity and water services will be provided inside the greenhouse since these utilities exist at the MOA facilities.

The greenhouse will be provided with a small area for storage and office space. Restrooms, parking, gate control and other services are already available at the site.

No major earthwork is anticipated at this site and construction materials, unskilled and skilled labor will be available from nearby Quezaltenango. The construction cost of the Greenhouse does not include the cost of shelving, supplies, materials and equipment.

The estimated cost of this subprojects is calculated as follows:

Main building 120 M^2 at $\$125/\text{M}^2$ = \$15,000

Engineering, supervision
contingencies and inflation at 30% = \$ 4,500
Total cost \$19,500

d) Training Center

A Training Center will also be built at the existing facilities of the MOA and similar to the academic buildings built under previous AID loan 520-L-018.

The building for approximately 100 students will basically have three classrooms, restrooms, warehouse and a lounge/snack bar.

For the same reasons of economy, time savings and easiness in construction, this buildings will also be made up of prefabricated steel structural members, covered with asbestos roofing and cement tile floor. The partitions between classrooms will be removable so as to permit the classrooms to be converted into an area for multipurpose uses.

Water and electricity will be provided since these services exist at the MOA's site.

No major earthwork excavation is anticipated and construction materials as well as labor should be readily available for Quezaltenango City.

The cost of this training center is again calculated taking into account the factors mentioned in building a) above.

<u>Item</u>	<u>Area M²</u>	<u>\$/M²</u>	<u>Total \$</u>
Classroom (3)	192	160	30,720
Restroom	36	200	7,200
Lounge/snack Bar	64	160	10,240
Warehouse		100	1,920
Covered Corridor	116	130	15,080
Urbanization and Landscaping	<u>100</u> 520	30	<u>3,000</u> 68,160

175

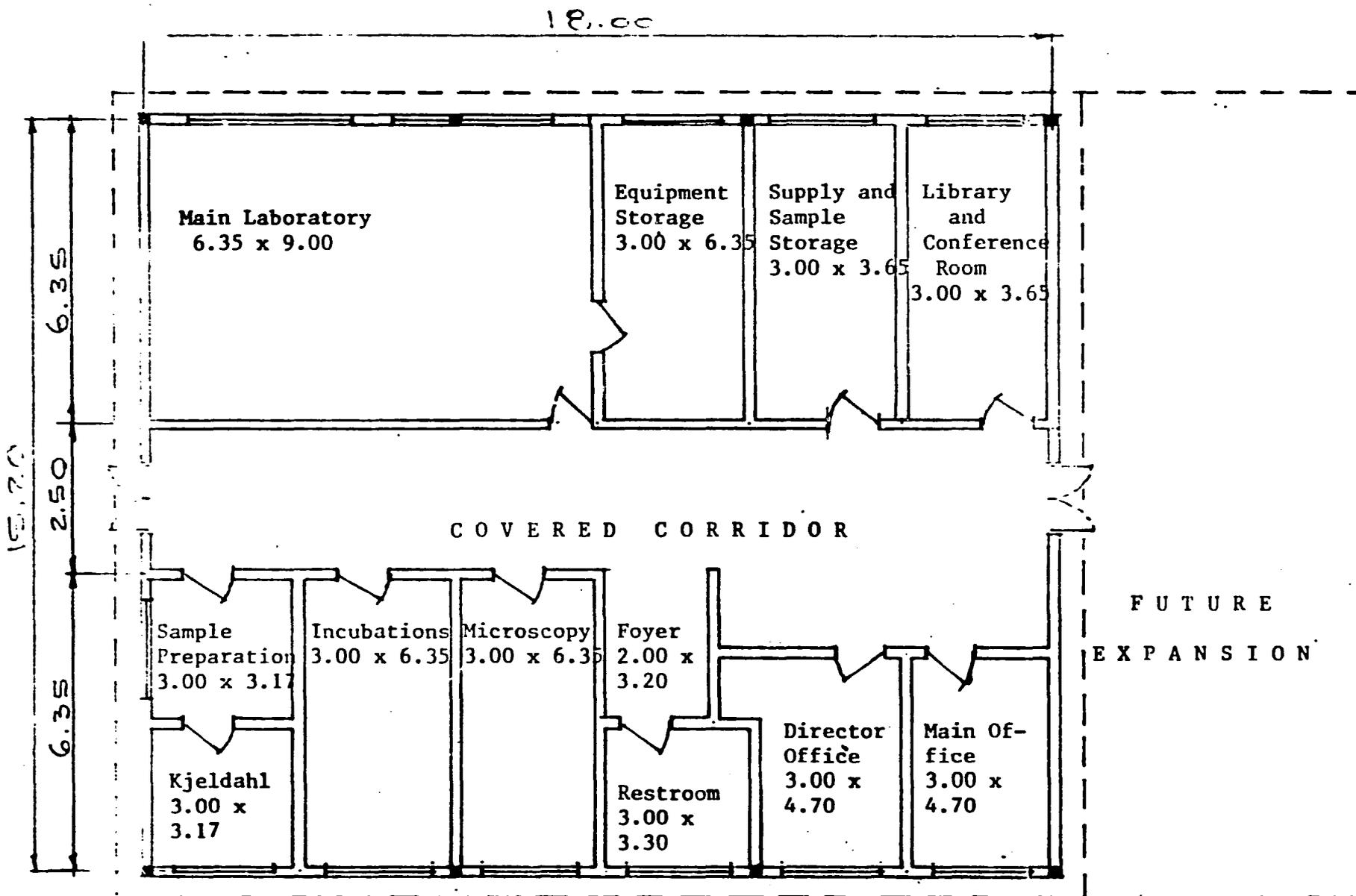
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Engineering, supervision contingencies and Inflation (30%)	<u>\$20,448</u>
Total Cost	<u>\$88,608</u>

A cost summary follows:

Construction	\$192,365
Engineering Design and Supervision (12%)	\$23,084
Contingencies and inflation (18%)	<u>\$34,626</u>
Total Cost	\$250,075

DIAGNOSTIC LABORATORY
FLOOR PLAN



All Dimensions are in Meters

1 of 4

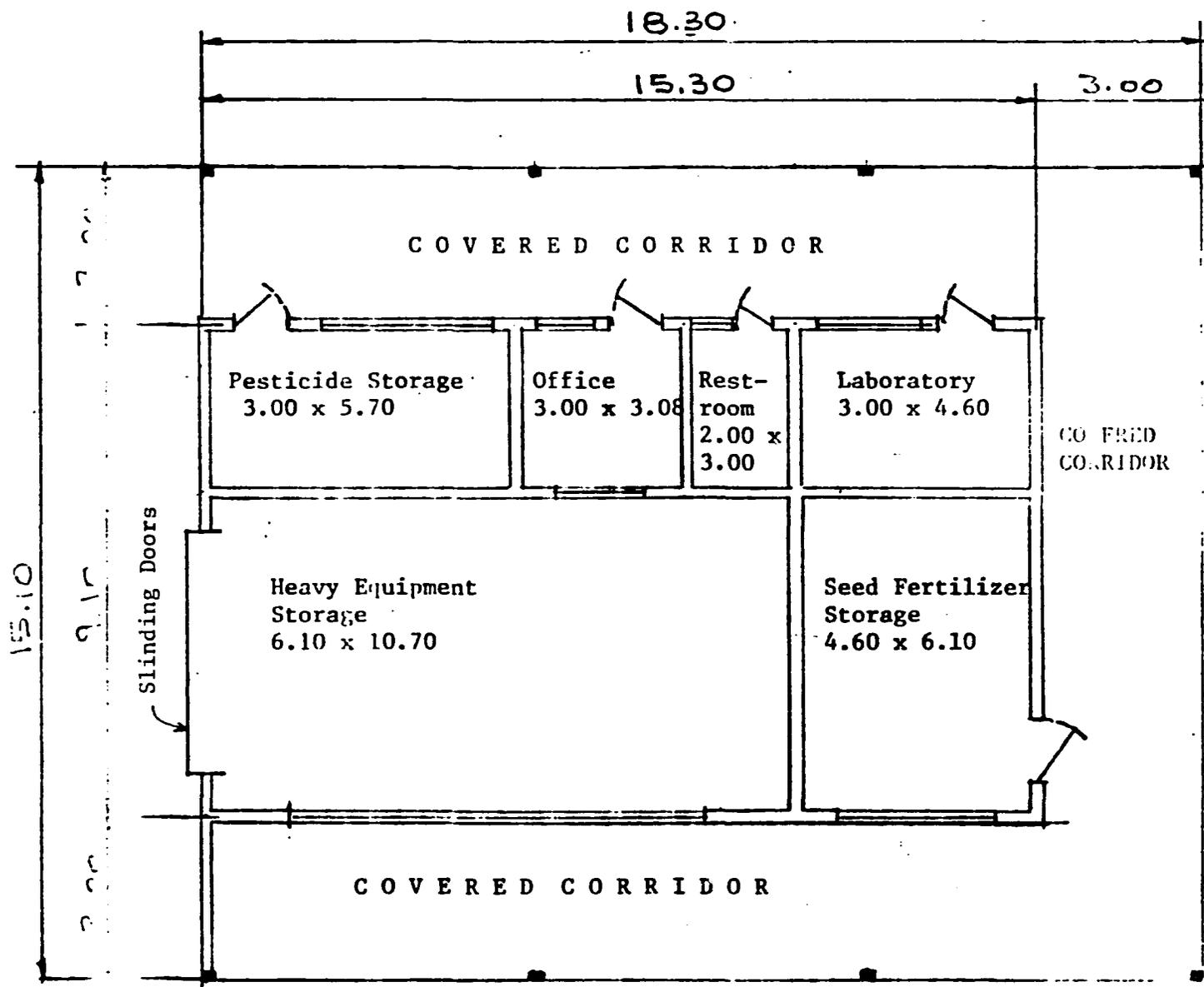
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UNCLASSIFIED
ANNEX H
Page 12 of 15

