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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

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PROJECT PAPER

LAC REGIONAL

LAC CROP CREDIT INSURANCE SYSTEMS

LAC/DR:78-19

Project Number:598-0579

UNCLASSIFIED

AUG 2 3

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR (LAC)

FROM: LAC/DR, Marshall D. Brown

Problem: Authorization of a $4.375 million regional crop credit insurance pilot project grant.

Discussion: The purpose of the project is to develop viable, national level crop insurance programs on a pilot basis to service small farmer needs in three Latin American countries. The crop insurance programs are designed, first, to reduce the risk of excessive default faced by lending institutions--thus encouraging them to lend to small farmers who otherwise would not be eligible for credit; and second, to reduce the risk faced by small farmers in adopting new and improved production technologies--thus providing an important incentive to increased production.

Under the project, semi-autonomous crop insurance agencies attached to the Ministries of Agriculture will be established in Ecuador and Bolivia, and an existing crop insurance agency in Panama will be strengthened. The companies will initially undertake limited crop insurance activities on a pilot basis, and will expand their coverage gradually as their programs prove successful. Core personnel from each of the three agencies will be trained in various aspects of crop insurance (policies, forms, rates, etc.), and technical assistance, both long and short term, will be provided to each of the agencies in management and specific areas of insurance, such as rate making, loss adjustment and underwriting.

The project also involves research activities in each of the three countries, as well as in Mexico, which has the only existing small farmer oriented crop credit insurance program in the world. The research will focus on different methods of providing crop insurance, and on the impact of crop insurance upon credit demand and availability, technology adoption, crop mixes, employment and farmer welfare. The possibility of creating a regional crop reinsurance mechanism will also be explored during project implementation, with a view to establishing such a mechanism by the end of the four year implementation period.

AID will provide $4.375 million in grant funding to the Inter-American Institute for Agricultural Sciences (IICA), which in turn will provide sub-grants to the three crop insurance agencies to finance start-up costs and operating expenses. The AID grant to IICA will also finance

the technical assistance, training and research activities under the project. The three host governments involved will subsidize up to two-thirds the cost of crop insurance premiums to farmers and will cover all losses incurred by the three insurance agencies which are not covered by premiums. The total host government contribution will vary, therefore, with the amount of losses incurred. Based upon estimates of maximum probable losses, the host government contribution is estimated at $12.8 million.

The Bureau's Environmental Committee has reviewed the Initial Environmental Examination prepared in conjunction with the PP and has concurred in the recommendation for a Negative Determination.

The project is included in the FY 1978 Congressional Presentation, but at funding levels below those currently proposed. An Advice of Program Change has been submitted.

The DAEC reviewed and approved the project on June 20, 1978.

Recommendation: That you sign the attached Project Authorization and Request for Allotment of Funds (PAF) form, thereby authorizing SER/CM/ROD/LAC to negotiate and sign a Grant for the LAC Regional Crop Credit Insurance Systems Project.

Attachments:

1. TAB A-PAF
2. TAB B-Project Paper

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

ASSISTANT
ADMINISTRATOR

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

Name of Entity :	Inter-American Institute for Agricultural Sciences
Name of Project:	LAC Crop Credit Insurance Systems
Project Number :	598-0597

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to the Inter-American Institute for Agricultural Sciences (the "Grantee") of not to exceed One Hundred Thousand United States Dollars ($100,000) (the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The Project consists of pilot crop-credit insurance programs to be organized in three countries in Latin America and located organizationally within the national governments of these countries; the training of personnel and development and testing of administrative policies and procedures; and a research component that will report on how best to adapt crop credit insurance to local conditions and measure the impact of this type of insurance upon government finances and upon farmers' use of inputs, crop mixes, income and other economic factors (the "Project").

I approve the total level of A.I.D. appropriated funding planned for the Project of not to exceed Four Million Forty-Six Thousand United States Dollars ($4,046,000) Grant, including the funding authorized above during the period FY 1978 through FY 1982. I approve further increments during that period of Grant funding up to $3,946,000, subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and conditions together with such additional terms, covenants and conditions as A.I.D. may deem appropriate:

A. Source and Origin of Goods and Services

Except as provided in Section D hereof, goods and services financed by A.I.D. for the Project shall have their source and origin in the United States. Ocean shipping financed under the Grant shall be procured in the United States, except as A.I.D. may otherwise agree in writing.

B. Conditons Precedent to Subgrant Disbursements

Except as A.I.D. may otherwise agree in writing, prior to any disbursement or the issuance of any commitment documents under the Project Agreement for subgrant programs the Grantee shall obtain from the subgrantee and shall furnish in form and substance satisfactory to A.I.D.:

1. A time-phased implementation plan for carrying out the subgrant project including identification of all resources to be provided by the subgrantee. The plan shall include a definition of eligible small farmers satisfactory to the Grantee and the local A.I.D. Mission.

2. Evidence of a commitment of the subgrantee:

   (a) to consult with the Grantee and the local A.I.D. Mission prior to the issuance of crop insurance in the process of selecting the crops to be insured;

   (b) to make available, in the areas in which crop insurance is offered, the necessary complementary input services;

   (c) to pay all losses arising from the issuance of crop insurance pursuant to the Project without regard to whether such losses may exceed premiums collected from insured farmers; and

   (d) to assume all administrative costs of continuing the program at approximately this one level upon completion of the respective subgrant project.

C. Condition Precedent to Continued Disbursement for Subgrants

Except as A.I.D. may otherwise agree in writing, the subgrantee shall be required to provide within six months from the date of signing of each subgrant agreement evidence to the Grantee that legislation has been enacted or other appropriate legal authorization provided to enable the crop credit insurer to function fully in accordance with the terms of the subject agreement.

D. Waivers

1. The A.I.D. grant will finance research on the economic desirability of making large capital investments in crop credit insurance in the future. Mexico has the only small farmer oriented crop credit insurance program in the world. The Mexican institution, which has been functioning for 15 years, is the only site where research into a crop credit insurance program can take place. Therefore, procurement of services from A.I.D. Geographic Code 523 (Mexico) and the conduct of Project activities related to research are authorized.

2. The Project will utilize technicians who are experts in crop insurance and familiar with development issues. However, there are very few technicians who meet these qualifications. A small number of professional and competent personnel can be found in Mexico, Japan, Sweden, Israel, Canada and the United States. The number of technicians available from the U.S. would not meet all program requirements to permit orderly implementation of the Project. Sympathetic consideration will be given to procurement of technical services from A.I.D. Geographic Code 899 committees on a case-by-case basis.

E. USDA RSSA

In addition to the amount of the Grant, I further authorize the use of not to exceed $329,000 during the life of the Project for the establishment of a Resources Support Services Agreement (RSSA) with the U.S. Department of Agriculture for

the services of a Crop Insurance Specialist and other related consultants required in the process of project implementation and evaluation.

Assistant Administrator
Bureau for Latin America and the Caribbean

Aug. 29, 1978
Date

Clearances:

LAC/DR,WSigler _____ Date
LAC/DR,MBrown _____ Date 8/23

GC/LAC,JLKessler:lb:8/23/78:23272

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: [A] A = ADD, C = CHANGE, D = DELETE

PP

2. DOCUMENT CODE: 3

3. COUNTRY/ENTITY: LA Region

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): 598-0579

6. BUREAU OFFICE: A. SYMBOL: LA; B. CODE: 3

7. PROJECT TITLE (Maximum 40 characters): LAC Crop Credit Insurance Systems

8. ESTIMATED FY OF PROJECT COMPLETION: FY 83

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 78; B. QUARTER 4; C. FINAL FY 82 (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	100	( )	100	4,375	( )	4,375
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY	100		100		12,813	12,813
OTHER DONOR(S)						
TOTALS						

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY GRANT	E. 1ST FY LOAN	H. 2ND FY GRANT	H. 2ND FY LOAN	K. 3RD FY GRANT	K. 3RD FY LOAN
(1) FN	241	041		100		980		1,014	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY GRANT	N. 4TH FY LOAN	O. 5TH FY GRANT	O. 5TH FY LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) FN	1,062		1,219		4,375.0	
(2)						
(3)						
(4)						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULED: MM 06 YY 81

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET. [1] 1 = NO, 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE

TITLE
John S. Balis
Chief, LAC/DR/RD

DATE SIGNED: MM 07 DD 27 YY 78

15. DATE DOCUMENT RECEIVED IN AID, OR FOR AID, W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-6 (3-76)

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B. Recommendations

LAC/DR/RD recommends that a grant for $4,375,000 covering a period of four years be approved to permit the creation of crop-credit insurance programs in Latin America, the development of related support institutions, and the analysis of its impact.

It is also recommended that the waivers requested herein be granted. These grant permission to carry out research and training in Mexico and to use advisors who are not citizens of the U.S. or host countries.

C. Description of the Project

Pilot crop-credit insurance programs will be organized in three countries. The programs will be located organizationally within the national governments of these countries. Personnel will be trained and administrative policies and procedures will be developed and tested.

Crop-credit insurance is a mixture of credit insurance and crop insurance. It protects lenders from default when crops fail and guarantees to farmers that their income will not fall below zero when they try modern but risky technology. Farmers will have to continue to use traditional risk management methods (such as belonging to extended families; see Annex B, page 4) in the same way that they do when they plant with traditional methods. Although the insurance does not usually make a payment directly to the farmer, it does protect two important assets of his; his source of credit and his debt carrying capacity. Crop-credit insurance can be thought of as part of the new delivery mechanism required by the green revolution.

The research component of this project will report on how best to adapt crop-credit insurance to local conditions, will measure the impact upon farmers' use of inputs, crop mixes, income and similar economic factors, and finally, upon government finances.

D. Summary Findings

1. The most widely accepted model of the effect of risk on farmers' decision making states that farmers will reject options which involve a substantial probability of earning an income below some survival threshold. Crop-credit insurance can effect this probability and the acceptability of these options.

2. The lack of effective loan collateral is one reason why private, formal lenders will not lend to small farmers. Crop-credit insurance acts as collateral since loss payments are made first to the creditor to cancel outstanding loans.

3. Crop-credit insurance is unique in being able to effect both the demand and supply sides of the small farmer credit situation.

4. There is one successful small farmer oriented crop insurance program operating under LDC conditions in the world. That is in Mexico and it has been successful to the extent of involving private institutions in small farmer credit.

5. Adequate resources exist to staff the programs and to provide training and technical assistance for this pilot project.

6. Social analysis indicates that there are no insuperable obstacles to this program although sensitivity to cultural factors will be required to assure reaching the target population.

7. Economic analysis indicates that the effect upon technology adaption, crop mixes, credit flows, production, employment and similar consideration will be positive and will likely be greater than economic costs.

8. The strategy proposed for the project assures that it will be affordable fiscally for the host governments. Three countries have requested assistance.

9. Some degree of subsidy from government will always be required, thus the insurance will never be financially viable in the strictest sense. However, it is likely to create net financial savings for governments which wish to reach small farmers.

10. Crop credit insurance has a positive bias towards small farmers when economic benefits are considered. It does not have to be purchased in minimum size chunks. Deliberate efforts must be made to assure that it reaches small farmers. The average size of insured Mexican farmers' landholdings is 3.5 hectares. The minimum size is 1/3 hectare.

E. Project Issues

Issues identified in the January 21, 1977 memorandum on this project follow. That memorandum is incorporated here as appendix A.

1. Other Relevant Experience: This is summarized in appendix B.

2. Project Studies: Phasing the project in stages has been accomplished by designing a three stage project. This project cover the first stage.

3. LDC Cooperation: The proposed countries have informally, but strongly indicated their interest in participation. Negotiations of the sub-grants will formalize that commitment.

4. Implementing Agent: An agency has been identified as superior for this project's requirements and presented here.

5. Economic, Social and Other Analysis: These have been completed and are presented here. Generally, favorable results obtained.

6. Target Group Coverage: This has been discussed in the technical analysis and in appendix B. Indications are mixed but strongly weighed in

favor of the project reaching the target group. The research component of the project is designed to measure the extent to which this goal is achieved.

7. Financial Viability: This is discussed in the Technical Analysis, the Financial Analysis, the Economic Analysis, and appendix B. Crop credit insurance will always need governmetn subsidies, but will be viable within this limitation.

In addition to the issues identified earlier, the DAEC should consider the following:

1. Research in Mexico. One component of this project is to research the economic desirability of making large capital investments in crop credit insurance in the future. Since Mexico presently has the only small farmer oriented crop credit insurance program in the world, the includion of Mexico as a research site under the project will result in an increase in the number and quality of observations. Mexico's ANAGSA has had over fifteen years of experience with crop credit insurance, and will be able to provide much more detailed and reliable information about the impact of this type of insurance than will be obtained from the three organizations established under this project. It is contemplated, therefore, that the IICA will use a portion of the funds from the Grant to pay for ANAGSA's expenses incurred in carrying out the necessary research, either pursuant to a contract between IICA and ANAGSA or through a sub-grant.

Under A.I.D. policy, Geographic Code 000 (United States) is the authorized source for procurement for grants of the type proposed by this paper. For the reasons presented above, however, a waiver from Code 000 to Code 523 (Mexico) is believed to be critical to the success of the project.

2. Third Country Nationals as Technicians. The project contemplates the utilization by IICA of several technicians, either as independent contractors or as employees of IICA. However, the supply of technicians throughout the world who are expert in crop insurance and familiar with development issues is limited. A small number of professional and competent personnel can be found presently in Mexico, Japan, Sweden, Israel, Canada, and the U.S. Travel and investigation during the design phase of this project provided support for the conclusion that there are not more than one or two qualified persons in any of these countries, other than in Mexico. The only source for qualified technicians from the U.S. is the Federal Crop Insurance Corporation, which is part of the Department of Agriculture. At present, the FCIC is reorganizing in response to changes in its mandate by Congress and is seeking to add personnel to its own roster of the types required by this project. FCIC has agreed, however, to assign two persons to this project.

Since one purpose of this project is to develop several models for operating this kind of insurance enterprise and because of our relatively high level of inexperience with respect to crop

insurance in LDCs, it is desirable to incorporate the lessons from as many successful programs as possible.

Due to the scarcity of the required personnel in the U.S. and the host countries, and the desirability of incorporating the lessons of other countries into this project, it is believed that the interests of the U.S. would be best served by permitting the procurment of services from free world countries other than the U.S. and, therefore, a waiver from Code 000 should be granted to permit the use of technicians from countries included in A.I.D. Geographic Code 899.

F. Project Committee

The project committee has been composed of:

James T. Riordan, LAC/DR/RD, AID/W
William G. Kaschak, LAC/DR/MAD, AID/W
Nelson Maurice, LAC/DR/RD, AID/W

The following people also contributed significantly to the design of the project although not as committee members:

Bastiaan Schouten, Deputy RDO, AID/La Paz
Daniel A. Chaij, RDO, AID/La Paz
Vincent Cusumano, LAC/DR/RD, AID/W

Part II - Project Design And Detailed Description

A. Background

For many years AID has attempted to help modernize agricultural sectors of Latin America. It has striven to improve the lives of small farmers and deliver the promise of the green revolution. Its strategy has been to strengthen agricultural input and output institutions and improve the position of poor farmers viz-a-viz those institutions. It has attempted to develop programs which were biased in favor of poor farmers or were at least neutral between them and large farmers.

For a variety of reasons poor farmers are hard to reach and help. Small farmers are many, scattered, isolated, illiterate and generally more difficult to reach than larger farmers. From the farmers point of view, government agents and programs are viewed with suspicion. Recommendations of extension agents are relatively more expensive for poor farmers to adopt, and if the recommendations prove wrong, the very survival of near subsistence farmers may be threatened.

To overcome the problem of the cost of inputs, agricultural banks and cooperative systems have been supported by AID throughout all of Latin America. These institutions have met with only limited success, however, as they have had to endure serious decapitalization which cripples their lending ability. Part of this decapitalization is the result of poor loan portfolio management, but crop failures, which prevent farmers from paying back loans, are also responsible for a significant portion. Efforts to separate poor management induced losses from crop failure losses have been hampered by farmers who falsely claim crop losses. Agricultural lenders have longed for an insurance program which would compensate them in case of crop failures and also identify the non-serious farmers (NSF) using this as a cover for their willful failure to repay.

This decapitalization has occured with large and small farmers alike, even though small farmers usually have not been eligible for production loans. Some have been excluded because they do not have title to their lands and, therefore, could not present adequate collateral. Others, with clear titles have still been excluded because lenders realized that it would be too costly as well as politically infeasible to foreclose on small holders. Clearly, some kind of new mechanism is necessary if the small farmer is to be reached.

Even when welcome in the banks and cooperatives, the small farmers themselves have been less than enthusiastic. Institutional obstacles such as paperwork and language differences exist and, even if overcome, there still remains the farmers' critical sensitivity to risk. If the technology being advised by extension services fails, farmers wonder how their families will eat and what they will be required to do about the loan.

This problem is more serious for the small farmer operating at the margin of survival than for the large farmer who has considerable wealth and other sources of income. Again, some kind of insurance mechanism would be helpful to protect farmers from the risk involved in adopting new technology.

Three kinds of insurance have been considered. The first is credit insurance, which, in the case of agricultural credit, would repay the bank when it is unable to collect from the farmer. Credit insurance is inadequate however, because, although it pays the bank, it does not forgive the farmer.

The second type is called crop insurance and does make a payment directly to the farmer. The third type is a subset of crop insurance and is called crop-credit insurance. The policy covers the farmer's loan and pays it off if there is a crop failure. Lenders are happy because they have an improved guarantee for their loans. Farmers are happy because they can make risky decisions at the beginning of the year confident that the worse possible outcome will not be worse than if they had used traditional technology and no insurance. Also, the debt carrying capacity of the farmers is protected as the slate is wiped clean each time and the solvency of their banks and coops is protected as is the availability of loans in future years.

Since the 1950's there have been frequent calls for the establishment of either credit or crop insurance programs. The credit insurance programs and proposals have actually tended to be loan guarantee programs and have not been designed for permanence. (See Annex B.) Crop insurance programs have generally not gotten off the ground in developing countries. This has been largely due to a lack of understanding about their operation (which in turn is due to their newness) and a lack of adequate financing. As it now exists, all risk crop insurance has only been in existence since the late 1940's when programs in the U.S. and Japan were redesigned. Successful crop insurance programs have been concentrated in the developed world (U.S., Japan, Canada, Sweden, Israel, South Africa).

As a result of this ignorance and lack of experience, naively designed programs were created in several LDCs. In many cases the insurance was modeled on private rather than social insurance and was expected to be self-financing while being open to all classes of farmers at artificially low rates. Failures abounded and, by the mid-sixties, the general wisdom developed was that crop insurance, although nice, is just not realistic.

Since 1962, however, Mexico has developed a crop-credit insurance program which has enjoyed considerable success. The program is not well known outside Mexico and has really been reviewed only once, and then by a scholar who focused on transitory organizational problems. Solutions to many of these problems have since been demonstrated in successful pilot projects.

The Mexican program was created to resolve a loan collateral problem associated with ejidal land holdings. Ejidal farmers own their land, but they cannot sell or mortgage it. Therefore, banks cannot make loans using the land as collateral. Crop insurance was created in Mexico to act in lieu of collateral in case of crop failure. Clearly, here is a program that fulfills the needs stated earlier.

If AID continues to provide agricultural credit funds, extension assistance, support the introduction of new technology and promote the substitution of narcotic crops, it has an opportunity to gain leverage on the institutional effectiveness of these programs and their acceptability to small farmers by exploiting newly developed crop-credit insurance technology.

It is important to stress that this insurance technology is new.

International agencies concerned with agricultural development are generally unaware of the nature of its management and operation and tend to hold opinions based on the 1950's experience. Rigorous economic analysis of its impact have not been performed. The Nathan & Associates study performed for this project review was the first of its kind. (See Section III D.)

There was an attempt in the late 1960's in Latin America to initiate a regional crop insurance project. Three conferences were held from 1966 to 1970 at the initiative of Mexico which wanted to share its findings, but also wanted to attract support for its own program by establishing a regional reinsurance pool. This flurry of activity was supported by the FAO but produced very limited results. A program serving large rice farmers in Costa Rica was established. Programs were considered and abandoned in several countries, mainly as a result of unstable political conditions, but also because of naive financial and technical analysis.

A cursory examination of crop insurance suffices to identify that the possibility of catastrophic losses is a significant threat to the viability of the program of any small or medium sized nation. Reinsurance appears to be the most effective mechanism for resolving this problem. * The already existing commercial market however, is not willing to accept this risk because of the social/political hazard involved. (See Annex B.)

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* Reinsurance refers to the practice where a large company or a pool of companies guarantees a smaller company against the eventuality that risks which it has accepted "go bad" and cause excess losses for that company.

Therefore, if the problem is to be resolved, if small countries are to be assisted, they must form a pool to provide their own reinsurance. Such a pool for Latin America would require several participant nations and large scale financing from international sources. An important component of this project will be to examine the feasibility of establishing such a regional reinsurance pool (Agencia Latinoamericana de Reaseguro Agricola-ALARA).

The present is a particularly opportune time to begin building towards that point. There is considerable interest again in Latin America in crop insurance. There are two ongoing programs, two new programs, studies or discussions in nine other countries, and one regional organization is actively studying the topic. AID can, by acting at this time, cause this latest interest to coalesce in operational programs thus making the viability of LDC small farmer crop insurance programs feasible.

It is not advisable, however, to begin work on ALARA immediately as several national programs must first be in place and because the large amount of financing that will be required for successful reinsurance program necessitates more careful analysis than has been performed to date. The execution of successful pilot projects and the associated research will provide a basis for proper judgment at a later date.

AID can further use its support of crop insurance as leverage to induce national governments to direct additional resources to the agriculture sector in general and to the target group, the rural poor, in particular The ongoing programs in Costa Rica and a proposed program in Guatemala, for example, are directed exclusively at medium and large size farmers. AID assistance could be instrumental in redirecting these programs towards small farmers.

It should be noted here that the economic analysis crop-credit insurance indicates that higher net economic benefits for the nations will be realized if the programs are directed at small rather than larger farms. No alternative program exists that impacts on credit institutions or small farmer technology adoption rates as efficiently and effectively as crop-credit insurance. (See Annex B.)

Detailed Description

1. Project Goal

In general, AID agriculture programs in Latin America have focused on various methodologies designed to increase small farmer production: introduction of new technologies, improved seeds, strengthening of extension services, farm-to-market roads, credit, etc. This pilot project will continue to pursue this goal of increased small farmer production and improved welfare through the testing of the feasibility of a crop insurance program designed, first, to reduce the risk of

excessive default faced by lending institutions--thus encouraging them to lend to farmers previously ineligible for credit, and, second, to reduce the risk faced by small farmers in adopting new and improved production technologies--thus providing an important incentive to increased production.

2. Project Purpose

The purpose of the project is to develop viable, national level crop insurance programs which service small farmer needs. Utilizing the data collected from project activities, the feasibility of an internationally financed regional crop reinsurance mechanism for Latin America (ALARA) will also be examined and designed should it be proven to be feasible. Panama, Ecuador, and Bolivia will participate in this pilot project. Programs will be developed and tested based upon the experience gained from similar crop insurance programs throughout the world (see Annex B for a detailed discussion on these programs).

As a pilot program, it is expected that successful implementation will not only lead to expansion of the program to other countries but will also provide incentives for increased participation at a later stage by the private sector in making credit available to small farmers.

3. Outputs

The outputs of this project can be thought of as being oriented towards the present or towards the future. The later is the more important of the two. Present oriented outputs refer to the farmers served and credit insured. It is expected that approximately 15 million dollars of credit and 10,000 farmer-years of insurance will be provided. These sums are quite modest and are in the result of the project strategy.

This strategy indicates that inorder to begin an insurance program with almost no actuarial data, the project must be small. The actuarial data required for a later program which is national in scope will come from this project. Therefore, small beginnings are appropriate since they provide information almost as significant as large programs but without risking the same magnitude of funds.

Future oriented outputs refer to the information, plans and capabilities which will be created by this project and which will permit the more aggressive and confident provision of risk management services to target farmers in the future.

Specifically, core personnel in three countries will be trained, the mechanics of doing insurance (eg-policies, forms, rates) will have been developed, economic benefit/cost analysis will have been completed, and a regional reinsurance mechanism designed.

AID 1020-25 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 78 to FY 81
Total U.S. Funding 4,100,000
Date Prepared 4/78

Project Title & Number: CROP - CREDIT INSURANCE SYSTEMS

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Increase total food production and small farmer welfare.	Measures of Goal Achievement: - Increased production and consumption of food products by small farmers. - Increased wealth of small farmers.	- Project research component - USDA, FAO and OAS reports.	Assumptions for achieving goal targets: - Small Farmer food production continues to be an important host country priority in Latin America. - International donors and host governments will continue to support other programs designed to improve the performance of the small farmer sector.
Project Purpose: To develop viable national level crop insurance organizations which service small farmers.	Conditions that will indicate purpose has been achieved: End of project status. - National crop insurance organizations established in three countries with host government commitment to finance them. - Two years of experience insuring clients of a private sector lender. - Applications from 5 countries for assistance to start new programs. - Involved countries decide to create and support ALARA.	- Quarterly project reports to AID. - Project research component. - Scheduled AID evaluation reports.	Assumptions for achieving purpose: - General political and economic stability maintians in the three countries. - Target farmers will be willing to participate in the pilot project.
Outputs: - Feasibility and desirability of crop-credit insurance demonstrated and projects ready to expand to national coverage. - Personnel trained and "how-to-insure" technology developed. - Research into risk and credit systems and farmers-behavior completed. - Regional reinsurance agency (ALARA) designed.	Magnitude of Outputs: - Three pilot projects will have insured at least $15,000,000 in credit for approximately 10,000 farmer-years. - Thirty country and five international technicians will be trained. - Contracts and administrative systems for insuring a total of ten crops in three countries will exist.	- Quarterly reports to AID - Project Research component - ALARA designed and funding proposed. Magnitude of Outputs continued: - Economic impact analysis will have been completed in Mexico and three other countries. - Plans for ALARA complete and submitted to governments.	Assumptions for achieving outputs: - Suitable personnel can be located and recruited in each country.
Inputs: Three pilot projects administrative costs Technical assistance and research AID/W supervision and support Complete computer research project TOTAL AID Premium subsidies Contingent reserves for catastrophic losses Total other Governments Grand TOTAL	Implementation Target (Type and Quantity): ($000) FY78 / 79 / 80 / 81 / TOTAL 519.0 / 532.5 / 543.0 / 567.5 / 2,162.0 397.0 / 365.0 / 398.0 / 469.0 / 1,629.0 66.0 / 72.5 / 62.5 / 100.5 / 301.5 7.5 / - / - / - / 7.5 989.5 / 970.0 / 1003.5 / 1,137.5 / 4,100.0 103.0 / 194.0 / 260.0 / 346.0 / 903.0 1707.0 / 2816.0 / 3378.0 / 4009.0 / 11,910.0 1810.0 / 3010.0 / 1638.0 / 4355.0 / 12,813.0 2782.0 / 3951.0 / 4269.0 / 5451.0 / 16,813.0	- Quarterly project reports to AID - AID financial records.	Assumptions for providing inputs: -----

4. Inputs

Resources required by this project are manpower, commodities and financing. The personnel required are presented in tables 4, 6, 8 and 10, which are presented in the financial analysis section. Each of the three country programs will be staffed with about one dozen people. They will constitute the minimum core of the insurers. The regional technical assistance agency will require four professionals and supporting assistance. One technician will be assigned to each country and a project manager will work out of the headquarters of the regional agency.

Short term consultants on both insurance and economic matters will be utilized. Finally, project supervision for AID/W will be handled by a PASA technician assigned on a two thirds time basis to LAC/DR/RD by the USDA's Federal Crop Insurance Corporation.

Commodity requirements for this project are moderate. A total of 20 vehicles as shown in tables 3, 5 and 7 will be needed. In addition office furniture, equipment and supplies will be required.

Financing of the project departs from the most common approach In this case, AID will underwrite administrative expenses, and the host countries guarantee losses. The specific amounts involved are on the face sheet and in tables 1 and 2.

The cause for this reversal is based on a condition which has destroyed many previous crop insurance attempts and which, among insurers, is known as moral hazard. Essentially, this means that people are more willing to suffer a loss if they know that someone else will pay for it. In this case, governments will be running the programs and decidind which losses to pay. Political considerations will mitigate for the making of unnecessary loss payments. There will be more reluctance to do this if losses are paid out of a local government account than if made from an AID provided guaranty.

5. Choice of Participating Countries

This pilot project will operate initially in three countries: Panama, Ecuador and Bolivia. Although it would be beneficial to include more countries in the early stages of the project, three has been judged to be the minimum number required to conduct a viable research program. Five countries would be ideal. The project should be expanded as soon as possible to provide an adequate experimental base. Colombia, Nicaragua, Brazil and Honduras have been identified as possible expansion areas.

Prior to selecting the participating countries, several countries in the region were visited to determine whether the appropriate organizational structures exist to support the project, as well as the extent of government commitment to the project. Specifically,

factors examined include the existence of credit programs which the proposed project could complement, the availability of basic agricultural infrastructure support, complementary AID projects in agriculture, and the receptivity of small farmers to the program (see social analysis for a discussion of this latter factor).

Panama is the only country of the three which currently has a crop insurance program. It is less than two years old, however, and participation in this project will provide the opportunity to upgrade and redirect the program through the technical assistance to be provided and research to be conducted. In addition to the general considerations already mentioned, the existence of this program, particularly in its very early years, was a principal factor in selecting Panama.

AID's participation in Panama can be important for helping ISA to improve in several areas. Advice and assistance can be used by ISA (Instituto de Seguros Agropecuario) to do the following:

i. Review and recommend a new law for ISA;
ii. Review and recommend a new financial structure for ISA;
iii. Provide broader coverage including the insuring of interest and premium charges, providing group life insurance and voluntary coverage of amounts in excess of the minimum;
iv. Improve formal and working links with credit institutions;
v. Improve working links with agricultural research and planning agencies;
vi. Improve outreach to small farmers; and
vii. Support the integrated area development project at Tonosi.

While Ecuador and Bolivia do not have crop insurance programs, their selection is based on the judgment of the project committee that the situation in the ag sector in these countries is particularly ripe for the addition--or at least testing in selected geographic areas--of the insurance program. National agricultural development banks exist, cooperative programs have been developed and are expanding, and the governments have shown interest in reaching the small farmer and providing all possible incentives to increased production and, thus, improved welfare. Discussions with officials from the respective Min Ags confirmed this commitment of the GOE and GOB.

Selection of these countries is of course dependent upon final negotiations. If one of these countries were to drop out, it could be replaced with another, possibly Honduras, Colombia, Brazil or Nicaragua.

Guatemala would have made an excellent test site because the economic research reported on in this paper was performed using Guatemalan data. A tie-in between that research and what is proposed here would have been particularly useful. AID/Guatemala, however, recommended against operating there citing a lack of government interest in serving small farmers. Although AID's involvement would be justified for the purpose of changing this anti-small farmer bias, it was decided not to operate in Guatemala because a very long pipeline there made new projects difficult.

6. Project Design

a. Strategy

Inorder to maximize the production stimulating effect of insurance and minimize administrative costs and certain problems inherient in the nature of insurance, this program will be piggy-backed on already existing credit systems. The insurer will contract with lenders to provide coverage for borrowers. Lenders will agree to require all eligible borrowers to purchase insurance. They will facilitate the application process and will provide farmers with premium financing if necessary.

Although there are many different ways of structuring the coverage plan of the insurance policy, the minimum coverage provided will be enough to repay the farmer's production loan. Coverage can be greater than the credit involved, in which case, loss payments would be used first to cancel debt and then to compensate farmers.

One of the serious problems hampering crop insurance efforts is that there is little data on which to build rate and reserve structures. To overcome this, the program will begin small and will grow slowly. The loss experience gained each crop cycle will be used to adjust the informed estimates on which rates will be initially based. Only one or two crops will be insured the first year, and only one or two crops will be added each year thereafter.

This conservativeness in expanding the program gradually protects governments from suffering large losses. Governments are reluctant to enter into crop insurance programs because they are sensitive to potential for tying up large portions of their resources. Gradualism guarantees that they will not have to commit more than what they can afford to spend.

