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LIST OF ABBREVIATIONS

A.I.D.	Agency for International Development
AID/LAC	A.I.D. Bureau for Latin America and the Caribbean
AP	Atlantic Piedmont
BANDESA	Banco Nacional de Desarrollo Agrícola. (National Agricultural Development Bank of Guatemala)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza. (Tropical Agronomy Center for Research and Education)
CECON	Centro de Estudios de Conservación.(Center for Conservation Studies)
CICP	Consortium for International Crop Protection. (Consorcio Internacional para la Protección de Cultivos)
CLM	Commercial Land Markets
CONAMA	Comisión Nacional del Medio Ambiente. (National Commission for the Environment)
CONAPA	Consejo Nacional de Areas Protegidas. (National Council for Protected Areas)
EA	Environmental Assessment
EAP	Escuela Agrícola Panamericana. (Panamerican Agriculture School at El Zamorano, Honduras)
EPA	Environmental Protection Agency of USA
FAO	Food and Agriculture Organization. (Organización de las Naciones Unidas para la Alimentación y la Agricultura)
FUNDACEN	Fundación del Centavo. (Penny Foundation)
GOG	Government of Guatemala
GTZ	Sociedad Alemana de Cooperación Técnica, Ltda. (West-German International Development Agency)
ICI	Intermediary Credit Institutions
IEE	Initial Environmental Evaluation
IHL	Interior Highlands
IPM	Integrated Pest Management (Manejo Integrado de Plagas)
LOP	Life of Project
MADELEÑA	A.I.D. Lumber and Firewood Financed Project
MAG	Ministerio de Agricultura y Ganadería (Ministry of Agriculture)
MOH	Ministry of Health (Ministerio de Salud)
NRDC	National Resources Defense Council
ORD	USAID Office of Rural Development
PACD	Project Actual Completion Date
PCLL	Petén-Caribbean Lowlands
PID	Project Identification Document
PLL	Pacific Lowlands
PP	Project Paper
R&D	Research and Development
ROCAP	Regional Office for Central America and Panamá (A.I.D.)
TR&D	Tropical Research and Development, Inc.
TSC	Tropical Science Center. (Centro Científico Tropical)
US	United States

USAID/G	A.I.D. Mission in Guatemala.
WHO	World Health Organization. (Organización Mundial para la Salud)
WDC	Washington, D.C.

EXECUTIVE SUMMARY

USAID/Guatemala's economic support to FUNDACEN has enabled the project to purchase land from large land holders and sell it to land-less and land-poor campesinos. FUNDACEN sees this as a promising contribution to the economic development of Guatemala. The project amendment subject to this Environmental Assessment (EA) provides FUNDACEN additional economic support to expand the program and to transform it into a self-supporting activity.

The FUNDACEN Commercial Land Markets II project operates country-wide; the Petén Lowlands is the single geographical area of importance where FUNDACEN has not acquired land for the program. Therefore, the potential for environmental effects is very broad. In this EA, however, we will limit our discussion to the possible effects on the sustainability of land use and the protection of tropical forests and biological diversity. The pest/pesticide management aspects were considered in an earlier assessment.

Current FUNDACEN policies call for an evaluation of potential land use as a component of the farm evaluation process. Furthermore, areas with no agricultural potential and buffer strips 20 meters wide along both sides of all streams should be designated protected areas. Farms that are not intensively managed, but have been developed and fully utilized in the past, are preferred.

FUNDACEN senior management is concerned with the price of land, because high prices might reduce total land acquisitions and program beneficiaries. Although we agree that all efforts should be made to get the best possible price for land, the team considers this criterion to be over emphasized. As a result, there is a tendency to acquire poor agriculture sites; this will have a more negative effect on the program and the number of beneficiaries over the long term.

Surprisingly, land acquisition is not the major expense in the FUNDACEN program. Approximately, one out of six dollars (about 17%) is used to buy land. The rest of the money is channeled into subprograms to develop needed infrastructure and permanent crops (coffee, etc.), or used to pay other production costs. Ironically, poor sites require higher infrastructure development and production costs, while providing lower yields.

After field visits to more than half of the FUNDACEN land acquisition/distribution sites and review of the pertinent files, the team has assessed that FUNDACEN needs:

- to be more fully aware of the importance of resource conservation and the specific rules designed to achieve those goals;

- to adhere to the concept of "agricultural land" and avoid looking at the land they are buying and selling only in terms of surface area; and

- to provide intensive training in land capability assessment and its practical application in planning land distribution and implementing credit and technical assistance activities.

These needs were evident because current land distribution into parcels does not adequately take into account land quality. Some parcels are excellent for agricultural production while others are extremely poor. Furthermore, examples of long-term unsustainable land use and clearing of tropical forest were observed in some areas.

The Team considered three alternatives for a course of action. The first option was to continue the project as it is presently being implemented. The second added a set of environmental management activities to the first alternative, and the third was a no-action alternative which implied halting the economic support to FUNDACEN.

By comparing the alternatives, the team concluded that superior performance will be achieved by implementing the second alternative. Conversely, the third alternative was found to be the least desirable based on all the considered criteria.

Selected as the preferred alternative, the second alternative incorporated a set of environmental management activities to the original project. This option was consistently better when all alternatives were tested against a set of preestablished criteria, including:

- socio-economic development,
- sustainability of land use,
- protection of tropical forests, and
- protection of biological diversity.

MITIGATING MEASURES

The mitigating measures proposed in the preferred alternative include the following activities:

1. Regulatory Requirements

The cooperative agreement signed by FUNDACEN and USAID/Guatemala must be modified to incorporate compliance with A.I.D. regulations and Government of Guatemala (GOG) laws -- required to clear money for buying additional land. The general goal is to make the FUNDACEN program more environmentally sound.

To ensure that this requirement is met, it is necessary to improve the way that the following two sets of activities are being implemented:

1.1. Identification of Areas to be Protected

Based on current regulations from A.I.D. and GOG, at least three types of areas must be protected:

- areas which are currently covered by natural forest,

- riparian zones, up to a 20 meters wide strips on each side of all streams, and
- areas with no sustainable use capabilities.