176

FARM RESEARCH AND STORAGE BUILDING

FLOOR PLAN



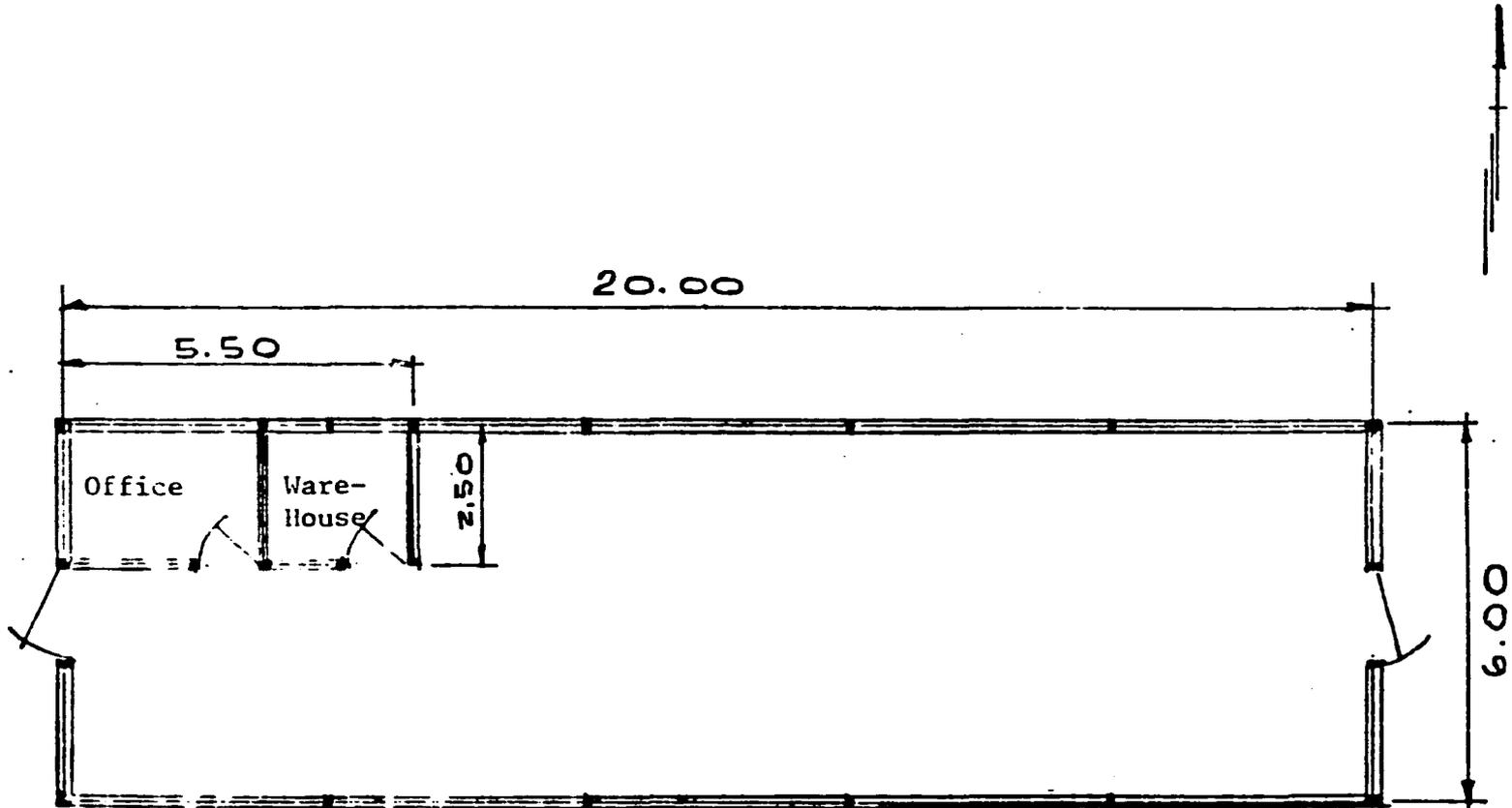
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All Dimensions are in Meters

UNCLASSIFIED
ANNEX H
Page 13 of 15

GREENHOUSE

FLOOR PLAN



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UNCLASSIFIED
ANNEX H
Page 14 of 15

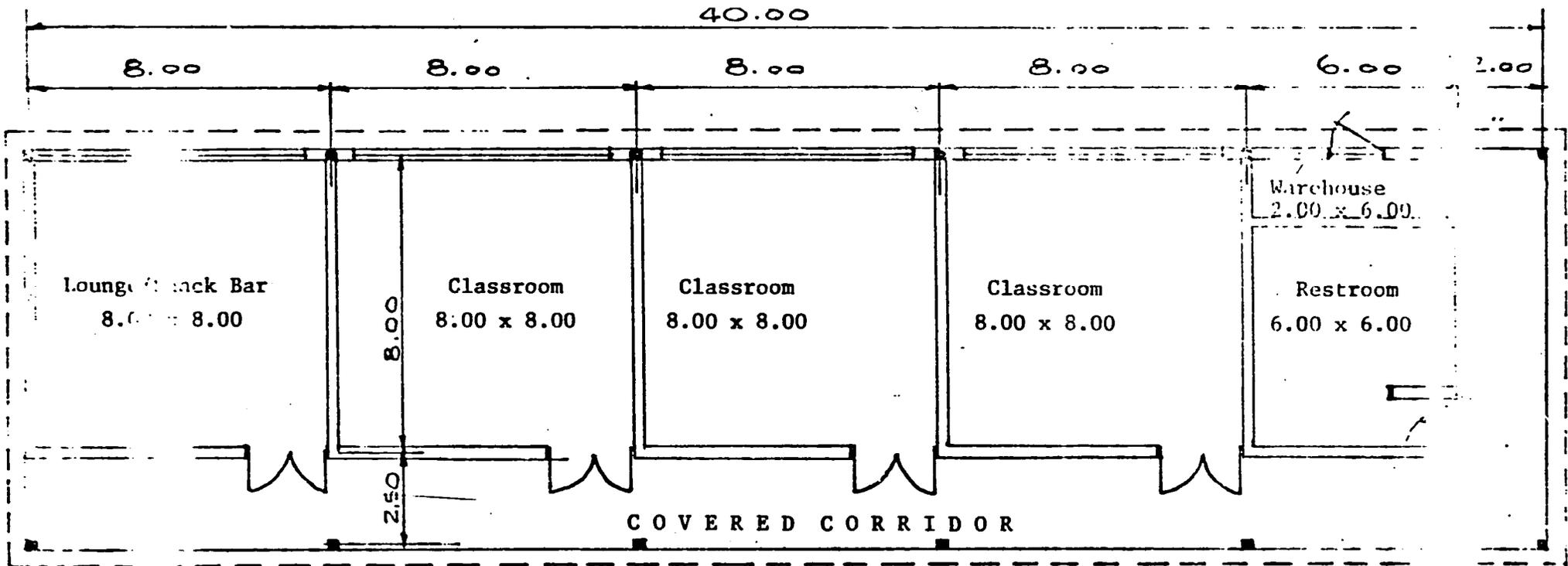
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3 of 4