Subsidies are necessary, but the incentive for governments to subsidize crop insurance programs are not all obvious. The political and social benefits can be readily seen. Potential financial benefits, however, are more subtle. It is possible that crop credit insurance may cause a reduction in fiscal outlays by government. This project will be sensitive to this possibility and will measure the fiscal impact on government.

One way in which fiscal savings might be realized once the program is mature involves the credit system. Presently, in order for government to make one dollar of production credit to flow to farmers it must invest one dollar in one of its own banks. When crop-credit insurance is available, government will be able to invest five to ten cents of subsidy in the insurance system to leverage that one dollar of credit from private lenders. If subsidized and/or artifically low interest rate policies were abandoned, significant increase in the participation of private sector creditors could be expected.

Significant involvement of private lenders cannot realistically be expected during the life of this pilot project. Other minimal and sometimes indirect effects on government finances result from changes in tax collections, foreign exchange operations, exports, imports and employment.

One reason why insurance will have an impact on agricultural lenders is that it will solve a serious problem which has resisted all prior attempts at resolution. The problem is that small farmers are unable to provide effective collateral for their production loans. Chattel mortgages on the future harvest are defeated by crop failures and by surreptitious and preemptive sales of the harvest. Since a large portion of AID's target farmers do not have clear titles to their lands, they cannot even offer them as collateral. Finally, when small farmers do have title to their lands the inconvenience, cost, and political discomfort involved in foreclosing render the effective value of the collateral nil.

Crop credit insurance serves in lieu of a mortgage and guarantees repayment to the bank under most circumstances. The most notable exception is dishonesty. In this case the bank can protect itself by using normal collection practices and by rejecting the dishonest farmer in the future.

Although we stated above that fiscal benefits would accrue to governments to the extent that private lenders are involved, this project will work almost exclusively with public banks. The thrust for this initial stage must be to establish, test and prove the insurance operations. For this purpose, any credit institution is adequate. At present, the agricultural development banks have achieved the greatest degree of penetration into the small farmer sub-sector. To reach these farmers and satisfy the effective demand which presently exists for crop insurance, it makes sense to begin with government banks. At least one cooperative group will be incorporated into each of the pilot projects so that experience working with this kind of organization can be developed.

A significant change in the long term role of government development banks viz-a-viz small farmers will probably occur in later stages if this project is successful. Presently, these institutions and informal lenders provide the bulk of small farmer credit. As private lenders, both banks and cooperatives, enter into this area the need for development bank participation will be reduced. These banks will gradually cease to be the primary source of formal credit for small farmers and will become capacitating agencies.

Their role as capacitating agencies will be to pioneer remote regions of the country, introduce modern technology to farmers and give them experience using credit. Once the farmers establish a track record and when a sufficient volume of business in developed, the banks portfolio can be turned over to private sector lenders. In this way, instead of spreading its resources thinly over the entire country it can concentrate its efforts in a few areas and move to others once the credit development job is done.

b. Insurers in Participating Countries

This project will create new insuring organizations in two countries and strengthen the already existing agency in Panama. The agencies are or will be semi-autonomous institutions attached to the ministries of agriculture. They will be full service, government owned insurance companies; insuring, collecting premium, inspecting risks, adjusting losses and paying claims.

These insurers will not be part of, or controlled by the development banks nor the central banks. Obviously, since the development banks are major clients of the program, a serious conflict of interest would exist which would threathen the insurers financial stability if they controlled loss payments. These banks will be represented on the board of directors, but will not have the ability to control the insurer.

C. Technical Assistance

Both long and short term technical assistance will be provided. A full time technician will be assigned to each country as counterpart to the director of the insuror. This person will provide assistance directly, will identify program needs and request short term technical assistance. He will act as laison with AID and other development agencies and will stimulate program growth in any way possible. This person will also have direct responsibility for supervising the research program in that country.

Short term technical assistance will be provided through the regional agency and will be of two types. First, insurance specific technicians will be available in such areas as rate making, loss adjustment, and underwriting.

Second, a research team will be constituted to prepare and analyze the research component of this project. Short term consultants, specialists in agricultural and/or developmental economics, research methodology and the social sciences will be part of that time.

d. Research

Two kinds of research will take place. The first is an outgrowth of the project itself; the question of how to do crop-credit insurance in developing countries will be directly assayed. Lessons learned here will have a direct impact on implementation efforts elsewhere. IICA will prepare reports on how different approaches affect the programs operation. The reports will discuss under what circumstances small farmers use crop credit insurance and the level of operating costs required by the program.

The second question is, "Is crop-credit insurance worth the effort?" Cost/benefit analysis, both in the economic and fiscal sense will be performed. The impact upon credit, technology adoption, crop mixes, employment, and farmer welfare will be analyzed. It will not be possible to assess the effect on credit availability at this time.

The economic hypothesis to be tested here is, in simple terms, that the availability of insurance decreases the impact of risk which permits an increase in the use of capital (credit) and, hence, modern technology and also permits other changes in input uses and crop mixes. These changes should then be reflected as increases in overall production and income, assuming stable prices.

Inorder for the crop credit insurance program to proceed to the second stage, that is, to become operational, large additions of new funds will be required. The economic research proposed here must answer the questions that will be asked when those funds are sought. Among those questions will be the following:

i. How is farmer's welfare affected?
ii. Is it less expensive, in both economic and fiscal terms to provide financing for mixed credit and insurance programs than for just credit alone?
iii. Is it less expensive in the long run, in both economic and fiscal terms, to do crop credit insurance than to not do it?
iv. What is the full range of benefits (economic, political, social) enjoyed by the interests involved (national, government budget, banks, small farmers, consumers, labor, etc.)?

This second research effort will be under the direction of an ad hoc team composed of the directors of each insurer, the country representatives of the regional organization, the aforementioned scientists and the IICA research technician. They will prepare and design the research instrument. It's field implementation will be the responsibility of the country programs but will be supported and monitored with centrally funded consultants. Responsibility for final analysis will again fall on the research team.

Because of the advanced status of the Mexican program the research design there will vary somewhat from the other three countries. It will focus however on the micro economic aspects, specifically, changes in small farmer behavior. Work on the research design in Mexico is advanced, and a proposal from the Mexican insurer will soon be presented to IICA.

No attempt will be made to homogenize the insurance program in the other three countries to increase the comparability of economic research results there. Differences are expected in the modes of operation in each country. The program will be managed to maximize the probability of success and the economic research will report on the dissimilar programs.

As much as possible, data gathering for actuarial and economic research purposes will be combined, Economic data gathering will be monitored by the research team to guarantee comparability from year to year.

IICA will present its completed research design to AID for comments before implementing it. It is expected that corrections and changes in the research design will take place as necessary during the life of the project.

e. ALARA-Regional Reinsurer

The additional funds mentioned above will be required both in the form of operating subsidies for national programs and as start up capital for a reinsurance fund. The amount, type (grant, loan, guarantee) and source (AID, World Bank, IDB, other) will be planned during this first stage. Positive answers to the cost/benefit and other research questions from the first stage will support these requests.

Crop-credit reinsurance will not be available from commercial sources. It will be necessary to create a regional mutual reinsurance agency. It has been tentatively dubbed ALARA (Agencia Latino Americano de Reaseguros Agricolas). The economic analysis will also support plans for supporting this institution.

A mutual type reinsurance pool is needed to reduce the high degree of moral hazzard existing in a program with significant social/political benefits.

ALARA will not have to provide by itself all the reinsurance required, but it will have to cover the first layer of risk. The U.S. government through AID, the World Bank, the Interamerican Development Bank and similar organizations can establish reinsurance or guarantee systems to absorb risks which exceed ALARA's capacity. After several years of operation, and once reliable loss data is generated, commercial reinsurers can also supply this second stage or surplus reinsurance.

In addition to reinsurance, ALARA will become the source for other technical services, such as rate making, training, loss adjustment and product design,

The present pilot project then, lays the base for expanded projects in many countries later and for a regional reinsurance agency. It will not promote ALARA until a sufficient number of programs exist, but will explore the possibility of other agencies becoming involved.

Inorder for an insurance or reinsurance operation to be successful, it must achieve some spread of risk. For crop credit insurance in Latin America, this implies that about five to eight countries are needed to begin a program. The roster of potential participants includes: Bolivia, Ecuador, Panama, Mexico, Costa Rica, and Brazil. Crop insurance programs of different types are in operation in the last three countries.

It is desirable therefore to expand the number of countries involved in this project later, once the initial implementation stage is complete. Particularly desirable nations are Colombia and Venezuela which provide some balance to the larger nations; Mexico and Brazil.

Part III - Project Analysis

A. Technical Analysis: Reaching Small Farmers

1. Linkages-General

Crop-credit insurance is different from most other programs that AID has supported as it reduces or removes risks of doing business for both lenders and small farmers. It makes it safer for lenders to lend and farmers to borrow. This is unlike credit insurance or guarantees programs which can only stimulate one party (usually the banker) at one time.

Crop and crop-credit insurances are used to protect agricultural production credits and farmers minimum incomes. Production credits as used here specifically refer to the short term credits used to bring in one season's harvest. Long term credits may be affected by several devices among which would be a succession of crop insurance policies.

Almost all other insurance programs developed to date have failed either to reach small farmers or achieve permanance. This is treated at length in the background paper presented in Annex B.

An important result of this insurance is its effect on small farmer behavior. Generally, the poorer a farmer the closer he is to some catastrophic threshold. When insurance is made available to these marginal operators, the magnitude of change in behavior will be greatest for those closest to the margin. It is this positive small farmer bias which accounts for the high level of benefits the program can generate for a nation's economy.

2. Linkages-Small Farmers and Agricultural Production Credit Institutions

a. Effect on the small farmers:

Crop-credit insurances capacity for generating behavioral change is not only facilitative (i.e.--removing risk and facilitating farmers switching to new crops.) There is also a contingency element. Contingencies in the insurance contract require that the farmer do certain things (e.g.--use a certain variety of seeds, sew at a

certain population density, etc.) if he is to be protected. As a result of this, the insurance promotes behavioral change thus stimulating production, improving extension effectiveness and government planning and policy directive capacity.

Crop credit insurance can follow or lead credit institutions into the field. It can go wherever the credit system can, and can help poor farmers in those areas to become credit worthy.

b. Effect on small farmer credit institutions:

Presently, small farmer credit institutions in the less developed world are generally failing to reach their target clientelle for a series of reasons. Among these are the following:

i. Small farmers are unable to offer effective collateral to guarantee repayment, thus threatening the viability of lenders serving small farmers;

ii. Ever increasing dishonesty delinquency due to poor control systems threaten the institutions' solvency; and

iii. The high cost of servicing small farmers.

Crop-credit insurance promises to have a significant effect on each of these obstacles. Let us look at each of these items to examine the insurance-credit linkage.

First, small farmers often do not have titles to their land and can not mortage them. The land may be communally owned and inalienable as in the case in Mexico and Peru. Even when the small farmer does own and mortage his property, its location and size and the farmer's status makes the political and financial costs too great for the banks to actually use the threat of foreclosure as an effective delinquency control tool. When a large area suffers reverses, the difficulty of proceeding against a large and politically visible group of underdogs becomes apparent.

Insurance serves as an effective collateral thereby resolving this problem altogether in most cases. The remaining cases are treated below.

Second, once uncontrolable dishonesty is introduced into a system, managers have only two options: close down the system or wait for it to be destroyed. Failed credit systems and systems which exclude small farmers exist throughout Latin America in proof of this condition.

Uncontrolable dishonesty in this case is the farmer who says to the banker, falsely, "my crop failed and I cannot pay you back." When some succeed with this routine others are encouraged to try the same the next year and still more in following years. After a few years, the lender is bankrupt and the only source of credit is the nonformal local lender (the biased term, userer, is deliberately avoided here) who has effective delinquency control measures available.

When insurance is introduced, one costless by-product is an identification of NSFs, i.e., Non-Serious Farmers. The task of portfolio management is facilitated when the number of persons to be contacted and coerced to pay their debts is reduced. This will also have an effect on the number of false claims presented in succeeding years.

The third obstacle mentioned is the high cost of reaching small farmers. They always will be expensive to reach and someone, either the government or the farmers themselves must bear this cost. Crop-credit insurance provides means of funding this expense with either or both farmer or government acting as sources.

Part of the burden of the cost of making credit available can be placed on the farmer by transferring the subsidy on credit to the insurance program when the latter is introduced. This will provide adequate revenues to lenders and have the added attraction of making small farmer credit more appealing to private lenders who are not presently operating in this market.

Other expenses presently being borne by government can be reduced thus making more money available to underwrite small farmer programs. The control of dishonesty-caused delinquency discussed above is one example. There are many others, but the most significant has to do with the leveraging of private sector resources. The possibility exists that government can use resources destined for its own credit programs in the insurance program and thus leverage ten to twenty times more credit using private sector resources. Savings realized by the government can be used to underwrite the higher costs of reaching smaller farmers. These and related points are discussed further in section 3 below. This discussion indicates that insurance will promote options which may have a major impact on how credit systems operate.

First, as previously mentioned, an opportunity and a rationale will be provided to move away from subsidized credit and thereby open the door to increased participation by the private sector.

Second, traditional development banks may phase out of this area altogether leaving it to an invigorated private sector. In this case, the development banks would become habilitating agencies. Their functions would be to open up areas, bring farmers into the credit system, train them in how to use it, give them experience, and, eventually, graduate them to the private sector organization that would follow into those areas. They would promote the farmers development by developing the banks needed to serve the farmers.

3. Financing the System

If crop credit systems are to continue after the termination of USAID assistance, host governments will have to provide substantial subsidies. A rough estimate of the magnitude of these subsidies is provided by the Mexican example. There, 40 crops, nearly one million farmers and one fourth of the cultivated acreage are insured. The average cost of insuring (losses plus administration) has been almost 15% of the coverage provided. Government has provided a subsidy ranging from one half to two thirds of this cost.

Where will funds for these expenses originate? Possible sources are detailed below:

a. General revenue is the most likely source. The crop insurance program can stimulate some earnings. As exports increase (from increased agricultural production), taxes on exports and commissions on monetary transactions will increase. Likewise, expenses associated with importing agricultural produce will decrease.

b. Aggregate bank losses may decrease as a result of the effect of the crop insurance system on portfolio management. Control of dishonesty caused delinquency will be made easier.

c. Transfer of other subsidies; there are two approaches to this:

- Subsidies on inputs, which distort the use of the input and do not necessarily lead to optimal use of inputs or maximize production, can be partially or totally transferred to the insurance program. Subsidies applied through the insurance mechanism tend to act as output subsidies, calling forth maximum production of the subsidized crops. The introduction of the crop insurance scheme presents a politically useful opportunity for removing the dysfunctional subsidy on credit.

- Extension services can be used both as a source of personnel and funds. The crop-credit insurance mechanism will tend to enhance the performance of the extension function. The two functions could be merged thus providing economies of scale.

d. Private sector funds can be leveraged for agricultural production credits as a result of the crop-credit insurance programs, thus freeing up government funds for other purposes. Instead of investing directly in development banks and getting zero leverage (1:1) on the amount of money loaned, it is possible for government to invest in the insuror to guarantee private sector credits and enjoy a leverage factor in the 1:10 to 1:20 range.

e. Title III generated local currencies can be used to cover administrative and premium subsidy costs and even excess losses.

This indicates that there are adequate sources of funds to finance a program. The fourth item above, leverage, is a significant potential source of funds. Crop-credit insurance may create enough savings and new income to pay for itself. It may be cheaper for a government to do crop insurance than not. This project is designed to shed light on this possibility.

4. Reinsurance

The need for reinsurance has already been discussed in Part I, C. We can repeat here that it is especially needed by small countries to protect against catastrophic losses which would otherwise place an impossible drain on a nation's budget. It is also needed to make more efficient use of reserve capital. This is because one large reinsurer need hold less total capital than what several small insurors would have to hold individually.

Although reinsurance operations in this area are extremely difficult, there are no technical issues which would make a reinsurance pool impossible. Commercial reinsurors will not enter however, because of the danger of uncontrolled losses resulting from the substitution of the profit motive with the social/potential hazard. By offering a type of reinsurance called "excess of loss"(it pays only those losses resulting from a recognizable catastrophe) and building a strong loss adjustment department, ALARA can overcome the social/political hazard problem.

When it does, it will be able to attract commercial reinsurors and will have achieved demonstrable autonomy and viability.

The possibility of adapting existing guarantee mechanisms such as Section 222A of Title XIII (Housing and Other Credit Guaranty Programs) will continue to be analyzed. This would permit the U.S. government to play the role of a traditional reinsuror. The possibility of legislation creating contingent development loans will be examined.

5. Strategy

The most promising strategy for developing the crop insurance tool in Latin America is to follow a three stage development plan. This Project Paper presents the first stage.

a. Stage one--Establish three pilot projects and develop them to the take-off point. Carry out economic impact analysis to use for later decision making purposes. Bring three pilot project countries and two or three other advanced countries together to develop a proposal for ALARA. If initial implementation is successful, add two to three new countries. (Four years.)

b. Stage two--Fund and develop ALARA; fund as necessary and graduate the three original pilot project; begin five new pilot projects. (Five years.)

c. State three-Fund and graduate ALARA and the five remaining programs. (Five years.)

A realistic goal for this three stage, fourteen year program would be to have a total of 12 programs (eight started by AID, four independantly) and a regional reinsurance pool integrating the structure.

6. The Insurance Plan

The crop-credit insurance program will be an all-risk program. That is, it would protect farmers and lenders against losses arising from any cause except losses induced by the farmer himself. This provides the broadest margin of security for the interested parties and will stimulate the greatest changes in behavior.

Loss payments would be made to the banks. If payments exceed the outstanding loan, the balance will be paid directly to the farmers. Although in most cases the farmers will not be receiving direct cash payments, he will have his bank debt liquidated thus restoring his ability to borrow in subsequent years.

Life insurance equal to the amount of the loan may also be provided. This is a risk that concerns the lender and is easy and inexpensive to manage. It will be well received by the farmers and serve as positive promotional tool for the program.

This pilot program would begin insuring no more than two or three crops. Additional insured crops may be added from time to time as actuarial information is developed.

The amount of insurance offered can be split in two parts. The first part will be mandatory for all borrowers and will be equal to the production cost or loan on the crop. The second part can be voluntary and will represent the net of farmers income. This is shown in Figure 1.

Figure 1. Amount and Types of Insurance and Deductibles as Percents of the Expected Yields of Crops.

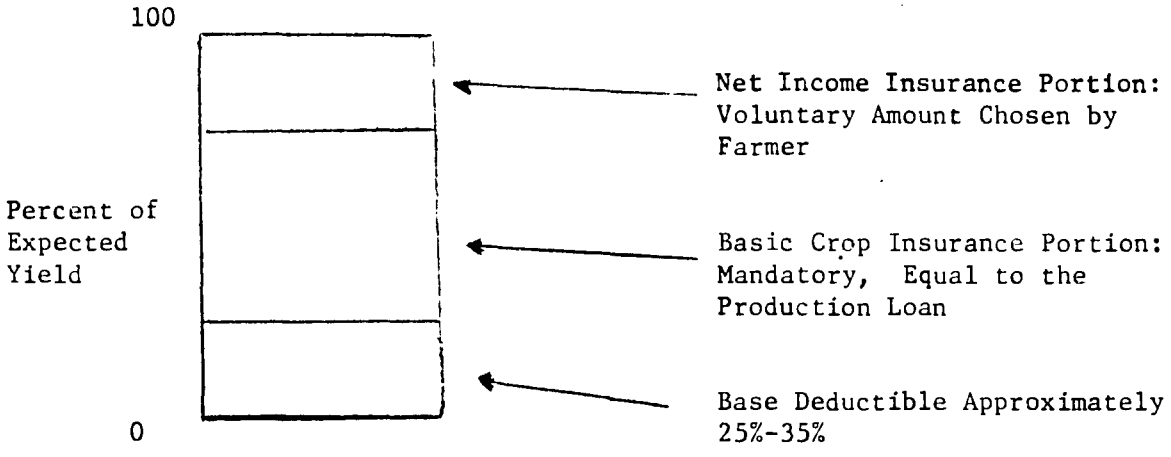

Figure 1 implies that once a crop fell 25% to 35% below the expected yield, the insuror would begin to pay off the loan. The insuror would continue to pay as yield decreased until the loan was completely paid. Then, the farmer would keep his remaining crop which would represent his net income. If he wishes he can insure this portion also. The credit portion will be partially subsidized by the national government. The income portion need not be. It is more costly to insure and less beneficial than the credit portion. (Charging full price for insuring net income will lessen the financial burden on government.

Base deductibles are used to eliminate small and frequent losses and the related loss adjustment costs. They are also needed for assuring that the farmer do his best to avoid losses.

Credit institutions would be used to sell the insurance. A contract between the insuror and the lender would require that all eligible borrowers be insured. The lender would prepare the insurance application at the time of making the loan. The cost of the insurance would be added to the loan. The basic loan, insurance and interest would all be insured in the credit portion.

The insurance applications and premium for all insureds would be forwarded to the insuror which will inspect the lands of applicants to determine if they are insurable. If they are, the insurance contract enters into effect from the date of loan. If not, only the initial loan disbursement is insured. Failure by the farmer to follow procedures agreed to in the loan and insurance contract result in a partial or total reduction in coverage depending on the severity of the failure.

Insurance inspectors will visit the farms near planting time and when losses are reported. They will also make spot visits to individual farms and will watch conditions in the general area in order to stay on top of the situation and prevent losses whenever possible.

An insurance plan designed in this way can effectively reach small farmers, reduce risk and prevent unncessary losses to credit system.

B. Financial Analysis and Plan

1. Financial Plan

Tables 1 through 11, which follow, present contributions required of AID and host governments, resources required by each agency involved in the project, cost for each project segment, and personnel requirements.

AID will grant fund all administrative and technical assistance. Host countries will subsidize premium by one half to one third, will be liable for losses in excess of premiums collected and will provide uncosted support from ancillary agencies such as meteorology, extension, research, social security, and credit. These expenses are detailed in table 1.

AID's contribution will be for the life of the pilot project, which is four years. It is recommended that AID fund administrative expenses rather than guarantee losses in order to avoid the destructive effects of moral hazard. This is discussed in section II. B., Detailed Description.

At the end of this stage, AID will discontinue its present contribution. If the host governments involved decide to continue and expand the program (which implies, by definition, success), they will assume the administrative costs previously financed by AID. This does not preclude the possibility that AID will provide some financing for the added costs incurred in expanding the program to national scope.

2. Recurrent Budget Analysis

One purpose of this project is to determine if crop credit insurance really is financially desirable for governments. Their likely and contingent costs for the first four years are shown in table 2. If the program is continued and expanded, these costs will increase at a less than proportional rate. The administrative and technical assistance costs shown in tables 3, 5 and 7 would also increase at a less than proportional rate. If the program is successful, and governments decide to go operational in a second stage project they will be expected to fund the local costs now paid by USAID.

Detailed quantitative analysis of host government budget capacities, although desirable, is not essential at this time. This is because certain qualitative arguments indicate that providing crop-credit insurance reduces budget demands on governments. Future financing of the project, therefore, is facilitated.

It is, of course, the purpose of this project to determine the validity of these arguments. They are presented below.

a. Government has to replace losses from public banks anyway, so insuring their credits involves not a new expenditure but a transfer of a present expenditure.

b. If the portion of the premium paid by the farmers is equal to or greater than the administrative costs of the system, then government will actually have a decrease in the cost of maintaining the agricultural credit system or will, at worst, experience no change.

c. Insofar as insurance seperates delinquencies caused by natural hazards from those caused by dishonesty, bank portfolio management in enhanced and reduced.

d. Governments gain valuable leverage when they insure private lenders. Instead of investing one dollar in a public sector bank to make a one dollar loan, they can invest five to ten cents in a crop-credit insurer and leverage ten to twenty times more of private sector resources.

e. Transfer other subsidies; there are two approaches to this. --Subsidies on inputs, which distort the use of the input and do not necessarily lead to optimal use of inputs or maximize production, can be partially or totally transferred to the insurance program. Subsidies applied through the insurance mechanism tend to act as output subsidies, calling forth maximum production of the subsidized crops. The introduction of the crop insurance scheme presents a politically useful opportunity for removing the dysfunctional subsidy on credit. --Extension services can be used as a source of personnel and funds. The crop-credit insurance mechanism will tend to enhance the performance of the extension function.

f. Title III generated local currencies can be used to cover administrative and premium subsidy costs and even excess losses.

Funds exist therefore, to operate a program. The size of the program and the amount of funds which government is willing to make available are the critical variables. The availability of reinsurance and careful underwriting (choosing different crops with zero or negative correlations) will increase the magnitude of risk that can be absorbed for any given amount of capital.

Loans to the governments for the purpose of increasing the number of participants in the program is an effective way of channeling resources to the agricultural sector and the small farmer sub-sector. The use of loans will be explored during the project and proposed in stage 2.

The project funded here will have as one of its prime functions the measurement of economic and financial advantages.

i. The main section of the project will measure impact in the three pilot countries.

ii. The ANAGGSA (Mexico) study will follow the progress of paired villages for three years.

iii. The regional contractor will manage the research project to do these things.

iv. The small farmer risk study to be completed herein will analyze the degree of risk averseness in farmers according to the size of their holdings and will predict the financial and economic advantage of using insurance with different classes of farmers. This information becomes particularily relavent when action agencies (ie-credit, extension, insurance) are determining how far "up into the hills" to extend their activities.

Presented below are the following tables which detail the participation and needs of the parties:

1. Estimated total project costs corresponding to AID.

2. Likely and contingent host country direct costs for the crop-credit insurance programs.

3. Operating expenses - Ecuador

4. Manpower requirements - Ecuador

5. Operating expenses - Bolivia

6. Manpower requirements - Bolivia

7. Operating expenses - Panama

8. Manpower requirements - Panama

9. Estimated project costs for project specialists/regional contractor

10. Manpower requirements - regional contractor

11. Estimated costs of AID/W project supervision and technology transfer services.

TABLE 1

Estimated Total Project Cost
Corresponding to AID
($000)

	YEAR 1	2	3	4	TOTAL
1. Pilot Operations	519.0	532.5	543.0	567.5	2,162.0
A. Ecuador	173.0	163.0	173.5	186.5	696.0
B. Bolivia	190.0	217.5	219.5	227.0	854.0
C. Panama	156.0	152.0	150.0	154.0	612.0
2. Project Specialists/ Regional Grantee	489.0	402.5	449.0	543.5	1,884.0
3. AID/W Project Supervision, Evaluation and Technology Transfer	72.0	79.0	70.0	108.0	329.0
TOTALS	1,080.0	1,014.0	1,062.0	1,219.0	4,375.0

NB: Inflation has been handled in the budget presented here by including an approximate 10% increase over the previous year on most items. Contingencies are shown as seperate line items in the remaining tables.

NB: Because of changes in the availability of grant funds occuring after the preparation of this table, the project will be funded over a 5 year period. In fiscal 1978, $100,000 will be provided for initial implementation expenses of the regional grantee. In fiscal 1979, $980,000 will be provided to cover the remainder of the expenses shown under Year 1 above. Years 2, 3 and 4 remain unchanged.

TABLE 2

Likely and Contingent Host Country Direct Costs for the Crop-Credit Insurance Programs *
(US $000)

		YEARS				
		1	2	3	4	TOTALS
Bolivia:	Likely	10	21	46	89	166
	Contingent	169	294	577	958	1,998
	Total	179	315	623	1,047	2,164
Ecuador:	Likely	24	78	100	134	336
	Contingent	432	1,092	1,200	1,337	4,061
	Total	456	1,170	1,300	1,471	4,397
Panama:	Likely	69	95	114	123	401
	Contingent	1,106	1,430	1,601	1,714	5,851
	Total	1,175	1,525	1,715	1,837	6,252
TOTAL:	Likely	103	194	260	346	903
	Contingent	1,707	2,816	3,378	4,009	11,910
	Total	1,810	3,010	3,638	4,355	12,813

* Figures presented here are based on insuring specific crops in specific localities. Changes in crops and places insured during the life of the project are expected. One project function is to determine, based on economic advantageousness, which crops to insure. The figures presented in this table, therefore, should be understood to be general rather than hard goals.

TABLE 3

Operating Expenses
Ecuador
($000)

		YEARS				
		1	2	3	4	TOTALS
1.	Salary & Benefits	58.5	81.0	89.0	98.0	326.5
2.	Travel & Per Diem (National)	10.0	19.0	27.0	35.0	91.0
3.	Travel & Per Diem (International)	10.0	10.0	7.5	10.0	37.5
4.	Publications & Publicity	5.0	5.0	5.0	5.0	20.0
5.	Furniture & Equipment	22.0	5.0	-	-	27.0
6.	Rent & Utilities	12.0	12.0	12.0	12.0	48.0
7.	Supplies	3.0	3.0	3.0	3.0	12.0
8.	Vehicles (4,1,1,0)	35.0	9.0	9.0	-	53.0
9.	Repairs, Maint. & Op. Costs	7.0	9.0	10.5	12.0	38.5
10.	Contingencies	10.5	10.0	10.5	11.5	42.5
	TOTALS	173.0	163.0	173.5	186.5	696.0

TABLE 4

Manpower Requirements
Ecuador
(US $000)

	POSITION	NET ANNUAL SALARY	YEAR 1	2	3	4	TOTAL MAN YEARS
1.	Director	16	1	1	1	1	4
2.	Actuary	4*	PT	PT	PT	PT	PT
3.	Legal Counsel	2*	PT	PT	PT	PT	PT
4.	Loss Adjustor	9	1	1	1	1	4
5.	Communications Specialist	9	½	1	1	1	3½
6.	Chief & Field Agent	9	½	1	1	1	3½
7.	Field Agents	3.5	-	1	1	2	4
8.	Product Development Specialist	9	1	1	1	1	4
9.	Admin./Acct.	4	1	1	1	1	4
10.	Secretary	3	1	1	1	1	4
11.	Typist/Clerk	2.5	-	1	1	1	3
12.	Consierge	2.0	1½	2	2	2	7½

* Salaries quoted are for Part-time (PT) employees

TABLE 5

Operating Expenses
Bolivia
($000)

		YEARS				
		1	2	3	4	TOTALS
1.	Salaries & Benefits	73.5	110.0	125.0	129.5	438.0
2.	Travel & Per Diem (National)	15.0	21.0	34.0	42.0	112.0
3.	Travel & Per Diem (International)	10.0	10.0	7.5	10.0	37.5
4.	Publications & Publicity	5.0	5.0	5.0	5.0	20.0
5.	Vehicles (3,3,1,0)	24.0	25.0	9.0	-	58.0
6.	Repairs, Maint. & Op. Costs	4.5	10.0	11.0	12.0	37.5
7.	Furniture & Equipment	33.0	10.0	-	-	43.0
8.	Rent & Utilities	12.0	12.0	12.0	12.0	48.0
9.	Supplies	3.0	3.0	3.0	3.0	13.0
10.	Contingencies	10.0	11.5	13.0	13.5	48.0
	TOTALS	190.0	217.5	219.0	227.0	854.0

TABLE 6

Manpower Requirements
Bolivia
(US $000)

		NET ANNUAL SALARY	YEAR 1	2	3	4	TOTAL MAN YEARS
1.	Director	12.0	1	1	1	1	4
2.	Actuary	2.5*	PT	PT	PT	PT	PT
3.	Legal Counsel	2.0*	PT	PT	PT	PT	PT
4.	Loss Adjustor	6.0	½	1	1	1	3½
5.	Communications Specialists	6.0	½	1	1	1	3½
6.	Product Development Specialist	8.5	1	1	1	1	4
7.	Chief Field Agent	5.5	½	1	1	1	3½
8.	Field Agents	4.5	-	½& 2PT	1½& 4PT	2½& 4PT	4½ & 10 PT
9.	Admin./Acct.	4.0	½	1	1	1	3½
10.	Secretary	2.5	1	1	1	1	4
11.	Typist	2.0	½	1	1	1	3½
12.	Consierge	1.5	1	1	1	1	4

* Salaries quoted are for Part-time (PT) employees

TABLE 7

Operating Expenses
Panama
($000)

	Components	YEARS 1	2	3	4	TOTALS
1.	Salaries & Benefits	79.5	92.0	101.0	111.0	383.5
2.	Travel & Per Diem (National)	4.5	5.5	6.0	7.0	23.0
3.	Travel & Per Diem (International)	11.0	8.0	7.5	9.0	35.5
4.	Publications & Publicity	6.0	5.0	5.0	5.0	21.0
5.	Vehicles (3,3,1,0)	18.5	19.0	9.0	-0-	46.5
6.	Repairs, Maint. & Op. Costs	3.5	7.5	9.0	9.5	29.5
7.	Furniture & Equipment	20.0	2.5	-	-	22.5
8.	Supplies	3.0	3.0	3.0	3.0	12.0
9.	Contingencies	10.0	9.5	9.5	9.5	38.5
	TOTALS	156.0	152.0	150.0	154.0	612.0

TABLE 8

Additional* Manpower Requirements
Panama
(US $000)

	POSITION	NET ANNUAL SALARY	YEAR 1	2	3	4	TOTAL MAN YEARS
1.	Agricultural Engineer	7.5	3	3	3	3	12
2.	Veterinarian	7.5	3	3	3	3	12
3.	Asst. Vet.	4.5	-	-	2	2	4
4.	Field Agents	3.5-4.0	2	4	4	4	14
5.	Communications Specialist	9.5	1	1	1	1	4

*The program in Panama is already operating and some personnel hired. USAID's assistance will support the additional personnel shown here.