Maps that will demonstrate actual land cover and land capabilities are the best tools to identify those areas. Those maps should be prepared before each individual farm is divided into parcels to avoid inclusion of protected areas in the beneficiaries' parcels.

1.2. Delineation of Individual Parcels

The parcels assigned to individual beneficiaries of the program should be suitable for sustained agriculture production. Therefore, they should be defined based on the resources available in the field. The basic information to properly perform this task should come from the land capability map. The end result of the map should be the identification of areas more or less homogeneous which are suitable for sustained production of annual and/or permanent crops.

Once the homogeneous areas of land capabilities have been established, they can be divided into parcels. Parcel design should attempt to provide units with similar agricultural values. If this is not possible because of the spatial distribution of resources, provisions should be made for allocating different sizes and/or prices to the individual parcels in accordance with their capabilities. Beneficiaries getting lower quality land should not be obligated to pay the same price per unit as that of higher agricultural value.

Parcels with more intensive land-use capabilities should have a higher value, even though they are going to be used for the same type of crop. The parcels with more intensive land-use capabilities are more likely to have higher yield and lower costs of production for the same crop, even if, for example, coffee is being produced on land suited for annual crops.

2. Training Requirements

In order to meet the existing environmental regulations, FUNDACEN staff must be aware of them, accept their validity, and at the same time have the capacity to implement an appropriate methodology that will achieve sound results. Land Use Planning and Management has been identified as the most critical training need.

Given the present organization of FUNDACEN the training can be achieved by implementing seminars for each administrative region. As a result of these seminars the agronomist and technicians of each region will prepare land-use maps of the farms they are now managing. A total of five seminars each four weeks long should be implemented.

3. Long Term Management of Protected Areas

Vegetation of protected areas should not be altered. The only valid use for many protected areas is for hunting, which improves the animal protein content in the diet of the community. Leaving the vegetation untouched will maintain the habitat required for wildlife. The actual abundance of wildlife populations will then depend on the hunting pressure exerted and the surface area of the reserved areas.

Managing stream corridors connecting neighboring areas will enhance biological diversity. They would allow higher animal population densities and in some instances the connection of two small areas by a corridor can make the difference between the presence or absence of a given species because of the dimensions of the habitat required for breeding, feeding, and other behavioral patterns.

Viable mechanisms for maintaining protection on these areas after FUNDACEN withdraws from a particular farm should be established. The Team believes that a management plan should be prepared by the community. The titles for these areas should be transferred to the individual communities only if the management plan developed by them to ensure protection appears satisfactory. We encourage FUNDACEN to consult with CONAMA and/or conservation NGO's, about the viability of the individual plans.

4. Development of Community Based Woodlots

Firewood is the primary cooking fuel in rural Guatemala and is therefore required in large quantities in all the settlements promoted by FUNDACEN because of the high population density. Woodlots should be developed to provide for firewood and alleviate pressure on the protected areas.

Some of the farms have natural woodlots (lots which have trees that have not been planted). The population of trees is so sparse that they can not be considered a forest. These woodlots should be managed for fuel wood production and replanted as necessary. Those farms which do not have wooded areas available will need to have woodlots developed through planting.

Woodlots should not be confused with protected areas. Woodlots are not expected to provide a major habitat for wildlife, although some birds and small mammals will visit or reside in them. Their role in the environmental management context herein described is that of alleviating the pressure on reserve areas in which wildlife is expected to flourish.

Areas identified as suited for permanent forest or timber production in the land capability maps are ideal for establishing these kind of woodlots.

5. Environmental Education

Long-term sustainability of the transformation incorporated in the Guatemalan society by the FUNDACEN project is going to be possible only if the settlements themselves are viable on a long term basis. To achieve this goal natural resources conservation is essential. These concepts can be addressed through the school system (which FUNDACEN supports) to reach the younger generation and to a lesser extent the adult generation.

CONAMA has the capability and is willing to cooperate with FUNDACEN to develop posters, pamphlets, and field activities to facilitate the learning process. Workshops should be implemented for teachers and FUNDACEN personnel in which they would receive guidelines from CONAMA's delegates on how to use the field activities, posters, pamphlets, and any other material resources to properly develop an environmental awareness (or education) program.

The US Peace Corps Volunteers could be incorporated into this activity. Volunteers could stay on a farm working with the local teacher to implement the environmental education program.

The costs associated with these recommendations comes mainly from the implementation of the Land Use Planning and Management seminars. Other expenses considered include: acquisition of field equipment for the determination of the land use capability and audio-visual materials and equipment for the environmental education program. FUNDACEN has enough infrastructure to implement the rest of activities related with these recommendations.

The costs are roughly estimated as follow:

	US $
Land Use Planning and Management Seminars:	59,000
Field Equipment:	15,000
Audiovisual Aids:	16,800
TOTAL COST	90,800

1.0. INTRODUCTION: PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

Conservation of renewable natural resources has proven to be essential for the achievement of sustained development. Sustainability of the benefits obtained from the resource base over time, in the form of goods and services, depends on the maintenance of the productive capacity of the ecosystems providing them. This applies to all forms of resource utilization (agriculture, forestry, aquaculture, or fisheries).

Present natural resource utilization patterns in most developing countries are threatening these resources. The pressures from rapidly expanding population, poverty, inequitable concentration of resources, land ownership, and political instability have usually led to the application of shortsighted economic and resource management policies. This can lead to natural resources destruction, generating more poverty and actually narrowing the possibilities of future economic growth and development.

1.1. A.I.D. Policy for the Environment and Natural Resources

A.I.D.'s major environmental objective is to promote rational resources management for sustainable utilization. To achieve this goal, the approach must be environmentally sound, and thus must make a rational attempt to manage natural resources for the benefit of both future and present generations. It is believed that this approach has a better chance of achieving the desired long-term economic growth.

In accordance with the above, A.I.D.'s three major environmental program areas are sustainable production, maintenance of natural ecosystems, and meeting human needs by improving environmental quality. Issues of special concern include the conservation of tropical forests and the preservation of biological diversity.