178

TRAINING CENTER
FLOOR PLAN

179
180



All Dimensions are in Meters

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4 of

UNCLASSIFIED
ANNEX H
Page 15 of 15

COSTOS PROMEDIOS POR CULTIVO: REPOLLO
(1 hectárea) (en precios constantes 1980)

Insumos Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (Jornales)	(r ₁) Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) Costo unitario	(K ₂) Pesticidas	(r ₃) Costo unitario	(K ₃) Semillas	Costo total por hectárea				
	3,20 ^{1/2}	x 158	=	15,0	x	17	=	200	x	9	=		
	Q	505,60		Q	255,60		Q	120,00		Q	18,00	=	899,20

a) Costo de Insumos (K ₁)	393.60
b) Costo de mano de obra (L)	505.60
c) Interés:	
(Costo (K) x .08) / (P / 12)	$\frac{393 \times .08}{3} = 10.48$
d) Amortización de Miniriego (10 años)	104.30
Costo total:	Q1,013.98

Valor de Producto	Q1.50 x 1800 =	Q2,700.00
(minus) Costo total		<u>1,013.98</u>
Ingreso neto por cultivo/ha.		Q1,686.02
(por) Dos cosechas con riego (2)		Q3,372.04
Financ. Valor neto de maíz/ha.		<u>58.02</u>
Interés neto: Ajustado por costo de oportunidad		<u>Q3,314.02</u>

Salario mínimo rural (precio de sombra) W = Q3,20
 rendimiento promedio por hectare = 1,800 bultos

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COSTOS PROMEDIOS POR CULTIVO: BROCCOLI
(1 hectárea) (en precios constantes 1980)

	(W)	(L ₁)	(r ₁)	(K ₁)	(r ₂)	(K ₂)	(r ₃)	(K ₃)	Costo total por hectárea ^{2/}
Insumos Variables de la Producción	Costo unitario	Mano de Obra (Jornales)	Costo unitario	Fertilizantes (qq)	Costo unitario	Pesticidas	Costo unitario	Semillas	
	Q3.20 ^{1/} x	131 =	Q15.00 x	18 =			Q7.50 x	9 =	
		Q419.20 +		Q270.00 +		Q180.00 +		Q67.00 =	Q936.20
a) Costo de insumos (K ₁)			Q	517.00					
b) Costo de mano de obra (L)				419.20					
c) Interés:									
				13.79					
d) Amortización de Miniriego (10 años)				104.30					
Costo total:				Q1,054.29					
Valor de Producto		Q10.00 x 400 =		Q4,000.00					
(menos) Costo total				1,054.29					
Ingreso neto por cultivo/ha.				Q2,945.71					
(por) Dos cosechas con riego (2)				Q5,891.42					
(menos) Valor neto de maíz/ha.				58.02					
Valor neto: Ajustado por costo de oportunidad				Q5,833.40					

^{1/} Salario mínimo rural (precio de sombra) W = Q3,20

^{2/} rendimiento promedio por hectare = 400 qq

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COSTOS PROMEDIOS POR CULTIVO: COLIFLOR
(1 hectárea) (en precios constantes 1980)

Insumos Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (Jornales)	(r ₁) Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) Costo unitario	(K ₂) Pesticidas	(r ₃) Costo unitario	(K ₃) Semillas oz.	Costo total por hectárea
	3.20 ^{1/}	x 131 =	Q15.00	x 18 =			Q1.50	x 9 =	
		Q419.20	+	Q270.00	+	Q160.00	+	Q13.50	= Q862.70

a) Costo de insumos (K ₁)	Q 443.50
b) Costo de mano de obra (L)	419.20
c) Interés:	
($\frac{\text{Costo (K)} \times .08}{P}$)	11.83
12	
d) Amortización de Miniriego (10 años)	<u>104.30</u>
Costo total:	Q 978.83

Valor de Producto	Q9.00 x 360 qq = Q3,240.00
(menos) Costo total	<u>978.83</u>

Ingreso neto por cultivo/ha.	Q2,261.17
(por) Dos cosechas con pliego (2)	Q4,522.34
(menos) Valor neto de maíz/ha.	<u>58.02</u>
Valor neto: Ajustado por costo de oportunidad	Q4,464.32

^{1/} Salario mínimo rural (precio de sombra) W = Q3,20

^{2/} rendimiento promedio por hectare = 360 qq

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COSTOS PROMEDIOS POR CULTIVO: CEBOLLA
(1 hectárea) (en precios constantes 1980)

Insuros Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (Jornales)	(r ₁) Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) Costo unitario	(K ₂) Pesticidas	(r ₃) Costo unitario	(K ₃) Semillas lbs.	Costo total por hectárea ^{2/}
	3.20 ^{1/}	x 424	=	15.00	x 23	=	20.00	x 5	=
		Q 1,356.80		Q 345.00		Q172.00		100	= Q1,973.80
a) Costo de insumos (K ₁)				Q 617.00					
b) Costo de mano de obra (L)				1,356.80					
c) Interés:				16.45					
(Costo (K) x .08)									
$\frac{P}{12}$									
d) Amortización de Miniriego (10 años)				104.30					
Costo total:				Q2,094.55					
Valor de Producto		Q15.00 x 345	=	Q5,175.00					
(minus) Costo total				2,094.55					
Ingreso neto por cultivo/ha.				Q3,080.45					
(por) Dos cosechas con plego (2)				Q6,160.90					
(minus) Valor neto de maíz/ha.				58.02					
Valor neto: Ajustado por costo de oportunidad				Q6,102.88					

^{1/} Sitio mínimo rural (precio de sombra) W = Q3.20

^{2/} rendimiento promedio por hectare = 345 qq

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COSTOS PROMEDIOS POR CULTIVO: REMOLACHA
(1 hectárea) (en precios constantes 1980)

Insumos Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (Jornales)	(r ₁) + Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) + Costo unitario	(K ₂) Pesticidas	(r ₃) + Costo unitario	(K ₃) Semillas lbs.	Costo total por hectárea ^{2/}
	3.20 ^{1/}	X 127	=	15.00	X 18	=	10.00	X 2	=
		Q406.40		Q270.00		Q 80.00		Q20.00	= Q776.40

- a) Costo de insumos (K₁) Q 370.00
 b) Costo de mano de obra (L) 406.40
 c) Interés: 9.87
 ($\frac{\text{Costo (K)} \times .08}{12}$)
 d) Amortización de Miniriego (10 años) 114.30
 Costo total: Q 890.57

Valor de Producto 05.00 X 360 = Q1,800.00
 (minus) Costo total 890.57

Ingreso neto por cultivo/ha. Q 909.43
 (por) Dos cosechas con riego (2) Q1,818.86
 (minus) Valor neto de maíz/ha. 58.02
 Valor neto: Ajustado por costo de oportunidad Q1,760.84

^{1/} Salario mínimo rural (precio de sombra) W = Q3,20

^{2/} rendimiento promedio por hectare = 360 bultos

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COSTOS PROMEDIOS POR CULTIVO: ZANAHORIA
(1 hectárea) (en precios constantes 1980)

Insumos Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (dornales)	(r ₁) + Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) + Costo unitario	(K ₂) Pesticidas	(r ₃) + Costo unitario	(K ₃) Semillas / (lbs.)	Costo total por hectárea ^{2/}
	3.20 ^{1/} X	139 =					8.00 X	14	
		Q444.80		Q750.00		Q80.00		Q112.00	= Q1,386.80
a) Costo de insumos (K ₁)			Q 942.00						
b) Costo de mano de obra (L)			444.80						
c) Interés:			25.12						
(Costo (P) x .08) $\frac{P}{12}$									
d) Amortización de Miniriego (10 años)			104.30						
Costo total:			Q1,516.22						
Valor de Producto	Q2.50 X 1,380 =		Q3,450.00						
(menos) Costo total			<u>1,516.22</u>						
Ingreso neto por cultivo/ha.			Q1,933.78						
(por) Dos cosechas con riego (2)			Q3,867.56						
(menos) Valor neto de maíz/ha.			<u>58.02</u>						
Valor neto: Ajustado por costo de oportunidad			Q3,809.54						