TABLE 9

Estimated Project Costs for Project Specialists/Regional Contractor
($000)

	Components	YEAR 1	2	3	4	TOTALS
1.	Salaries: Project Director and 3 Country Program Specialists, Research Technician	164.0	183.0	203.5	226.0	776.5
2.	Short Term Consultants and In-Country Research	65.0	16.5	25.5	35.0	142.0
3.	Salaries: Clerical and Administrative Personnel at Regional and Country Offices	36.0	39.0	42.0	45.5	162.5
4.	Transportation, Travel and Per Diem	81.0	47.5	51.0	104.0	283.5
5.	Furniture, Equipment and Supplies	12.0	2.0	2.0	2.0	18.0
6.	Publications	1.0	2.0	2.0	4.0	9.0
7.	Contingencies	36.0	29.5	33.5	42.5	141.5
8.	Overhead	59.0	48.0	54.5	69.5	231.0
9.	ANAGSA (Mexico) Research	35.0	35.0	35.0	15.0	120.0
	TOTALS	489.0	402.0	449.0	543.5	1,884.0

TABLE 10

Manpower Requirements
Regional Contractor
(US $000)

	POSITION	NET ANNUAL SALARY	YEAR 1	2	3	4	TOTAL MAN YEARS
1.	Regional Director	c 25.0	1	1	1	1	4
2.	Research Technician	c 22.5	1	1	1	1	4
3.	Country Program Specialists	c 20.0	3	3	3	3	12
4.	Secretary - Regional Office	7.5	½	½	½	½	2
5.	Accountant/Administrator - Regional Office	4.0	½	½	½	½	2
6.	Secretaries - Country Programs	6.5	3	3	3	3	12
7.	Consultants	---	AS NEEDED - PART TIME				

TABLE 11

Estimated Cost of AID/W Project Supervision
and Technology Transfer Services
($000)

	YEAR				
	1	2	3	4	TOTALS
1. 2/3 time supervisor and crop insurance specialist plus overhead	27.5	30.0	33.5	36.0	127.0
2. 2/3 time Secretary	9.5	10.0	11.5	12.0	43.0
3. Consultants for Evaluation and Proj. document assistance.	8.5	17.0	-	33.0	58.5
4. Publications	2.0	2.5	3.0	3.5	11.0
5. Travel & Per Diem	24.5	19.5	22.0	23.5	93.5
TOTALS	72.0	79.0	70.0	108.0	329.0

C. Social Analysis

1. Beneficiaries

Because of the experimental nature of this project there are three distinct beneficiary groups: (1) 1500 small farm families in the highland valleys of Bolivia; (2) approximately 1,000 small farmers drawn from both the highland and coastal areas of Ecuador; and (3) approximately 1,000 small farmer households in a frontier area of Panama. All three have common traits--pertaining to the poorest strata of the rural social structure, small scale farming, basic subsistence orientation coupled with measured participation in markets, and low rating in quality of life indicators such as health and education status. However, each has a unique set of social characteristics (ethnicity, language, community organization mechanisms) and particular physical environment (mountains, settled lowlands, and frontier) which result in adaptation strategies as well as mechanisms to reduce the risk involved with subsistence farming and the adoption of new technical inputs such as crop credit insurance. It is felt that the diversity of these groups encompasses the range of living conditions and characteristics of AID target groups. The data generated will provide useful insights on: (1) the target group type which will most readily accept crop insurance; and/or (2) the proper strategies for successful implementation with a variety of target groups.

A. Beneficiaries - Bolivia

The target group in Bolivia will be drawn from among small farmers in the mountain valley areas of the department of Potosi. The wide majority of people in this zone are native Quechua speakers. For cultural and historical reasons they have been relegated to the bottom level of rural social organization. Even though agrarian reform measures initiated in the early 1950s have made slight improvements possible, the Indian peasants continue to live under conditions of extreme poverty. Recent field research has revealed this to be the poorest of the rural areas in Bolivia.*

The target group practices mixed mountain agriculture (ground crops supplemented by a few animals) and produces both for subsistence and market purposes. The land tenure system is a combination of privately owned fields and communally held pasture. The size of the farms (privately owned land) is small-- the average for Potosi is 2.5 hectares, which is the lowest in Bolivia, and they are divided into a number of non-contiguous parcels. Morever, historical factors have limited the location of these farms to the minimally arable upper reaches of the mountain valleys, often at altitudes approaching 13,000 feet above sea level.

*Riordan, James T. An Assessment of the Target Region for USAID/ Bolivia's Agricultural Sector Loan II. Washington. A.I.D. July, 1977

Production techniques are traditional; the typical tool kit consists of a hoe, machete, and digging stick, and a wooden plow. Only a fortunate few own oxen, so field work for the majority is done either by hand or with borrowed or rented animals. Seeds (several varieties of potatoes, wheat and quineua are the principal crops) are native varieties saved from preceeding crop cycles and only the exceptional farmers employ modern inputs like fertilizers and other chemical products.

Given the small size of the farms, the poor quality of the soil and traditional farming techniques, production levels and therefore on-farm incomes are extremely low. Most households engage in some form of off-farm (seasonal migration to coastal areas to work as casual day laborers) and non-farm income (wool production or other cottage industry of modest scale). But even with these complimentary sources of money incomes are meager. Field research calculated average incomes at $253 per household ($52 per capita), of which only $180 per household ($37 per capita) is in cash.

Quality of life measures such as nutrition and education provide further evidence of target group poverty. In general nutritional levels are below par. The base of the diet is the staple crop, potato, which is supplemented to a limited degree with food items not produced on the holding. Quineua is grown on most farms and does provide a valuable source of protein, but almost completely absent from the diet are meat and other animal by products.

Environmental health and hygiene conditions are likewise sub-standard, latrines are conspicuous for their absence, drinking water is often contaminated by livestock and laundry details, and barn-yard animals (especially guinea pigs) normally share living space with household members. Malnutrition, complicated by respiratory and digestive tract ailments present a bleak health picture. Contact with modern medicine is minimal, and the use of folk remedies and consultation with local curers are commonplace.

Formal educational facilities consist of single room school houses. Normally they are staffed by one teacher who must handle a number of grades simultaneously. Didactic materials are in chronic short supply and even though the vast majority of the students are native Quechua speakers, all teaching is done in Spanish. Attrition rates are high; only an estimated three percente of the children enrolling in first grade complete the six year primary cycle. Further, absenteeism, owing to economic responsibilities of the children on the farm, also is elevated.

There are several features of the social system which merit comment because of their influence on risk management strategy. First, there is a considerable amount of intermarriage among neighboring families which emphasizes the importance of an reliance on kinsman

even though the extended household family is the basic social and economic unit. Second, social control at the local level is maintained by the syndicate (union). The officials of the syndicate are all community men of considerable standing who have as one of their main responsibiliteis the task of interfacing with people (e.g., technical assistance representatives) from the outside. In addition, their standing in the community enables them to exert a considerable amount of persuasive influence concerning the productive uses of farm land.

B. Beneficiaries - Ecuador

In Ecuador the beneficiaries will be drawn from two different types of small scale farmers: (1) indigenous communities in the highlands and (2) mestizo peasant groups on the coast.

In the sierra estimates indicate the "pure" Indians account for 20 to 25 percent of the population and that Indians who are in the process of acculturation, yet still distinct from mestizos, constitute another 40 to 45 percent. In many ways they are similar to the target group in Bolivia. For example, they also have been subjected to social, political, and economic discrimination, form the base of the social pyramid in the highlands, are marginal to the national mainstream, and live under conditions of extreme poverty.

The wide majority of native Quechua speakers (most younger adult men and some women have varying degrees of facility with Spanish) who have retained traditional cultural forms despite close proximity to the Spanish system. The basic social unit is the extended domestic household generally made up of children, parents, grandparents along with one or two other close relatives.

In the community households are tied to each other through kinship and compadrazgo (co-parenthood) bonds as well as reciprocal work exchanges among close relatives and mingas (community work details) in which all households are expected to participate. Internal leadership is provided by a socio-political cargo system according to which men gain prestige and authority by acts of service (especially organizing and financing community-wide fiestas) to the community. Under this system the governing body (cabildo) is charged with maintaining social order within the community. In addition it functions as an intermediary between the community and the outside world -- screening out what is seen as harmful while facilitating what is judged to be beneficial. This system has been recognized as a legal entity by the Ecuadorian Government. It constitutes the lowest administrative level and is directly responsible to mayors (usually mestizos) who have jurisdiction at the parish level and who are appointed by the national government.

Farming is the principal occupation of the Indians and the conditions

under which it is practiced give a clear indication of the level of poverty. Land tenure has been and continues to be dominated by a latifundio-minidundio dichotomy. Although disaggregated data for the sierra is not available, extant countrywide information points out that as of 1968 over 75 percent (approximately 470,000 units) of the farms were less than five hectares and comprised only 10 percent of the agricultural land. At the other extreme, 1.5 percent of the holdings (about 10,000 units) were 100 hectares or more and accounted for 47 percent of the total farmland. Moreover, in 1968, 33 percent of the holdings (over 206,000) were less than one hectare in size--a figure which represents a four percent increase in the number of micro-holdings during a 14-year period, 1954-1968. These data give a clear indication of the minute size of peasant holdings. And, as stated above, although the figures are aggregated for both coast and sierra, the overall situation is worse in the highlands where the hacienda system and associated features of a debt-peonage and tenant farming are most solidly entrenched.

Among peasants tenure patterns vary from one area to another, but prominent forms include privately owned farms, sometimes combined with use rights to communal land, tenant farming, and to a limited degree participation in cooperatives. In almost all instances holdings are divided into a number of dispersed parcels, a situation that is a product of inheritance patterns which divide land equally among all heirs, and risk management that employs "vertical space" to take advantage of the multiple micro-environments existing in the highlands.

Similar to other Andean small farmers, traditional production techniques are predominant. Tool inventories are limited to simple hand implements and few farmers are employing elements of modern technological packages such as improved seed varieties, fertilizers, and other chemical products. Credit programs, in most instances related to cooperative schemes, have been instituted in a number of areas, but have met with only limited success. Principal constraining factors include bickering among coop members, cultural dissonance between the credit promoters and the farmers, and cumbersome delivery systems which delay the transfer of credit beyond critical points in the crop cycle.

Throughout the highlands, principal crops are tubers and grains. Given the poor quality of soil, rudimentary technology, and small farm size, yields are low. For example, in one typical valley in the northern sierra average small farmer yields for the three most important crops (corn, potatoes, and barley) are less than five quintales per hectare. The principal orientation of crop production is for subsistence, although there is some participation of local and regional markets. The main factors constraining increased market involvement appears to be low production levels; hesitancy or fear of dealing with non-indians in economic matters is a real but less important matter.

Typically, ground crop production is complemented by stock-raising--both large herd (cattle, sheep) animals and small barnyard (chickens, guinea pigs). The by-products are directed toward the market, but on an extremely limited scale; equally they serve as an insurance policy against financial crises or to meet family social obligations.

In addition to the subsistence and market selling there is an extensive barter (treque) system among Indians. Micro-environment specific crops as well as cottage industry products (rope, pottery, wooden utensils) are traded in inter-community and inter-region networks. The barter, in addition to providing a mechanism for non-cash exchange of goods, assists in establishing and maintaining social networks (e.g., locating marriage partners) which in turn help maintain Indian culture as a distinct entity.

Cottage industry, generally artisan work, and day laboring are widespread among the Indians and serves to augment income derived from the holding. Field laboring is undertaken both on local haciendas as well as large plantations on the coast. Even though working on the coast entails a seasonal separation from family, the higher wages ($2 dollars a day compared to $1.20/day) make the seasonal trip attractive. A typical pattern finds campesinos preparing and planting their own fields, migrating to the coast leaving the women to run the holding, and returning in time for the harvest. Further, there is evidence, albeit limited, that seasonal work trips are the first step of a permanent move of highland peasants to coastal areas.

In the context of quality of life indicators (education and health and nutrition status) the small farmers in the Ecuadorian sierra rank among the most backward in Latin America. Available data indicate that the illiteracy rates for persons over 15 in the rural sierra averages about 50% while reaching levels of almost 90% in some areas with heavy Indian concentrations. For cultural (parents misunderstanding nature of education and believing after a few weeks or months that everything necessary has been learned) and economic (cost of education and the labor countribution of children to the holdings) reasons dropout and absenteeism rates are high. Further, it is estimated that 30 percent of school age children are not attending calsses for lack of facilities and trained teachers.

In the health sector conditions are similarly below par. There is an acute shortage of health faciliteis and trained personnel in the countryside and cultural dissonance between the few medical people available (urban-raised mestizo doctors) and the Indians, as well as the persistence of folk beliefs and practices, curtail use of health facilities.

Environmental sanitation devices (privies, piped water and the like) are conspicuous by their near total absence. During the 1960s the principal reported causes of death in rural areas were respiratory

ailments followed by infectious and parasitic diseases. There is a direct link between an unsanitary environment and all three types of illnesses. Finally, mortality rates among infants and young children (29 per 1,000 live births for the country - with the highest levels in the rural sierra) are among the most elevated in Latin America. To place this figure in perspective, infant mortality rates in the United States are currently at about 3.5 per 1,000 live births and the ratio for Costa Rica and Mexico are 29 and 30 respectively. Generally in the rural sierra mortality was high at all ages up to five years, but one-third of all infants deaths occurred in the first month of life. An important contributing factor was that most births (over 80 percent) took place without the assistance of a professional medical practioner nor the aid of untrained midwives.

The peasants of the coastal area are generally more acculturated to the mainstream of Ecuadorian life than their counterpart from the sierra. Since colonial times the coastal peasant (montuvio) has spoken Spanish and has adopted the dress, customs, and behavior patterns of Spanish life. For example, the nuclear family is the primary social unit, and although in a given area households are linked through kinship and compadrazgo bonds, the ties are far less extensive. Absent are the reciprocal work exchanges and the minga as any day laboring which is performed is done for hire. Also absent is the informal leadership fiesta system as officials appointed by the national government attend to public administrative functions.

Farming is the principal occupation, and even though agricultural units tend to be larger than those of peasants in the mountains they are nevertheless small. For example, in Los Rios and Gayas provinces. which constitue a major portion of the productive areas of the coast, 87 percent of all farms are five hectares or less. The principal crops (rice, corn, coffee, bananas and cacao) are of the commercial varity, and although small farmers keep a significant portion of their produce for household subsistence needs, there is active market participation.

As in the sierra, land tenure is dominated by latifundio-minifundio divisions. However, the manorial system was never as dominant on the coast and large landowners wield less economic and political power (on the coast such power has always been concentrated in commercial and financial interests). Consequently land reform efforts, although not a complete success, have made more headway than they have in the mountains. Though purchase (AID Land Sale Guarantee Loan) played an instrumental role in the matter, land invasions have led to an increase in private ownership, which along with traditional tenant farming, are the principal tenure modes of small scale growers. Cooperative landholding, a product of the Agrarian Reform Empresas Agricolas Program (partially financed by AID is the third major tenure

type. To date cooperative farming endeavors have met mixed success. In some cases, production and marketing associated activities such as the receipt of credit and technical assistance are being conducted on a joint cooperative basis. In numerous cases coops have floundered for a variety of reasons including mismanagement, internal bickering, failure of government agencies to provide timely technical assistance and credit. In still other instances the coop mechanism has been used by "members (mostly former tenant farmers - many of whom are recent immigrants from the sierra) purely as a vehicle to acquire land. Even though nominally they are coops, in practice the land has been divided into discreet parcels and is being farmed independently.

Research carried out in the Guayas River Basin, a major agricultural area on the Ecuadorian coast, revealed heavy reliance on traditional farming methods. High cost of inputs and relatively low levels of sophistication hinder the adoption of new farming techniques. Limited infrastructure (access roads, irrigation, land levelling) ignorance concerning such items as proper dosages, and appropriate application periods in the crop cycles concerning chemical products are widespread difficulties. The use of traditional techniques seriously affects productive capacity. For example, data compiled in 1975 among rice growers on the coast revealed that farmers with five or less hectares using only limited modern inputs were producing an average of 20 quintales (hundred weight) per hectare, while those farms of one hundred hectares or more using substantial amounts of modern inputs were averaging close to 80 quintales per hectare.

Unlike the sierra there is very little cottage industry among small farmers on the coast. The principal off-farm source of income is generated by day laboring on local plantations. Wages average about $2 per day but the work is not full time or steady. At a maximum a field hand can expect four months intermittent employment for an entire year. Based on a six-day work week this represents an earning capacity of s/5,000 ($200. Research conducted in 1975 estimates that entire incomes (farm and off-farm) for small farmer households in the Guayas River Basin to be about $900.

Health status of the lowland campesino is as equally below par as is his highland counterpart. Infant and early childhood mortality rates, although generally lower, are nevertheless high - registering levels of 22 per 1,000 births, 23 per 1,000 births, and 18 per 1,000 births respectively in the lowland provinces of Los Rios, Esmeralda and Guayas. Malnutrition, again, plays a key role in elevated rates of early childhood death. Data indicate that in coastal rural areas there are severe shortfalls in calorie intake as well as deficiencies in calcium, riboflavin and niacin. A successful malaria eradication campaign has drastically reduced the incidence of this disease. However, the virtual absence of hygiene facilities, uncontaminated sources of drinking water, and general lack of proper environmental sanitation cause elevated occurrences of gastroenteritis, anemia, and pernicious diarrea.

Concerning education, although disaggregated data is again unavailable, the consensus is that, although sub-standard, conditions are an improvement over those found in the highlands. Closer integration to national lifestyle (e.g., Spanish as the primary language, recognition of the value of education) is responsible for not only higher levels of adult literacy but also decreased rates of absenteeism, dropout, and repetition in the primary grades. Finally, schools and teachers generally have been more accessible on the coast, a condition which is in part related to the fact that the small farmers are mestizos, not Indians, and therefore have not been subjected to a social and economic discrimination as have the Indians.

c. Beneficiaries - Panama

In Panama the target zone is a relatively isolated (the first road was opened in 1965) district of Tonosi in the southern tip of the Azuero Peninsula. It is largely a cattle herding and rice and corn growing area. The social structure (a two-class arrangement featuring a small elite and a large peasant mass) determines the land tenure system which has the flat arable land of the area (12% of the total) in the control of a few large cattle ranches, while the majority of the population is relegated to subsistence farming, with only limited market participation, on the less arable slopes of the surrounding mountains.

Similar to conditions in Paraguay, land is privately owned and either worked outright or rented. Also similar is the employment of traditional production techniques and the fact that the authority over the uses to which land is put resides in the individual household. Finally, like Bolivia, production is geared for both subsistence and market purposes.

The frontier character of the area and the fact that the bulk of the population are recent immigrants from many different parts of the country means that stablw social institutions (churches, schools, voluntary organizations) have yet to take a firm hold; kinship and friendship networks are reduced in scope with a consequent increased emphasis on the nuclear family in the social and economic spheres.

The target population will be drawn from among those households with per capita incomes of substantially less than $1,000. This group consists of (1): farmers on plots of land between one and ten hectares whose produce is used mainly for subsistence although they do generate a small marketable surplus; (2) beef and/or milk cattle ranchers working parcels of land between 10 and 100 hectares of degraded and overgrazed land; and (3) small scale cattlemen with adequate acreage of potentially productive land (20-50 hectares) whose level of technology keeps them below the target net income.

Available quality of life indicators (education, health, and housing) further substantiate the poverty level of the recipients. In 1970 the average illiteracy rate among people over 10 years of age was 43% which was approximately 8% higher than the national average for rural population. Primary school enrollment percentages and facilities, although not outstanding, are comparable with other rural zones. The principal educational problem is the high adult illiteracy rate which no doubt is caused in part by a regression of once literate people by living in an environment which places little emphasis on reading and writing skills.

Health infrastructure services generally are lacking. In 1970 only about 40 percent of births had modern medical attention - local curers and midwives are quite active. Moreover, less than 20 percent of the dwellings had potable water while merely 26 percent had sanitation facilities. These figures, as revealing as they are, mask the disparity between the district seat (where conditions are much better), and the hinterland (where the target population resides). The district does have a health center staffed by professional and paraprofessionals. The center provides out patient clinical services as well as immunization, injections, home visits, health education and environmental sanitation counseling. However, although people from the outlying areas are not excluded from the center, by and large its use is limited to district residents. Therefore, if disaggregated data were available, conditions in the countryside would be shown to be far worse.

2. Risk Management Mechanisms

As can be seen from the preceeding description of the target groups, all have a tenuous economic situation marked by considerable risk and uncertainty. In all three countries the farmers have devised a variety of mechanisms to manage the risk involved in small scale farming and the adoption of new technology. These mechanisms can be divided into three categories or sets of strategies: (i) production; (ii) exchange; and (iii) sociocultural.

a. Production Strategies

Production strategies are essentially diversification schemes and are carried out in a number of ways. First, among all of the target populations in this project, production is divided into two domains, subsistence and market crops; failure in one area can be eased by success in the other. Secondly, a variety of subsistence crops (e.g. wheat and several varieties of potatoes in Bolivia; potatoes, broad beans, corn in highland Ecuador and rice, and corn on the coast; and rice and corn in Panama) are planted in order to spread out the possibility of total loss. This practice is related to the dispersed field pattern and is more prevalent in highland areas (Bolivia, Ecuador) than in lowland zones with even terrain. The dispersed plots generally are located at different altitudes and therefore in distinct micro environments. Farmers reason that planting different crops in the various ecological settings reduces the probability of a complete loss through some unforeseen disaster. A third strategy employed is simultaneous participation in several market systems. This strategy also is more applicable to the Bolivian and highland Ecuador target groups insofar as the local and regional market systems are far better established in the Andes than in lowland areas. The strategy here is to create alternatives in order to find the most favorable selling conditions and to avoid price lowering gluts. Finally, cottage industry (wool, and artisan production in Bolivia and Ecuador), seasonal wage labor and the use of native seed varieties and long fallow periods are likewise used, in all three countries, to reduce the chance factor involved with small scale farming.

b. Exchange Strategies

Exchange networks, both in money and in kind, between individuals and families facilitate risk reduction by providing the farmer with alternative ways of gaining access to scarce resources, goods, and services. These types of risk management devices are more prevelant among the highland Bolivian and Ecuadorian Indians than the other target groups. Their ethnic homogenity and language, high rates of local marriage, communal land, extended families and an informal local leadership of structure, provide favorable pre-conditions for exchange strategies. Examples of exchange vehicles include sharecropping, borrowing barter, and use rights to communal pasture which enable peasants to gain access to land. In a similar vain tools and seeds are borrowed with a tacit understanding to return the favor when called upon. Finally, work bees (mingas), organized on the basis of either obligation of reciprocity or payment in kind, provide required labor

forces at critical moments. The pattern typically followed in these exchange is that each household tries to maximize the number of trade-off possibilities. the result is a "spreading out of exchange networks which in turn serves to minimize risk. In Panama and lowland Ecuador the social institutions (no communal land, emphasis on the household unit, no informal community leadership structure and recent immigration of people from among different areas in Panama) of the target group do not lend themselves to the use of exchange network mechanisms consequently few are in evidence.

c. Sociocultural Strategies

Sociocultural strategies include the kinship system, fictive kinsmanship (compadrozgo), and patron-client relationships. In almost all instances activity of these networks is based upon reciprocity - the tacit agreement to return a favor when asked. They assist in managing risk by providing a pool of people (in effect an assurance guarantee) which an individual or household can call upon to secure resources, goods, and services when needed.

Similar to exchange networks the sociocultural strategies are most prevelant among the Sierra target groups. Local intermarriage has created strong kinship networks, the influence of the Church hence the compadre institution has been greatest in highland areas, and historical factors have made seeking a beneficient patron a chief menas of survival.

In Panama and costal Ecuador significant recent immigation and closer identification with cultural patterns of the national mainstreams preclude the existence of extensive kin networks. Ceremonial ties (compadrazgo), although they do exist, are not of the same degree of importance as in Bolivia.

3. Constraints and Strategies

Constraints, real and potential, which may affect the success of this project exist among all three target populations. Although they occur in distinct combinations and with different degrees of intensity from one group to the next, a level of generalization, with notable exceptions taken into account, can be made for the target group as a whole. Likewise, strategies to deal with the constraints can be generalized once area-specific pecularities are accounted for.

A primary general problem is the lack of data -- especially in reference to small farms. Reliable information is either absent or insufficient about such relevant matters as determination of property rights, and classification according to productivity, yield variation or crop loss for type and areas of farms over the long run, etc. Where such data does exist it pertains to larger holdings. This fact coupled with the realities of rural infrastructure and the availability of credit and extension services, all of which is skewed to the benefit of larger farmers, could result in the project benefiting middle size holders rather than AID's prime target group.

The obvious strategy to deal with this situation is to select an area, on a pilot project basis, about which there is a minimally acceptable level of actuarial data. If no such data is available, consideration should be given to including actuarial research on a limited scale in this project.

A second potential constraint is the "smallness" of small farmers. Available information (20 different data sets from around the world, including several from Latin America) pointed out that over 60% of the farmers have holding which are less than one hectare in size. Undoubtedly, in the Latin American context, these farmers are a major portion of the poor majority. Yet because of their extremely small holdings they may not have the capital to participate in a crop insurance program; nor, given their circumstances, may they see the utility of it.

This issue can be managed by directing the project form the outset at farmers who, although poor, are not necessarily at the lowest echelon. The poor majority is not a monolithic block; it consists of sub-divisions and has an element of stratification. Interventions can be made at different levels, and one of the determining factors of the projected point of impact is the type of project. Preliminary indications are that a crop insurance scheme requires certain prerequisites of the target group (including sufficient land to facilitate production for market) which makes its applicability to farmers with holdings below a certain size, say two hectares, problematical. Furthermore, several studies have noted new technology adoption rates are highest not among the smallest, one hectare or less, of farmers, nor among the upper levesl of the middle group, but rather among the lower elements of the middle group. In the context of rural Latin America this element in most cases represents farmers with holdings of between 2 and 10 hectares. As currently designed most of the target group members are within this level, a few in Panama exceed the upper limit, but the poor quality of the soil relegates their production to near subsistence amounts. Designing the project to impact on farmers within this category, which includes a large segment of the rural poor, will increase the probability of project success, as these are the farmers who are pre-disposed to employ technical innovations. For example, linking insurance with credit will bring into the system those farmers who have moved into the cash economy and who are more likely to use new technology, intensify operations or switch to a higher value, but more risky crop. The example of the success of these farmers with insurance, credit and technology will not be lost on neighboring farmers, other members of the rural poor.

The third potential constraint is the cost to the farmer of the intervention. The project will entail claims payments and administrative expenses which must be financed, at least partially, by the recipients and could retard its acceptance. Field observations of various groups of Latin American campesions reveal that they are reluctant to make frontend payments for any technological input (including insurance) until they become convinced, usually through first-hand experience, of its cost effectiveness. Moreover, project related research has revealed that for the small farmers to accept the idea it must be proposed to them in such a manner that it represents economically a "good deal". It has

to be demonstrated that within their (farmers) own time horizon it will be beneficial. To be sure there are cultural factors which come into play, but rarely are they insurmountable constraints to purely economic decisions. The project must be designed in such a way so that it is perceived by the farmers as a good deal for them to be receptive to it.

A fourth constraint is that the extension services required to manage an insurance project are extremely limited. In all three countries the extension components lack the appropriately trained manpower and technical and logistical support to adequately dispense with existing work loads. An insurance project would add to the burden of already overworked, understaffed underqualified extension systems. Compounding the issue is the fact that extensionists tend to gravitate, for reasons of cultural affinity and the promise of psychological satisfaction through higher probabilities of success, toward working with larger scale farmers. Without provisions for upgrading extension services a crop insurance project could contribute to increasing the gap between the poor and the less-poor in the countryside.

A devise to overcome this problem is to upgrade the extension services in the area to be affected by the project. Two avenues seem appropriate for accomplishing this end. The first would be to enhance the quality of services through specialized training of existing agents. Although this would improve their capabilities, it would not resolve the gravitation issue and therefore would be only a partial solution. A more complete answer would be to compliment the training with staff increases. The additions would be crop insurance promoters; local leaders from among the target group (bare-foot extension agents) who have the confidence of the farmers in addition to knowing, from personal experience, the difficulties, priorities, and reservations which farmers have.

A fifth potential constraint is that, similar to the extension services problem, the availability of credit facilities for small farmers is far below par. This issue will assume increasing importance if the crop insurance project is tied to a credit scheme. By and large credit programs in the region are associated with cooperative endeavors. The history of such projects, in terms of small farmer participation and the credit institutions' ability to deliver sufficient amounts of money at appropriate times, has been checkered at best. With such a background, the efficacy of credit via cooperatives for an insurance scheme is problematical.

A reasonable strategy for dealing with this issue is to adopt the credit delivery mechanisms to the locally accepted system. For example, research among Guatemalan farmers revealed that, although campesinos are not attracted by cooperative ventures which are based on communal activity (production, marketing, etc.), there is a higher incidence of participation in co-ops (e.g. Savings and Loan Co-ops) which require limited social commitments. In this particular instance, credit mechanism structured so that a minimal amount of social obligations were expected of the campesinos would fit already established

local patterns and assure the highest probability of farmer participation. A similar process of identifying preferred credit vehicles in the three target geographical areas can be used to determine which mechanisms will have the highest probability of success.

The sixth potential constraint is the communal land holding pattern and community leadership structure which exist in Bolivia. Because, under these circumstances, determinations regarding the productive uses of land are often collegial matters and some members of the group have out-migrated and are therefore not physically present, the decision-making process to join an insurance project may become complicated.

A preferred strategy to combat this potential problem is to direct the project toward the privately owned holdings. Decisions making regarding land usage is considerably more simple in these cases which in turn should ease the process of incorporating farmers into the project. Failing this tactic, it will be necessary to identify beforehand the decision making process, in cases of joint ownership, in order to facilitate farmer participation.

Finally, the project must be wary of the social company it keeps, i.e., what kind of people introduce it and in what light are they viewed by the projected beneficiaries. Past abuses and failures, as well as ethnic and social class dissonance, cause small farmers to be wary of overtures of change agents, particularly government representatives. In order for the project to be successful, ideally it should be launched in an area where change agents have established good rapport and have gained the confidence of the farmers. At a minimum it should be attempted in areas where there is a neutral (non-negative) perception of change agents by the projected beneficiaries.

4. Benefit Incidence and Spread Effect

A complete description of the potential benefits to be derived from the project appears in Annex B. However, there are several probable advantages whose importance requires that they be previewed here.