The environmental regulations adopted by the Agency (AID/W, 1980) apply to all new projects, programs or activities approved as well as substantive amendments or extensions of ongoing projects. Exceptions to the established environmental procedures are mainly related to emergency situations or exceptional foreign policy sensitivities.

Certain actions are excluded from the procedures. These include activities that do not have an effect on the natural or physical environment, research activities which might have a limited effect on the environment but are performed under carefully controlled conditions, or cases when A.I.D. does not have knowledge or control over the details of specific activities that might affect the environment.

1.2. Pertinent Guatemalan Regulations

Several Guatemalan laws deal with the rational management of natural resources and protection of the environment. The project activities must therefore meet these regulations as well as those pointed out in the previous section. Relevant Guatemalan laws include the

following: Law of Protection and Improvement of the Environment (Decree No. 68-86), Forestry Law (Decree No. 70-89) and Law of Protected Areas (Decree No. 4-89).

1.2.1. Law of Protection and Improvement of the Environment

This law, approved on December 5, 1986, created CONAMA directly under the office of the President. The overall objective of this law is to maintain ecological equilibrium and environmental quality as a means of improving the quality of life of the country's inhabitants. Article No. 12 includes a long list of specific objectives which can be summarized as the rational management and preservation of all natural resources.

The most important aspects of this law in relation to the FUNDACEN CLM project is that it requires an environmental impact evaluation for all projects, works, industries, or any other activity that by its nature may cause a deterioration of the renewable or non-renewable natural resources or the environment. This regulation also applies to any activities that could result in harmful or noticeable modifications to the countryside and the cultural resources of the national heritage. A serious deficiency within the law is that it does not indicate the nature and content of this environmental impact evaluation.

1.2.2. Forestry Law

The new Forestry Law was approved December 20, 1989. This law, which is to be implemented by DIGEBOS, has as a major objective the monitoring of the protection, conservation, exploitation, industrialization, management, and promotion of the country's forest resources in compliance with the principles of sustained, rational use of the renewable natural resources.

This law requires that all projects exploiting forest, water, and non-renewable natural resources, as well as those focusing on agricultural development projects, must establish forest plantations on an area equal to that harvested or modified. The previous law didn't consider reforestation in water resource management projects.

Reforestation is to begin no later than one year after the initial date of resource exploitation. For agriculture projects, the alternative to reforestation is to pay 20, 3, or 2 % of the reforestation cost approved by DIGEBOS for annual, permanent non-tree, and permanent tree crops, respectively.

In another section, the law mentions that in all forest or agriculture projects, 10% of the total land area should be kept under forest cover or should be afforested if the forest cover is not present.

1.2.3. Law of Protected Areas

Another law related to the environment is the Protected Areas Law approved February 7, 1989. The main objective of this law, which created CONAP, is the establishment and management of a system of protected areas throughout the country.

The specific objectives are consistent with the general policy of national resource management pointed out in the previous laws. Additionally, the law recognizes the value of biological diversity for the sustainable development of Guatemala.

1.3. Project activities

The ultimate goal of the Commercial Land Markets Project is to achieve greater participation by the Guatemalan rural poor in the country's agricultural production. It is expected that this targeted sector of the population could then improve their own quality of life and contribute to a sustainable and real economic growth of the Guatemalan economy.

To achieve this, FUNDACEN is buying land from large land holders and selling it, in small parcels, to landless and land-poor farmers in an attempt to solve some of the imperfections of the land market in Guatemala. In addition to buying and selling land, the FUNDACEN program provides the technical assistance and financial resources deemed necessary for improving agricultural productivity.

The Project Amendment subject to this EA provides for additional support to the FUNDACEN project initiated in late 1984. The purpose of this additional support is to provide enough economic resources to expand the FUNDACEN program and establish it as a self-supporting activity. It is expected that FUNDACEN will eventually level off buying and selling to an average of 1350 hectares per year, benefiting about 360 families annually. Furthermore the project will provide money to pay for the administrative expenses of FUNDACEN until the PACD and to carry a series of studies designed to discover alternative mechanisms for developing a stable commercial land market in Guatemala. These last two sets of activities are of lesser importance to the objectives of this EA and therefore will not be described in further detail.

The goal of FUNDACEN is to work closely with its beneficiaries, for a period of approximately ten years, at which time FUNDACEN will withdraw from the farm. At this time, it is assumed that the new land owners will have been able to pay for their land, homes, and the credit required for production. It is also expected that they will recognize the importance of continuing technical assistance and be willing and able to pay for it.

1.3.1. Land Purchase and Sale

The land purchase and sale activities include the location, appraisal, acquisition, survey, and distribution of properties. A copy of the process approved and followed by FUNDACEN is included in Annex 1.

Location of potential farms is carried out through direct advertising in newspapers, through real estate agents and personal contacts of FUNDACEN employees and members of the board of directors. The appraisal is done by FUNDACEN employees following the procedures cited above, which includes requested price, location, size, topography, soil, and climatological information available; status of present crops; infrastructure; expected socio-economic impact; and general impressions of the agronomist making the evaluation.

The final decision for buying a particular farm is taken by FUNDACEN's board of directors. Upon recommendation of the agronomist performing the appraisal, FUNDACEN presents a payment plan to the seller which usually includes 50% down and the remaining 50% financed over a five year period at 9% simple interest. If the seller accepts these conditions, the general manager of the foundation visits the farm to confirm the farm profile outlined by the agronomist. If the general manager is satisfied, he then presents the proposal to the board.

Dividing the farm into parcels and selling them to the beneficiaries of the program constitutes the next step in the process. The farm is divided into 2.8 hectares parcels. Based on the reports provided by the agronomist, the parcels with serious limitations to agricultural development are excluded and set aside as "reserves" or "protected areas". However, no formal mapping of actual and potential land-use is done. A review of the files in FUNDACEN showed a great deal of variation in the information available for each of the farms.