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^{1/} Salario mínimo rural (precio de sombra) W = Q3,20

^{2/} rendimiento promedio por hectare = 1,380 bultos

COSTOS PROMEDIOS POR CULTIVO: EJOTE
(1 hectárea) (en precios constantes 1980)

Insumos Variables de la Producción	(W) Costo unitario	(L ₁) Mano de Obra (Jornales)	(r ₁) Costo unitario	(K ₁) Fertilizantes (qq)	(r ₂) Costo unitario	(K ₂) Pesticidas	(r ₃) Costo unitario	(K ₃) Semillas qq	Costo total por hectárea ^{2/}
	Q3.20 ^{1/} x	82 =	Q15.00 x	6 =			Q40.00 x	1.1 =	
		Q262.40 +		Q90.00 +		Q40.00 +		Q44.00 =	Q436.40
a) Costo de insumos (K ₁)			Q 174.00						
b) Costo de mano de obra (L)			262.40						
c) Interés:									
			4.64						
			$\frac{(\text{Costo } (L) \times .08)}{12}$						
d) Amortización de Miniriego (10 años)			104.30						
Costo total:			Q 545.34						
Valor de Producto		Q10.00 x 250 =	2,500.00						
(menos) Costo total			545.34						
Ingreso neto por cultivo/ha.			Q1,954.66						
(por) Dos cosechas con pliego (2)			3,909.32						
(menos) Valor neto de maíz/ha.			58.02						
Valor neto: Ajustado por costo de oportunidad			3,851.30						

^{1/} Salario mínimo rural (precio de sombra) W = Q3.20

^{2/} rendimiento promedio por hectare = 250 qq

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PROJECTED IMPLEMENTATION OVER L.O.P.^{1/}
 (Cumulative Area (hectares) under cultivation)

<u>Diversified Crop</u>	<u>Project Year</u>	<u>#1</u>		<u>2</u>		<u>3</u>		<u>4</u>		<u>5</u>
Cabbage		74	(91)	165	(99)	264	(115)	379	(116)	495
Potato		34	(41)	75	(45)	120	(52)	172	(53)	225
Broccoli		25	(30)	55	(33)	88	(38)	127	(39)	165
Cauliflower		23	(28)	51	(30)	81	(35)	116	(34)	150
Onion		20	(25)	45	(27)	72	(32)	104	(31)	135
Beet		11	(14)	25	(15)	40	(18)	58	(17)	75
Carrot		20	(25)	45	(27)	72	(32)	104	(31)	135
String bean		18	(22)	40	(24)	64	(28)	92	(28)	120
<hr/> Project year targets:		225	275	300		350		350		

^{1/} Numbers do not necessarily add due to rounding

DIVERSIFIED FRUIT TREE CROPS: COSTS AND REVENUE PROJECTIONS

Project Year	1	2	3	4	5	6	7	8	9	10
<u>A P P L E</u>										
Year 1	(46,487)	(10,057)	(10,123)	(8,980)	(9,146)	(10,367)	75,613	95,826	150,116	205,583
Year 2		(46,487)	(10,057)	(10,123)	(8,980)	(9,146)	(10,367)	75,613	95,826	150,116
Year 3			(46,487)	(10,057)	(10,123)	(8,980)	(9,146)	(10,367)	75,613	95,826
Year 4				(46,487)	(10,057)	(10,123)	(8,980)	(9,146)	(10,367)	75,613
Year 5					(46,487)	(10,057)	(10,123)	(8,980)	(9,146)	(10,367)
Annual net total	<u>(46,487)</u>	<u>(56,544)</u>	<u>(66,667)</u>	<u>(75,647)</u>	<u>(84,793)</u>	<u>(48,673)</u>	<u>36,997</u>	<u>142,946</u>	<u>302,042</u>	<u>516,771</u>
<u>P E A C H</u>										
Year 1	(30,396)	(4,800)	(5,652)	28,158	28,038	56,658	58,716	76,332	76,110	75,864
Year 2		(30,396)	(4,800)	(5,652)	28,158	28,038	56,658	58,716	76,332	75,110
Year 3			(30,396)	(4,800)	(5,652)	28,158	28,038	56,658	58,716	75,332
Year 4				(30,396)	(4,800)	(5,652)	28,158	28,038	56,658	58,716
Year 5					(30,396)	(4,800)	(5,652)	28,158	28,038	56,658
Annual net total	<u>(30,396)</u>	<u>(35,196)</u>	<u>(40,848)</u>	<u>(12,690)</u>	<u>15,348</u>	<u>102,402</u>	<u>165,918</u>	<u>247,902</u>	<u>295,854</u>	<u>343,630</u>

191

DIVERSIFIED FRUIT TREE CROPS: Cost and Revenue Projections

Project Year No.	1	2	3	4	5	6	7	8	9	10
<u>P E A R</u>										
Year 1	(13,086)	(1,323)	(2,892)	(2,793)	(2,205)	6,606	8,190	10,536	12,684	16,539
Year 2		(13,086)	(1,323)	(2,892)	(2,793)	(2,205)	6,606	8,190	10,536	12,684
Year 3			(13,086)	(1,323)	(2,892)	(2,793)	(2,205)	6,606	8,190	10,536
Year 4				(13,086)	(1,323)	(2,892)	(2,793)	(2,205)	6,606	8,190
Year 5					(13,086)	(1,323)	(2,892)	(2,793)	(2,205)	6,606
Annual net total	<u>(13,086)</u>	<u>(14,409)</u>	<u>(17,301)</u>	<u>(20,094)</u>	<u>(22,299)</u>	<u>(2,607)</u>	<u>6,906</u>	<u>20,334</u>	<u>35,811</u>	<u>54,555</u>

DIVERSIFIED FRUIT TREE CROPS - COSTS AND REVENUE PROJECTIONS

Project Year	1	2	3	4	5	6	7	8	9	10
<u>P R U N E</u>										
Year 1	(7,870)	(797)	(1,588)	1,382	1,735	1,661	2,354	4,585	5,139	5,477
Year 2		(7,870)	(797)	(1,588)	1,382	1,735	1,661	2,354	4,585	5,139
Year 3			(7,870)	(797)	(1,588)	1,382	1,735	1,661	2,354	4,585
Year 4				(7,870)	(797)	(1,588)	1,382	1,735	1,661	2,354
Year 5					(7,870)	(797)	(1,588)	1,382	1,735	1,661
Annual Net Total	<u>(7,870)</u>	<u>(8,667)</u>	<u>(10,255)</u>	<u>(8,873)</u>	<u>(7,138)</u>	<u>2,393</u>	<u>5,544</u>	<u>11,717</u>	<u>15,474</u>	<u>19,216</u>
<u>A V O C A D O</u>										
Year 1	(46,267)	(4,949)	(4,277)	(4,787)	6,083	11,567	15,220	22,340	35,851	50,107
Year 2		(46,267)	(4,949)	(4,277)	(4,787)	6,083	11,567	15,220	22,340	35,851
Year 3			(46,267)	(4,949)	(4,277)	(4,787)	6,083	11,567	15,220	22,340
Year 4				(46,267)	(4,949)	(4,277)	(4,787)	6,083	11,567	15,220
Year 5					(46,267)	(4,949)	(4,277)	(4,787)	6,083	11,567
Annual Net Total	<u>(46,267)</u>	<u>(51,216)</u>	<u>(55,493)</u>	<u>(60,280)</u>	<u>(54,197)</u>	<u>3,637</u>	<u>23,806</u>	<u>50,423</u>	<u>91,061</u>	<u>135,085</u>

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4/9/81

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ANNEX 1
Page 12 of 19 pages

192

a-4) Total de Hectáreas Frutales

Frutales	Hectáreas	Porcenta - je.
Manzana	55.5	37 %
Aguacate	40.5	27 %
Melocotón	30.0	20 %
Pera	15.0	10 %
Ciruela	9.0	6 %
Totales	150.0	100 %