Principally the scheme will reduce the risk factor involved in adopting new technology. Improved seed varieties, processed fertilizers and other chemical products (common elements of new technological packages) often represent unknown, consequently risk generating factors to the small farmer. Under a crop-credit insurance scheme the farmer knows before planting the size of his minimum income -- an important factor given their tenuous economic position. As a result a major portion of the risk involved in small scale farming (especially in adopting new technology) is transferred from the farmer to the insurer. With risk minimized it is anticipated that adoption rates of modern inputs among small farmers will increase.

A second major benefit is the technical assistance provided by the project. Often technological packages require incorporation of production procedures with which the farmer is unfamiliar and levels of sophistication with which

he is not accustomed to operating. For example, to approach yield expectations hybird seed varieties require strict water control, appropriate applications of fertilizers, and proper dosages of herbicides, insecticides and the like -- practices in many instances complicated and foreign to small farmers. Therefore, the mere availability of modern inputs is not sufficient to improve production levels. Competent advise on technical matters is likewise needed to increase the probability of success.

Finally, the target groups will receive the benefits of the credit channel which will be established by the project. Processed fertilizer and other chemical products, improved seed varities and infrastructure works are costly items often exceeding small farmer budget capabilities. The availability of modern technical inputs becomes meaningless unless small farmers have access to credit. This project will present an avenue for credit. As a point of fact it will be based on an offer of credit to the farmers who then must accept the insurance in order to qualify for the credit.

The spread effect is dependent upon the results of the pilot endeavors. If evaluation results are positive among all three groups -- i.e., if crop-credit insurance proves to be a major stimulus in reducing the risk involved in changing production systems, then future replications can be expanded to include larger groups of peasants. Furthermore, if it is found successful with a specific type (set of characteristics) of small farmer, then subsequent efforts can be directed only at that group, thereby avoiding unnecessary wastage.

5. Impact on Women

It is anticipated that the project will impact equally on the men and women of the target group. As described in other areas, the family is the basic social and economic unit -- even though there are differing degrees of reliance upon kinsmen. The division of labor within the small farming family is such that all members who are physically able must make a labor contribution to the maintenance of the household. With respect to women this means a full complement of child raising and domestic tasks in addition to active field chores (preparing land, planting, and harvesting) herding animals, and often running the household's non-farm economic endeavors. In Bolivia there is a general tendency for the role women management of the holdings to assume even greater importance because of farm employment patterns and it is common practice for men to be away from the holding for extended periods (months) working as day laborers. In their absence women assume not only the responsibility of running the farm but often increased work loads as well. In light of these factors it seems safe to assume that women will be equally direct recipients as men of the risk reduction, technical assistance, credit and benefits of the project.

D. Economic Analysis

In its approval of intensive review leading to submission of this project paper, the DAEC provided the following guidance for the preparation of the economic analysis:

> The Intensive Review should attempt to establish in the PP that crop insurance will actually stimulate the adoption of new farm management practices and increase total production and that under LDC conditions the economic benefits of crop insurance can exceed its costs.

In addition, the DAEC instructed the project committee to consider the relationship and possible complementarities or tradeoffs of crop insurance with credit insurance, loan guarantees, interest rate policy, price stabilization programs, supervised credit, group farming and other policies and programs which affect risk.

In accordance with these directives the economic analysis which follows will consist of three parts:

i) An attempt to quantify the impacts of crop insurance on small farmer technology adoption, production and income (including calculations of internal rates of return);

ii) A discussion of the impacts of crop insurance on other social objectives; and

iii) The relationship of crop insurance with other policy instruments.

1. Crop Insurance Impacts on Small Farmer Technology Adoption, Production and Income

Introduction

While the bulk of the analysis which follows revolves around the question of technology adoption, it is important to note that even in the absence of such adoption, economic benefits, in the broad sense of the term "economic," may still be substantial. Although this issue will not be pursued any further here, crop insurance can naturally serve other objectives such as maintenance of income and (as in the case of fire insurance) protection against disastrous events. The reader should be aware, therefore, that since no pretense is made to quantify the "utility" associated with protection alone, the benefits of crop insurance which are discussed here are thereby understated.

The existing empirical bases for analyzing the impacts of crop insurance as a development tool for small farmers are extremely limited. Although there is a relatively abundant literature on crop insurance programs in developing countries, this literature falls into two categories: the purely descriptive and that which is concerned with the technical operational features of insurance.[1] Thus far there has been no analytical study of crop insurance as an instrument of development policy. To the project committee's knowledge, the analysis reported here is the first effort to quantify the economic implications of a crop insurance program in developing countries.

The choice of analytical approaches open to the project committee was restricted by two factors. First, the experience of developing countries with crop insurance is limited. While a variety of developing countries have introduced crop insurance in some form, these programs have tended to be restricted to limited crops for specific hazards and oriented to income maintenance or protection against disastrous events rather than as a policy instrument to induce technological change and increased productivity. The one exception is Mexico, whose long experience with crop insurance can serve as a useful guide for other developing countries.

Second, there was no specified program proposed for a specific country to which the analysis could be directed. Rather, the economic assessment had to be directed to a generic crop insurance program. This was a major reason, in fact, that the Mexican experience was not chosen as the cornerstone for the analysis here. As it turns out, however, the recommendation to which the project committee ultimately came is that the potential economic benefits of an insurance program are highly sensitive to the institutional framework in which it operates and that the linkage of insurance with an ongoing small farmer credit or extension program is the proper way to proceed. It is important to note that this is a conclusion not a premise, however.

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1. A reasonably comprehensive and current summary of crop insurance programs is provided by Vincent R. McDonald, "Crop and Livestock Insurance: An Aid to Small Farmer Development," International Bank for Reconstruction and Development. Rural Development Division, Working Paper No. 2, 1975.

Analytical Framework

In light of these restrictions, then, the framework chosen as the basis for economic analysis was a cost-benefit study of an illustrative crop insurance program for a "representative" small Latin American country.[1] Specifically, a simulation of small farmer behavior was performed in the presence and in the absence of crop insurance and the results were then compared and analyzed.

The point of departure for this analysis was a linear programming model of small farmers in the central highlands of Guatemala.[2] While this model is naturally location-specific, the farmers in question are nevertheless not atypical of many farmers who are the target of AID development assistance. Furthermore, as we shall see, considerable sensitivity analysis was conducted with this model to provide a range of analytical conclusions--rather than one sole result which would be treacherous to extrapolate elsewhere.

The linear programming model served two important functions in the assessment of crop insurance programs: to estimate the benefits attributed to a crop insurance program and to identify other impacts (for example, shifts in cropping patterns) which such a program may induce. The linear programming model for Guatemala was selected in part because of its ready availability, but a more important reason was to have an analytical tool for estimating benefits which permits decision making by farmers to incorporate simultaneously the choice of technology, the risk, and the influence of crop insurance. Although there are conceptual and empirical limitations to the linear programming model, it serves as a highly useful analytical tool for simulating quantitatively the impacts of a crop insurance program under a wide range of assumptions and varying values for key parameters.[3]

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1. See Robert R. Nathan Associates, Inc., "An Economic Assessment of Crop Insurance for Small Farmers in Latin America," Report Prepared for the U.S. Agency for International Development under Work Order No. 17, AID/afr-c-1134. The bulk of the analysis presented here is taken from this study.

2. See Robert M. House, "A Linear Programming Analysis of Small Farms in the Central Highlands of Guatemala," Draft Report, U.S. Department of Agriculture--ERS/FDD/SAIG, November, 1975.

3. Computer programming assistance for the linear programming model was provided by the Surveys and Evaluation Unit of the U.S. Bureau of the Census.

A full exposition of the structure and conclusions of the Guatemalan small farmer model, as adapted for the purpose of crop insurance analysis, is clearly infeasible here. In what follows, therefore, a relatively brief summary will be presented. For further detail, the interested reader is referred to the complete report on which this summary is based.[1]

The Guatemalan small farmer linear programming model was adapted for use in estimating the stream of farmers' net income over time, with and without a crop insurance program. The model selects a set of crop activities[2] on the basis of expected yields, taking into account the farmer's working capital, credit, market prices and risk considerations. Net income is then calculated on the basis of the achieved yields which occur at the time the crop is harvested. In the without insurance case this is the final net income figure. In the case where crop insurance has been purchased; the farmer's net income is increased by the amount of any indemnities he receives. This process is repeated for each of ten years with the working capital constraint in each year adjusted when necessary to take into account the previous year's financial outcome.

Within the context of the crop insurance model, linear programming provides a procedure for determining the mix of crop technologies which would achieve maximum net income for the farmer, taking into account the risks associated with each alternative technology.[3] In evaluating each technology, linear programming compares the input resources required (for example, land, labor materials) with the farmer's ability or willingness to obtain the resources. Where the farmer is averse to the risk associated with a particular technology, the model will exclude the activity from the selection process even though it might be the most profitable. Crop insurance provides a means for loosening the risk restrictions within the model. Thus, depending on the cost of insurance coverage, the risk restriction may be sufficiently loosened so as to bring a formerly risky technology into the final solution. In the context of the model, risk offers to the drop in yields that would occur in a so-called worst year. A high-risk crop activity is so named because of the large drop in yields that will occur in the worst year.

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1. See Robert R. Nathan Associates, Inc., op.cit.

2. An activity represents a different way of producing a crop and is usually distinguished by different types or amounts of resource inputs.

3. Technologies are differentiated by their use of fertilizer and machinery inputs with the lowest technology (1) using none, and the highest technology, both. "Higher" technologies need not be the most profitable. As a rule, though, higher yields are associated with higher expenditures--and thus, more risk.

Other specific characteristics of the crop insurance model are as follows:

i. A 1-3 hectare farm was selected for the crop insurance model. A farm of this size was chosen becuase it represents the predominant farm size in the Central Highland.

ii. In the model, insurance coverage is related to mean expected yields.[1] Three levels were used: 50 percent--and, later, 40 percent and 30 percent of expected mean yields.

iii. For each specified level of insurance coverage, an insurance premium cost is calculated solely on the basis of actuarial methods. It is assumed that administrative costs associated with an insurance program will not be borne by the farmer. As such, the cost of the premium, over a sufficiently long period of time, will be equal to the amount of the indemnities paid back to the farmer.

iv. The risk constraint function stipulates that the ratio of "worst" expected farm income to mean expected farm income must be greater than or equal to a prespecified level.[2] Since a level of 35 percent generated solutions which closely approximated actually observed patterns of production in the Central Highland, the base solution level was established at this value. Further analysis was then performed to test the sensitivity of results to this level.

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1. Preliminary crop-specific statistical analysis suggested that there are differences in the crop insurance potential of different crops. In the model at hand, therefore, only corn and garlic activities above the lowest technology level are insured. The reasons for relating insurance coverage to yields rather than, say, expenditures or credit, are discussed in the Nathan report.

2. "Worst" expected farm incomes and mean expected farm incomes are merely linear functions of "worst" expected crop yields and mean expected crop yields, respectively.

   The "worst" expected yield of a given technology within a given crop is defined as the yield below which the probability of its occurrence is so small that it can be ignored as a likely possibility. For this purpose, it is assumed that all catastrophic yields whose frequency of occurrence is less than once in ten years can be ignored. In the without crop insurance case, it is this value which is embodied in the risk function. With crop insurance, it is the insured minimum guaranteed level.

This procedure thus reflects the most common hypothesis in the vast literature on risk,[1] namely, the focus-loss concept.[2] According to this hypothesis, the small farmer perceives risk in terms of avoiding a bad loss which will severely affect his consumption and ability to sustain his future income-earning capacity. This approach to risk is attractive, particularly because of the intuitive judgment that small farmers who are close to a survival income initially cannot afford the risk of outcomes which have a high probability[3] for leaving them with incomes below this survival minimum.

Premium levels, mean expected yields, "worst" expected yields and, for a given year, achieved yields[4] are all derived from cross-sectional crop distributions. Strictly speaking, of course, cross-section data (which incorporate differences in management, in land quality, in planting dates, in timelines and quality of inputs, etc.) are inappropriate for accounting for the inter-temporal variations in the natural factors (such as weather) over which the farmer has no control--and whose adverse impact is precisely what the farmer is being insured against. The absence of pertinent time series information necessitated the use of cross-section data as a proxy, however. And given the illustrative nature of this exercise (as opposed to providing a firm justification for a specific crop insurance scheme), the use of such a proxy does not appear to be misplaced.

It is also important to note that yield distributions for one year probably are greater than could have been brought about by natural factors alone. To the extent that this is true, their use in estimating the cost of insurance programs would result in an overestimate--which may not be inappropriate for a first approximation.

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1. Two good summaries of the literature on risk and the small farmer are Sara S. Berry, "Risk and the Poor Farmer," Draft Report Prepared for the U.S. Agency for International Development, November, 1976; and Development Alternatives, Inc., "Small Farmer Risk-Taking," Report Prepared for the U.S. Agency for International Development, June, 1976.
2. See ibid.; and Jean-Marc Boussard and Michel Petit, "Representation of Farmers' Behavior under Uncertainty with a Focus-Loss Constraint," Journal of Farm Economics, XLIX (November, 1967), 869-80.
3. This behavioral assumption is of course an assumption. For an example in which this assumption does not appear to be justified, see James A. Roumasset, Rice and Risk: Decision Making among Low-Income Farmers (Amsterdam: North Holland Publishing Co., 1976)
4. Achieved yields were randomly selected with probability proportional to their frequency of occurrence.

Estimation of Benefits

The results of the crop insurance model suggest that crop insurance can be quite beneficial in stimulating technology adoption and increases in production and income levels of small farmers. In Tables 1,2 and 3, the results of the base solution are summarized for the with- and without-insurance cases. Tables 1 and 2 give net income by crop activity for each of ten years. The expected net income row refers to the income anticipated by the farmer on the basis of historical or expected yields. The second row, adjusted net income, is the net income from crop production actually realized. The insurance indemnity applies to insured farmers and refers to claims paid to farmers as a result of actual yields falling below the minimum guaranteed. The last row, net income, is the sum of adjusted net income and insurance indemnity, if any. Table 3 presents a ten year summary of net income by crop and technology class.

In the without insurance case, the farmer's crop activity mix as selected by the model consisted of corn--technology 2 (0.68 hectare), interplanted corn and beans--technology 2 (0.18 hectare), wheat--technology 1 (0.45 hectare), and land rented out (0.49 hectare). With crop insurance, the crop activity mix changed to the following: corn--technology 4 (1.44 hectares), bean--technology 1 (0.18 hectare), garlic--technology 2(0.036 hectare), wheat--technology 1 (0.072 hectare) and land rented out (0.07 hectare).

The shift to corn--technology 4 and garlic--technology 2, which are relatively high-risk crop activities, was the result of a reduction in the farmer's risk aversion brought about by the availability of crop insurance. The insuring of the high-risk crops provided for a minimum guaranteed yield which served to reduce the risks of corn--technology 4 and garlic--technology 2 to a level comparable with the other lower-risk crop activities. The result of the shift for the ten-year period is a substantially increased net income (Q4169 to Q1534, a difference of Q2635 -- where Q1 = $US 1).

A comparison of the actual achieved net income for both cases (Figure 1) shows that in six of the ten years, actual income was above expected income while in four it was below, a not unusual result. Further, for the total ten year period, achieved and expected net income were approximately the same (Q1534 vs. Q1545 for the without insurance case and Q4169 vs. Q3862 for the with insurance case).

Although it is not known what minimum level of net income the farmer requires to cover unavoidable consumption and working capital expenses, it can be seen in Figure 1 that under the without insurance case in two years (6 and 8) net income was only Q8 and Q18 respectively. For the insurance case, there are several low-income years in a row (6,7 and 8), however, they are above the lowest year of the without insurance case and are cushioned by five preceding years of above-average income.

Table 3 Total Net Income
(quetzales per farm)

Crop activity	Technology 1	2	3	4	Total Crop
		Without crop insurance			
Beans					
Corn		1,024			1,024
Corn/beans		224			224
Garlic					
Potatoes					
Wheat	287				287
Total	287	1,247			1,534
		With crop insurance			
Beans	80				80
Corn				3,459	3,459
Corn/beans					
Garlic		583			583
Potatoes					
Wheat	46				46
Total	126	583		3,459	4,169
		Difference (with/without)			
	-161	-664		3,459	2,635

Table 2 Net Income by Crop and Year, without Crop Insurance
(Quetzales per farm)

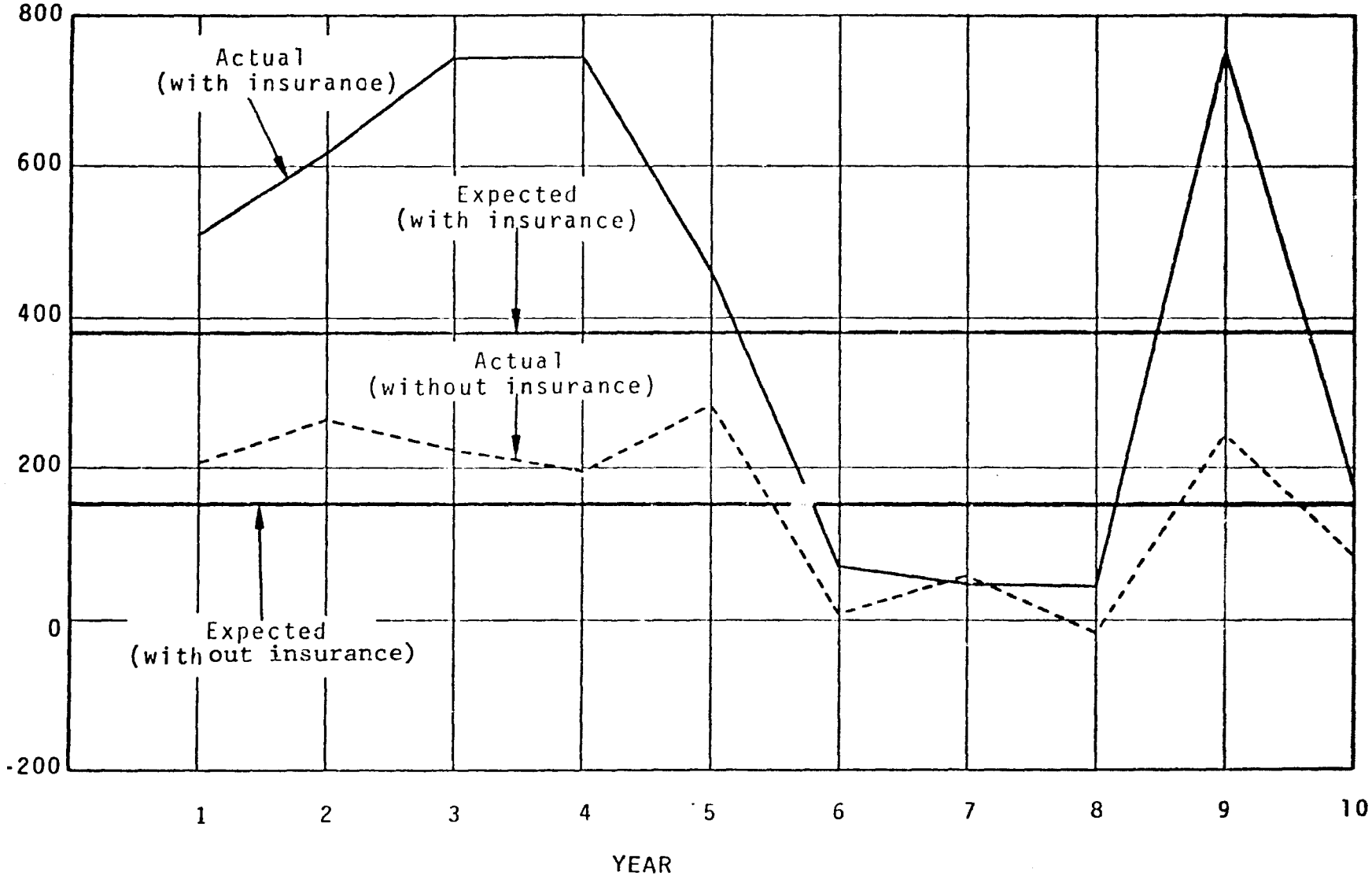
Crop activity	Year 1	2	3	4	5	6	7	8	9	10	Total
Corn P23											
Expected net income	95	95	95	95	95	95	95	95	95	95	949
Adjusted net income	103	229	166	166	166	-24	4	-24	198	39	1.024
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	103	229	166	166	166	-24	4	-24	198	39	1,024
Corn/beans P23											
Expected net income	21	21	21	21	21	21	21	21	21	21	208
Adjusted net income	22	49	36	36	36	-4	2	-4	42	9	224
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	22	49	36	36	36	-4	2	-4	42	9	224
Wheat P11											
Expected net income	39	39	39	39	39	39	39	39	39	39	389
Adjusted net income	80	-15	10	-6	80	36	53	10	2	36	287
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	80	-15	10	-6	80	36	53	10	2	36	287
Total for all crop activities											
Expected net income	154	154	154	154	154	154	154	154	154	154	1,545
Adjusted net income	205	264	212	196	282	8	59	-18	242	85	1,534
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	205	264	212	196	282	8	59	-18	242	85	1,534

Table 1 Net Income by Crop and Year, with Crop Insurance
(Quetzales per farm)

Crop activity	Year 1	2	3	4	5	6	7	8	9	10	Total
Beans P12											
Expected net income	10	10	10	10	10	10	10	10	10	10	102
Adjusted net income	22	8	-11	18	-6	6	15	-1	11	18	80
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	22	8	-11	18	-6	6	15	-1	11	18	80
Corn P42											
Expected net income	322	322	322	322	322	322	322	322	322	322	3,217
Adjusted net income	444	604	604	604	444	-47	-47	-47	604	112	3,274
Insurance indemnity	--	--	--	--	--	62	62	62	--	--	185
Net income	444	604	604	604	444	14	14	14	604	112	3,459
Garlic P22											
Expected net income	48	48	48	48	48	48	48	48	48	48	481
Adjusted net income	30	-22	149	122	4	43	-22	30	136	43	515
Insurance indemnity	--	31	--	--	5	--	31	--	--	--	68
Net income	30	10	149	122	10	43	10	30	136	43	583
Wheat P11											
Expected net income	6	6	6	6	6	6	6	6	6	6	62
Adjusted net income	13	-2	2	-1	13	6	9	2	--	6	46
Insurance indemnity	--	--	--	--	--	--	--	--	--	--	--
Net income	13	-2	2	-1	13	6	9	2	--	6	46
Total for all crop activities											
Expected net income	386	386	386	386	386	386	386	386	386	386	3,862
Adjusted net income	510	588	743	743	456	8	-45	-16	750	179	3,915
Insurance indemnity	--	31	--	--	5	62	93	62	--	--	253
Net income	510	619	743	743	461	69	48	45	750	179	4,169

FIGURE 1 COMPARISON OF ACTUAL VS. EXPECTED NET INCOME, WITH AND WITHOUT INSURANCE

(QUETZALES)



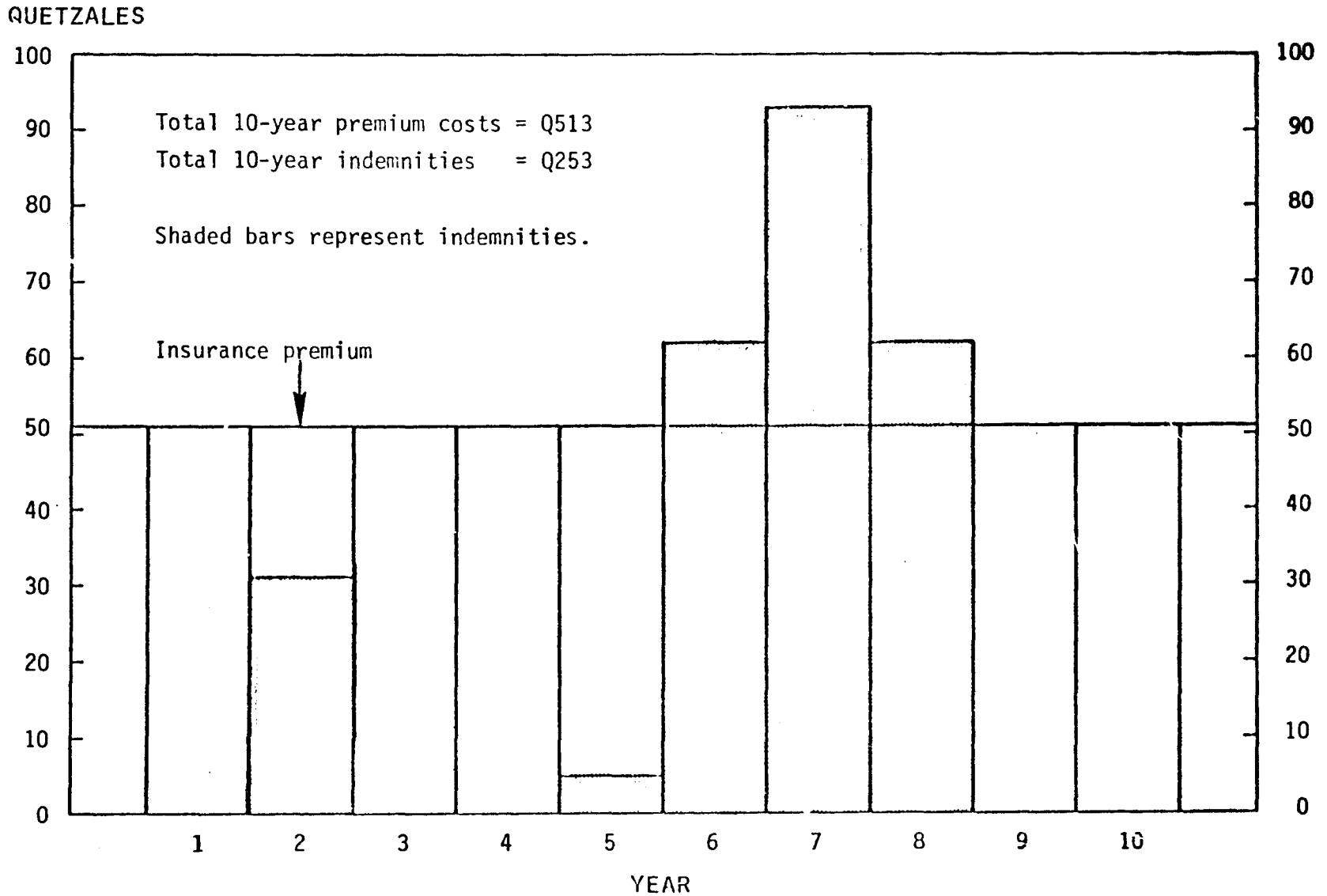
For the insurance case, indemnities were paid in five out of the ten years, with the lowest payment being Q5 and the highest Q92 (Figure 2). In two years (2 and 5) indemnities were paid out even though net income was above average. This was because one of the insured crops (garlic) had very low yields even while corn was enjoying better than average years. In terms of the relationship between premiums and indemnities, in seven years indemnities were less than premiums, with the result that reserves were accumulated for handling future disasters. As a percentage of net income, indemnities were only 6 percent of the total for the ten-year period.

The premium paid by the farmer, which included only the actuarial cost, was Q51 per year (Q44 for corn and Q7 for garlic). These insurance costs amounted to 18 percent of working-capital costs for corn--technology 4 and 43 percent for garlic-technology 2.

As a whole, the base solution results of the model suggest that the development potential of crop insurance may be substantial. Such a favorable prognosis must, however, be guarded for three reasons. First, there are a number of institutional assumptions implicit in the modeling exercise itself to which we shall be returning below. Secondly, one must be wary of drawing infuences from one sole solution which is naturally a function of a set of key parameters. And thirdly, it is possible that the positive impact of crop insurance can only be achieved at unbearably high social cost.

In an effort to determine the sensitivity of the crop insurance model to parameter specifications, a number of alternative runs and tests were performed. As a rule, the upshot of these activities is that crop insurance benefits continue to be high. Nonetheless, two cautions must be noted. First, the level of coverage must be geared to the degree of small farmer risk aversion: if coverage is low, there may not be sufficient incentive for the farmer to switch production practices. This clearly implies the need for small-scale experimentation before entering into a program on a massive scale. Secondly, in the model a policy of tighter credit or a reduction in working capital funds will force the farmer to cut back land in production. As restrictions become more severe, there is eventually a shift to the less expensive and less profitable crop activities. Although this applies to both the without and with insurance cases, the impact is greater on the latter because of the higher credit and capital requirements. A drop of 1 percent, for example, in credit in the with insurance case resulted in net income falling 0.8 percent while in the case without insurance the same percentage drop in credit resulted in only about a drop of 0.3 percent in net income. The implication, therefore, is that inadequacy of credit availability may well jeopardize obtaining the full potential of a crop insurance program.

FIGURE 2 COMPARISON OF PREMIUM COSTS VS. INDEMNITIES



Cost-Benefit Analysis

The advisability of launching a crop insurance program naturally hinges on a comparison of its benefits with its costs. In order to estimate such costs, the dimensions of an insurance program first need to be specified. Since this study is not directed to any specific proposal for a crop insurance program for any particular country, it is therefore necessary to define an illustrative program.

The two principal dimensions of a crop insurance program are its initial base of coverage (how many farmers will participate) and the rate at which coverage expands over time. In defining these dimensions, the following assumptions were made: (1) the crop insurance program is set in a small Latin American country; (2) the program would be directed principally if not exclusively to small farmers; (3) the program would be linked formally to (or be dependent upon) an established agricultural service already reaching small farmers, such as a supervised credit program; and (4) the program would be initiated on a pilot basis in order to test operating procedures and the response of the farmers and to gain experience before launching into larger scale coverage.

The crop insurance program which was specified is relatively modest in size (in terms of participating farmers) and rate of growth over time. The number of participants by year and the corresponding economic costs for the illustrative program are shown in Table 4.

The specified crop insurance program has an initial year designated for design, preparation and organization of the program. In many circumstances a two to three-year design and preparation period is likely to be required and a separate internal rate of return is therefore computed under this assumption. There is also a one-year pilot program involving only 250 farmers; a longer testing period may be realistic and the number of farmers in the pilot program could vary widely from that specified here.

The economic costs of a crop insurance program include start-up costs, ongoing management and administration costs, and (potentially) reserves. The costs shown in Table 4 are only approximations; and mainly for this reason, the cost parameters are adjusted under alternative computations of the internal rate of return.

Table 4 Program Specification and Economic Costs for an Illustrative Crop Insurance Program

Year	Number of participants	Economic costs (U.S. dollars)	Cost per participant (U.S. dollars)
0 (preparation for startup)	--	50,000	n.a.
1 (pilot program)	250	160,000	n.a.
2	1,000	275,000	n.a.
3	2,500	350,000	140
4	3,500	370,000	108
5	5,000	380,000	76
6	7,500	390,000	52
7	9,500	400,000	42
8	12,000	410,000	34
9	14,500	420,000	29
10	17,000	430,000	25

n.a. = not applicable

Start-up costs are difficult to estimate and ultimately reflect best judgments. Administrative costs are estimated through a combination of determining staffing requirements for a program having up to 2500 participants and an upward adjustment of the cost experience of the Mexican crop insurance program. Finally the opportunity cost of holding reserves in highly liquid form is not estimated directly but a separate internal rate of return is computed by increasing basic costs by 25 percent, with this increase serving as a proxy for reserves held in this manner.

The basic indicator employed in this analysis to measure the overall economic profitability of a crop insurance program is the internal rate of return (IRR), i.e., the annual interest rate at which the stream of costs, converted to present value, equals the stream of benefits, also converted to present value. The base case for these calculations corresponds to the base solution of the linear programming model discussed above and the base set of costs outlined in Table 4. In this instance, the IRR turns out to be 184 percent which is high by any standard -- and thus suggests that investment in a crop insurance program is an appropriate allocation of scarce public resources. Once again, however, some notes of caution are in order:

i. The insured activities in the crop insurance model are significantly more profitable than non-insured activities. The extent to which this situation is generalizable is naturally debatable.

ii. The crop insurance model assumes that farmers without insurance do not adopt higher technology activities throughout the ten-year period. This may be a reasonable assumption in some circumstances but the presence of other effective agricultural services could, in time, lead to adoption of higher-productivity technologies. If this were true, then the benefit of crop insurance is the earlier adoption of new technology than would otherwise be the case.

iii. The model also assumes that crop prices remain unchanged. In some regions a significant increase in the production of a crop may result in lower prices, thus reducing the level of benefits.

iv. The base solution assumes single specific values for such key variables as level of insurance coverage, program costs, farmers' risk aversion, credit availability and working capital constraints. Hence to the extent the IRR is highly sensitive to these values, so too is the economic advisability of an insurance program.