The price of the individual parcels is determined by dividing the total cost of the farm purchased, plus the expenses to transfer the title from the original owner to FUNDACEN and then onto the individual beneficiaries, by the number of usable parcels. No distinction is made between parcels of different land quality or production potential. The interest rate is similar to that used by commercial banks for long-term loans. The loan for buying the land is expected to be paid by the beneficiaries over a period of ten years.

The selection of the beneficiaries does not appear to be a standardized procedure. In some instances beneficiaries might be moved to the new settlement from various regions of the country, or they might come from the surrounding area. The latter being the preferred case.

In the best case scenario the agronomist and technician in charge of the newly acquired farm begin by promoting the project in nearby municipalities. During this stage they usually hold meetings with the potential beneficiaries in order to explain the nature and objectives of the program as well as the requirements each individual has to meet to qualify. A questionnaire is completed for each applicant, and the information is then

processed in the main office in Guatemala City. A priority list of candidates is produced by this process.

With the help of the list and their personal impressions from meeting the candidates, the technician and agronomist make an initial selection. The parcels are assigned by a random process in which parcels are numbered and then drawn by the beneficiaries. Each candidate must then go through a probation period. During this period they can be asked either by the technician or the community to leave if they don't live on the farm or don't meet the production plan developed for the farm. There are also a number of beneficiaries that voluntarily drop out of the program.

1.3.2. Farm Management

FUNDACEN is assuming the cost of the technical assistance required to increase the productivity of the individual parcels. Highly productive operations are required by the beneficiaries to both make a living and pay for the loan provided by FUNDACEN to buy the land. FUNDACEN provides the technical assistance to its beneficiaries through a team of agronomists and technicians directly employed by the institution.

In addition to providing the technical assistance, FUNDACEN staff also make decisions as to the type of crop that should be established in every case, and how or when the agricultural practices are going to be implemented. In order to do this FUNDACEN has created five different Regional Directorates, each one under the responsibility of an agronomist (Ingeniero Agrónomo). Each of these agronomists works with a team of field technicians (Peritos Agrónomos) who live on the individual farms. Larger farms might require more than one technician. An important variation of the general scheme occurs in the highlands where the farms are so small that the presence of a technician on 100% basis is not justified. In this case, the technicians supervise several farms.

The job of the technicians is actually very diverse. In addition to the duties related to agricultural matters, they manage farm supplies, payroll, and accounting. They also provide a wide range of counseling services, mediate disputes between neighbors, establish contacts with other agencies that might provide some assistance to the farmers, and represent the beneficiaries in their dealings with the Foundation.

FUNDACEN has also utilized public and non-profit technical assistance services on specific issues. However, they feel that they must maintain their own technical assistance unit to insure reliability and permanence of these services as experience has shown that public technical assistance in Guatemala is subject to fluctuations due to availability of funds and/or political circumstances.

1.3.3. Production Credit

The new beneficiaries have had no land or very small holdings. They do not meet the credit requirements demanded by intermediary credit institutions (ICI's), or even the Agricultural Development Bank (BANDESA). Therefore, it has been the policy of FUNDACEN to provide the required production credit for the beneficiaries. The interest on this credit is similar to that of commercial banks, and thus greater than the rate of inflation.

Credit for annual crops is payable on an annual basis, while credit for permanent crops has a longer time horizon, with a grace period depending on the crop. The credit provided by the foundation covers the required production materials and a subsistence wage. This means that the beneficiaries of this program actually have to finance part of the cash otherwise required for the development of their crops with their own work.

Besides providing the required financial resources to begin agricultural production for each individual beneficiary, FUNDACEN's goal is to teach the new farmers how to obtain and service a production loan. FUNDACEN will provide the credit records of individual beneficiaries to BANDESA or any other ICI's helping them to meet the requirements for additional loans when FUNDACEN is no longer managing a specific farm and consequently providing their financial needs.

1.3.4. Other Activities

Besides technical assistance in agriculture, FUNDACEN considers that its beneficiaries should make improvements in general education leve', community organization, and entrepreneurial development if their transformation to small farmers is to become sustainable. Education, health, and social development are considered critical needs of the beneficiaries and as such are treated as an important part of the project. Government institutions generally can not provide these services in a timely manner because of budget and planning limitations.

FUNDACEN is thus trying to fill this need. The foundation is providing schools, furniture, and teaching materials for the new settlements, as well as paying the teachers salary when the GOG doesn't have one available. The education program is not only targeted on the children; illiterate adults are also identified and asked to participate in a special educational program.

In addition FUNDACEN has a special team of professionals consisting of a Social Worker, Home Economist, Health Technician, and an Accountant. This team visits the different administrative regions and individual farms on an as needed basis. They provide additional counselling on the subjects mentioned above with the help of the teachers, agronomists, and technicians. With the new funding provided by A.I.D. through this project amendment, these services are going to be expanded. Their goal is to have at least one team per region. The frequency of visits to individual farms will therefore increase. The identification and solution of problems is expected to improve.

1.4. Environmental Assessment of the Commercial Land Markets II

The project paper (PP) mentions that an Initial Environmental Examination (IEE) made a negative determination. However, in the same PP, an IEE dated April 5, 1988 made a positive determination. This IEE (Annex 2) pointed out four areas of major environmental concern:

- Pesticide procurement and use;
- The sustainability of land-use and the management of foundation properties in accordance with land-use capabilities;
- The protection of biological diversity and tropical forest resources; and
- The conservation of communal natural resources including woodlots, forest reserves, and water supplies.

The purpose of this Environmental Assessment (EA) is to provide the USAID/Guatemala and the host country decision-makers with a discussion of possible environmental effects derived from the implementation of the additional support to the FUNDACEN CLM project.

The pesticide aspect has been covered in an EA performed for all ORD projects which involve pesticide procurement and use in Guatemala (CICP/ECOTECNIA, 1988a). Therefore this EA, as specified in the scope of work (Annex 3), is dealing with the aspects not covered by the CICP/ECOTECNIA work. Specifically the subjects to be considered in this EA are the possible environmental effects of the project on:

- Tropical Forests,
- Biological Diversity, and
- Sustainability of Land Use.