Análisis de Rentabilidad de una Hectárea de Manzana

<u>Años</u>	<u>Ingresos</u>	<u>Costos totales</u>	<u>Flujo de fondos</u>
1	--	4,188.00	(4,188.00)
2	--	906.48	(906.48)
3	--	911.58	(911.58)
4	--	809.18	(809.18)
5	--	823.73	(823.73)
6	--	933.81	(933.81)
7	8,000.00	1,187.82	6,812.18
8	10,000.00	1,366.78	8,633.22
9	15,000.00	1,465.81	13,534.19
10	20,000.00	1,478.61	18,521.29

Tasa de rentabilidad interna = 30%

FUENTE: Area de Proyectos, USPA
Ministerio de Agricultura

Análisis de Rentabilidad de una Hectárea de Durazno y/o Melocotón

<u>Años</u>	<u>Ingresos</u>	<u>Costos totales</u>	<u>Flujo de fondos</u>
1	--	5,066.37	(5,066.37)
2	--	800.30	(800.30)
3	--	942.30	(942.30)
4	5,540.00	847.17	4,692.83
5	5,540.00	866.83	4,673.17
6	10,387.00	944.16	9,442.84
7	10,850.00	1,063.66	9,786.34
8	13,850.00	1,127.66	12,722.34
9	13,850.00	1,165.25	12,684.75
10	13,850.00	1,206.21	12,643.79

Tasa de Rentabilidad interna = 50%

FUENTE: Area de Proyectos, USPA
Ministerio de Agricultura

Análisis de Rentabilidad de una Hectárea de Pera

<u>Años</u>	<u>Ingresos</u>	<u>Costo total</u>	<u>Flujo de fondos</u>
1	--	4,361.94	(4,361.94)
2	--	441.38	(441.38)
3	--	963.94	(963.94)
4	--	931.22	(931.22)
5	--	735.38	(735.38)
6	3,324.00	1,121.95	2,202.05
7	3,850.00	1,119.66	2,730.34
8	4,432.00	919.70	3,512.30
9	5,540.00	1,311.89	4,228.11
10	6,648.00	1,134.51	5,513.49

Tasa de Rentabilidad interna = 15%

FUENTE: Area de Proyectos, USPA
Ministerio de Agricultura

Análisis de Rentabilidad de una Hécatarea de Ciruela

<u>Años</u>	<u>Ingresos</u>	<u>Costos totales</u>	<u>Flujo de fondos</u>
1	--	4,371.84	(4,371.84)
2	--	442.59	(442.59)
3	--	882.48	(882.48)
4	1,731.25	963.58	767.67
5	1,731.25	767.74	963.51
6	2,077.50	1,154.30	923.20
7	2,423.79	1,115.30	1,308.45
8	3,462.50	915.28	2,547.22
9	4,162.50	1,307.63	2,854.87
10	4,162.50	1,119.47	3,043.03

Tasa de Rentabilidad interna = 13%

FUENTE: Area de Proyectos, USPA
Ministerio de Agricultura

Análisis de Rentabilidad de una Hectárea de Aguacate

<u>Años</u>	<u>Ingresos</u>	<u>Costos totales</u>	<u>Flujo de fondos</u>
1	--	5,712.24	(5,712.24)
2	--	610.64	(610.64)
3	--	527.80	(527.80)
4	--	590.56	(590.56)
5	1,360.00	609.28	750.72
6	2,040.00	611.60	1,428.40
7	2,550.00	670.64	1,879.36
8	3,400.00	641.84	2,758.16
9	5,100.00	673.44	4,426.56
10	6,800.00	613.44	6,186.56

Tasa de Rentabilidad interna = 13%

FUENTE: Area de Proyectos, USPA
Ministerio de Agricultura

199
200

CUADRO No. 2
 NUMERO DE PROYECTOS POR AÑO, VALOR UNITARIO Y MONTO TOTAL DE INVERSION
 PRODUCCION PECUARIA

MODELO	NUMERO DE PROYECTOS.....						COSTO	
	TOTAL	AÑOS					UNITARIO	TOTAL
		1	2	3	4	5		
Ovino	176	13	19	32	46	66	1700	299,200
Caprino	135	10	15	25	37	48	2000	270,000
Bovino	100	7	11	19	26	37	2000	200,000
Porcino	63	5	7	11	16	24	1800	113,400
Avícola	12	1	2	5	2	2	4000	48,000
Apícola	15	1	2	3	4	5	700	10,500
Cunícola	40	4	4	8	10	14	197.50	7,900
	541	41	60	103	141	196		949,000

PROFORMA INCOME STATEMENT(Incremental Income and Expenses for 1 Hectare Farm)

	<u>Year 1</u>		<u>Year 2</u>		<u>Years 3-10</u>	
	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>
Sale of Carrots	\$988		\$ 2,138		\$ 2,138	
Subsidy			470			
Farm Inputs		314		628		628
Fertilizing		220		250		
Irrigation		700		--		
Interest on Borrowing		<u>66</u>		<u>28</u>		<u> </u>
Total Costs		1,300				
Net Profit (Loss)	(312)		Q 1,702		Q 1,510	

Present net worth discounted at 20% for 10 years equals \$3,646

IRR = 64%

TATotino:mdp:4/13/81

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PROFORMA INCOME STATEMENT

(Incremental Income and Expenses for 1 Hectare Farm)

	<u>Year 1</u>		<u>Year 2</u>		<u>Years 3-10</u>	
	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>
Sale of Cabbage	Q 738		1,638		1,638	
Subsidy			470			
Farm Inputs		131		262		262
Terracing		700				
Irrigation		220		250		
Interest on Borrowing		<u>28</u>		<u>12</u>		<u>-</u>
Total Costs		Q 1,079		Q 524		Q 262
Net Profit (Loss)	(341)		1,584		1,376	

Present net worth discounted at 20% for 10 years equals \$3,403

IRR = 67%

TATotino;mdp:4/13/81

PROFORMA INCOME STATEMENT(Incremental Income and Expenses for 1 Hectare Farm)

	<u>Year 1</u>		<u>Year 2</u>		<u>Years 3-10</u>	
	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>
Sale of Onions	Q 1,563		Q 3,288		Q 3,288	
Subsidy	-		470		-	
Inputs		206		412		412
Leasing		700		-		-
Irrigation		220		250		-
Interest on Borrowing		43		18		-
Other		258		516		516
Total Costs		<u>1,427</u>		<u>1,196</u>		<u>928</u>
Net Profit (Loss)		Q 136		Q 2,562		Q 2,360

Present net worth discounted at 20% for 10 years equals \$6,754

IRR = 95%

T. Totino:mdp:4/13/81

PROFORMA INCOME STATEMENT(Incremental Income and Expenses for 1 Hectare Farm)

	<u>Year 1</u>		<u>Year 2</u>		<u>Years 3-10</u>	
	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>
Sale of Broccoli	Q 1,171		Q 2,504		Q 2,504	
Subsidy			470			
Farm Inputs		172		344		344
Seeding		700				
Irrigation		220		250		
Interest on Borrowing		36		15		
Total Costs		Q 1,128		609		344
Net Profit (Loss)		43		Q 2,305		Q 2,106

Present net worth discounted at 20% for 10 years equals \$6,120.