The interesting outcome of a variety of sensitivity analyses performed on the values of these variables is that while the value of the originally calculated IRR changes considerably in percentage terms, crop insurance is clearly economically viable under a broad range of operating assumptions. In the vast majority of the cases considered, the IRR is 50 percent or more and as in our discussion of benefits above, the one major exception occurs when the level of insurance coverage is too low relative to the level of farmers' risk aversion.

v. Lastly, and most importantly, the benefits attributed here to a crop insurance program are conditioned on, and are in fact partly a function of, other programs as well. To the extent that additional services must coexist with insurance before farmers are able to adopt more profitable technologies, then the IRR overstates the economic return attributed to crop insurance alone. This problem of isolating a single input where complementary inputs (joint costs) exist is common to many agricultural-related programs.

It may be useful to outline examples of such services. Farmers must first of all have the technological information which is relevant to their needs. Secondly, the timely availability of modern inputs is essential if this information is to be translated into practice. Credit must also generally be available to purchase these inputs. And finally, channels must exist for the farmer to market his increased production, particularly in the case of perishable crops.

It is naturally beyond the scope of an insurance program to provide all these services -- although it may not be unreasonable to expect such a program to be efficient in the performance of the extension function. The point, therefore, is that crop insurance can not be introduced in a vacuum. The institutional context in which an insurance program enters is thus a critical question. Indeed, this is all the more so when one takes into account the variety of operational programmatic considerations associated with crop insurance proper which are discussed elsewhere in this project paper.

In summary, then, the analysis reported here strongly suggests that crop insurance has substantial potential as a development tool. The analysis does not, however, lay out a blueprint for proceeding directly to large scale operations. Experimentation with operational and institutional arrangements is clearly called for before such a step is taken. Hence small-scale pilot operations appear eminently justified.

One final note: As part of the process of determining the potential economic viability of crop insurance, the standard[1] recommendation was incorporated that administrative costs of the program would not be borne by the farmer -- and, thus, that the program would not pay for itself. It may be useful, therefore, to place the relationship between economic and financial viability in some perspective. There is a tendency to consider commercial, or financial, viability of a crop insurance program as an essential feature, much as with a credit institution. This need not be the case. As long as the national economic benefits of an insurance program are positive, the financial viability of the institution operating the program is of secondary importance. Indeed, the structure of premiums and indemnities should be guided principally by the objectives of the program (increased productivity through adoption of higher technologies) and the target group (small farmers), rather than by the financial soundness of the managing institution.

2. Crop Insurance Impacts on Other Social Objectives

The introduction of a crop insurance program will have a variety of economic impacts which are not reflected in the results of the cost-benefit analysis. These include impacts on employment, foreign exchange, savings, income distribution and availability of capital through credit institutions. Most of these impacts are likely to be positive in character, though there can be negative economic implications as well.

A common characteristic of these impacts is that in absolute terms they tend to be small, despite significant relative changes (such as the percentage increase in employment). The reason is that a crop insurance program of approximately the size specified in this analysis involves a very small share of farmers in economies where agriculture remains an important sector. The impacts of insurance coverage for 20,000 farmers will necessarily be small in comparison with the broader universe. The smallness in absolute terms, however, should not obscure the evaluation of the impacts nor the recognition that most of the impacts are positive.

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1 P.K. Ray, Agricultural Insurance -- Principles and Organization and Application to Developing Countries (New York: Pergamon Press, 1967), p. 286.

Under most circumstances crop insurance should lead to increased utilization of labor. Results from the crop insurance model affirm this conclusion, with the average annual number of days of labor for the typical farm increasing from 110 without insurance to 180 with insurance, or an increase of 64 percent with crop insurance. Much of this labor is in the form of increased utilization of family labor, but some is hired labor as well. While the percentage increase in labor requirements is substantial, the absolute numbers are small even in the context of a moderate-sized country such as Guatemala. The smallness of the absolute numbers, of course, is a function of the size of the program's coverage.[1]

To the extent that a country imports or exports agricultural commodities and is dependent on imported inputs to increase agricultural production, a crop insurance program will have an impact on that country's balance of payments. Increased production attributed to crop insurance may induce input importation, substitute for commodity imports or increase commodity exports. The net effect will depend on the particular crops insured and the composition of agricultural trade.

A crop insurance program can affect savings in a number of ways. First, the increased income generated by the participating farmer as a result of crop insurance will most likely yield an increase level of savings by the farmer. Just how much additional savings are generated depends on the marginal savings rate and the size of the crop insurance program. To the extent that income is transferred from the government to small farmers by means of the crop insurance program (This will be discussed shortly.) and if the marginal savings rate of the government is higher than that of participating farmers, the savings impact will be correspondingly reduced.

Crop insurance may also assist in channeling savings by placing a floor on the income of farmers, even in the most disastrous year. Without crop insurance farmers would tend to hold (hoard) their savings for such disastrous years but with crop insurance they may be induced to place part of their savings in some other form (bank deposit, government bond, cooperative savings account, etc.)

Savings may also be created if premiums paid by farmers exceed indemnity payments, resulting in the establishment of reserves. These reserves represent financial savings which are available for reinvestment elsewhere in the economy. Whether such reserves will be established, and if so, how large they will be, depends on the relationship of premiums and indemnities over time, which is in turn a function of numerous variables (actuarial base of the premiums, actual yields, etc.).

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1. It is recognized that crop insurance may not always generate increased employment. With the size of farms and technology choices utilized in the illustrative model, however, one would not anticipate displacement of labor.

If the principal participants in a crop insurance program are small farmers, and if they are part of the low income stratum of the country, then a crop insurance program will have a positive impact on the distribution of income. This impact takes place two ways. First, and more importantly, crop insurance enables the average participating farmer to increase his income, not through indemnity payments but by encouraging him to move to more productive technologies which yield higher income. The results of the crop insurance model illustrate how the income of a small farmer can be significantly increased.

Income distribution also occurs through the likely financing by the government of administrative and related costs. Since these resources are probably general revenues, with the bulk of taxes being generated from the middle and upper income strata, the beneficiaries are the farmers; in effect, they are relieved of a cost which they would otherwise have to incur. The same redistribution effect would occur should the government also pay for part of the premium. As one can see from the illustrative crop insurance program, the transferring of income through government financing of the program is small in comparison to the changes in the income of farmers.1/

One of the reasons frequently cited for banking and credit institutions not serving small farmers in developing countries is the poor repayment record of small farmers. This in turn is often explained by the limited financial capacity of small farmers; if hit by a poor year they do not have the resources to repay their loans. For a government sponsored credit institution, created specifically to serve small farmers because other institutions will not, a large proportion of unpaid loans attributable to poor harvests in any one year could lead to partial decapitalization. This in turn would mean either a curtailing of credit in subsequent years or a replenishing of the institution's capital base.

It is reasonable to expect that the availability of crop insurance, particularly if linked formally to credit, will avoid the decapitalization problem. At the same time, the availability of crop insurance may induce other (private) banking institutions to move into or increase their lending for agricultural purposes and specifically to small farmers, which in itself would have a positive effect.

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1. There may also be countervailing income distribution impacts. For example, if crop insurance takes the form of insuring credit, with the insurance permitting higher returns to the suppliers of credit (because of reduced defaults, lower administrative costs, etc.), there will be a corresponding transfer of income to the owners of such capital.

Crop insurance may have other impacts as well.2/ On the positive side, for example, increased production could lead to declines in consumer prices and insurance could enable the government to avoid large and unexpected fiscal transfers in the event of serious crop failures. On the other hand, incomes of noninsured farmers could fall as a result of price declines and crop insurance, like a price support program, could lead to distortions in the allocation of resources in an economy, particularly if insurance is provided for only selected commodities. The extent to which resources would be allocated in a different way from what would be the use with a well-functioning market is difficult to estimate, however.

3. Relationship of Crop Insurance with Other Policy Instruments

Crop insurance is unique as an instrument of agricultural development policy in that it is geared directly to alleviating the risk associated with natural factors in farmer decisionmaking. Hence crop insurance generally plays a complementary role to other development tools. In light of the analysis above input provision, credit and marketing services are obvious examples of this. This is also true for other instruments as well, even though they may appear to be substitutes at first blush.

In this section, the three policy tools most frequently suggested as crop insurance substitutes will be briefly examined. For a more detailed discussion of these tools and the complementarity/competitiveness of other policy instruments, the reader is referred to Annex B.

1. Price stabilization programs, like crop insurance, do address farmer risk aversion and do have production impacts. The risk to which they are directed, however, is the danger of price declines, whereas crop insurance addresses the other major component of risk, namely, yield losses. The two tools are therefore clearly complementary. As a rule, however, there are differences in their extent of impact: Price stabilization programs generally have broader macroeconomic effects whereas crop insurance can be targeted more directly for income distribution purposes.

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2. For a rather extensive catalog of potential positive benefits, see Annex B

ii. Credit insurance, as distinguished from crop insurance and crop-credit insurance, is designed to protect lending institutions alone. The farmer is not protected. His loan is not forgiven but is transferred to the insurer. If the loan is forgiven, then, by definition, we have a form of crop insurance. It is also important to note that for credit insurances to be efficient, adequate premiumsmust be charged and controls must be introduced to monitor farmers' operations at the farm level these features are also critical to the workings of a crop insurance program.

iii. Finally, loan guarantees--which are schemes through which funds are placed at the disposal of farmers to pay off loans when natural disasters render them unable to do so, are frequently temporary programs which terminate upon depletion of funding. If they are to be efficient permanent programs, actuarial soundness and loss control measures must be introduced, i.e., a form of de facto crop-credit insurance must be established.

Summary and Final Conclusions

An overall conclusion which emerges from this analysis is that crop insurance for small farmers offers the potential of being a useful instrument for increasing agricultural production in developing countries and for improving the welfare of small farmers. The concept of crop insurance as a means of encouraging small farmers to adopt higher-productivity technologies merits serious consideration, particularly the commitment of resources for a trial of such a program.

The cost-benefit analysis of the illustrative crop insurance program--modest in size and rate of growth--yielded high net benefits. The internal rate of return ranges from about 50 percent to about 185 percent, depending on the particular costs and benefit values employed. These represent a high level of national economic profitability by any standard. The results of the economic analysis also demonstrate that the income of small farmers can be increased substantially with crop insurance. There are, however, several cautionary notes which must be recognized: the cost-benefit analysis was based on an illustrative program; some of the increase in agricultural productivity (i.e., program benefits) is a function of other activities which cannot readily be isolated; it was assumed that the crop insurance program, albeit modest in size, was a well-functioning program, with farmers understanding the program and thus willing to participate; and the accumulated knowledge on selected variables, particularly small farmers' perception of risk, is admittedly limited.

The economic analysis clearly suggests that crop insurance for small farmers is a promising agricultural development mechanism. Yet there

are institutional considerations which temper this conclusion. The introduction of crop insurance will confront a number of constraints; existing agricultural services, on which crop insurance is dependent, reach only a nominal share of the universe of small farmers in most developing countries; the crop yield data for determining a sound actuarial base are sparse; there are existing traditional systems for managing risk which may deter the introduction of crop insurance (and should not be lost through a poorly implemented crop insurance program); understanding of crop insurance may not come easily to small farmers, in part because of an expected initial uncertainity on their part as to who benefits from it; and the characteristics of land holdings of small farmers--often very small and fragmented--will lead to demanding requirements for supervision and high administrative costs.

The basic operational features of a crop insurance program should reflect these constraints. A program of modest scale seems essential, with a limited number of participants and only selected crops being covered in the initial years. An appropriate design period is equally essential, concentrating on development of crop yield data (cross-section data for selected years may offer a reasonable substitute for time-series data), implementation of pilot programs to learn and train staff and the preparation of an educational component which can communicate the features of insurance to small farmers. Well-designed communication is the critical link for bridging the expected improvement in the income of small farmers resulting from crop insurance (as indicated by the results of the economic analysis) and the institutional factors which may impede the initial response by farmers to insurance. The crop insurance program should be linked closely, if not formally, with existing agricultural services reaching small farmers, which means that the size and growth of the insurance program are determined by these services.

E. Institutional Analysis

1. Receipient Institutions

The key institution for the success of this project is the regional grantee. IICA, the Inter-American Institute for Agricultural Sciences is recommended for this role. In various interviews with its management, both in Washington and at its headquarters in San Jose, Costa Rica its desire in participating and its ability to execute the project have been stressed.

IICA was created by and exists under the organizational umbrella of the Organization of American States. It has projects in most all Latin American nations. It has diplomatic recognition to operate throughout the hemisphere.

IICA's political control and entree to governments is an asset for this project. One purpose of the project is to prepare for a successor project and establish the regional reinsuror, ALARA. IICA's political nature will facilitate the international cooperation necessary to bring about the creation of ALARA.

It is possible, but still remains to be analyzed thoroughly, that IICA may serve as the organization for the reinsurance activities. In any case, it can be a closely involved parent. One benefit of this connection is that valuable experience gained by the staff during this pilot project phase will be transferred intact to the reinsurer.

At present, IICA is involved in a variety of agricultural programs which are complementary to the crop insurance effort. IICA has programs in agricultural credit, agronomic research, marketing, information systems, extension and other areas. A successful crop insurance effort will integrate these areas, thus IICA's present activities will prove valuable. IICA has programs in agricultural credit, agronomic research, marketing information systems, extension and other areas.

It also has a strong agricultural economic research capacity which will be called upon to participate directly in the research phase of this project. Finally, IICA has begun surveying the availability of skilled crop insurance/development specialists and has access to adequate personnel.

IICA's full time project personnel will be key elements for the success of this undertaking. These people are not presently employees of IICA and it is impossible, therefore, to evaluate their ability to successfully implement this project. For the positions of Project Manager, Research Technician, and Country Advisors, IICA will submit the names and relevant data of the candidates whom they intend to hire and will obtain approval from AID prior to the commencement of their employment.

The second group of institutions involved in the project are the three groups of country institutions. These groups are composed of the insurance agencies and the various support groups which include the ministries of agriculture and of finance or treasury, the agricultural development banks, the extension services, the meterological services, the agronomic research services, and others. In each country, the assistance of each of these has been promised and it will be the task of the pilot project implementers to actualize these promises.

In each country, the number, capability and willingness to cooperate of these support organizations is adequate to support this beginning effort. As the projects develop, they will have to define their own relationships with the support organization. The development of productive modus operandi will be necessary precondition for funding a second stage project.

In all three countries, there will be a need for close cooperation with the national agricultural banks: Banco Agricola de Bolivia, Banco Nacional de Formento (Ecuador and the Banco de Desarollo Agricola (Panama). Again, in all three countries, there will be an attempt to involve some local cooperatives which are engaged in agricultural production credit.

ISA (the Agricultural Insurance Institute) in Panama is presently well organized and has an adequately trained staff nucleus to participate in this project. With respect to Panama, the focus of this project is to help strengthen the organization, correct certain deficiencies such as the overly optimistic legislation creating the organization and turn it in new directions.

In the two remaining countries new organizations will be created by the Ministries with the assistance of the regional contractor. The Ministries of Agriculture have indicated willingness to participate in this project and have been involved in similar endeavors in the past indicating a capacity to participate successfully at this time.

Client agencies, such as the agricultural banks and local cooperatives will be called on to cooperate as sales and administrative agencies. These responsibilities are well within their demonstrated capabilities.

The Mexican crop-credit insurance benefit analysis will be directed by the regional contractor but will require the active collaboration of several Mexican organizations.

These organizations are:

i. ANAGSA (Crop insuror)
ii. DGPEA (Agricultural extension)
iii. INIA (Agricultural Research Institute)
iv. CIDER (Rural Development Research Center)

All have indicated their interest and ability to participate in the project. ANAGSA, the lead organization in the project has particularly competent and appropriate personnel for participation in this type of project.

2. A.I.D.

AID/W will have overall responsibility for the management of this project. That responsibility will be located specifically in the LAC/DR/RD office. It will require additional manpower familiar with both crop insurance and agricultural credit and rural development problems. This project provides for a two-thirds time RSSA personnel borrowed from the F.C.I.C. (Federal Crop Insurance Corporation) of the USDA.

This project manger will report to a LAC/DR Regional Projects Supervisory Committee composed of:

LAC/DR, Deputy Director/Sector Analysis and Technical Services;
LAC/DR, Deputy Director/Development Finance; and
LAC/DR/RD, Chief

Part IV Implementation Plan

A. Administrative and Contracting Arrangements

Initial implementation responsibliities will belong to LAC/DR/RD to be exercised by an agricultural insurance specialist. AID project supervision and back stopping responsibilities will be similarly assigned.

Two contract relationships will be established for AID under this proejct. The first will be a grant with IICA funding technical assistance provided by IICA and administrative expenses of the three pilot agencies. IICA will enter into sub-grants with the host governments for this purpose.

In addition, IICA will promote and supervise economic research into the effectiveness of the ANAGSA program in Mexico. It will enter into a sub-grant agreement with the government of Mexico for that purpose. Personnel involved in this project will be trained using these grant funds in Mexico. A waiver will be required for carrying out the Mexican based research. See Section I, E, Project Issues.

IICA will supply three country technicians proficient in both crop insurance and the problems of development. It will also furnish a project manager with superior qualifications, and a research technician. An insufficient number of personnel of this sort is available from the United States and the host countries. A waiver is required to permit using other skilled technicians. See Section I, E, Project Issues.

The hiring of employees for the insurance agencies by the host governments is an important step. Signing of the grants will be subject to governments agreeing to hire on the basis of job description and qualification requirements established jointly by the host country and the IICA technicians.

Host countries will also be required to pass enabling legislation creating the crop credit insurance agencies at least on an experimental basis. Part of this required legislation shall be that government will provide some premium subsidy and will be responsible for excess losses. The governments involved have indicated informally that they are agreeable to these conditions.

The second contract relationship will involve a RSSA with USDA to provide an agricultural insurance specialist and related support to assist AID/W with administration and support of the project.

Transfer of funds for the second contract will not be difficult. In the case of IICA's grant, however, it will receive requests for reimbursments of expenses from the several countries and will process these and present global (i.e., all countries plus itself) requests for payments to AID/W. IICA will be paid with a Federal Reserve Letter of Credit.

B. Implementation Plan

The following calendar of events applies to the implementation of the project. Times shown are number of months after approval by the DAEC:

	EVENT	TIME
1.	DAEC Approval	0
2.	Signing IICA Grant	2
3.	Signing USDA RSSA Agreement	2
4.	Hiring Project Director	2-3
5.	Signing 1st Host Country and ANAGGA Sub-Grants	3
6.	Hire 1st Host Country Advisor	3-4
7.	Draft Enabling Legislation	4-6
8.	Sign 2nd Host Country Sub-Grant	3-4
9.	Sign 3rd Host Country Sub-Grant	4-5
10.	Hire Agency Personnel	4-6
11.	Training in Mexico of Personnel	7-8
12.	First meeting of Research Committee	9
13.	Selection of crops and zones to insure, preparation of policies, creation of information system	9-11
14.	Training of bank loan offices and education of farmers	11
15.	Enabling legislation for pilot projects offered	12
16.	First crops insured	11-13
17.	Research instrument prepared, first field data gathered	12-13
18.	Completion of Small Farmer Risk study	14
19.	Completion of first insurance year	15
20.	Meeting of project personnel and research committee	16
21.	Commence planning of ALARA	16
22.	Review country experience and revise insurance and operational policies	17-20
23.	Select second year's crop and area	17
24.	Implementation Evaluation	19-20
25.	Second year's insurance activities complete	26
26.	Meeting of Project Personnel and Research Committee	26
27.	First ALARA draft and first research results presented	26
28.	Select third year's crop and area	27

29.	Revise insurance and operational policies based on prior experience	27
30.	Begin insuring borrowers of one private lender	28
31.	Draft enabling legislation for permanent insurance agencies	30
32.	Complete third year of insurance operations	36
33.	Meeting of project personnel and research committee to present final ALARA design, review program results and analyze research results	36
34.	Begin fourth years insurance activities	36
35.	Economic Impact Evaluation	40-42
36.	Present permanent enabling legislation	39
37.	Final conference of project personnel research committee and representatives of other crop insuring countries	43
38.	ALARA established, development proposal completed	43
39.	Research complete	45
40.	Fourth year insurance activities complete	48

C. Evaluation Plan

Two evaluations will be performed during the life of the project. The first at approximately 18 months and the second at three to three and one half years. The first will concentrate on managerial and implementation aspects. The second will focus on impact. Specifically it will cover the extent to which small farmers are affected, technology adopted, small farmer credit made to flow and similar economic concerns.

The purpose of the second evaluation is to provide an independant analysis of the major conclusions of the project. Since this is properly a pilot project, designed to provide information as to the desirability of proceeding with full scale operations, the reliability of project based information must be proved.

The first evaluation will be performed by a team composed of consultants and regional AID personnel. The second will be performed by the project research team with the assistance of outside consultants. Approximately two man months of consulting time will be used for the first evaluation and twice that for the second.

In addition to the evaluations discussed above, IICA will submit various reports which will facilitate monitoring and evaluation. These reports include the following:

1. Regular quarterly reports. These will report on overall project activities and will summarize the monthly reports submitted to IICA from the several sub-projects.

2. Yearly experience and research report. Each year IICA will prepare a report suitable for distribution to the international development community detailing the lessons and experiences relevant to the management of crop credit insurance agencies and the preliminary results of the economic research activities.

3. Final comprehensive report. At the end of the project IICA will present the conclusions of the economic research team and of the insurance management personnel.

D. Covenants and Conditions

In order to assure that the adequate conditions exist for supporting the project, covenants and conditions to accomplish the following will be written into the implementing documents of this project.

1. There shall be a covenant in the grant to IICA and in the sub-grants to the host governments stipulating that AID financed insurance activities shall be directed to small farmers. The definitions of small farmer shall be that which is currently employed by the AID mission in the host country. Insureds need not be exclusively small farmers, but the program must be directed at them.

2. There shall be a condition precedent in the sub-grant wherein the host governments agree to arrange to pay all losses even if those losses exceed premiums collected from farmers.

3. There shall be a covenant in each sub-grant wherein the host governments agree to chose crops to insure which will facilitate the research to be carried out under this project and which will then provide maximum economic benefits. The host governments shall further agree to consult with the local AID mission on the choice of crops to insure prior to insuring those crops.

4. There shall be a covenant in each sub-grant stipulating that the host governments acknowledge being aware that AID shall not continue to finance administrative costs after completion of this project. The host governments shall agree to finance these costs if they desire to continue and expand the crop credit insurance program. This covenant will not imply that AID may not finance other project related costs at a later stage if it so desires.

5. In each sub-grant there shall be a covenant wherein the host government shall agree to make available in the areas where insurance is offered the necessary, complementary input services such as, but not limited to, credit, extension, seeds, fertilizers and marketing.

6. In each sub-grant there shall be a condition precedent that prior to the disbursement of any funds to the host government by IICA, the host government shall submit to IICA and AID a plan for implementing the project in that country.

7. In each sub-grant, there shall be a condition that no funds may be disimbursed to the host government after four months unless legislation or some other appropriate authorization exists enabling the crop credit insurer to function fully.

ANNEX A

JAN 21 '77

INFORMATION MEMORANDUM TO THE ACTING ASSISTANT ADMINISTRATOR (LA)

FROM : LA/DR, Charles B. Weinberg

SUBJECT: L.A. Regional Grant Project PRP (FY 1978) - Latin American Crop Insurance Systems

The DAEC reviewed the subject PRP on November 17, 1976 and approved intensive review leading to submission of a Project Paper (PP) in accordance with the following guidance:

1. Other Relevant Experience - To the extent feasible, the PP should contain a description of the relevant characteristics and operational experience of national-level insurance schemes. Also, the prior experiences of the IDB and the Inter-American Institute for Agricultural Sciences in studying a Latin American Crop Reinsurance Fund should be described.

2. Project Studies - The Intensive Review should investigate the possibility of separating the project into phases. Specifically, the PP should indicate whether the studies proposed can be scheduled chronologically or schematically so that threshold, or "go/no", decisions on subsequent efforts can be made if necessary in the event of an unfavorable recommendation from an early study.

3. LDC Cooperation - The PP should clearly indicate the commitment of those LDCs selected for participation in crop insurance studies to the possible development of national crop insurance programs if feasibility is indicated.

4. Implementing Agent or Institution - The PP should describe the possible arrangements and institutions for implementing the project with a justification for the approach and institution selected.

5. Economic Analysis - The Intensive Review should attempt to establish in the PP that crop insurance will actually stimulate the adoption of new farm management practices and increase total production and that under LDC conditions the economic benefits of crop insurance can exceed its costs. 1/

1/ Among the studies which should be consulted for this purpose are the papers being prepared for TA/AGR/ESP by Professors Sara Berry of Boston University and Stanley Johnson of the University of Missouri (Columbia) on the role of risk and such programs as crop insurance in accelerating adoption of new technology. The views of the Rural Development Division of the World Bank (IBRD) should also be consulted. Additionally, the relationship and possible complementarities or trade-offs of crop insurance with credit insurance, loan guarantees, interest rate policy, price stabilization programs, supervised credit, group farming and other policies and programs which affect risk should be considered.

6. Target Group Coverage - Existing national insurance schemes should be analyzed to assess the capability of such programs to reach and service small farmers. In this regard, crop insurance approaches which tie insurance obligatorily to small farmer credit programs should be examined to identify and assess the impact of any disincentives such arrangements may cause to the desired target group participation.

7. Financial Viability - The PP should present financial operating data from other national schemes, as feasible and relevant, in support of the recommendation for project approval.

ANNEX B

EXPLOITING CROP-CREDIT INSURANCE FOR DEVELOPMENT PURPOSES IN DEVELOPING NATIONS

Nelson Maurice*

PRESENTED AT
THE FERTILIZER ASSOCIATION OF INDIA/
INTERNATIONAL FERTILIZER DEVELOPMENT CENTER SEMINAR

DECEMBER, 1977**

ABSTRACT

Crop-credit insurance, a linking of crop and credit insurances, provides protection for farmer and banker both, thereby stimulating agricultural production and providing a broad range of other benefits. It is a new kind of insurance, a development adapted especially to the needs of less developed countries. Successful programs exist in less developed countries and can serve as effective models for government officials wishing to exploit this development potential for their own nations.

Economic analysis is lacking from the literature, but the analysis presented here indicates that crop-credit insurance is a more efficient means of stimulating agricultural development than several alternative policies. Government subsidies are required and are justified on the basis of economic viability.

The insurance plan itself and the needs for reinsurance are also discussed. Finally, the role of cooperatives and private sector groups is analyzed.

*Nelson Maurice is an agricultural insurance consultant to the US Agency for International Development. Opinions expressed here are his and not USAID's.

**Changes have been incorporated in this paper through July, 1978.

EXPLOTACION DEL SEGURO AGROCREDITICIO CON FINES DE DESARROLLO EN LOS PAISES EN VIAS DE DESARROLLO

ABSTRACTO

El seguro agrocrediticio, una vinculación de los seguros para cultivos y créditos, ofrece protección tanto para el agricultor como para el banquero, con lo cual estimula la producción agrícola a la vez que brinda una amplia gama de otros beneficios. Constituye un nuevo tipo de seguro, una innovación adaptada especialmente a las necesidades de los países menos desarrollados. En la actualidad existen en varios países menos desarrollados programas que se desenvuelven con éxito y que pueden servir de modelos eficaces para funcionarios gubernamentales que en beneficio de sus propios países desean explotar este potencial para el desarrollo.

Los trabajos escritos sobre el tema carecen de análisis económicos, pero en el análisis que aquí se presenta se indica que el seguro agrocrediticio constituye un medio más eficiente para estimular al desarrollo agrícola que otras varias políticas opcionales. Los subsidios gubernamentales se requieren y justifican sobre la base de la viabilidad económica.

También se examinan el plan de seguros propiamente dicho y las necesidades de reaseguro. Finalmente, se ofrece un análisis del papel que les incumbe a las cooperativas y a diversos grupos del sector privado.

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UNE ASSURANCE CREDIT CONTRE LES MAUVAISES RECOLTES AUX FINS DE DEVELOPPEMENT DANS LES PAYS EN DEVELOPPEMENT

RESUME

L'assurance crédit contre les mauvaises récoltes, combinaison d'assurance des récoltes et des crédits, apporte une protection tant au cultivateur qu'au banquier, stimulant de ce fait la production agricole et assurant une large gamme d'autres avantages. Il s'agit d'un nouveau genre d'assurance, un concept adapté spécialement aux besoins des pays moins développés. Des programmes satisfaisants existent dans les pays moins développés et peuvent servir de modèles efficaces aux fonctionnaires désirant exploiter ce potentiel de développement pour leurs propres pays.

L'analyse économique manque de documentation, mais l'analyse ici donnée démontre que l'assurance crédit contre les mauvaises récoltes constitue un moyen plus efficace de stimuler le développement agricole que certaines autres politiques possibles. Des subventions du gouvernement sont nécessaires et justifiées sur la base de la viabilité économique.

Le plan d'assurance lui-même et les besoins pour son renouvellement sont également étudiés. Enfin, le rôle des coopératives et des groupes du secteur privé fait l'objet d'une analyse.

APROVEITAMENTO DO SEGURO AGRO-CREDITICIO PARA FINS DE DESENVOLVIMENTO POR NACOES EM DESENVOLVIMENTO

RESUMO

O seguro agro-creditício, uma liga de seguro agrícola e de crédito, oferece proteção tanto ao agricultor quanto ao banqueiro, estimulando assim a produção agrícola e proporcionando una vasta gama de outros benefícios. Trata-se de uma nova modalidade de seguro, um avanço especialmente adequado às necessidades de países em vias de desenvolvimento. Existem, em países menos desenvolvidos, programas bem sucedidos que podem servir de exemplos reais a funcionários governamentais desejosos de aproveitar este potencial de desenvolvimento em benefício de seus próprios países.

Em material impresso não consta a análise econômica, porém a análise aqui apresentada indica que o seguro agro-creditício é um meio mais eficiente de estimular o desenvolvimento agrícola do que vários outros planos alternativos. Subsídios do governo são necessários e se justificam com base na viabilidade econômica.

O plano de seguro em si e as necessidades de resseguro são também debatidos. Finalmente é analisado o papel das cooperativas e dos grupos do sector privado.

TABLE OF CONTENTS

Exploiting Crop-Credit Insurance For Developing Purposes in Less Developed Nations

I. INTRODUCTION

Although the commercial and agricultural activity known generally as crop insurance has occupied the minds of men for a long time, it still remains under-exploited today. Many attempts have been made using traditional private sector approaches to develop crop insurance. There has been success with limited risk programs in Europe, the United States and a few other countries, notably Argentina. However, most attempts by the private sector to offer all-risk insurance have failed. 1/

Governments have been more successful in the all-risk area since 1917 when Japan and then the United States established the first modern programs. Today, close to two dozen nations have government operated all-risk crop insurance programs. There is considerable variety in the structure and success of these programs (cf. Crawford).

One notable similarity, however, is that the successful programs are concentrated in the developed nations. Less developed nations have not exploited this potential resource. To date only the program in Mexico has achieved a considerable degree of success and contributed to the development of the nation. But the degree of success achieved is remarkable. It is deliberately used to support the agricultural credit system and direct the development of the agricultural sector in accordance with government policy. In Mexico, crop credit insurance is an integrative and facilitating tool. It facilitates the workings of other institutions and integrates them by serving as a planning focus and a policy directive tool.

Crop-credit insurance provides relief to both farmers and lenders at the same time while providing considerable leverage for promoting the development of agricultural sectors. Farmers have long demanded a system such as crop insurance to protect themselves against losses in production. Banks have desired some sort of credit insurance system to protect themselves against losses resulting from the farmers' inability to repay loans when they suffer crop losses.