In order to have an overall impression of project performance it was considered convenient to visit as many environments as possible. Representative farms in each physiographic region were selected with the help of FUNDACEN staff.

2.0. SELECTION OF PREFERRED ALTERNATIVE

In this chapter we identify the alternatives which serve as a basis for the EA. The alternatives are described and an analysis is made of the overall effects that the implementation of each one of them would have in the long run.

2.1. Description of Alternatives

Three alternatives are considered in this EA. The first one considers continuing the project as it is now and the second considers the addition of an environmental management component to the project. The third alternative considers no action, which means halting the funding of the FUNDACEN CLM project.

2.1.1. **Alternative One: Project as Outlined in Original Project Paper**

The first alternative is the continuation of the project exactly as it is going on at present. The activities currently carried out by FUNDACEN have already been described in the previous chapter.

2.1.2. **Alternative Two: Present Project plus Environmental Management**

Alternative 2 includes the present project as described in Chapter I plus a set of environmental management activities listed as follows:

- Regulatory Actions
- Training Activities
- Long-Term Management of Protected Areas
- Development of Community Based Woodlots
- Environmental Education

2.1.2.1. Regulatory Actions

The development of each farm should follow a detailed plan. The plan should consider the actual as well as potential land use of the farm. In addition the plan should identify areas that have to be protected because of their intrinsic limitations or specific regulations coming from A.I.D. and/or GOG. Fund clearance should be conditional to the presentation of such a plan for all new land acquisitions. In order to assure that FUNDACEN is going to comply, this condition should be incorporated in the cooperative agreement signed between FUNDACEN and USAID/G. In addition the

production plans for the 29 farms already under development should be reviewed and adjustment made for them to become environmentally sound and comply with existing A.I.D. mandate and Guatemalan laws.

The elements required to achieve a sound development plan for the farms already being managed by FUNDACEN and any additional acquisitions, should at least, include:

Identification of Areas to be Protected

Based on current regulations from A.I.D. and GOG, areas that fit the following criteria must be protected:

- Areas which are currently covered by natural forest,
- Riparian zones, up to a 20 meters wide strips on each side of all streams; and
- Areas with no sustainable use capabilities.

Preparation of maps for actual land cover and land capabilities are the best tools to identify those areas. Those maps should be prepared before each individual farm is divided into parcels to avoid inclusion of areas protected in the beneficiaries parcels.

1) Actual Land Use Map

A map of actual land use should be prepared before the individual farm is divided into parcels. Areas covered by forest should be identified on such a map and set aside as reserve areas. This is necessary to comply with the present A.I.D. mandate and GOG laws which intend to prevent the destruction of tropical forest unless the land is going to be managed for the sustainable production of timber. To date, the FUNDACEN project has not considered selling parcels to its beneficiaries for that purpose. A buffer strip of at least 20 meters along both sides of all streams must also be set aside by law for protection and, therefore, not included in the effective area to be parcelled.

For the purpose of this recommendation forests should be considered as those areas where the original cover of tree species characteristic of a particular ecosystem are largely intact. These forests might have been degraded in the past; however, if they were not completely cleared or burned they will most likely still have the potential for regeneration required for protection.

2) Land Capability Map

The preparation of a land capability map must also proceed the delineation of individual parcels. The objective of this activity is to identify similar areas within the farm that can be utilized under varying degrees of management in a sustainable manner. The farm could have areas that are suited for annual crops, livestock grazing, permanent crops, timber production, and/or complete protection.

Areas considered in the category for complete protection, by definition, must be set outside. Since FUNDACEN has not yet considered the possibility of developing grazing programs for livestock or timber production, the areas which could sustainably support these activities could be utilized for firewood supply during the implementation of individual or community woodlots. Community woodlots are described later.

Delineation of Individual Parcels

The parcels assigned to individual beneficiaries of the program should be suitable for sustained agriculture production. Therefore, they should be defined based on the resources available in the field. The basic information to properly perform this task should come from the land capability map.

Once the homogeneous land capability areas have been established, they can be parceled. Parcel design should attempt to provide units with similar agricultural values. If this is not possible because of the spatial distribution of resources, provisions should be made for allocating different sizes and/or prices to individual parcels in accordance with their potential. Beneficiaries getting lower quality land should not be obligated to pay the same price per unit as that of land within higher agricultural value.

Parcels with more intensive land-use potential should have a higher value, even though they are going to be used for the same type of crop. The parcels with more intensive land-use potential are more likely to have higher yield and lower costs of production for the same crop, even if, for example, coffee is being produced on land suited for annual crops.

2.1.2.2 Training Activities

The achievement of a sound management plan for each of the farms and the implementation of all other environmental management activities considered in this alternative depends on the awareness of the constraints and the availability of technical expertise.

In order to meet the existing environmental regulations, FUNDACEN staff has to be aware of them, accept their validity, and at the same time have the capacity to implement an appropriated methodology required to achieve sound results. Land use planning and management has been identified as the most critical training need.

Given the present organization of FUNDACEN the training can be achieved by implementing seminars in each administrative region. A total of five seminars, each four weeks long, should be implemented. During these seminars, the agronomists and technicians will prepare actual land use and land capability maps for representative farms they are now managing, with the help of the instructors. In this way they should be able to fully acquire the methodology and apply it thereafter.

2.1.2.3. Long-Term Management of Protected Areas

Three categories of reserve areas have been mentioned so far. They include the areas covered by forest, the riparian zones of streams crossing the farms, and areas only suitable for protection, regardless of vegetation cover, because of their natural limitations for agricultural production (such as steep slope or rocky outcrops).

The vegetation of protection areas should not be altered. The only valid uses for them are hunting and harvest of non-timber products such as resins and fruits. Leaving the vegetation untouched will keep the habitat structure required for wildlife. The actual abundance of wildlife populations will then depend on the hunting pressure exerted and the surface area of the reserved areas.