IRR = 99%

RR Motino;mdp:4/13/81

PROFORMA INCOME STATEMENT

(Incremental Income and Expenses for 1 Hectare Farm)

	<u>Year 1</u>		<u>Year 2</u>		<u>Years 3-10</u>	
	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>	<u>INCOME</u>	<u>EXPENSES</u>
Sale of Cauliflower	Q 918		Q 1,998		Q 1,998	
Subsidy	-		470		-	
Farm Inputs		148		296		296
Terracing		700		-		-
Irrigation		220		250		-
Interest on Borrowing		<u>31</u>		<u>13</u>		<u>-</u>
Total Costs		Q 1,099		559		296
Net Profit (Loss)	(181)		Q 1,909		Q 1,702	

Present net worth discounted at 20% for 10 years equals \$4,611

IRR = 81%

TATotino:mdp:4/13/81

TABLE 6

MODEL THREE HECTARE FARM

(US\$)

<u>Crop</u>	<u>Area</u>	<u>Y e a r s</u>									
Cabbage	1 ha(1,023)	4,752	4,123	4,123	4,123	4,123	4,123	4,123	4,123	4,123	4,123
Broccoli	1 ha 129	6,915	6,318	6,318	6,318	6,318	6,318	6,318	6,318	6,318	6,318
Corn & Beans	1 ha 257	257	257	257	257	257	257	257	257	257	257
Net Cash Flow	(637)	11,924	10,698	10,698	10,698	10,698	10,698	10,698	10,698	10,698	10,698

Present net worth discounted at 20% for 10 years equals \$36,257

MODEL FOUR HECTARE FARM

(US\$)

<u>Crops</u>	<u>Area</u>	<u>Y e a r s</u>									
Peas	1 ha	(5,066)	(800)	(942)	4,693	4,673	9,443	9,786	12,722	12,688	12,6
Corn flower	1 ha	(543)	5,727	5,106	5,106	5,106	5,106	5,106	5,106	5,106	5,1
Cassava	1 ha	408	7,686	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,0
Beans	1 ha	257	257	257	257	257	257	257	257	257	2
Total		(4,944)	12,870	11,501	17,136	17,116	21,886	22,229	25,165	25,131	25,0

Present net worth discounted at 20% for 10 years equals \$54,924

MODEL FIVE HECTARE FARM

(US\$)

Y e a r s

<u>Crop</u>	<u>Area</u>										
Apples	(1 ha)	(4,188)	(906)	(912)	(809)	(824)	(934)	6,812	8,633	13,524	18,521
Onions	(1 ha)	408	7,686	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080
Broccoli	(1 ha)	129	6,915	6,318	6,318	6,318	6,318	6,318	6,318	6,318	6,318
Cabbage	(1 ha)	(1,923)	4,752	4,128	4,128	4,128	4,128	4,128	4,128	4,128	4,128
Corn Beans	(1 ha)	257	257	257	257	257	257	257	257	257	257
Net Cash Flow		(4,417)	18,704	16,871	16,974	16,959	16,849	24,595	26,416	31,117	36,117

Present net worth discounted at 20% for 10 years equals \$64,533

209
210

ESTIMATED VEHICLE, MACHINERY AND EQUIPMENT REQUIREMENTS

A. Vehicles	Cost (\$000)
1. Motorized	<u>455.5</u>
a. Small Jeep or pick-up (28 at \$9,000 ea.)	252.0
b. Large 4-wheel drive pick-ups (8 at \$11,000 ea.)	88.0
c. Large Van or carry-all type (4 at \$12,000 ea.)	48.0
d. Motorcycles 125 cc. scrambler type (45 at \$1,500 ea.)	67.5
2. Non-Motorized (132 bicycles at \$150 ea.)	<u>19.8</u>
T o t a l	\$475.3
B. Agriculture Machinery and Equipment	<u>49.0</u>
C. Laboratory, Engineering, and Veterinary Equipment	<u>79.4</u>
D. Office Equipment	<u>56.0</u>
E. Audio-Visual Equipment	<u>18.3</u>
T o t a l	<u>\$678.0</u> =====

DRAFT PROJECT AUTHORIZATION

Name of Country: Guatemala
Name of Project: Small Farmer Diversification
Number of Project: 520-0255
Number of Loan: 520-T-034

1. Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Small Farmer Diversification project for Guatemala (the "Cooperating Country") involving planned obligations of not to exceed Five Million, Five Hundred Thousand United States Dollars (\$5,500,000) in loan funds ("Loan") and Two Million, Six Hundred Thousand United States Dollars (\$2,600,000) in grant funds ("Grant") over a five year period from date of authorization subject to the availability of funds in accordance with the A.I.D. OYB allotment process to assist in the financing of the foreign exchange and local currency costs of the project.

2. The project (Project) consists of the development of the institutional capacity of the Government of Guatemala to promote and support the introduction of diversified crops in the small farm sector by (1) carrying out adaptive research and development of appropriate diversified production technologies for small farm enterprises; (2) dissemination of appropriate diversified production technologies to small farmers; (3) provision of short and long term credit to small farmers to finance farm improvements and production inputs required for crop diversification.

3. The Project Agreements, which may be negotiated and executed by the Officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Interest Rate and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in U.S. dollars within twenty-five (25) years from the date of first

disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in U.S. Dollars interest from the date of first disbursement of the Loan at the rate of (i) two percent (2%) per annum during the first ten (10) years, and (ii) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

b. Source and Origin of Goods and Services (Loan)

Goods and services, except for ocean shipping and motorcycles, financed by A.I.D. under the Loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Loan shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States or of countries that are members of the Central American Common Market.

c. Source and Origin of Goods and Services (Grant)

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

d. Conditions Precedent to First Disbursement (Loan)

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

- (1) A financial plan detailing the Cooperating Country's annual counterpart contribution to be made in support of the Project.

213
214

(2) A detailed time-phased plan setting forth all activities to be completed during the life of project including staffing, organization and other administrative arrangements required to implement the project.

e. Conditions Precedent to Disbursement for Credit Activities

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(1) A trust agreement between the Borrower's Ministry of Finance and Agricultural Development Bank (BANDESA) for the transfer of no less than \$3,000,000 of A.I.D. loan funds and \$2,200,000 of Borrower counterpart funds to finance the long and short term credit requirements and social cost payments of the Project.

(2) The terms and conditions for farm improvement credit and production credit to be provided under the Project.

f. Covenants

The Cooperating Country shall covenant that the National Agricultural Development Bank (BANDESA) will carry out, within one year of loan first disbursement date, a study to review the appropriateness of current interest rate policy. In addition, the Cooperating Country shall covenant to employ its best efforts to maintain the diversification credit fund at its original level during the five year period following the final disbursement of loan funds, i.e., to cover reductions in the fund to the extent that uncollectible accounts and administrative expenses of each fiscal year are not covered by income generated by the interest rate spread.

g. Waiver (Loan)

Motorcycles financed by A.I.D. under the Project and having a value of approximately \$67,500 may have their source and origin in countries included in Geographic Code 899.

Date

TECHNICAL ASSISTANCE PLAN

Research Specialists

9 Person Years

Vegetables	3 Person Years
Fruits	3 Person Years
Animal Husbandry	3 Person Years

The nature and scope of work of the research specialists in vegetables, fruits, and animal husbandry is similar. In each case, the subject matter specialist will work with one or more counterpart Guatemalan technicians to help them develop sufficient technical and administrative competence to permit the phase-out of United States technicians by the end-of-project. It must be kept in mind that team-work among the subject matter specialists and the other technical advisers is necessary to accomplish this task. Spanish language capacity is important; practical ability to observe, to adapt knowledge to the special environment of the small-scale highland farmer is more important than knowledge of highly sophisticated technology. In this context, the research specialists each in his own field will:

1. Establish farm systems analysis programs within the ICTA agronomic/social analysis philosophy to serve as a basis for research to determine the most advisable combinations of crop, livestock and horticultural enterprises for small farmers in the highlands.

2. Supervise test and demonstration plots at research stations and in farmers' fields. These tests will be designed to validate the combinations of enterprises which are most likely to result in the highest possible income consistent with an acceptable level of risk.

3. Operate training and education programs for research and extension personnel to improve their ability to transfer technology to farmers.

4. Promote collaboration among other development agencies, including INCAP, CATIE and the CECOMERCA Marketing Agency to assure adequate prices.

Agricultural Economist

1 Person Year

This person will be a member of a multi-disciplinary team to participate in the survey of small farms which should reveal the rationale of the existing farming systems. The objective of this technical assistance is to determine, and to train other people how to determine which combination

of crop, livestock and horticultural enterprises will result in the highest income for the small farmer in the highlands, consistent with an acceptable level of risk. The agricultural economist will therefore:

1. Observe activities and conduct surveys of typical small farms in the project area to determine how economic resources of land, labor and capital are used; to analyze produce storage and marketing practices; and identify constraints.

2. Participate in multi-disciplinary team discussions to share this expertise and assist in training programs. In consultation with other team members, the economist will suggest, for various categories of farm size, the combinations of enterprises which should be further tested in field experiments.

3. Collect and analyze economic information of small farm activities, including instruction of counterparts to enable them to do similar work following departure of the contract agricultural economist.