This paper explores several facets of this new kind of insurance; the potential benefits, requirements, problems, alternative policies, the

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* The author wishes to express a debt of gratitude to Drs. P.R. Fay and Bernard Oury. Kay's classic text Agricultural Insurance is the outstanding work in this field. Dr. Oury's seminal article in 1969 first focused attention on the relationship between insurance and economic growth.

1/ The only exception is the Santrocos cooperative in South Africa which has been operating without governmental support as an all-risk crop insurer since 1970.

insurance plan itself, experience in other countries, the need for reinsurance and finally, the potential for participation of private groups such as cooperatives.

II. DEFINITIONS

A. Agricultural Insurance

Agricultural insurance includes all forms of insurance which affect agricultural activities, including crop insurance, fire insurance on farm buildings, liability insurance on animals and so forth.

B. Crop Insurance

Crop insurance includes all forms of insurance which compensate the farmer for losses of his crops.

C. Agricultural Credit Insurance

Credit insurance protects the lender when there has been a crop failure, but does not forgive the farmer his loan. The insurance company takes over the farmer's note once it pays the bank. The insurance company then, has a legal right to collect from the farmer. Commercial and export credit insurance are the models for this line (see Phelps).

D. Crop-credit Insurance

Crop-credit insurance refers to a close linking of all-risk crop insurance and the agricultural credit mechanism. Farmers are compensated for their losses, but benefits [illegible] loans, and then the remainder is paid in cash to the farmer.

The program in Mexico is the best developed example of crop-credit insurance. They, however, refer to it as investment insurance because the insurance is limited to the maximum a farmer may borrow. This is limited to the "direct" investments in the crop (interest, premiums and rent, for example are excluded). Because of the focus on protecting both the farmer and the lender and because of the direct links to credit institutions (for sales, premium collection and benefit payment purposes), crop-credit is a superior title to crop-investment insurance.

E. Specific Risk Crop Insurance

Specific Risk Crop Insurance (or limited risk crop insurance or crop-hail insurance) protects farmers from damage to his crops resulting from certain, specified hazards. Generally, these hazards occur in a small area and at a specific time. The losses resulting from these hazards are readily identifiable. Hail, fire and windstorm are typical examples. This limited set of risks covered came about as a result of private insurance companies with limited capital needing to limit their exposure to losses.

F. All-risk Crop Insurance

All-risk crop insurance (or comprehensive crop insurance) does not really do what its name implies. Generally, policies state that all losses are covered except those that are specified in the coverage clause. Universally, self-inflicted carelessness and poor management caused losses are excluded. The main difference between all and specific risk insurance is that hazards occurring over broad areas and long and indefinite periods of time are included. These include drought, excess moisture, disease.

When integrated with an agricultural development program, the insurance can cover the appropriateness of recommended technology.

G. Loan Guarantees

Loan guarantees protect the lenders and may even allow the farmer to be forgiven. However, they are not insurance plans as premia are often not collected. When collected, they are not actuarially determined but fixed at some arbitrary figure, usually between 1% and 5%.

H. Income Maintenance Programs

Income maintenance programs are designed to prevent farmers income from falling below a certain level as a result of production or price declines. They differ from crop insurance, however, because of the absence of contingencies. There are no contractual obligation requiring the farmer to behave in any particular manner.

Crop insurance, of course, acts to maintain income. When it cancels the farmers debt it keeps his income above zero. When coverage exceeds borrowings, the insurance provides some useable income for the [illegible]r. Here, however, the term income maintenance is reserved for [illegible]rams that do not test each individual farmers harvest yield or [illegible]re him to pay premia and use specified technologies.

I. Informal Risk Management Methods

Informal risk management methods include ad hoc submissions to reality such as permitting, either deliberately or not, loan extensions, soft loans or decapitalization. They are generally unplanned measures born of desperation.

J. Traditional Risk Management Mechanisms

Traditional risk management mechanisms developed by the farmers themselves are of different classes. The technical, agricultural class includes the use of traditional seed varieties, interplanting and farming in several ecological niches. In the economic class are share cropping, buying or selling of labor and dependence on and subservience to village money lenders. In the cultural class we find the maintenance of extended families, compadrazgo and food sharing arrangements. (See Cancian (2) for a somewhat different typology.)

Traditional risk management devices may be either relatively less or more productive and desirable than modern methods (insurance). The use of traditional seed varieties is economically less desirable than the use of appropriate high yielding varieties combined with insurance. Mixed planting techniques may be more productive than monocultural farm practices (see Berry, Bartlett).

III. POTENTIAL BENEFITS OF CROP-CREDIT INSURANCE

Although crop-credit insurance is simply designed to pay-off farmers and banks when crops fail, there are a broad range of benefits that can be derived when proper planning and integration takes place. Those benefits are presented below under six categories, those that accrue principally to all consumers, to farmers, to lenders, to the agricultural sector in general, to government, and finally to rural communities.

A. Benefit Accruing to Consumers: Effect on Production and Price

In policy terms, crop insurance is a production stimulating tool. The insurance can be thought of as an output subsidy, calling forth increased production of the insured crops. If this is done without planning, then an excess can be created which could depress prices and decrease farmers' welfare.

However, with planning this need not happen. Only those crops which the nation desires need be called forth. Japan deliberately uses its crop insurance program to pursue self-sufficiency in rice. It is now self-sufficient and frequently adjusts the premium subsidy and coverage level to keep production in balance.

stability of both
In the long run,/availability and price of foodstuffs can be enhanced with the help of crop insurance.

B. Benefits Accruing to Farmers

1. Benefits to Farmers

Farmers are protected as a matter of right, not by chance nor political connection nor post-loss governmental decisions. This is an important difference between a crop insurance program and relief or credit insurance programs. The importance of this is that the farmer knows for certain before he plants what his minimum income will be. Some of the risk of farming is contractually transferred to the insurer. With a relief or credit insurance program, the farmers uncertainty about what and how much risk he faces is not resolved until after the loss has been sustained and program authorities solicited.

2. Utilization of Rural Labor

Under most circumstances crop-credit insurance should lead to an increased utilization of rural labor. In a computer simulation analysis, it was predicted that rural labor utilization would increase by 8% (see Nathan). Of course, the size of the absolute increase would depend on the extent of the insurance program.

The increased labor would tend to come primarily from the farm family, but some hiring of off-farm laborers would be required, even by small landholders.

The adoption of technology could result in a displacement of labor, but the type of technology appropriate for smaller farmers is not likely to displace labor.

3. Income Distribution

If the programs are directed primarily at small farmers, income distribution will be favorably affected as a result of increased income resulting from more productive agricultural technologies. To a lesser extent, the subsidies of the program by government will also affect income distribution positively.

C. Benefits Accruing to Lenders

1. Decapitalization Avoided

Agricultural lenders are protected from the steady decapitalization that results from the individual crop failures which occur each year and after the area-wide catastrophes which occur from time to time.

2. Easier Portfolio Management

The banks can concentrate their efforts on managing their portfolios and controlling bad debts resulting from perverse wilfulness and similar causes. When crop-credit insurance is in place, the pool of delinquent borrowers contains a higher proportion of nonserious farmers (NSF), those who exploit the agricultural credit mechanism for selfish and, often, non-productive purposes. Crop-credit insurance then, enchances the ability to identify and eliminate NSFs. This is necessary both to protect credit institutions and to assure that scarce resources are allocated to those who will use them best.

The bank is able to identify and keep its creditworthy customers. Usually, without insurance, lenders are faced with having to cut off borrowers who are unable to repay loans even if they are hard-working and good long term prospects. The bank may have invested a great deal to develop these farmers to the point where they were good credit risks.

3. Interest Rates and Foreclosures

The political positions of banks (and when it is the case, the governments who own them) are considerably improved. For example:

A. They do not have to foreclose on or harass delinquent farmers as frequently.

B. They can accept customers whom they previously had to reject.

Governments can take advantage of the introduction of subsidized insurance to remove the low ceilings imposed on interest rates. Low interest rates have been a major obstacle to the establishment of effective rural credit systems since they act as a disincentive to private sector participation. When that happens, poverty groups supply all rural credit from its own scarce resources. By switching its subsidy to insurance and permitting interest rates to rise, poverty can stimulate or leverage a correspondingly larger amount of credit from the private sector.

4. Private Credit Availability

The flow of private credit to agriculture will become more likely as a result of the insurance protection. In Mexico, the insurance agency recently contracted with the private banking sector to insure sixteen billion pesos in agricultural loans (See The News). Private lenders have less to fear and will be more willing to participate in the agricultural credit system.

5. Savings

Savings will be affected. Depending on the size of the marginal propensity to save of farmers, part of their increased income will be saved. This saving must, of course, be directed into investments if it is to have any economic impact. Finally the product of the farmers marginal savings rate and his increased income must be greater than the product of the governments marginal savings rate and the income which it channels into operating the program if there is to be a net positive impact on savings.

For these savings to reach the agricultural credit system, it may be necessary to extend the banking and cooperative systems to include farmers not now being served.

Traditional insurance savings (from the establishment of reserves) will be minimal as the programs will tend to be operated on a pay-as-you-go basis, and because premium will be financed partially by bank loans.

D. Benefits Accruing to the Agricultural Sector

1. Adoption of New Technology

Insurance affects the adoption of new technology by transferring risk from the farmer and at the same time improving on the agricultural extension service. In order for the insurer to perform its function, it must send its inspectors to each farm one or more times each year. These inspectors make sure that the farmer has sewn what and where he said he would in the agreed manner, and that he has fertilized and weeded and so forth in conformity with the insurance contract.

Two things are happening here; first, the farmer and a technician are coming into contact and having an opportunity to talk. If the technicians are properly trained, there is ample opportunity to share knowledge. Second, the insurance contract contains contingencies which effectively require the adoption of new technologies.

That is, the farmer will be paid when there is a loss IF he does "certain things." Those "certain things" are designed to assure that on the average farmers will produce above the guarantee level and the insurer will not have excessive losses. Typically, the types of seed and type and amount of fertilizer are specified. The farmer may be allowed to choose at what level of technology he wishes to operate, but his guarantee will be adjusted accordingly.

In Mexico, insured farmers are given earliest and latest permissable planting dates. Farmers in the state of Michoacan mentioned to me that both they and their uninsured neighbors relied on the insurors advice for planting times. After 500 years someone has finally replaced the Aztec priests as keepers of the agricultural calendar in Mexico!

The key element here is that the insuror has a need to have its personnel actually visit farms. Extension agencies merely have to avoid complaints, they do not have to produce results. If an extension agent turns in false trip reports and spends his time at something else, no pressure will be brought to bear on the agency unless complaints flow in. If the insurance inspector does this, there will be a trend of rising losses from his area which will be readily detectable by the home office.

2. Extensification of Operations

There will be a tendency to extensify operations. It was a farmer in Mexico who used the "working for the bank" (see E below) metaphor to explain why he only planted one of his three hectares. Although he could have borrowed to plant all three, he took only enough to plant one third of his parcel. If his crop failed, then he would plant two hectares the second year and would use the additional income to pay off both years' loans.

This man was operating at the margin of survival, much too close to follow an optimizing strategy. His was a survival strategy (see Lipton). It is interesting to note that even where land availability is a problem underutilized reserves probably exist.

3. Intensification of Operations

By the same argument, crop-credit insurance supports the intensification of agriculture and the adoption of new technology. This operates in two ways. Where simple fear of borrowing is involved as in the "working for the bank" example above, insurance permits the transfer of the risk and an allaying of the associated fear.

Where the farmer is uncertain about the appropriateness of the technology recommended relative to his personal operations (which are very distinct from test plots!) and the yet-to-be-experienced weather conditions, the insurance relieves him of that uncertainty and permits him to choose the new, intense technology.

4. Research Feedback

Research programs will benefit from feedback provided through the insuror. The insurance agency will pay when poor recommendations flow out of the research agency. To avoid these losses, it will provide field data to the research agency which can then re-examine its findings and provide improved recommendations to the profit of the insuror, the farmer and the consumer.

5. Willingness to Borrow

Farmers will be more willing to borrow as they do not have to fear "working for the bank" if they suffer a few bad years. Debt carrying capacity is a limited resource for the small farmer. His lands and/or capital are limited and he cannot expand much in succeeding years to earn additional income to pay off the first year's loan. Farmers fear that payments due on past loans may exceed present expected income: he may become a perpetual slave to the bank!

For the payment of a small premium at the beginning of the year, additional reserve capacity is immediately created for the farmer to use when needed.

6. Responsiveness to Market Forces

The existence of the insurance and the information system it requires will increase the farmer's responsiveness to market forces. It is to be expected that considerable switching of crops and rationalization of land use will take place.

Insurance is, among other things, a cost allocating mechanism. As the result of the normal underwriting, loss control and ratemaking functions, the price, coverage and availability of insurance protection will vary. When this is added to expectations about price and the farmers new freedom from risk and uncertainty, it can be expected that he will avail himself of the comparative advantage of superior crops.

7. Insurance Collateral Replaces Need for Land Title

Public, as well as private, capital is made to flow by the insurance's resolution of two related problems. First, land tenure, land title and mortgageability of land become less important. The insurance serves as collateral for the production loan making it possible to lend to a farmer who does not have clear title to his land. This holds for production loans only, not capital improvement loans.

even
Second,/ small farmers with mortgageable land titles will become subject to production loans from formal institutions. Previously, the high financial and political cost of foreclosing the mortgage of a small holder made those guarantees useless. Again, insurance serves as a superior collateral.

8. Agrarian Reform

Agrarian reform projects can be supported. In Mexico, communal ejidos are characterized by the fact that the land held by each individual is inalienable. 2/ There, the insurance is a necessity for collateral purposes.

Whether or not other land reform projects vest an alienable title to the farmer, there will be a need for credit and a need for guarantees to the credit institution. Newly settled farmers are not particularly good credit risks and the collateral effect of crop-credit insurance will help overcome this.

Crop-credit insurance can support and be an integral part of any integrated rural development project.

E. Benefits Accruing to Government

1. Positive Financial Effect

Unlike informal risk management techniques, crop insurance provides for some income to government from farmers. With a policy of decapitalization, for example, agricultural banks simply accept their losses and hope that government will recapitalize them every few years. Even with a subsidized insurance program, however, farmers are paying some premiums. If the portion paid by the farmers is greater than the costs of administering the insurance program plus increased losses resulting from the improved insurance coverage, than the governments financial position is improved.

2. Policy Implementation

The existence of the insurance and the insurance institution will facilitate the implementation of national agricultural policy.

Insurance will both create conditions favorable for farmers accepting national policies and provide a certain degree of coercion to accept such policy. For example, government may alter the level and distribution of subsidies, crops insured, coverage levels and insuring conditions (i.e.--technologies required).

2/ The land is held as a life tenancy with the rights of survivors recognized subject to the approval of ejidal leadership.

3. Government Planning Stability

Government will be relieved of the need to manage disruptive ad hoc relief programs as the insurance mechanism will be in place, and capable of distributing assistance. In the United States for example, legislation is presently pending to deny emergency relief benefits to any farmer who had insurance available but failed to purchase it. (see Comptroller General, U.S. House of Representatives).

4. Balance of Payments

Of course, if production is being stimulated there can be an effect on the nation's balance of payments as imports may be reduced or exports increased. The assumption here, of course, is that the crops being stimulated are exportable or in demand domestically. Prior planning must take place to assure that this is true.

F. Benefits Accruing to Rural Communities

The benefits presented here are tentative and have never been measured or analyzed. Nevertheless, they should not be dismissed as they have valid potential. Crop insurance officials in several countries volunteered these items. They felt that these were real benefits but were unable to substantiate them.

1. Rural Emigration

Rural-urban migration may be slowed. The improvement in agricultural activities and employment will make rural settings less desperate and reduce pressure for emigration. When I asked a small group of young farmers in Mexico what they would do if crop insurance was not available, I received the expected answers--

--plant less land;
--not use credit;
--not use fertilizers; and
--plant maize for consumption rather than a cash crop.

However, I also received two surprising answers--

--go as a wetback (illegal immigrant) to the U.S.; and
--plant marijuana and smuggle it to the U.S.

Facial expressions and the ensuing conservation and activities led me to believe that the respondants were not jesting or trying to be shocking. It all seemed most reasonable to the eight or ten men present.

2. Rural Industry

Rural industry will fare better on a base of progressive, rational and responsive agriculture where it can count on a relatively stable supply of commodity inputs and a more affluent and effective consumer class.

3. Rural Communities

Rural communities themselves will be supported. Money will flow through the community regardless of whether the crop was good or bad (see Walker and Hensen).

It should be noted although the lists of benefits presented above are all potentially available through a properly exploited crop-credit insurance system, all require considerable planning to achieve.

It is possible to establish a costly program which will provide few of these benefits while serving as a disincentive to production as may be the case in Sri Lanka. (See Maurice (2)).

IV. PROBLEMS AND CRITICISMS OF CROP-CREDIT INSURANCE

A. Reaching Small Farmers

Many critics feel that crop insurance programs will tend to be taken over by larger farmers and will serve their needs preferentially. This is certainly the case in Costa Rica where the average insured farm had almost 26 hectares of sown land covered in 1975. But, this is not an intrinsic and universal program defect as crop insurance in Costa Rica was lobbied for by a group of larger rice farmers and was created to serve their needs. A recent legislative enactment charges the insuror with extending its operations to all farmers. Suitability and success in reaching small farmers can only be measured by examining progress since that law passed.

A better example of what is possible with respect to large and small farmers is Mexico where approximately 900,000 farmers with average land holdings of 3.4 hectares were served in 1975 (see Aseguradora (1)). This demonstrates vividly the potential for reaching small farmers.

Preferential service to large farmers can be avoided procedurally as a result of policy directives. For example, insurance administrators can be given a quota of small farmers that they must serve. Smallness can be defined objectively (e.g. hectares of Y crop) and measured easily. This approach would not be effective under usual private insurance conditions, but would be if a government subsidy were involved.

Another approach would be to vary the subsidy of premium in accordance with the size of the farmer. Making larger farmers pay the full cost of coverage will reduce their use and leave more resources for serving the smaller farmers (see Maurice ( )).

When crop insurance is introduced, greater economic benefits would be expected for and from small rather than larger farmers. This is because they live closer to the survival margin and base decisions on a "survival algorithim" or "Focus-Loss" model (see Lipton, Berry, Shackle).

As a result of the reduction of risk, these farmers can be expected to depart more radically from their traditional mode of operation than would wealthier farmers. The insurance provides collateral for loans that they were not able to obtain before or allows them to use technology which was too risky given their previously inadequate reserves. Larger farmers, by definition, have reserves (their own wealth or access to credit) to tide themselves over after a poor year. Insurance simply will not affect their activities as much as it will smaller farmers.

Relative to this point, it is interesting to note that in the United States only 13% of farmers eligible to purchase all-risk crop insurance do so. The others have wealth, access to credit or use multiple cropping systems for protection (see Shipley).

Finally with respect to the small/large farmer dichotomy, we should look at cultural factors. Insurance field workers will tend to be educated, travelled, cosmopolitan and have aspiration to a certain degree of affluence which cities and stable office work offer. They will gravitate towards larger farmers who will share or understand these values and who will accept more readily their recommendations.

One way by which this inevitable problem may be minimized is by using "barefoot technicians" as much as possible. Field workers should be chosen who come from farm backgrounds and who have not left them too far behind. The cultural and social status difference between field workers and large farmers should be increased while reducing the difference between field workers and small farmers.

B. Risk and Technology Adoption

Crop insurance advocates claim that by transferring risk and uncertainty from the farmer to the insurer, the farmer is freed to adopt risky technology (see Maurice (2)). This is based on the rationale that marginal farmers operating close to the edge of survival cannot afford to dip below

some minimal income level. Traditionally they employ a host of risk management devices, many of which involve suboptimal use of land and labor (see Cancian, Sutti) These strategies are designed to avoid or reduce the severity of the worst loss which can befall them. What is left is the Maximum Probable Loss (MPrL).

Farmers try to limit the MPrL to keep their minimum income above some threshold. If they can do so and adopt more productive technology they are likely to innovate.

Critics maintain that crop-credit insurance coverages may be insufficient to prevent incomes from dropping below this threshold. Most existing crop-credit insurance only insure the outstanding loan. It is possible for a farmer to lose production corresponding to the deductible and the loan and still have enough surplus production left over to maintain his income above the survival threshold. But, in a total disaster year, this is inadequate as it will leave the farmer without any income at all. See figure 1A. In the Mexican case the entire difference between the expected yield and the loan is used as a deductible. This always provides inadequate income protection since the farmer is always below his threshold if the insuror pays any claim at all. See figure 1B.

Figure 1A.
Insurance coverage plan for a typical crop-credit insurance program.

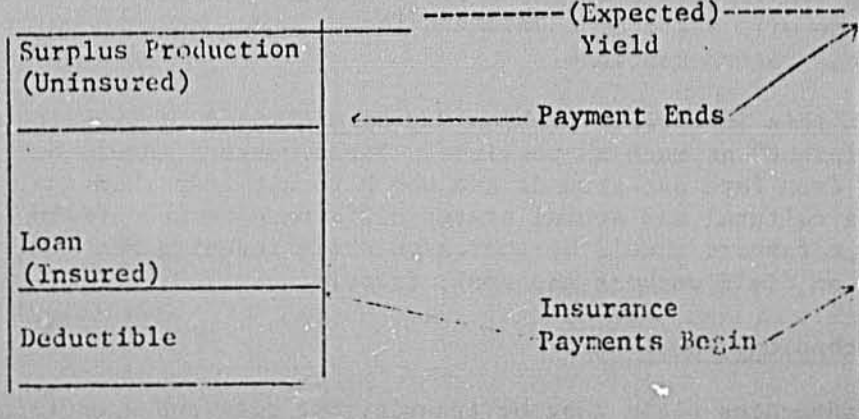
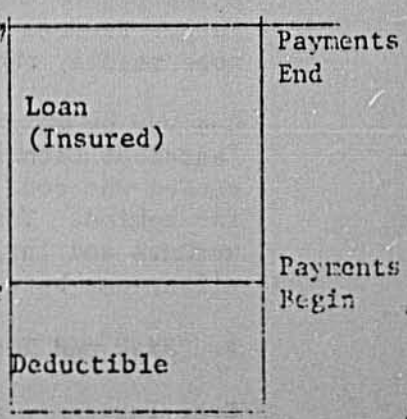


Figure 1B.
Insurance coverage plan for Mexico



The Mexican plan protects the credit system and guarantees the farmer that he will be able to borrow if he can make it through the year somehow. Development is still promoted, however, because the credit system is kept intact. Development arising from farmers adoption of risky technology however, is probably reduced.

To achieve effective leverage on both credit institutions and farmers, the insurance should cover at least that part of the expected yield which corresponds to the farmers minimum income. See figure 2.

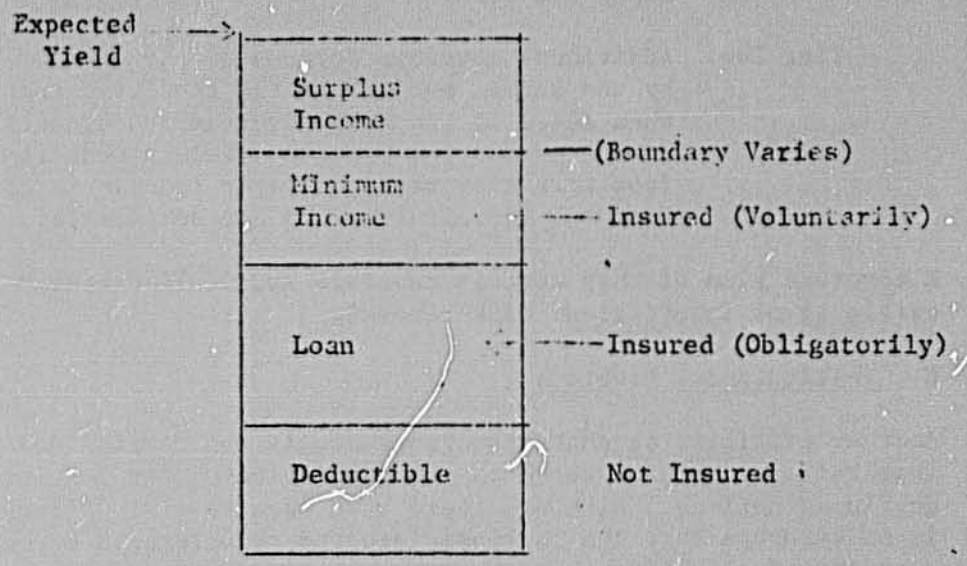


Figure 2. Insurance Coverage Plan Protecting Farmers Minimum Income

Since different farmers have different minimum income levels, it is impossible to set one single effective limit or know what is proper for each farmer or group. One effective approach would be to use a two tier coverage plan. (A deductible of 25% to 35% of yield is assured in all cases.)

- Tier One: Base coverage equal to the loan, obligatory and partially subsidized by government. Upon loss, payment of benefits go first to repay the loan.

- Tier Two: Additional coverage for any amount chosen by the farmer subject to the condition that when added to the base coverage and deductible it not exceed the expected yield. Benefits from this tier received after loan is repaid. Purchase is voluntary and not subsidized.

A coverage plan of this sort is feasible and would overcome the criticism of insufficient risk removal.

C. Institutional Problems

Another criticism is that crop insurance is too complex and requires institutional support which is too sophisticated for most of the less developed nations. Although there have been several failures, there is no evidence that the intrinsic program requirements exceed the capacity of all LDCs.

It is true that not all countries will be able to undertake the task of providing crop insurance at this time. Some cannot meet the indispensible requirements presented in the next section. They do not even have the modest basic manpower required or the economic resources necessary to underwrite the project. Without either of these a program will be a complete failure.

Some nations do not have the other institutional supports in place, i.e.--agricultural credit, marketing, research, input supply and planning systems. Without these a system can operate with a minimal degree of success, but will fail to provide the full benefits for which it is designed.

Some nations have too many projects in their development pipelines and are simply unable to add more at this time. None of this indicates that the institution building task is too complicated; rather, only that resources are limited. Crop insurance is not usually the top priority item for a developing nation. Since it complements (i.e.--integrates and facilitates) the operations of other agencies, it should not be organized until the others have been begun. The other agencies do not

have to be perfected, but should at least be in existence. Crop-credit insurance could be begun at the same time as the agricultural credit system is established.

What does the experience with crop insurance around the world tell us? First, that the insurance technology is well developed, thoroughly understood and dominated. In several developed nations, it is thoroughly under control. Over the past thirty years, the FCIC program in the United States has had 97% loss ratio. The technical problem of establishing rates and controlling losses has been well dominated. Countries with successful programs include Japan, the United States, Canada, Sweden and Mexico. These countries, especially Mexico and Japan can serve as models for LDCs.

Second, experience tells us that not institutional sophistication, but another crucial element dominates the prospects for success. A look at four programs in less developed countries will be helpful 3/

The program in Sri Lanka could properly be termed unsuccessful. It is not reaching the number of farmers intended and is not delivering the promised services to those it does reach. In addition, the program may well act as a disincentive to improving agriculture. The insurance institution is not "in control," in the sense that it is not doing what its creators had planned. This seems to be the result of unrealistic expectations about what a program could do, how farmers would react to it and how it could be financed. Specifically, premium rates were kept lower than what was actuarially determined as necessary and adequate government subsidies were not provided. This under-financing has led to insufficient staffing, delegating away proprietary insurance functions and, eventually, an inability to deliver the services promised (see Maurice (2).

The program in Panama is new but some observations can be made. First, it has enjoyed adequate start-up funding and has pulled together a competent staff who have dominated the task at hand. Second, as in Sri Lanka program designers also had unrealistic attitudes about long term

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3/ Several countries with special and limited programs are excluded. For example, the successful program in Mauritus which insures sugar cane mainly against windstorms (see McDonald). Other countries with programs that failed are excluded because the failure was due to extraneous causes. The old CSNA program in Brazil which operated in a hostile political environment is an example.

financing for the program. If adequate subsidies are provided in the future, the institution could continue to grow as successfully as it has; if not, it will fail (See Maurice (1)).

The program in Costa Rica has enjoyed reasonable success. There the institutional problem has been minimized by attaching the program to the National Insurance Institute, a government operated insurance monopoly. Financing has been inadequate in Costa Rica also, but the insuror has responded by limiting its activities in accordance with the finances available to it. The operations carried out are professional and successful.

The program in Mexico has been adequately financed and is successful. It is unique among all programs reviewed, in that, on its board of Directors is not only the Secretary of Agriculture, but also the Secretary of the Treasury as well as a representative of the Bank of Mexico. The work plan and the budget of the agency is approved each year by the two Secretaries. To date, the budget allowed the agency has always matched the work plan assigned it. The program in Mexico has been generally successful. The agency has demonstrated that it has the ability to correct the problems encountered and grow successfully.

The common element of these four programs is the crucial role of finances, not of the difficulty of managing the institution. Given the substantial body of knowledge about crop insurance available in the world and the identification of financing as the crucial element for success of several programs, one must reject the criticism that the institutional factors are too difficult until contrary evidence is presented.

D. Expense

Some critics claim that crop insurance is too expensive. Although there is only limited data to help analyze this question, some observations are possible.

The only known study of economic benefits and costs was recently performed by a consulting economist under the project which the author is directing for USAID (see Nathan).4/ That study used a computer simulation analysis to estimate the Internal Rate of Return (IRR) of a ten year stream of benefits and costs. Costs were reasonable guesses based on the Mexican and other

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4/ For a comparison of operating costs in the U.S. and Japan, see No benefit/cost analysis was performed.

experience and on the judgment of technicians with field experience. The benefits were derived from estimates of increases in production that would accrue as farmers changed the allocation of their land, the crops planted and the technology employed in responses to decreases in risk as a result of the availability of insurance. Data generated in a USAID sponsored survey of Guatemalan highland farmers was used as a base. See Table 1.

Table 1. Program Specification and Economic Costs for an Illustrative Crop-credit Insurance Program
Source: After Nathan, pages 55 and 179.

Year	Number of Participants	Economic Costs ($000)	Cost Per Participant ($)
0 (Preparatory)	0	250	--
1 (Pilot)	250	240	--
2	1,000	413	--
3	2,500	525	210
4	3,500	553	159
5	5,000	570	114
6	7,500	585	78
7	9,500	600	63
8	12,000	615	51
9	14,500	630	43
10	17,000	645	38

The data presented here represents Nathan's estimated high cost. The associated IRR was 73 percent indicating substantial net positive economic benefits. 5/ This, of course, was a simulation study and not a measurement of benefits of any actual program. A study of an ongoing program is overdue.

5/ The IRR for the base case was 184 percent.

The Nathan study measured only increased production as a benefit. It recognized, but did not include in its calculation other benefits including increased employment, effect on the balance of payments, increased savings, improved income distribution, the impact on credit institutions, the effect on prices and on stability, government expenditures. Some other non-quantifiable benefits have been discussed already in this paper. The positive IRR understates the true benefits as it ignores these additional unquantified benefits.

At this point, a critic may claim that regardless of the economic IRR, the programs are not financially viable because of the need for continuing subsidies. But, "as long as the national economic benefits of an insurance program are positive, the financial viability of the institution operating the program is of secondary importance. Indeed, the structure of premiums and indemnities should be guided principally by the objectives of the program (increased productivity through the adoption of higher technologies) and the target group (small farmers), rather than by the financial soundness of the managing institution." (Nathan, p. 10.)

Economic rather than financial soundness is the proper measure of the desirability of this kind of program and the only study on the matter has a positive conclusion. (There have been other studies which attempted to analyze costs and benefits of crop insurance, but they were too general to be of any use here (see Medin, Millot). In absolute terms crop insurance makes sense.

In relative terms, however, it is necessary to compare crop insurance against other alternatives in order to determine if it should be funded. Some alternatives for stimulating agricultural production and farmers' welfare are the following:

1. Credit insurance;
2. Loan guarantees;
3. Interest rate subsidies;
4. Price stabilization policies;
5. Supervised credit;
6. Group farming; and
7. Technical assistance and extension.