Managing stream corridors connecting neighboring areas will enhance biological diversity. This would allow higher animal population densities, and in some instances, the connection of two small areas by a corridor can make the difference between the presence or absence of a given species because of the dimensions of the habitat required for breeding, feeding, and other behavioral patterns.

Viable mechanisms for maintaining protection on these areas after FUNDACEN withdraws from a particular farm should be established. The Team believes that a management plan should be prepared by the community. The titles for these areas should be transferred to the individual communities only if the management plan developed by them to ensure protection appears satisfactory. We encourage FUNDACEN to consult with CONAMA and/or conservation NGO's about the viability of the individual plans.

2.1.2.4. Development of Community Based Woodlots

Firewood is the base for cooking in Guatemala and is therefore, required in large quantities in all the settlements promoted by FUNDACEN because of the high population density. Woodlots should be developed to provide for the firewood and alleviate the pressure that is otherwise put on the reserve areas.

Some of the farms already have natural woodlots in the sense that the trees in those woodlots were not planted, however the population of trees is so sparse that they can not be considered a forest. These woodlots should be managed for that purpose and replanted as necessary. Other farms might not have wooded areas available and therefore woodlots should be developed through planting.

Woodlots should not be confused with reserve areas. Woodlots are not expected to provide considerable habitat for wildlife, although some bird and small mammals can visit them (See Biological Diversity). Their important role in the environmental management context herein described is that of alleviating the pressure on reserve areas where wildlife is present.

2.1.2.5. Environmental Education

Long term sustainability of the transformations incorporated into Guatemalan society by the FUNDACEN CLM project is going to be possible only if the settlements themselves are viable on a long term basis. To achieve this goal, natural resources conservation is essential. These concepts can be addressed, through the school system that FUNDACEN is supporting to reach the younger generation and, to a lesser extent, the adult generation.

CONAMA has the capability and is willing to cooperate with FUNDACEN to develop posters, pamphlets, and field activities to facilitate the learning process. Workshops should be implemented for teachers and FUNDACEN personnel. In these activities, they should receive guidelines from CONAMA's delegates on how to use the field activities, posters, pamphlets, and any other resources to properly develop an environmental awareness program.

US Peace Corps Volunteers could be incorporated into this activity. Volunteers could stay on a farm, working with the local teacher, to implement the environmental education program.

2.1.3. Alternative Three: No Action

The alternative of no action would imply halting financial support for the FUNDACEN CLM project. This would, of course, cause a major disruption of the FUNDACEN program. Without USAID/G help, the Foundation could not meet its operational cost and production credit requirement.

Without the support of technical assistance in agriculture, social development, credit management, etc., the beneficiaries now under the supervision of FUNDACEN will not be able to produce enough to pay for their land and make a living. Therefore, the opportunity of increasing the quality of life for the beneficiaries now living in the FUNDACEN managed farms would vanish.

2.2. Assessment of Alternatives

As a logical framework, a set of criteria was developed to determine which one of the considered alternatives shou'd be implemented. Then this set of criteria was applied to each of the alternatives being considered and used to select the most sound alternative.

Based on A.I.D.'s and GOG's environmental regulations and policy, the set of criteria estabiished follows:

- Sustainability of land use,
- Protection of tropical forests,
- Protection of biological diversity, and
- Socio-economic development.

2.2.1. Criterion One: Sustainability of Land Use

As stated earlier the sustainability of natural resource management is one of the priorities of A.I.D.'s current environmental policy. When we compare the three alternatives being considered in this amendment the following conclusions can be reached.

- Under alternative one, no special consideration is being given to land use sustainability. Good and bad soil management practices are likely to continue being implemented, following the present pattern. The extent to which inappropriate soil practices could increase or decrease in Guatemala as a consequence of FUNDACEN projects is difficult to assess. In some cases, the beneficiaries are to some extent forced to implement crops not suited for the land they receive. In other cases, however, steep slopes prevented them from planting corn and other annual crops.

  The acquisition of land by the target group of the Guatemalan population represents a permanent change. Therefore, poor practices in soil management will go on for enough time as to cause permanent damage to soils that otherwise would provide some service to Guatemalan society and the beneficiary community in particular. The deterioration of some of the land units bought by the beneficiaries will cause them to be abandoned and the campesinos will move into other areas and further land deterioration will occur.

- Under alternative two, a consideration of the physical limitations of the environment for agriculture production will prevent the utilization of areas

not suited for sustainable agriculture production. The inclusion of the environmental planning requirements in the cooperative agreement will force FUNDACEN staff to look at the land capabilities and act accordingly.

Training and education activities at different levels will provide expertise and develop the consciousness required to achieve permanent results in the planning and management of natural resources.

- Alternative three leaves the present beneficiaries with no additional technical assistance and without the financial resources to implement the soil conservation practices. This alternative would probably have a devastating effect on the resources of the farms that have already been bought. Without the guidance and control of FUNDACEN the beneficiaries are more likely to plant corn and other annual crops without considering sustained use potential.

2.2.2. Criterion Two: Protection of Tropical Forests

Both A.I.D. and GOG regulations call for the protection of forest remnants in Guatemala. The rationale is that the forest resources are not being appropriately managed. Most forest destruction comes from the clearance of new land for agriculture. Timber utilization in most cases is minimal or non-existent. A more sound approach to increase agricultural production is the intensification of management in suitable areas that have already been cleared. This approach leaves untouched the remnant forests as a reserve for the future.

- Under alternative one, the protection of tropical forests is not being properly considered. As a result, some patches of forest are being cut for new agricultural plots. As with all other activities, the cutting of the forest is being done partly with financing by FUNDACEN.

- Alternative two, should prevent the destruction of the tropical forests. The best mechanism to achieve this on a permanent basis is environmental education. However the development and acceptance of crucial concepts take time.

  Enforcement of regulations is required. The inclusion of this requirement in the USAID/G-FUNDACEN cooperative agreement is the short term mechanism most likely to provide the desired result. Money clearance could actually be conditioned on FUNDACEN general environmental management. Training activities should provide FUNDACEN the technical expertise required to protect tropical forests in the future.