Sociologist

1 Person Year

This person will be a member of a multi-disciplinary team to participate in the survey of small farms which should reveal the rationale of the existing farming systems. The objective of the sociologist will be to interpret the rationale behind farm business and family decisions for the agronomic/economic experts. The sociologist will help to determine which of the possible modifications of the farm business will most likely be accepted by farmers and therefore would merit further research. The sociologist will:

1. Observe activities and conduct survey of typical small farms in the project area to determine how farm and family decisions are made. In this respect, the consultant will try to determine the inter-personal relations of family members and the effect this has on economic decisions.

2. Suggest to research technicians and extension personnel how best to transfer technology.

3. Participate in design and presentation of training courses.

Extension Specialists

9 Person Years

Soils and Irrigation	3 Person Years
Livestock Management	3 Person years
Crop Protection	3 Person Years

The nature and scope of work of the subject matter extension specialists in soils and irrigation, livestock management and crop protection are

similar. Closely related to the work to be performed by the researchers, the task of these specialists is to "translate" the research work into practical application of research results on farms. They should be the "trouble shooters" who teach how to recognize production or marketing problems, who know where to look for assistance to resolve problems, who provide "feed-back" to researchers to help keep the research component relevant to farmers' needs.

Soil and Irrigation Specialist 3 Person Years

This person will:

1. Teach extension agents how to classify soils so they can help farmers to determine which enterprises are most likely to prosper on the various areas of the farm.
2. Instruct extension agents on the principle and practice of irrigation so they can help farmers to establish the most effective irrigation scheduled.
3. Follow up on the work already in progress in soil conservation and small irrigation projects.
4. Collaborate with subject-matter specialists in fruit, vegetables and animal husbandry to plan, observe, and maintain test areas.

Livestock Management Specialist 3 Person Years

This person will:

1. Teach extension agents how to inventory the actual and potential animal feed resources of a small farm to determine what animal production enterprises might be feasible.
2. Instruct extension agents in the principles and practice of animal husbandry so they can transfer this knowledge to farmers.
3. Evaluate the existing small livestock promotion project of the Ministry of Agriculture to determine how this project could be coordinated with the diversification project.
4. Collaborate with other subject-matter specialists to plan, observe and maintain experiments and farm demonstrations.
5. Teach extension agents how to slaughter animals and how to prepare the various animal products for home consumption and sale so they can transfer this knowledge to farmers.

Crop Protection Specialist

3 Person Years

This person will:

1. Teach extension agents how to recognize plant diseases and pests, how to determine when the level of infection or infestation is high enough to justify control measures, and how to choose among the various possible pest control actions to protect human lives and the environment.
2. Consult with the fruit and vegetable specialists to identify problems encountered in the research component.
3. Provide expert advice needed by USAID/G to assure compliance with environmental protection rules and regulations.

Short-term Technical Assistance

2 Person Years

The purpose of short-term technical assistance is to help subject-matter specialists to resolve special problems which are beyond the capabilities of the resident consultants. Examples of such cases might be a pathologist to identify and suggest control measures for an exotic animal or plant disease. Such consultants could also be used to evaluate research and extension progress and results. Short-term consultants to help solve engineering or design problems for the buildings and equipment to be purchased could conceivably be needed.

Project Coordination (local hires)

15 Person Years

The purpose of the project coordination team is to create a central point which will expedite project administration. The coordinator, with the support of an accountant and a secretary will:

1. Obtain from the various agencies of the GOG the documents necessary to meet conditions precedent to disbursement for transmittal to USAID/G.
2. Assist the implementing agencies to prepare requests for proposals, bid documents, contracts and expedite transmittal to USAID/G to facilitate procurement of consultants, commodities and construction,
3. Maintain files of Implementation Letters and financial transactions to prepare financial reports vouchers, and budget control documents.
4. Obtain from the implementing agencies the required progress reports, evaluation reports and transmit to USAID/G in accordance with mutually acceptable schedules.

219
220

5. Conduct Project Implementation meetings on a regular basis to promote active coordination of the various agencies involved in the project.

Total Number of Person years of TA: 37

Annex N

Draft Project Description

The goal of this project is to improve the economic well-being of rural Guatemalans living in the Northwestern Highlands of Guatemala. In support of this goal, the project will strengthen public agriculture sector capacity to stimulate small farm diversification from basic grains production of higher value diversified crops which are more labor intensive. Hence, the project will generate increased on-farm employment opportunities and raise small farmer incomes.

The project will provide technical assistance, training, and credit financing to the public agricultural sector in order to develop its capacity to support small farm diversification in the project area (Region I). The AID loan and grant will provide assistance to the Government of Guatemala's Agriculture Science and Technology Institute (ICTA); General Directorate for Agricultural Services (DIGESA); General Directorate of Livestock Services (DIGESPE), and the National Agricultural Development Bank (BANDESA) as well as other Government agencies in an effort directed toward: 1) an improved understanding of the small farm household production/ consumption system; 2) the adaptation and generation of appropriate diversified crop/livestock technology; 3) improvement of the linkages between research and extension institutions for a more responsive and cost-effective system of disseminating small farmer-oriented technologies; 4) dissemination of information and technical assistance geared to small farmer needs; 5) short-term credit to assure small farmer access to necessary agricultural inputs to support small farmer diversification; and 6) long term credit to permit necessary on-farm investments related to diversified crop/livestock production.

1. Applied Research and Technologies Adaptation

The applied research and technology activities under the project will be implemented by ICTA, a semi-autonomous entity within the public agricultural sector. The Aid loan and grant will provide technical assistance and research training to ICTA in diversified crop and livestock systems. The project will utilize the basic methodological approach developed by ICTA for research testing and generation of technologies. The project will expand the ICTA research program to include diversified crops and livestock systems. Within the project area, ICTA, in collaboration with other public agriculture sector institutions, will carry-out a small farm management survey to collect socio-economic data on the small farm enterprise. The design and execution of the survey will be performed by ICTA early in project life. The survey data will be analyzed by ICTA to develop small farm models to guide research efforts and identify appropriate cropping systems. These models will indicate preliminary crop

combinations which appear to be economically and technically appropriate for small farmers in Region I. These crop combinations will be further studied by ICTA under controlled conditions at ICTA research facilities and later on small farmer plots. The diversified crop technologies once validated by ICTA will be turned over to the formal extension system for dissemination under the project. ICTA will help train extensionists in these technologies and together with DIGESA/DIGESPE supervisors will review technology transfer in the field.

2. Technology Transfer and Technical Assistance

The Technology Transfer and Technical Assistance activities under the project will be implemented by DIGESA/DIGESPE. These institutions will have the responsibility of providing extension service support to the small farmer in diversified crop and livestock production systems. A "Demonstration and Training Center" will be established, under the project, in Region I to train extensionists in diversified crop technologies and appropriate extension methods. The extensionists after receiving training in diversified crop technologies will be assigned to regional districts to promote diversification at the farm level. They will be supervised by extension specialists and assisted by small farmer "guias" who have participated in the diversified crop orientation program. In addition, DIGESA will organize two "miniriego" irrigation teams and two soil conservation teams to provide technical assistance to small farmers who wish to make on-farm improvements related to diversification. Extension and research activities will be closely coordinated at the regional level. A data bank will be maintained at the demonstration and training center to provide feedback and information for adjustment of programmed activities.

3. Small Farm Diversification Credit Fund

The project will establish in BANDESA a special credit fund for agricultural diversification. This fund will provide long-term credit for on-farm improvements as well as short-term credit for the purchase of farm inputs, e.g. seed and fertilizer. The fund will be used to finance small scale irrigation systems and social cost payments will be made to stimulate soil conservation and land terracing in the project area. The cooperative federations may act as credit intermediaries providing credit either in cash or in-kind.

4. Project Coordination

The project will establish a special unit within USPA, to coordinate project activities and assist in project procurement and reporting requirements. The Unit will be staffed with full-time personnel and will make frequent inspection trips to the field. The Unit will also have major responsibility for fiscal programming of AID and counterpart resources for the project, within the annual GOG budget cycle.

The financial plan and project budget are summarized in the attached table. The total project cost is \$14.8 million of which AID will contribute \$8.1 million, (55%), while the GOG will provide \$6.7 (45%) in counterpart resources. The AID contribution will consist of a \$5.5 million loan and a grant of \$2.6 million. The disbursement period for the project is five years and six months from the loan signing date.