1. Credit Insurance

Credit insurance programs promise considerable savings because they are directed towards the lenders and enjoy the low costs of group policies. They have, however, two drawbacks which must eliminate them from consideration.

First, in order to survive for a long period of time they, like all other insurance programs, must charge adequate premiums and prevent excess losses. In order to do this, it is necessary to inspect hazards at the farmers level in order to set premium rates and underwriting conditions. It is also necessary to inspect the operations and reported losses of farmers to prevent the milking of the program. If this is done, all the work and costs of crop insurance are being incurred and there will be no savings advantage.

Second, credit insurance protection stops at the bank level. The farmer is not protected, his loan is not forgiven; it is transferred to the insurance company. If the loan is forgiven, then by definition we have crop-credit insurance!

2. Loan Guarantees

These schemes typically involve the government placing a fund of money at the disposal of farmers to use to pay off loans when natural disasters render them unable to do so. Several drawbacks mitigate against accepting this alternative.

First, the program may be temporary, ending when the fund is used up. No benefits would be provided after that. Crop insurance, however, is designed to be permanent.

Second, although one could charge farmers or lenders a premium for the guaranty, the problem of actuarial soundness surfaces. Typically, these funds have charged an arbitrary amount, between 1% and 5%. What relationship this bears to the likelihood of loss on any given farm is unknown. It is necessary to establish a rate making capacity similar to what is found in crop insurance programs. Again, costs begin to approximate those of a crop insurance program.

Third, if a flat level of premium is charged there will be dissatisfaction on the part of the farmers because of the inequity. (See Sanderatne.) In addition, and more seriously, there will be a distortion in the use of land and other inputs. The cost allocating functions of insurance are lost.

Fourth, if a government wants to set up a permanent fund, with or without charging premiums, it could keep it operating by providing it with annual appropriations. It is to be expected that losses would be higher than with insurance as there is no loss control mechanism. However, administrative expenses would be lower. On balance, it is likely that the increase in losses paid would greatly offset the decrease in administrative expenses.

The financial advantage of the two alternatives could be compared by calculating what I call the Degree of Financial Improvement (DFI) associated with each.

$$DFI = 1 - \left(\frac{IL + ACI - FP + \Delta ACL}{UL + \Delta ACL} \right)$$

where:

IL = Insured losses that would be incurred by an insurance or guarantee program.

ACI = Administrative costs of the insurance or guarantee program.

FP = Premiums paid by farmers.

ACL = Administrative costs of portfolio management of the lender.

UL = Uninsured losses, i.e., those that occur when there is no special system. This would also be decapitalization losses.

Δ ACL = Change in costs between the uninsured and insured cases.

The DFI can range from -1.0 to +1.0. A positive number indicates a financial (i.e., cash) saving for government when using an insurance scheme. The denominator is constant as it represents the losses in unpaid loans and associated administrative costs for which government is responsible.

There is, however, considerable variability in the numerator. IL will usually be greater than UL because the insurance program is designed to pay losses. IL can be varied by offering different coverage levels and using more or less administrative capacity to prevent and control losses. Δ ACL will probably not vary much. It recognizes the decrease in costs that should result when the lender has fewer delinquent loans with which to cope.

The farmers share of the premium (FP) can be set by government at any level. An increase in FP, or a decrease in government's subsidy, will move the DFI towards +1.0. Planners can use the DFI for comparing alternative insurance or guarantee schemes and for finding premium subsidy levels which the government can afford.

Fifth, it is possible to build a loss control system into a loan guarantee program. There are three approaches to this. One is to operate at the group level, and pay off all farmers' loans on an average basis whenever there is an area wide catastrophic loss. This system is inefficient as some farmers are paid who have not suffered losses and other farmers are not paid who have suffered losses. There is often not a reasonable matching of losses and benefits. Instead of protection and relief from risk, farmers are left holding a compound lottery ticket (see Sweden in Maurice (2)).7/

Another approach is to work at the group or bank level and force the banks to control losses. This is done by having a ceiling on losses. If banks go beyond this limit they are expelled from the pool. Presumably the threat of losing the service is enough to get banks to spend the resources necessary to supervise small agricultural loans adequately. The fallacy of this approach is obvious.

The final approach is to control losses down at the level of the individual farmer. As we saw with credit insurance, at this point one is actually doing crop insurance.

In all cases, we have seen that loan guarantees are either temporary or more costly than crop insurance or if properly organized are de facto crop insurance programs.

3. Interest Rate Subsidies

These will promote the use of credit, in fact, they will distort Its use; crop insurance will not do this.

Rate subsidies do nothing about risks which affect users. This in turn determines who the users will be. Primarily, those who have sufficient wealth to not be concerned about "working for the bank" or slipping below their minimum income level will borrow. Rate subsidies are biased in favor of larger farmers and will not help the most needy.

Also, if the hypothesis presented earlier is true, that poorer farmers are affected more as a result of the introduction of crop insurance because of their marginal position, less than optimal economic results will be realized from the interest rate subsidy.

7/ See page 36 for a discussion of compound lottery tickets.

4. Price Controls and Stabilization

Price policies are complimentary to crop insurance policies. As risk affects farmers it affects them through their income which is a combination of price and production. Crop insurance only protects against declines in quantity produced. Price policies affect only price in the short run. In the long run, both have an affect on the others domain.

If price policies alone are relied upon, small farmers still face considerable risk and economic disincentives to increasing production. If prices are kept high, good years may produce enough wealth to carry farmers through one or two bad years. But, more likely, price policies will be used to keep prices at some relatively low level in response to demands from urban consumers.

Crop insurance also only does half the job as farmers are left open to the risk of low prices. But, two of the requirements for a successful program are the existence of effective marketing and planning systems. These two can be used to prevent much of the adverse price effect that will be caused by increased production.

A disadvantage of the price policy approach is that it is extremely broad and expensive. All producers are included and subsidized. The system will provide more benefits to larger farmers; there is no chance of using the tool for redistribution of income as with crop insurance. Nor is there any chance of directing the tool at any segment of the population. Although price policies will promote land use rationalization they will not do this as effectively as insurance which allocates a differentiated cost to each farm zone, crop and technology. Price policies do not provide (nor incur the expense of providing) supervision or extension. Finally, price policies do not provide direct protection to banks.

In resume, both tools are recognized as being powerful, output side promoters of production. Price policies are very broad and may favor larger farmers. Crop insurance is more like a scapel; it can be directed anywhere, used for redistributing income, protecting banks or improving extension efforts. Each is complementary to the other, and the farmer faces less risk when both are employed.

It is impossible at this point to say which dominates the other. Crop insurance has an advantage in that it can be directed at small farmers. Further research on the question and experimentation with crop insurance programs is required.

5. Supervised Credit

Crop-credit insurance programs are designed to support supervised credit programs. By removing risk from the farmers they encourage them to join the credit programs. Then, by their inspection activities they complement the credit supervision. It has been suggested that supervised credit programs reduce the farmer's risk by providing extension services. This is not the case; see item 7 below for a discussion of this point

Supervised credit is not an alternative to, but a complement of crop-credit insurance.

6. Group Farming

This method has been suggested as a risk management and production promoting device. Like traditional risk management methods, it does transfer some risk away from the individual farmer. Also, like traditional methods it does this inefficiently. No protection is provided, for example, when a drought affects the entire collective farm.

Social costs are quite high. Farmers must cease to operate individually and create a permanent structure for cooperation as close and as vital as is usually found in human marriages. Systems for management, decision making and for sharing costs and production must be created.

When social conditions are appropriate for group farming, the collective farm itself will probably want to purchase a crop insurance policy. This would be especially true if the communal land is inalienable and unable to be offered as collateral for a loan.

7. Technical Assistance and Extension

It has been suggested that by providing farmers with improved knowledge about his activities, that his risk and uncertainty can be reduced and production stimulated. Risk and uncertainty for example, are reduced when a farmer is guaranteed a fixed price. Uncertainty is reduced when the farmer is guaranteed that a certain seed variety will produce a certain yield under normal conditions. In this case, however, considerable risk remains. It is the risk that the conditions will not be normal; that there will be too little

or too much rain, for example. Therefore, the first criticism of technical assistance as a risk reducing mechanism is that it leaves too much risk behind. The maximum probable loss may still be great and may still be below the farmer's minimum income threshold. The farmers uncertainty (e.g., wondering if his yields will be like those of the test plot) remains unaffected

A second criticism is that crop-credit insurance can do a better job of extension than extension agencies. As discussed in the benefits section (Adoption of New Technology, page 8) there is an improved element of supervision and awareness of failure to reach farmers implicit in crop insurance. If the insurance and extension agencies are merged, resources can be used more effectively and each might be better able to support the other.

Looking at another aspect, we can see that because of the residual risk, technical assistance does little to improve the situation of banks. They will still be reluctant to lend to farmers without adequate guarantees.

Extension and technical assistance while useful seem to be thoroughly dominated by crop-credit insurance as a means for reaching farmers, lenders and promoting production.

8. Summation

We have looked at the cost/benefit position of crop insurance and found it to be positive and worthy of support. We have looked at some alternative tools for stimulating production and helping small farmers and found none superior and all lacking except for price policy which is a complement for crop insurance.

Based on this analysis, it is recommended that crop-credit insurance programs be initiated on a pilot basis, that their benefits be closely analyzed, and that the comparative advantages of insurance and price policies be further studied.

E. Operations in Kind

From the time of the first thinking about crop insurance it has been suggested that farmers be allowed to pay premiums with produce, that they receive benefits in kind and that the insuror operate a crop storage facility. The program in the United States began by permitting payment of premium and benefits in kind but this was quickly abandoned when its costly and cumbersome nature became evident (see Halcrow, Myrick).

Today, no crop insurance program in the world permits operations in kind. The cost and difficulty of doing so are more than can be borne by insurance programs. One estimate is that as much as 20% of the value of a crop is consumed by storage, handling, transportation, and spoilage (see Keyfitz). Many crops are excessively perishable and not subject to storage at all (see McNicol). For an insurer to deal in these, it must create an entire marketing department complete with quality control, packaging, transportation and sales units. Clearly, the problem is beyond the scope of the insuror to handle.

Operations in kind are suggested for several reasons. One is that the poor farmer is unable to pay for his insurance except with his produce at harvest time when prices tend to be depressed. Therefore, it is recommended that the insuror accept payment at harvest time in kind and at a guaranteed price. Crop-credit insurance overcomes this problem by financing the premium by an add-on loan and allowing the farmer to pay it off when he pays the rest of his loan. The farmer unfortunately retains the price risk. This is a different problem and cannot be handled safely by the crop insuror.

A second reason offered for in kind operations is that the insurors build-up and draw-down of reserves will counter natural cycles and thus moderate price fluctuations. This is a price operation, one which requires more stock to impact on the market than will be produced by the insurors reserve. The problem is large, complex and political. It can best be handled by a price control agency. There will be strong political pressure on the agency to behave in different ways (farmers who want prices raised, consumers who want them lowered, and others who are concerned about maintaining emergency stocks). It is safer to keep the insuror isolated from these forces so that it can focus on its own technical and demanding task.

Dr. Yamauchi suggests a third reason for in kind operations. In years of widespread crop failures, payments of insurance benefits in money will not permit the purchase of adequate food stocks as prices will have risen due to scarcity. Therefore, the farmers' minimum income threshold will be violated. While this is true, it is still not advisable to operate in kind for the cost, complexity and political reasons. Rather, the solution to be pursued is to use reinsurance. 8/ A reinsurance policy would provide benefit

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8/ Purchased from international sources. See Section VIII, Reinsurance.

payments in hard currency which the nation could use to purchase and import the needed food at relatively stable world prices. When this crop is delivered to the countryside, the farmer would be able to purchase reasonable quantities.

It is appropriate to note here that crop insurance should not, indeed, not, replace all traditional risk management methods. Farmers must and will continue to use some of these methods for protection in times such as these. Crop insurance will replace dysfunctional methods (e.g., using stable producing but low yielding varieties; not borrowing; not extensifying production) but it will only complement the functional methods (e.g., extended families, food sharing agreements).

F. Farm Laborers

It has been suggested that although crop insurance will benefit farmers and lenders that it will worsen the plight of farm laborers. Presently laborers are subject to relief payments (where such assistance is available) just as are farmers in times of catastrophic losses (see Crawford). With insurance, farmers may reap all benefits and landless laborers would be worse off.

While this is true, it is important to analyze the impact of crop insurance on labor utilization. According to the Nathan study, the use of rural labor would be increased on the typical small (Guatemalan) farm from 110 man/days to 180 man/days per year as a result of the technological changes induced by the introduction of crop insurance. Although much of this labor will be provided by the farm family, some of it will be hired labor. If the insurance is directed at smaller farmers, the technology options available will be labor intensive. If the insurance is directed at larger farmers the technology employed could easily displace labor.

On balance, farm laborers could be better off with insurance than without. The introduction of crop insurance implies a trade of uncertain and infrequent relief benefits for more frequent employment of unknown certainty.

G. Summation

In this section we have examined some of the issues and criticisms relevant to crop insurance. The first dealt with whether or not crop insurance could reach small farmers. It was suggested that despite biases in favor of large farmers (lower administrative costs) that the program could be directed at small farmers and would produce greater net economic benefits for the national economy.

The issue of the relation of risk to technology adoption was discussed. Although not nearly enough is known about this, the focus loss or survival algorithm model seems most relevant. It is generally supported by field observations of the author and suggest that there is a positive correlation between the removal of risk and the willingness to borrow capital to finance the use of improved technology.

The issue of institutional problems was analyzed and in the case of four programs in developing countries, success was shown to be more dependant upon the adequacy of financing. Institutional problems leading to failures seemed to grow out of inadequate fundings.

The cost of crop insurance was discussed and it was shown that there was only one benefit/cost analysis of the matter. That study suggests that net economic benefits are positive and that financial viability is secondary to economic viability. An analysis of potential alternatives to crop insurance was undertaken. All suggested alternatives were discarded for ineffectiveness of inefficiency. Price policy, however, was shown to be complementary.

The possibility of joining the administration of crop insurance, grain storage and price controls was studied and rejected. The complexity of carrying out operations in kind would threaten the viability of the insurance administrative capacity. Political problems associated with grain storage would further hamper operations.

Finally, in analyzing the condition of farm laborers, it was recognized that they might lose relief benefits if such were available but would also be subject to increased employment opportunities.

V. ANALYSIS OF REQUIREMENTS FOR CROP-CREDIT INSURANCE PROGRAMS

Many writers have discoursed on what are the key elements for the successful establishment of a crop insurance program. Below, I present my list separated in two parts labeled Indispensable and Desirable but Dispensable (see Ray for his list of key elements).

A. Indispensable Requirements

1. Personnel

Skilled personnel must be available. This is as essential as it is obvious. Let's look at the minimum personnel requirements. The organization will have to start small and grow organically, that is, grow in harmony with other parts of its environment. Crop-credit insurance has a captive market (the borrowers) but can only grow as fast as the agricultural credit system. Therefore, there will be some time to train people as the agency grows.

Director--needed from beginning--should be a lawyer, economist, agricultural economist, insurance executive or have similar experience.

Actuary--from beginning--part time in beginning--can be borrowed from the social security agency or from private industry; previous specialty unimportant, can be trained in crop insurance outside the country in one or two months and can be assisted by consulting actuaries from other countries.

Lawyer--from beginning--part time--duties assist in preparing contracts and policies.

Chief Fieldman (Inspector)--from beginning--full time, should be an agricultural economist or agriculturalist.

Assistant Fieldman--needed later--full time--some should have training similar to the chief, others should have minimum agricultural training.

Deputy Fieldman--needed later--part time, used at peak season--should be able to read and write, drive a motor vehicle and should come from farming backgrounds. If these people are "barefoot technicians" (i.e.--not urbanized like the highly educated people above) they will reduce the cultural communication gap between farmer and agency.

Communication/Training Specialist--from beginning--full time--experienced with writing, teaching. Will produce training materials and explain the program to bankers and farm leaders.

Product development specialist--from beginning--full time--should be a generalist, perhaps an agricultural economist; should have an aptitude for mathematics. Will assist actuary, lawyer, chief fieldman in creating the insurance structure, designing policy coverage, gathering data, etc.

Secretaries, clerks and accountants are also needed.

In addition to the four full time and two part time professionals beginning immediately, an underwriter will be required later if any voluntary business is written. Loss adjusters will also be required.

Beyond this, department heads with skills similar to the chief fieldman can be added as the organization grows and needs to separate line and staff operating units.

Manpower requirements are crucial, but are not excessive.

2. Credit System

There must be an agricultural credit system. It can be small or large, monolithic (government bank) or diverse (coops, private banks and government), but there must be either an already existing system or one begun at the same time as the insurance program.

3. Marketing System

There must exist an effective marketing system capable of disposing of the production stimulated by the insurance.

4. Input Supply System

There must exist an effective input supply system capable of providing the fertilizer, seeds and hardware needed when they are needed.

5. Research Capacity

An agricultural research capacity must exist to develop or adapt new technology to local conditions.

6. Planning Capacity

A planning capacity must exist to bring these disparate ingredients together and direct their efforts so as to maximize the usefulness of their resources. Planning is a key element here. Agricultural development is a servomechanical process: setting courses, measuring accomplishments and making adjustments as needed. If resources and the development potential of crop-credit insurance are to be efficiently and effectively used, planning is a prime ingredient.

7. Subsidies

National governments must be willing to partially subsidize operations. All major all-risk crop insurance programs have their administrative costs subsidized and most have a part of the losses subsidized. Because of its experimental nature, the obligatory purchase feature and the limited financial resources of poor, marginal farmers, partial subsidies must be provided.

8. Loss Reserves

Adequate reserves must be provided. Losses covering a wide area and classed as catastrophic may occur in the first or any subsequent year. These losses may overwhelm the ordinary financial arrangements of the insurer. Reserve capital in the form of drawing rights on a capital fund or the national treasury or the pledging of the "full faith and credit" of the government are required.

The important element here is that the insurer be able to pay off its debts promptly and without recourse to "fine print." If not, farmers will remain uncertain about their financial futures and will not be induced to make production stimulating decisions (see the Sri Lanka Case in Maurice (2)). Recourse to reinsurance is one other way of providing this reserve capital.

9. Summation

In resume then, the indispensible ingredients for a successful crop-credit insurance program are:

A modest pool of competent personnel;
An existing agricultural credit system;
An existing agricultural marketing system;
An existing input supply system;
An existing agricultural research capacity;
A functioning and effective sector planning capability;
Government willingness to provide adequate subsidies; and
Adequate reserves to cover catastrophic losses.

Agricultural extension per se does not appear to be necessary since it can be provided more efficiently by the crop-credit insurance program itself.

B. Desirable But Not Indispensable Requirements

1. Actuarial Data

Actuarial data must be available for ratemaking, coverage and guarantee level purposes. When the program began in the United States there was 30 years of high quality data on the county and village level to use. This is seldom the case in less

developed countries, but is not a serious obstacle. Some data exists in most countries. Meterological data, hydrological and soil surveys are generally available and are useful. Tax records and other indications of production are useful. These or similar sets of information will permit the classification of farms into more-or-less homogeneous groups and will permit the establishment of trial premium rates.

Since the insurance program must begin small and grow through pilot stages there will be ample opportunity to revise rates as experience is gained. If, additionally, the programs are partially subsidized and have access to adequate reserves, then there will be no danger of bankruptcy or of overcharging farmers because of inadequate data.

2. Demand

There must be adequate farmer demand for the insurance (see Crawford). In the case of voluntary insurance, demand is an indispensable requirement, but when the insurance is obligatory, demand is no longer as crucial. There should be demand to assure that farmers will cooperate with the program and not flee it, select adversely against it or sabotage it.

Crop-credit insurance is semi-obligatory, that is, if the farmer wants credit, he is required to purchase insurance. He may only buy both or neither. As long as there is demand for credit there will be demand for insurance.

A caveat here is that there must not be such dislike of insurance that it will reduce demand for credit. This is reported as being the case in Puebla, Mexico (see Diaz-Cisneros, Morss, et al), but the data there is subject to alternate interpretation. First, many of the things about which the farmers complained are proper and reasonable ingredients in an insurance program. This suggests that there is a need for education which the insurance institution had not yet recognized. Another aspect of the Puebla complaints is that the farmers feel that there is not enough insurance coverage, that all the benefits go to the bank. The Mexican insurer, ANAGSA, has responded by establishing a pilot program in Michoacan which provides additional coverage and education (see ANAGSA (2)). The results of this pilot program seem to be high farmer satisfaction and utilization of credit and technology.

Although dissatisfaction or negative demand for insurance could have cut down on the use of credit, this does not seem to be the case. Insurance and banking officials in Mexico reported to me that more insurance would have been sold in recent years if additional lending funds had been available.

For a voluntary insurance plan, the situation is quite different. Here demand is not a moot question; effective demand must exist.

Effective demand for a product appears to depend on three conditions:

a. A felt need to resolve some problem;

b. An understanding of the product as a potential solution of the problem; and

c. Sufficient purchasing power to effect the purchase.

Purchasing power exists when farmers can afford to pay for the insurance. This can be achieved by insuring wealthier farmers (who do not need insurance as much as poorer farmers) subsidizing premiums, charging inadequate premiums (to the long term detriment of the program) or financing the premium at the bank while introducing new, more profitable technologies. Crop-credit insurance relies on this later method as well as government subsidies to assure effective purchasing power.

Understanding in either voluntary or compulsory programs obtained by providing education on top of a base of common understanding. It is likely that most peasant farmers will understand, in general terms, this intagible and sophisticated thing called insurance. The fact that adverse selection 9/must be protected against in all programs indicated that farmers understand. The farmer must understand the system to be able to manipulate it (i.e.--select adversely).

However, poor farmers generally have no experience with insurance and are unaware of the contingencies for "fine print." This must be explained for them to properly conceptualize potential benefits and to avoid disappointment, dissatisfaction and rejection later.

9/ In insurance, adverse selection refers to the process where poorer risks (those most likely to suffer losses) will buy insurance whereas better risks will not. This leads to the insurer paying larger than anticipated losses.

Once they understand insurance the farmers must see it as an effective problem solving tool. One group of Indian farmers, for example, were concerned about agency corruption and incompetence jeopardizing their benefits (see Chandrakarth). Diaz reports the same feeling about [illegible] ico. The farmers may feel that they are buying a "compound lottery ticket" rather than insurance. (See arrow.) This "compound lottery" has the farmer paying the premium and going through a series of obstacles and contingencies each of which has two outcome possibilities--reject the claim or go on to the next, and eventually the last level. The farmer's certainty about receiving insurance protection is reduced. Education to remove the apparent obstacles and institutional reform to remove the others is needed.

The felt need to resolve a problem is affected by several factors. First, a need must exist. In one case, a crop-hail program in Swaziland failed because hail simply was not a serious threat (See McDonald).

Second, the need must be felt to be not subject to easier, better known solutions. Traditional forms of risk management compete with crop insurance. (See Yamauchi, Shipley.) These include social and technical methods as well as simply having adequate wealth to carry the farmer over to the next year. Many traditional risk management forms, however, affect only the farmer and not the banker.

With crop-credit insurance, the service provided is joint. It may be that the farmer's felt need level is low, but the banker's may be high. In fact, the denial of credit to small farmers because of the riskiness perceived by the banker will raise the farmer's felt need level considerably.

Semi-obligatory crop-credit insurance then seems to have the requirements for creating or tapping effective demand.

a. The unique joint nature of this insurance assures a high felt need level where credit is scarce.

b. Purchasing power is supplied by the credit institution and by the technology being introduced as an integral part of the insurance program.

c. Understanding exists at a basic level but must be supplanted by education. A truism amongst insurance people is that "Insurance is Sold and Not Bought." The significance of this is that understanding is

not needed in the beginning but must be developed for the program to succeed.

3. Land Tenure

Stable land tenure is mentioned by Ray and most who follow him as essential. The reasoning is that it permits for the development of long term data, easy identification of plots and stability in the program in general. However, as we saw in the benefits section overcoming land tenure problems is one of the benefits of crop-credit insurance. The existence of the insurance will support a tendency towards stable land tenure in the long run as the economic viability of farms is increased and the riskiness of farming decreased.

If stable land tenure were the case, it would be less expensive to offer the insurance. Where it is not, nations will have to be content with serving fewer farmers in the beginning and taking more time for their programs to grow to maturity.

4. Access

Easy communication with farms is also presented by Ray as important for program success. But, again, this is not a sine qua non, but an obstacle to having an extensive program. Obviously, only those farmers who can be reached can be served. Decisions have to be made about how the limited resources of the insurer will be spent. There is no requirement that an insurance program cover 100% of a nation's farmers. Quite the opposite crop-credit insurance implies that only potentially credit worthy farmers will be covered. As the credit system is extended, so will be the insurance system.

If resources are available, quite a few farmers can be reached. In the Mexican program, insurance fieldmen often go on horseback to visit the more remote clients. How far they can go is a matter of resources.

Farmers with several small landholdings present a greater problem. It sometimes takes all day to visit the separate parcels. The existence of insurance will remove one of the reasons for this tenure pattern. Economic incentives such as decreased coverage or, preferably, an increased premium rate would tend to promote consolidation.

5. Price Policy

Price support or stabilization if often mentioned as a requirement for two reasons. First, if farmers are reasonably assured of a certain price for their produce, this will remove a large element of risk from their lives and call forth production of that crop. This will complement the effect of crop insurance. If crop insurance is offered but prices are unstable over a wide range, too much risk remains for production to be effectively stimulated.

This is one of the reasons for indicating planning and marketing as essential requirements for crop-credit insurance. If there is no price control program, planners must consider the eventual effect of the insurance on price. Insurance can be provided on different crops in different years or on a large variety of crops (the U.S. and Mexico both insure 35 - 40 crops) so that the farmer has alternative crops to choose from each year and market glutting can be avoided.
The second reason is that if prices drop sufficiently low during the growing season farmers may deliberately cause losses in order to collect from the insurer. For example, farmers with irrigated tomatoes may permit excess water into their fields to cause root rot. There are, however, various techniques to control for this problem. Various deductible and premium adjustment (increase) provisions come into play. Also, there is the use of regular inspections to detect some of the deliberately caused losses. No system is sufficient and the sum of all systems is not perfect control but, sufficiently tight control to permit the insurer to carry on operations safely.

6. Summation

Desirable support conditions which we have here examined include:

a. The existence of adequate technical data;

b. Active farmer demand for insurance;

c. Stable land tenure conditions;

d. Easy access to farmers; and

e. Stable commodity price conditions.

While all of these are shown to be important, it is suggested that by various strategies crop-credit insurance programs could begin and prosper without their pre-existing.

VI. REVIEW OF EXISTING CROP INSURANCE PROGRAMS

This section presents a capsule description of ongoing crop insurance programs which would be of interest to executives or administrators concerned with implementing programs in their own countries. Visits to the programs in the developed nations are relevant because much of the technology developed is transferrable. Establishment of contacts for the purpose of arranging training or consultants' visits is important.

A. Mexico

The program is administered by ANAGSA (Aseguradora Nacional de Agricultura y Ganaderia, S.A.), an autonomous government agency. It has been in existence since 1961 and now serves nearly one million farmers with a staff of approximately 2,000 employees. Half of the farmers farm less than 3.5 hectares of land. Approximately 85% of the insureds are ejidal farmers, most of whom would not be able to obtain credit if the insurer did not exist.

The program suffers from heavy centralization of administrative and decision making functions in Mexico City, inadequate education of insured farmers and inadequate coverage. Solutions for all of these factors have been implemented in a successful pilot project in the state of Michoacan.

ANAGSA offers the most relevant, successful model of a crop-credit insurance program for less developed nations.

B. Japan

Japan's program provides an interesting example of how to successfully mix government and private sector resources. The insurance is actually offered by cooperatives in each community which are called Mutual Relief Associations. These reinsure the bulk of their contracts with federations, there being one in each prefecture. The federations in turn reinsure the bulk of their business with the government through the Ministry of Agriculture and Forestry.

The organization chart for crop insurance is not "I" shaped (mutuals, federations, government), but "Y" shaped as it has two "heads." In order to balance the power of government and assure that federations and mutuals are able to defend their interests, a trade association called NAIA (National Agricultural Insurance Association) was established. NAIA plays a vital lobbying, representational, educational and research role in Japanese agriculture.

The program services approximately 5 million farmers with farms as small as ten ares. It uses 18,000 employees, mostly part timers employed by the mutuals. It is a highly successful program with, apparently, a high degree of satisfaction on the part of farmers. It is not a crop-credit insurance program. An agricultural credit insurance or guarantee program had been established approximately ten years prior to this one. This program is used to stimulate production and protect farmers' income.

Japan's program is relevant to less developed nations (LDC) because of the small size farms involved, the uniquely successful blending of private and public sector and the emphasis on stimulating food production. Additionally, the country offers an excellent opportunity for training and a source of assistance in the form of competent advisors.

C. United States

Crop insurance is available from two sources in the U.S. Against the risk of hail and certain other risks one can purchase protection from many small companies and mutuals. These all belong to a trade association, CHIAA (Crop Hail Insurance Actuarial Association).

All risk coverage is only available from a federal government agency, the FCIC (Federal Crop Insurance Corporation). Participation is voluntary and only about 13% of eligible farmers participate. The size and wealth of U.S. farmers, the vitality of the agricultural credit system and the numerous support programs make the insurance unnecessary for many.

The program in the U.S. is subsidized only to the extent of administrative costs. Losses are fully paid from farmers premiums. In the thirty year period, 1948-1977, losses have amounted to 97% of premiums! This is a marvelous technical achievement and represents a thorough domination of insurance technology.

The FCIC program is relevant to LDC leaders because of this technological domination and as a source of training and consulting assistance.

D. Sweden

A bold experiment was attempted in Sweden, to provide coverage on a group basis and thereby realize significant cost savings. This feature is called the Area Yield System and has provided mixed results. Sweden is now in the process of adjusting, or perhaps, abandoning Area Yield. The program as a whole is successful. It is administered by several different agencies, of which the lead agency is the Central Bureau of Statistics.

It is an excellent source of training and consultative assistance for LDC programs.

E. Israel

All risk insurance in Israel is offered by the INFRA (Insurance Fund for Natural Risks in Agriculture, Ltd.). INFRA's operations are relevant to LDC for two reasons. INFRA was given a government guarantee of deficits for seven years. By that time it must have sufficiently brought the insurance business under control to be able to operate on its own. It is presently at this weening stage, trying to switch from the government guarantee to commercial reinsurance. If it is successful, this will be a dramatic demonstration of the viability of crop insurance programs in small countries. The element of reinsurance is crucial here and is discussed below.

The second reason for its relevance centers on the control and marketing mechanisms. Control is vested in a committee of government officials and farm leaders. Farm leaders outnumber government officials. The farm leaders are mostly officials of agricultural marketing boards. The insurance is marketed through the boards, sold as a group policy covering all members of that group. This offers the opportunity for saving administrative costs but also creates a danger in that the coverage may be misapplied. The outcome of this experiment will be important for program designers in other countries.

In addition to the reasons mentioned above, INFRA offers the possibility of providing training or consultative assistance to other nations.

F. South Africa

The only totally independent program in the world is located here. The Sentraoes cooperative in Ficksburg, its predecessors, and members have offered crop-hail coverage since 1929. In 1970, it began to offer all risk coverage. Although small, the program has operated successfully. It issued 586 policies in 1975/76 for an average coverage of Rand 4,280 and a premium of Rand 206,000. 10/ All risk insurance accounted for only one percent of Sentraoes' total premium income. Its success is defined by the fact that it has managed to stay in business for six years, keep its average loss ratio down to 76% and convince international reinsures to sell it reinsurance coverage. It is one of only two all-risk insurors in the world who presently enjoy commercial reinsurance coverage.

G. Mauritus

Mauritus is the other. It insures sugarcane production through a national marketing board. The program has been in operation since 1946. It insures only against hurricane, drought and excessive rainfall. The latter two occur over long and indefinite periods of time and thus involve consequential losses such as insect infestation and disease. Therefore, it can be classified as all-risk coverage.