- Under alternative three, the situation is not much brighter than under alternative one. In some instances, it could actually be worse. This is

especially true for the farms that have already been bought. In these farms, at least in the "reserved areas", there is some control by the agronomists and technicians. If an individual beneficiary wants to cut down a tree for firewood or timber he has to get permission from the technician. This control will be gone if FUNDACEN has to withdraw because of the lack of economic resources.

2.2.3. Criterion Three: Protection of Biological Diversity

The regulations pertaining to biological diversity are very similar to those of tropical forests. Natural ecosystems are diverse and the permanence of that biological diversity is linked to the maintenance of the habitat structure. An additional consideration on biological diversity is the hunting pressure for food as well as for the pet market.

- The preservation of the biological diversity is not explicitly being addressed by the present project. Therefore the effect of an increased population density on the individual farms, is likely to have a negative effect on the abundance of wildlife populations.

- In alternative two, the key mechanism for improving and/or maintaining biological diversity is environmental education. The enforcement of the stream corridors management recommendations will also increase wildlife habitat.

- Under alternative three, the preservation of biological diversity is likely to decline as could be expected under alternative one. Halting FUNDACEN operations in the individuals farms is not likely to increase the abundance of wildlife species.

2.2.4. Criterion Four: Socio-economic Development

Improving socio-economic conditions of the target group, and hence of Guatemala, is the main objective of FUNDACEN projects. However the effect is going to be ephemeral if the transformation is not sustainable.

- As the project is being implemented now there is the risk that some of the parcels with serious limitations for agricultural production will deteriorate to the point that they will be abandoned. Whether or not the land has been paid for is not considered relevant. The important concern is that the beneficiaries that have acquired land can keep it and keep it in good shape for agricultural production.

  Some of the farms bought by FUNDACEN have actually a very small proportion of good quality agricultural land. This trend of buying cheap

land of poor quality in remote areas of the country is likely to increase in the future if FUNDACEN continues to consider land in terms of surface area rather than site quality and facilities available for production. Ultimately, if this process of land selection continues, a large fraction of the beneficiaries will fail.

Valuable financial resources are lost when investment is undertaken in areas with too many limitations. Coffee plants die as shallow rocky soils desiccate during the long dry and sunny season. Beneficiaries must pay for unproductive land and FUNDACEN must expend its resources on inherently unproductive enterprises.

- In alternative two, planning of natural resource management is likely to prevent bad investments on areas with extreme limitations to sustainable crop production, simply because they are not going to be surveyed into parcels.

  The enforcement of environmental regulations concerning the protection of tropical forests and biological diversity, as well as those dealing with land use capability, is likely to change the present trend of buying cheap land in remote areas. FUNDACEN should then emphasis the importance of providing its beneficiaries with good quality land where they actually can make a living on a permanent basis.

- In the case of alternative three, halting project funding, the socio-economic development process initiated would simply be stopped. Present beneficiaries would not be able to get credit and technical assistance required to achieve high agricultural productivity. Thus they would not be able to pay for their land or have an opportunity to improve their quality of life.

2.3. Identification and Rationale for the Preferred Alternative

The application of the set of criteria developed for this evaluation consistently showed that alternative two is the best option for achieving the project goals. Therefore, alternative two is the preferred alternative, and its implementation constitutes the major recommendation of this EA.

The incorporation of the environmental constraints into project planning will enhance the possibility of long-term sustainability and the improvement of the quality of life, as well as the conservation of renewable natural resources. The adjustment of land use to its present limitations is the only known way to bring about lasting development. Protection of the tropical forests and biological diversity, together with the development of woodlots, will save valuable resources for future generations and development options. Stream corridor management in connection with the other recommendations will prevent deterioration of water resources down stream. Environmental education as

an umbrella activity is likely to promote concepts that will modify the long-term relationship of the community with their surroundings.

The preferred alternative obviously has additional economic costs. However, the savings derived from good planning activities, plus the value of the resources protected, greatly outweighs the additional costs derived from the implementation of the preferred alternative. Development projects which are environmentally sound are also economically viable in the long term.

3.0. DESCRIPTION OF THE AFFECTED ENVIRONMENT

To date the FUNDACEN project includes a total of 29 farms distributed throughout the country. The only major area of the country presently not represented in the program is the Petén Lowlands. About 45% percent of these farms (13 properties) were visited during this EA (Table 1). All main environments covered by the program were visited. Detailed descriptions and specific recommendations for the farms visited are provided in Annex 5.

Since there are no restrictions for the general location of the areas where FUNDACEN can buy land for this program, the proposed activities have a potential country-wide impact. Therefore, a general overview of the country is necessary.

3.1. Socio-economic Overview

Guatemala occupies an area of 108,889 km^2 with an estimated population of nine million people and a 3% rate of population increase. Its land surface is perhaps 35% forested and at least 25% in agriculture. In 1985, Guatemala had an estimated population density of about 470 inhabitants/km^2 on its cultivated land and the highest death rate (31% of total deaths) in Central America due to infectious diseases and parasitism.

Guatemala's economy is agriculturally based. It is largely rural with about 60% of its work force engaged in agriculture. Agriculture accounts for two-thirds of all exports with coffee, cotton and bananas responsible for about 50%. The manufacturing sector, which is about 16% of the Gross Domestic Product (GDP), is also dominated by agriculture-related industries.

Farm size is heavily skewed towards the very small and the very large. About 54% of all farms, containing about 80% of the rural population, consist of plots of 1.4 hectares or less. In 1985, 83% of the rural population was classified as living in poverty. It was estimated that 41% of this population could not afford a minimum diet. The rural landless and near landless population was estimated at 400,000 families and growing. Thus there is considerable pressure to intensify exploitation of the best soils and perhaps permanently degrade its renewable natural resource base by extending agriculture and grazing into fragile areas and/or steep slopes.