Summary Project Budget
(\$ 000)

<u>Activity</u>	AID		<u>GOG</u>	<u>Total</u>
	<u>Loan</u>	<u>Grant</u>		
I Applied Research and Evaluation	1,202	1,357	1,551	4,110
II Extension and Promotion	895	1,012	2,835	4,742
III Credit and Social Cost Payments	3,168	-	2,288	5,456
IV Project Coordination	-	235	-	-
V Inflation/Contingencies	235	235	-	-
	=====	=====	=====	=====
Total:	5,500	2,600	6,674	14,774

CHART No. 1

ANNEX 0
Page 1 of 4

MARKET SHARE OF THE INCREASE IN LOCAL CONSUMPTION
OF SELECTED VEGETABLES AND FRUITS TO BE SUPPLIED
BY THE PROJECT

Products	Domestic Consumption 1975	Domestic Consumption 1967	Metric Tons	Tons	Approximate Annual rate of increase %	Share of the increase to be supplied Project	1980 Projected Domestic Consumption-M.T.
Potatoes	12,761	8,092	4,669	58	6	4	16,770
Carrots	10,750	8,098	2,652	33	4	4	12,261
Cabbage	10,634	8,232	2,404	29	3	2	27,911
Cauliflower	5,295	2,652	2,643	100	9	6	9,389
Chard	7,631	4,135	3,496	85	8	5	10,693
Beets	3,745	2,203	1,542	70	7	4	6,084
Onions	13,064	9,700	3,364	35	4	-	15,262
Lettuce	4,229	1,836	2,393	130	10	6	6,810
Garlic	3,739	2,959	780	26	3	-	4,137
Green Beans	4,468	3,288	1,180	36	4	-	5,173
Radish	3,310	2,434	876	36	4	-	3,834
Tomatoes	52,636	40,538	12,098	30	3	-	48,820
Green Peas	1,961	1,548	413	27	2	-	2,173
Cucumbers	4,352	3,448	904	26	2	-	4,810
Turnips	1,471	754	717	95	9	6	1,620
Spinach	1,287	950	337	35	4	4	1,487
Celery	656	415	241	58	6	4	834
Br. Sprouts	46	35	11	31	3	-	52
Broccoli	73	60	13	22	2	-	74
Asparagus	343	593	(250)	(42)	-	-	419
Plums							
Fruits:							
Avocados	17,087	14,100	2,987	21	2	2	17,824
Apples	840	356	484	135	11	8	1,194
Peaches	723	306	417	136	11	8	135
Prunes	672	463	209	45	-	-	1,243
Pears	366	120	246	205	15	12	849
Cherries	106	68*	38	56			

*includes processing with experts

NOTE: All the data on consumption was provided by Annex II of "Sistemas para el Mejoramiento del Pequeño Agricultor", AID Guatemala, Rural Development Files.

INCREASE IN PRODUCTION OF VEGETABLES GENERATED
BY THE PROJECT AND MARKETS WHERE PRODUCTS WOULD
BE SOLD

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Products										
1. With mini-irrigation										
1.1. Carrots:										
- Local market - M.T.	500	1000	1500	2100	2700	3300	3900	4500	5200	5900
Central American Market -M.T.		500	700	1000	1200	1600	2000	2200	2600	3000
total Increase - M.T.	500	1500	2200	3100	4000	4900	5900	6700	7800	8900
- Yield: 8.4 M.T. per Ha.										
- New Area cultivated - Ha. (two crops per year)	30	90	131	184	238	292	351	399	464	530
1.2 Cauliflower:										
- Local Market M.T.	600	1200	1800	2500	3200	3900	4700	5600	6500	7400
- C. A. Market - M.T.	-	600	900	1200	1600	2000	2300	1800	3200	3700
Total Increase - M.T.	600	1800	2700	3700	4800	5900	7000	7400	9700	11100
- Yield: 15.5 M.T. per Ha.										
- New Area cultivated - Ha. (two crops per year)	19	58	87	120	155	190	226	238	313	355
1.3 Chard:										
- Local Market - M.T.	500	1100	1700	2300	2900	3600	4300	5100	5900	6700
- C.A. Market - M.T.	-	500	800	1100	1500	1800	2100	2500	3000	3300
Total Increase - M.T.	500	1600	2500	3400	4400	5400	6400	7600	8900	10,000
- Yield: 14 M.T. per Ha.										
- New Area cultivated - Ha. (Two crops per year)	18	57	90	122	157	193	228	272	318	357

207

CHART No.3 - Page 2

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1.4 Beets:										
- Local Market - M.T.	200	500	800	1000	1300	1600	1900	2200	2600	2900
- C.A. Market - M.T.	-	200	400	500	600	800	1000	1100	1300	1500
Total Increase - M.T.	200	700	1200	1500	1900	2400	2900	3300	2900	4400
- Yield: 17 M.T. per Ha.										
- New Area Cultivated - Ha. (Two crops per year)	6	21	35	44	56	71	85	87	115	130
1.5 Lettuce:										
- Local Market - M.T.	400	800	1300	1800	2300	2800	3400	4000	4700	5300
- C.A. Market - M. T.	-	400	600	900	1100	1400	1900	2000	2300	2600
Total Increase - M.T.	400	1200	1900	2700	3400	4200	5300	6000	7000	7900
- Yield: 16.4 M.T. per Ha.										
- New Area cultivated - Ha. (Two crops per year)	12	37	58	82	103	128	162	183	214	241
1.6 Turnips:										
- Local Market - M.T.	100	200	300	400	500	700	800	1000	1100	1300
- C.A. Market - M.T.	-	-	-	-	-	-	-	-	-	-
Total Increase - M.T.	100	200	300	400	500	700	800	1000	1100	1300
- Yield: 13 M.T. per Ha.										
- New Area cultivated - Ha. (Two crops per year)	4	8	12	15	19	27	31	38	42	50

Chart 3

	82	83	84	85	86	87	88	89	90	91
1.7 Spinach:										
- Local Market - M. T.		100	200	200	300	400	400	500	600	700
- C.A. Market - M.T.	-	-	-	-	-	-	-	-	-	-
Total Increase - M.T.	-	100	200	300	300	400	400	500	600	700
- Yield: 10 M.T. per Ha.										
- New Area cultivated - Hect. (Two crops per year)	-	5	10	15	15	20	20	25	30	35
1.8 Celery:										
- Local Market - M.T.	-	-	100	100	200	200	200	300	400	400
- C. A. Market - M.T.	-	-	-	-	-	-	-	-	-	-
Total Increase M.T.	-	-	100	100	200	200	200	300	400	400
- Yield: 11 M.T. per Ha.										
- New Area cultivated - Ha. (One crop per year)	-	-	4	4	9	9	9	14	18	18
Total Area under irrigation:	89	276	427	586	752	930	1112	1256	1514	1716
New Area with Irrigation Each yr.	89	187	151	159	166	178	182	144	258	202
2 - without irrigation:										
2.1 Potatoes										
- Local Market - M.T.	600	1400	2100	2900	3600	4400	5300	6200	7100	8000
- C. A. Market - M.T.		300	500	600	900	1100	1300	1500	1800	2000
Total Increase - M.T.	600	1700	2600	3500	4500	5500	6600	7700	8900	10000
- Yield: 13 M.T. per Ha.										
- New Area cultivated (one crop per year)	46	130	200	270	346	424	508	592	684	768
2.2 Cabbage:										
- Local Market - M.T.	500	1100	1700	2300	2900	3500	4100	4800	5400	6100
- C.A. Market - M.T.	-	200	400	600	700	800	1000	1200	1400	1500
Total Increase - M.T.	500	1300	2100	2900	3600	4300	5100	6000	6800	7600
- Yield: 21.2 M.T. per Ha.										
- New area cultivated	24	62	100	138	170	202	240	284	320	358
Total Area without irrigation (one per year)	70	292	300	408	516	626	748	876	1004	1126
Total Area of Project	159	568	727	994	1268	1556	1860	2132	2518	2842
3: Number of Farmers participating										
each year - 1/3 Ha. per Farmer	477	1704	2181	2982	3804	4668	5580	6396	7554	8526