The experience of Mauritus would be relevant to any country which depends on one or a few commercial, export oriented crops. Crucial to the operation of this program was the pre-existence of the marketing board which has a monopoly in the trade of sugar in that country.

VII. THE INSURANCE PLAN

This section deals with the specifics of a hypothetical insurance plan designed to stimulate agriculture production, protect farmers and protect the agricultural credit system in the context of less developed countries. Dr. Ray presents an excellent discussion of this topic which complements what is presented below.

A. Whom to Insure

Because of the higher net economic benefits associated with insuring smaller than larger farmers (see Sec. IV., 1.), it is recommended that coverage be directed at the small farm sector. Probably the easiest way to achieve this is to subsidize the premium of small but

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10/ In June, 1977, Rand 1.00 = U.S. $1.15.

not large farmers. Operational definitions of small/large can be established for each country by creating a list of crop acreage equivalences and setting a ceiling for qualifying for subsidies.

For example, set the ceiling at 10 points with--

1 hectare of crop A	=	1 point
1 hectare of crop B	=	3 points
1 hectare of crop C	=	4 points
.		.
.		.
.		.
1 hectare of crop N	=	x points

A second question under the rubric of whom to insure is whether payments should go to banks or farmers. This was touched on in Section IV., 2. Priorities require that the credit system be protected first and that a second tier of coverage be available so as to impact on farmers' income.

B. What to Insure

Both crops and livestock are insurable. Livestock has been omitted from this discussion on the assumption that resources are scarce, the majority of LDC agricultural activity is in crops and that ranchers would tend to fall in the larger farmer classification where lower economic benefits are expected.

Livestock insurance is feasible and should be considered by any nation which has a significant potential for this activity. There is an additional requirement for livestock insurance--there must be an extensive pool of veterinary doctors available for use by the insuror. The primary service of this line of insurance is not the payment of benefits upon death or disability of an animal, but the provision of veterinary services by the insuror to prevent the occurrence of death or disability (See Munich Re). Therefore, if there is not an adequate pool from which the insuror can hire full time personnel, it will be unable to control losses or operate successfully.

Although the livestock line deserves consideration in some cases, I shall continue to ignore it in this paper so as to concentrate on the equally demanding and difficult task of crop insurance.

What crops then to insure? The answer is all those whose production one wants to stimulate. This requires the active participation of the planning, research and marketing agencies. They will help to identify crops which are needed and have good prospects for delivering positive economic benefits. It is expected that a country would begin insuring a basic grain crop, but this need not be the case. The insurance should be used as a leverage tool wherever it seems to be most beneficial.

As many crops as possible should be insured so that land use rationalization will take place (spurred on by the cost allocating function of insurance) and farmers will be able to make varied choices in response to their expectations about harvest prices. If an effective price stabilization or control program is functioning this latter loses some of its significance.

In addition to land use rationalization, another reason to insure as many crops as possible is to take advantage of the stabilizing effect on losses incurred. If the losses of different crops are not intercorrelated or are only slightly so, then the cyclic pattern of losses will tend to be flattened out. Less capital reserve will be required for any given total dollar volume of coverage written. Conversely, more farmers can be served for any given reserve capital amount.

Despite the advisability to insure as many crops as possible, a caveat is necessary. Any insurance program should begin small and grow conservatively. This is to give it time to learn from its mistakes while introducing new programs. If a program is introduced on a large scale, mistakes will be more expensive, but no more useful as learning devices than if the pilot program approach is used. As a rule of thumb, one might begin by insuring two or three crops and add as many as two more in each succeeding year.

C. Life Insurance

Yes, there is a role for life coverage here. Automatic coverage equal to the farmer's loan will save both bank and widow grief. The coverage can terminate with repayment of the loan or continue until the beginning of the next crop season. Coverage can be equal to the loan or some multiple, such as twice. This would provide an added visible benefit and reduce farmer dissatisfaction.

Since the life coverage would be of the group type, its cost would be low and administration easy. Cost could be included in the crop insurance premium without causing any significant distortion.

D. What Risks to Insure

It is easier to operate a specific risk program. Losses are limited and hard actuarial data can be built up more easily. But, the specific risk approach leaves too much risk untransferred and leaves the farmer still in jeopardy of falling below his minimum income threshold. Theoretically, all-risk is preferrable. However, there may be some areas where one single loss cause dominates and the specific risk approach would be satisfactory. Puerto Rico and Mauritus both started off this way, insuring against windstorm. All-risk does a more complete job of transferring risk away from farmers and should have a greater impact on technology adaption. covered in an all-risk program, In addition to the standard risks, /e.g.--

- drought;
- excessive rainfall;
- disease;
- pest damage (after using standard or recommended control practices);
- animal damage;
- windstorm; and
- flood,

the appropriateness of recommended technology when properly employed should be covered. This is automatically done when yield is guaranteed.

Variations in price should not be insured. Where price and quantity were both insured, the offering company always went bankrupt. Research is going on now in Japan and there is a small program operating in British Columbia, Canada. 11/ However, the task of controlling prices is still formidable and can be managed more efficiently by using control or stabilization policies than through the insurance mechanism.

11/ That program is titled Income Maintenance and has been in existence since approximately 1974. It covers approximately ten commodities, including beef and pork. The program was started as a support to an Agrarian Reform program. Certain marginal lands were classified for agricultural purposes only. The income maintenance program was chosen as the most efficient way to subsidize farmers locked onto those lands.

E. Voluntary or Compulsive

This question has intrigued most writers on crop insurance. Should farmers be forced to buy insurance? If they are forced, they may be resentful and political costs may run high. But if purchase is a voluntary matter, adverse selection will take place.

With crop-credit insurance this becomes a moot question. If farmers want loans, they must purchase insurance. Dissatisfaction is avoided by educating farmers about insurance and structuring the program to provide realistic and adequate benefits.

Actually, for developing countries the voluntary/complusive question is not relevant. If the program is to be directed towards poor farmers, it must have a compulsion element to assure a sufficient number of participants, a control of adverse selection and a lowering of average "sales" cost. Linking with credit is an effective way of doing this.

The pertinent question turns out to involve deciding whether the program should attempt to be universal or particular in coverage. Using the credit approach, it will be particular and will tend to be insurance. If the initial attempt is at universality, the strain on the capacity of the organizational structure will be great and the viability of the organization threatened (see Sri Lanka case in Maurice (2)). A universal program will have a tendency to move from insurance towards non-contingent income maintenance as the structure disintegrates.

F. Coverage on the Individual or the Area Results

Sweden attempted to avoid the cost and inaccuracies involved in adjusting losses on each farm by creating an area wide system. It measures the deviation from the guaranteed yield for each crop in the area and then calculates a weighted average for each farm based on the acreage of each crop planted. It is the most sophisticated area program proposed or in operation and is extremely well administered.

Farmers are dissatisfied with it however, and it should not be implemented elsewhere. The reason for this is that farmers operate on an individual basis, but this insurance compensates on a group basis. Too much risk remains, i.e.--the difference in performance between the individual and the area (see Swedish case in Maurice (2)).

G. Flat or Differentiated Premiums

For the sake of social fairness and ease of administration, flat premiums for all farmers are often recommended. This has several drawbacks however. Farmers in low risk areas complain that they are being forced to subsidize farmers in high risk areas. Farmers who are modernizing complain that they are subsidizing more traditional farmers.

Production costs are not allocated accurately with flat premium structures. There will be no incentive to switch to the most economic crop and the most efficient use of land, labor and capital will not be produced. Useful information about the productiveness and riskiness of agriculture will not be generated and directed to decisionmakers. The use of differentiated premium is strongly recommended.

H. Program Finance

Agricultural lenders should be used to finance premia. However, because target population in LDC's are extremely poor, government subsidies are necessary. These subsidies will take the following form:

1. Administrative expenses: Because these programs are experimental; because the use of administrative personnel is under government rather than free market control; because of the mandatory nature of the program; and because of the poverty of small farmers, it will be necessary for governments to underwrite administrative expenses.

2. Pure Premiums (or losses): A portion of the premiums designed to cover losses should be subsidized by the government in the case of small farmers. Smaller subsidies or no subsidy at all can be offered to larger farmers.

3. Guarantee against catastrophic losses: Losses in excess of premiums charged may occur. Until the reinsurance mechanism is developed, the national treasury will have to guaranty this amount.

Revenue to support these subsidies will come from several sources. These include:

1. General revenues: Over the long run, general government revenues will increase as a result of the increased economic activity in the agricultural sector caused by the presence of crop-credit insurance. Subsidies financed by general revenues represent a transfer to the agricultural sector and specially to the small farm sector.

2. Savings of agricultural bank decapitalization: Government supported or guaranteed lenders would suffer decapitalization without the existence of crop-credit insurance. That foregone decapitalization is a savings for government which can be used to underwrite part of the subsidy.

3. Transfer of other subsidies: Subsidies on inputs, which distort the use of the input and do not necessarily lead to optimal use of inputs or maximum production, can be partially or totally transferred to the insurance program. Subsidies applied through the insurance mechanism tend to act as output subsidies, calling forth maximum production of the subsidized crops and optimum use of inputs.

4. Extension services can be used both as a source of personnel and funds. The crop-credit insurance mechanism will tend to perform the extension function more effectively than the traditional extension services. The traditional service should maintain responsibility for those classes of farmers not reached by the insuror and can retain the research function.

5. Private sector funds can be leveraged for agricultural production credits as a result of the crop-credit insurance programs, thus freeing up government funds for other purposes. Instead of investing directly in development banks and getting zero leverage (1:1) on the amount of money loaned, it is possible for government to invest in the insuror to guarantee private sector credits and enjoy a leverage factor in the 1:10 to 1:20 range.

Funds exist therefore, to operate a program. The size of the program and the amount of funds which the government is willing to make available are critical variables in the financing equation. The availability of reinsurance and careful underwriting (choosing different crops with zero or negative correlations) will increase the magnitude of risk that can be absorbed for any given amount of capital.

Loans to the governments for the purpose of increasing the number of participants in the programs is an effective way of channeling resources to the agricultural and small farmer sectors.

VIII. THE ROLE AND PROBLEMS OF REINSURANCE

Because of the potential for catastropies involved in all risk crop insurance, insurors must have access to large amounts of capital. Unfortunately, small and less developed countries seldom have adequate financial capacity to finance the full risk burden. Catastrophic losses could bankrupt a program or negate one of the desired benefits of crop insurance--avoiding large, unexpected and disruptive demands on national treasuries.

The ideal way to resolve this problem is to reinsure the excess risk which the national government is unable to safely retain. Specialized reinsurance companies such as Munich Re and the Lloyds group exist to handle this kind of problem. With the exception of Mauritus and Sentraoes, 12/ the international reinsurance companies have refused to cover this risk.

There are several reasons for this:

- Catastrophic potential is involved so the reinsurors must be very careful about the business they accept less they lose significant funds.

- Specialized facilities are required to verify that losses do not occur unnecessarily or that false claims do not pass through the system.

- Crop insurors, if they are governmental entities, are not motivated by a desire for profits. Commercial reinsurors have as a prime assumption about their clients, that they too want to make money or at least avoid losses. Reinsurors loss control systems are based on this assumption.

- Governmental crop insurors are motivated by social/political concerns. It is to be expected that they will pay claims for social/political reasons which private insurors would avoid

With commercial reinsurance out of consideration, we must seek alternatives, the most likely of which is a reinsurance pool. This pool would operate regionally and would be formed and financed by those governments which have programs. It would pay losses when necessary and could channel and provide technical assistance and serve as a focus of integration and mutual assistance to the several insurers.

An important corollary function of the pool is that it would be used to wash out the social/political hazard and replace it with a profit motivation. At this point, the basic risk is "cleaned" and the commercial reinsurance market may be tapped for financial support.

Participating governments will be unwilling to subsidize each other over the long run, so there will be a necessity to build a strong loss adjustment and control capacity into the reinsuror. In addition, there will be a need to charge an adequate reinsurance premium. This will cause the pool officials to examine the means by which the basic premiums are calculated and assist in improving this method.

The pool would be financed by contributions of premiums and by purchase of capital stock. The purchase of capital stock can be financed by loans to the governments involved from international banks and development agencies. Loans should not be made directly to the pool, but through member governments so as to keep their interest in avoiding losses.

By using the pool to increase the number of farmers insured, the number of crops insured and the number of climatic zones covered, the amount of capital required relative to the size of operations will decrease. Thus, scarce capital will be used more efficiently and more farmers can be served (see Cummins).

There are several types of reinsurance coverage available (see United Nations). The type most appropriate for this situation is called excess of loss. Under excess of loss, the reinsuror pays benefits when a single, catastrophic event occurs and resulting losses rise above some threshold. The desirability of this approach is that some discrete event must be identified and the reinsuror can send in its loss adjustment and control crew to prevent unnecessary claims from being presented.

Stop loss is another coverage form often suggested. Under this form all losses during a time period are aggregated and the reinsuror pays if they exceed the threshold. This coverage form is undesirable because many small losses resulting from the social/political hazards will be included and the reinsurors loss control team will be unable to remove them efficiently.

IX. ROLE OF COOPERATIVES AND OTHER PRIVATE SECTOR GROUPS

There is demand that cooperatives and other private sector groups be given an opportunity to participate in crop insurance programs. Arguments in their favor are that they are closer to the people, generate additional capital and energy, improve information feedback, and control losses better among their members (see Souchon). Arguments against them center on their inability to generate adequate capital to protect insureds in case of catastrophes (see Souchon).

The problem of capital can be resolved by having governments reinsure the cooperatives as in the case in Japan and Israel. Or, it can be done by having the cooperative insuror seek outside reinsurance on its own as is the case with Sentrances and the intention in Israel. An added advantage of cooperatives is that they have a profit motivation, or at least a very strong desire to avoid losses, and thus overcome the social/political hazard which prevents purely governmental programs from taping the commercial reinsurance markets.

In order for cooperatives or similar groups to be able to play a meaningful role, there must be a strong cooperative movement or some other social institution prepared to establish crop insurance cooperatives. In Japan, for example, the cultural support of community organizations made creation of insurance mutuals feasible. Western nations with their individualistic societies would not be able to do so quite as easily.

Israel demonstrates one way out of this problem. It took advantage of the existence of marketing boards and other agricultural associations as a management control and delivery device (see Gilboa), 13/ Mauritus also has a marketing board at the center of its sugar cane insurance program.

Vertical integration of the insurance cooperative movement (as achieved in Japan's "Y" shaped organization structure) is necessary if cooperatives are to have any permanence. When marketing associations are used, they already are integrated vertically and are operating at the national level where they have developed some expertise in working with the government.

13/ Included are the Agricultural Center, Farmers Association, Farmers Union, and Production and Marketing Boards of Vegetables, Fruit, Cotton, Groundnuts, Flowers, Citrus, Poultry and Vine Growers, and the Field Crops, Sugar Beet and Fish Breeders Associations.

The use of private insurors has been attempted and not proven successful so far. In Mexico, for example, the government agreed that private insurors should form a consortium to offer the insurance and share the risk. The government provided substantial subsidies and guarantees to insure the integrity of the private insurors and the viability of the system. The program failed when the individual companies' underwriting efforts directed the programs at large farmers who were less expensive to reach and, perhaps, better risks. No attempt was made to set a quota for the number and percentage of small farmers served (see Basave-Gomez).

Cooperatives and other private sector organizations can play meaningful roles in the delivery of all-risk crop insurance benefits if they have reinsurance, either from governments or the commercial market available. The introduction of cooperatives into the delivery system lessens the social/political hazard and improves the prospects of obtaining commercial reinsurance. The two most relevant approaches in existence are through the use of marketing and production boards and through the use of community institutions.

X. SUMMARY AND RECOMMENDATIONS

A. Crop-credit insurance is a form of crop insurance which protects both farmers and bankers and provides a broad stream of benefits to the agricultural sector and the general economy.

B. The state of knowledge about crop insurance is mixed. We know how to do crop insurance and have several successful models to study, but we do not know if we should support these programs. Only one economic benefit/cost study has been undertaken to date; further analysis is required. This can best be accomplished by instituting a series of pilot projects and observing the results of these.

C. A substantial range of benefits can be expected of crop-credit insurance. Of signal importance are the stimulation of food production, the adoption of technology, the protecting of agricultural credit institutions and a positive effect on the flow of private and public credit.

D. Crop-credit insurance will produce greater economic benefits when directed to small rather than large farmers.

E. Crop-credit insurance will deliver its benefits more efficiently to the agricultural system and more directly to small farmers than any alternative policy tool.

F. Although there is a realistic opportunity for private sector action, government action and support seems a prerequisite in this area. Subsidies of administrative costs are required and subsidies of losses are desirable to overcome farmer resistance.

G. Economic viability rather than financial is the proper criteria by which nationally supported crop insurance programs should be judged.

H. Crop-credit insurance is not a first priority item for developnations. Agricultural marketing, research planning systems and an agricultural credit system must at least be begun at the same time as the insurance program or be already in place.

I. Other requirements are not excessive but must be met to guarantee a successful program.

J. The possibility of catastrophic losses threatens the solvency of most small nations's programs and can best be overcome by using reinsurance.

K. The replacement of the profit motivation by the social/political hazard is the single most important obstacle to commercial reinsurors' participation. The formation of regional reinsurance pools is likely the most effective way to wash out the social/political hazard. The use of cooperatives or other private sector organizations will also help control this hazard.

L. International banks and development agencies should not provide capital funding directly to any reinsurance pool as this will not have a positive effect on removing social/political risk. They may, however, make loans to participating governments which would use that money to capitalize the reinsuror.

XI. REFERENCES

Arrow, Kenneth. Essays in the Theory of Risk Bearing. Chicago: Markham publishing Co., 1971.

Aseguradora Nacional de Agricultura y Ganaderia, S.A. (ANAGSA). La Seguridad en el Campo. Mexico, D.F., Mexico: 1976.

Aseguradora Nacional de Agricultura y Ganaderia, S.A. (ANAGSA). III Seminario Nacional de ANAGSA: Plan Piloto Michoacan. Morelia, Michoacan, Mexico: March 1976.

Bartlett, Peggy. The Structure of Decision Making in Paso. Washington: National Institute of Mental Health, 1973.

Basave-Gomez, David. El Seguro Agricola Integral. Mexico City: ANAGSA, 1973.

Berry, Sara. Risk and the Poor Farmer. Boston: Boston University, 1976.

Cancian, Frank R. Change and Uncertainty in a Peasant Economy. Stanford, California: Stanford University Press, 1972.

Chandrakanth, M.G. "A Feasibility Study of Crop Insurance for Potato in Hassan Taluk of Karnataku State." Masters thesis, University of Agricultural Science, India, India, 1976.

Chen, Hsing-Yiu. "Crop Insurance of the United States and Japan with its Application to Taiwan Agriculture." Masters thesis, Ohio State University, 1958.

Comptroller General of the United States. Alleviating Agricultural Producers' Crop Losses: What Should the Federal Role Be?. Washington, D.C.: US GAO, May, 1976.

Crawford, Paul R. "Crop Insurance in Developing Countries." Masters thesis, University of Wisconsin-Madison, 1977.

Cummins, J. David. "Insurors Risk: A Restatement" Journal of Risk and Insurance, March 1974, pp. 147-157.

Diaz-Cisneros, Heliodoro. "An Institutional Analysis of a Rural Development Project: The Case of the Puebla Project in Mexico." Ph.D. thesis, University of Wisconsin-Madison, 1974.

Gilboa, David. "Government Crop Insurance Programme in Israel," Ad Hoc Conference on Crop Insurance for the European Region, Israel, 1972. Rome: Food and Agricultural Organization, 1973, Document number

Halcrow, Harold G. "The Theory of Crop Insurance." Ph.D. Dissertation, University of Chicago, 1940.

Keyfitz, Nathan. "Discussion: Grain Storage Banks," Transactions of the Society of Actuaries, Vol. 26 (1974), 507-515.

Lipton, M. "Agricultural Risk, Rural Credit, and the Inefficiency of Inequality." Chapingo, Mexico, (1976).
Paper presented to the ADC conference on Uncertainty in Underdeveloped Agriculture.

Maurice, Nelson, "Crop-credit Insurance in Panama," USAID Report, (September 1977).

------ "Crop Insurance Trip Report," USAID Report, (August 1977).

McDonald, Vincent R. "Crop and Livestock Insurance - an Aid to Smal Farmer Development," World Bank (1975).

McNicol, David L. Commodity Agreements and the New International Economic Order. Pasadena: California Institute of Technology, 1975.

Medin, Knut. "Cost/Benefit of Crop Insurance Programmer," FAO Publication ESE:CIE 72/10, Israel (October 1972).
Presented at the Ad Hoc Conference on Crop Insurance for the European Region.

Millot, Roger H. "Cost/Benefit Analysis of Crop Insurance Programmer," FAO Publication ESE:CIE 72/6, Israel (October 1972).

Morss, Elliot R., et al.; S. Strategies for Small Farmer Development: An Empirical Study of Rural Development Projects. Washington, D.C.: USAID Report, May 1975.

Munich Re (Insurance Co.). Livestock Insurance, Bloodstock Insurance. Munich, Germany: Munchener Ruckversicherungs-Gesellschaft, 1975.

Myrick, Dana H. "Improving the Effectiveness and Acceptability of the Federal Crop Insurance Program. Ph.D. Dissertation, Montana State University, 1965.

Nathan & Associates, RR. An Economic Assessment of Crop Insurance for Small Farmers in Latin America. Washington, D.C., 1977.

The News (Mexico City), August 20, 1977. "New Accord May Boost Basic Food Production."

Oury, Bernard. "Weather and Economic Development," Finance and Development, No. 2, 1969, Pp. 24-29.

Phelps, Clyde W. Commercial Credit Insurance as A Management Tool. Baltimore: Educational Division, Commercial Credit Co., 1961.

Ray, P.K. Agricultural Insurance. Oxford: Pergamon Press, 1967.

Sandartne, Nimal. "An Evaluation of Credit and Insurance Schemes for Paddy," Journal of the National Agricultural Society of Ceylon, VI (1969), 59-81.

Shackle, G.L.S. "Uncertainty," Chapingo, Mexico, 1976.

Shipley, John L. "Factors Influence Participation in Crop Insurance in the High Plains of Texas." Ph.D. Dissertation, Texas A&M University, 1966.

Souchon, Auguste. Mutual Aid In Agricultural Insurance. San Francisco: Pub. Exposition Universelle de San Francisco, 1915.

Sutti, R. de Ortiz. Uncertainties in Peasant Farming: A Colombian Case. Atlantic Highlands, N.J.: Humanities Press, Athlone Press, 1973.

United Nations Conference on Trade and Development. Reinsurance Problems in Developing Countries. Geneva & N.Y.: UN, 1973. Publication Number TD/B/C.3/106/Rev.1.

U.S., Congress, House. Farm Production Protection Act of 1977. Pub. H.R. 7111, 95th Cong., 1977, H.R. 7111.

Walker, Herman Jr. and Hensen, Peter L. "Local Government and Rainfall: the Problem of Local Government in the Northern Great Plains." The American Political Science Review, XL (1946), 1113-1123.

Yamauchi, Toyoji, "Considerations on Farmer's Demand for Crop Insurance in Japan," Rural Economic Problems, 1, 1; 1961, p. 61-75.

ANNEX C

República de Panamá

Ministerio de Planificación y Política Económica

INF																				
ACT											X									
OFF	DIR	D/DIR	A/DIR	EXO	ODP	ECON	SMC	CONT	EDIT	HRD	OES	ARD	EXP	SPC	AAG	IIS	RHUDO	EMB	C&R	

Panamá, 21 de noviembre de 1977
ATI-2016

ACTION
TO ARD
DUE 12-9-77
TAKEN 78-320, 12/5/77
78-319, 12/5/77

Doctor
Paul Saénz
Director Interino
Agencia para el Desarrollo Internacional
E. S. D.

Señor Director:

Tengo el agrado de dirigirme a usted con relación a la posibilidad que estudia la institución a su digno cargo, de desarrollar un Proyecto Regional de Sistemas de Seguros de Cosechas para América Latina, por el término de tres (3) años, el cual se iniciaría a partir del año 1978.

Sobre el particular me permito comunicarle que el Instituto de Seguro Agropecuario, tiene particular interés de participar en el aludido Proyecto. Por lo tanto mucho agradeceré considerar la participación de Panamá en el mismo.

Esperamos haga de nuestro conocimiento las consideraciones que esta solicitud le merezca.

Atentamente,

Gustavo R. González
Viceministro

RECEIVED NOV 28 1977 ROD

RECEIVED NOV. 25 1977

ACTION COPY

UNCLASSIFIED

Department of State

INC

TEL

ANNEX C

PAGE 01 LA PAZ 02596 3021142Z

ACTION AID-20

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INFO OCT-01 SSO-00 /021 W

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O 3021112 MAR 78
FM AMEMBASSY LA PAZ
TO SECSTATE WASHDC IMMEDIATE 117

UNCLAS LA PAZ 2596

AIDAC

E.O. 11652: N/A
SUBJECT: CROP CREDIT INSURANCE PP

REF: STATE 075417

1. FORMAL REQUEST RECEIVED FROM GOB AT 11:45 AM. LETTER FROM BANCO AGRICOLA DE BOLIVIA REQUESTS THIS PILOT PROJECT UNDER THE TERMS PROPOSED IN P.L. 480 TITLE III.

2. SUGGEST YOU ALERT BASTIAAN SCHOUTEN IMMEDIATELY, HOPEFULLY IN TIME TO ASSURE MAINTAINING THE AG BANK SUBPROJECT IN THE TITLE III PROPOSAL.
BOEKER

OFICINA NACIONAL
LA PAZ

BANCO AGRICOLA DE BOLIVIA

BANAGRICO
Casilla de
Cajón Pos

ANNEX C

La Paz, 30 de marzo de 1978
GCC/ 1178

Señor
Frank B. Kimball
Director de la Misión Económica
de los Estados Unidos en Bolivia
PRESENTE

Señor Kimball:

REF.: SOLICITUD ASISTENCIA TECNICA Y FINANCIERA
DE AID PARA PLAN PILOTO AGROCREDITICIO

El Banco Agrícola de Bolivia está sumamente interesado en el programa piloto de seguro agrocrediticio, o sea, una combinación de seguro de cosechas y de crédito.

El proyecto piloto tendría una duración de cuatro años, tres de experimentación de campo y el último año para analizar los resultados y tendría los siguientes propósitos:

1. Capacitar al personal que manejaría la organización en la etapa operacional,

2. Obtener datos confiables para organizar un programa más generalizado en el futuro,

3. Perfeccionar la política y métodos de trabajo antes de entrar en una etapa operacional,

4. Medir los efectos del seguro, sus costos y beneficios en base a una experiencia real.

Para respaldar este programa no existe ninguna posibilidad de contar con el apoyo del presupuesto regular del Gobierno por el momento, por lo que nos permitimos solicitar a la Misión a su digno cargo una donación de hasta $us. 1.372.000 para cubrir los posibles costos administrativos por el tiempo que dure el piloto y asumar la suma

OFICINA NACIONAL
LA PAZ

BANCO AGRICOLA DE BOLIVIA

Casilla
Cajas

ANNEX C

2. Carta GCC/1178 - A: USAID - L.P. 30/3/78

contingente de $us.2.163.400 para cubrir siniestros que sobrepasen el monto de las primas cobradas.

En la seguridad de que esta solicitud será atendida favorablemente, nos es grato expresarle nuestra consideración más distinguida,

BANCO AGRICOLA DE BOLIVIA

Samuel Gutierrez V.
GERENTE DE CREDITOS
Y COBRANZAS a.i.

Jaime Monroy V.
GERENTE GENERAL a.i.

/nsm

cc: GGL
GCC
GFC
File Gral.
File Cron.

ANNEX D

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

1. Facesheet

Project Location: L.A. Regional

Project Title: L.A. Crop Insurance Systems

Funding: $3,849,500

Life of Project: Four years , starting FY 1978

IEE Prepared by: Bastiaan B. Schouten, Agricultural Economist
LA/DR, November 1, 1976

Bastiaan B. Schouten

Environmental Action Recommended: No Environmental Assessment or Environmental Impact Statement Necessary. A Negative Determination is requested. See discussion in following sections.

Concurrence: Charles B. Weinberg, Associate Assistant Administrator for Development Resources
Date:

2. IMPACT IDENTIFICATION AND EVALUATION FORM

ANNEX D

Impact Areas and Sub-areas 1/	Impact Identification and Evaluation 2/
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	N
4. Jeopardizing man or his works	N
5. Other factors	
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	N
3. Ecological balance	N
4. Other factors	

1/ See Explanatory Notes for this form.

2/ Use the following symbols: N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

C. ATMOSPHERIC

1. Air additives ---------- N
2. Air pollution ---------- N
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

G. HEALTH

1. Changing a natural environment ---------- N ___
2. Eliminating an ecosystem element ---------- N ___
3. Other factors

_____ _____

_____ _____

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)

_____ _____

_____ _____

_____ _____

J. Discussion of Impacts: Nature, Scope and Magnitude

The activities which will be engaged in as a consequence of this Project will have a negligible impact on the human environment. The activities contemplated are principally of a study and feasibility determining nature. Even potential foreseeable events which might occur as a result of this Project - the establishment of national crop insurance schemes and a regional inter-country reinsurance scheme would be primarily of a financial nature and have no foreseeable direct impact on the environment.

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project
From FY 78 to FY 81
Total U.S. Funding $4,100,000
Date Prepared 8/78

Project Title & Number: CROP - CREDIT INSURANCE SYSTEMS

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Increase total food production and small farmer welfare.	**Measures of Goal Achievement:** - Increased production and consumption of food products by small farmers. - Increased wealth of small farmers.	- Project research component - USDA, FAO and OAS reports.	**Assumptions for achieving goal targets:** - Small Farmer food production continues to be an important host country priority in Latin America. - International donors and host governments will continue to support other programs designed to improve the performance of the small farmer sector.
Project Purpose: To develop viable national level crop insurance organizations which service small farmers.	**Conditions that will indicate purpose has been achieved: End of project status.** - National crop insurance organizations established in three countries with host government commitment to finance them. - Two years of experience insuring clients of a private sector lender. - Applications from 5 countries for assistance to start new programs. - Involved countries decide to create and support ALARA.	- Quarterly project reports to AID. - Project research component. - Scheduled AID evaluation reports.	**Assumptions for achieving purpose:** - General political and economic stability maintains in the three countries. - Target farmers will be willing to participate in the pilot project.
Outputs: - Feasibility and desirability of crop-credit insurance demonstrated and projects ready to expand to national coverage. - Personnel trained and "how-to-insure" technology developed. - Research into risk and credit systems and farmers-behavior completed. - Regional reinsurance agency (ALARA) designed.	**Magnitude of Outputs:** - Three pilot projects will have insured at least $15,000,000 in credit for approximately 10,000 farmer-years. - Thirty country and five international technicians will be trained. - Contracts and administrative systems for insuring a total of ten crops in three countries will exist.	- Quarterly reports to AID - Project Research component - ALARA designed and funding proposed. Magnitude of Outputs continued: - Economic impact analysis will have been completed in Mexico and three other countries. - Plans for ALARA complete and submitted to governments.	**Assumptions for achieving outputs:** - Suitable personnel can be located and recruited in each country.
Inputs:	**Implementation Target (Type and Quantity) ($000)** (see table below)	- Quarterly project reports to AID - AID financial records.	**Assumptions for providing inputs:** -----

Inputs	FY78	79	80	81	TOTAL
Three pilot projects administrative costs	519.0	532.5	543.0	567.5	2,162.0
Technical assistance and research	397.0	365.0	398.0	469.0	1,629.0
AID/W supervision and support	66.0	72.5	62.5	100.5	301.5
Complete computer research project	7.5	-	-	-	7.5
TOTAL AID	989.5	970.0	1003.5	1,137.5	4,100.0
Premium subsidies	103.0	194.0	260.0	346.0	903.0
Contingent reserves for catastrophic losses	1,707.0	2,816.0	3,378.0	4,009.0	11,910.0
Total other Governments	1,810.0	3,010.0	3,638.0	4,355.0	12,813.0
Grand TOTAL	2,782.0	3,951.0	4,269.0	5,451.0	16,813.0

ANNEX E