The pressures from its rapidly growing population are causing a short-sighted overexploitation and mining of its renewable natural resource base for immediate daily needs. Considerable evidence suggests that Guatemala, like all of its neighbors, is experiencing direct economic losses and has already sacrificed substantial future economic opportunities as a result of a short-sighted, politically expedient mismanagement of its renewable natural resources. These problems are not an inescapable consequence of population pressures and a lack of natural resources. Because of its geographical position, geologic history, and topographic variability, Guatemala has a remarkable diversity of climates, soils, natural resources, and biologically diverse regions. It clearly has a sufficiently wide range of climates and soils

to provide for its own food and fiber needs and to engage in a healthy international trade in these commodities.

A plethora of socio-economic problems are combining to make the condition of day-to-day living for a growing number of rural poor exceptionally bleak. The Kissinger Commission's "Report of the National Bipartisan Commission on Central America" concluded in 1984 that about half of the urban and up to three quarters of the rural population of Guatemala could not satisfy their basic needs in nutrition, housing, health, and education. This is not a consequence of lack of natural resources, but rather of misuse.

Since 1978 Guatemala's economy has experienced a negative growth rate that has been particularly harsh on the rural population, 83% of whom have been classified as poor. Because of a highly skewed income distribution even when Guatemala experienced a healthy growth rate in the 60's and 70's, the benefits of a positive growth rate did not reach the majority of the population. During the first half of the 1980's, the real per capita income declined by 16.5%. Because of the social structure and a skewed economy, most of this reduction in per capita income has been passed on to the poorest sector (i.e., the rural poor).

Land is a polarizing and potentially volatile issue in Guatemala. The landlessness and poverty in the rural sector represents a clear and present danger to any elected government. Historically rural society in Guatemala has developed into social and ethnic groups that are so far apart in custom, language and wealth that communication between these groups on such basic issues as a willingness to sell or buy land is essentially impossible. Even if the rural poor had access to information about the land market they do not have access to any form of credit for land purchase. Historically, they also lack the education or production credit necessary to commence an agricultural operation.

Within this context, the two most important steps necessary to retard the economic and social decline of the vast majority of Guatemalans are to create enduring economic progress in sustainable agricultural development and implement rational use of the country's abundant renewable natural resources.

To cope with its problems, the Government of Guatemala, USAID/G, and certain NGOs must take steps to implement sound natural resource management and sustainable agricultural practices.

3.2. Physical Environment

Guatemala occupies the northern portion of the Central American isthmus, and has a total surface area of 108,899 square kilometers. A mountain range crosses the country in an East-West direction, leaving the coastal plains the north and south. It is possible to identify five topographic regions: The Petén-Caribbean Lowlands (PCLL), The Atlantic

Piedmont (AP), The Interior Highlands (IHL), The Pacific Piedmont (PP), and The Pacific Lowlands (PLL) (See Map 1).

3.2.1. The Petén-Caribbean Lowlands

The Petén-Caribbean Lowlands form a large plain that extends from the northern foothills of Los Cuchumatanes and Chama mountain ranges to the Mexican border (into the Yucatan Platform) and some of the Caribbean plain territories. Since FUNDACEN has not acquired any land in the region, and is not likely going to, efforts in this area should be limited.

3.2.2. The Atlantic Piedmont

The Atlantic Piedmont is located south of the PCLL. It is a very rough and complex slope, formed by portions of Los Cuchumatanes and Chama mountain ranges, in the sections located in the Departments of Quiché and Atla Verapaz, respectively.

Dominant Life Zones in this part of the country are the Sub-tropical Wet and Rain Forest and to a lesser extent the Moist and Wet Montane and Lower Montane Forests, always within the Sub-tropical belt. The annual rainfall isolines map (Map 2) shows that precipitation is generally 3,000 to 4,000 mm.

Typical karst topography, developed on mesozoic carbonates, is the dominant landscape. Small surface water bodies are also a major feature. According to certain researchers (Kihn, 1990) the area has one of the greater endemic herpeto and icthiofauna, associated with these waterbodies. The Poecilidae family is particularly diverse.

Soils are mineral and shallow, overlaying calcareous rock. Exhuberant vegetation is found with plentiful epiphites, which are characteristic of the high-humidity natural communities of tropical and sub-tropical life zones. Due to the nature of relief, soils and climate, the area is extremely fragile and has strong limitations for agricultural development.

3.2.3. The Interior Highlands

The interior highlands is a complex region formed by valleys, plateaus, hills, slopes, volcanic cones, lake basins, etc., extending throughout the high plateau in the central mountain range. Because of elevation, the dominant altitudinal belts are Montane and Lower Montane. Atmospheric water availability determines sub-humid and humid provinces, which are ideal for human development. (Holdridge, 1967).

In the northern part of this region (upper watersheds of Cuilco and Motagua rivers), soils rest on metamorphic, sedimentary, or intrusive rocks. In the remainder of the region, soils are volcanic and very deep overlying on crystalline rocks.

The volcanic lakes of the region have been altered with introductions of exotic fish and shellfish, and the transformation of forested watersheds into cropland has been extensive. Forests were originally mixed stands of conifers and broad-leaf species, particularly pines, cypress, oaks, and "ilamos". Therefore, the bio-diversity of the zone does not currently reflect past richness.

Forest remnants are very important in this region because they provide habitat for native as well as migrant species. Unfortunately, human pressure for firewood and additional agriculture land is very high. Slash and burn agriculture and lack of soil conservation mechanisms are the more common threats to natural resources conservation.

3.2.4. The Pacific Piedmont

The Pacific Piedmont is a wide strip of land which constitutes the southern slope of the central mountain range. Topography is rough and the slopes are very steep. Elevation ranges from 750 to 3,000 meters above sea level. The region limits with the IHL in one side and the PLL on the other.

The soils are almost entirely formed from Cuaternary volcanic materials. The rainfall pattern is very seasonal, and due to the intensity of the precipitation during the wet month and the steepness of the slopes, the land is only suitable for forest production, permanent arboreal crops, and, in some areas of more gentle slopes, for livestock grazing.

Mid distance from the ocean is only about 100 km. Therefore, the region is highly influenced by the humid winds coming from the Pacific. In the mid and low altitude areas, high pluvial regimes develop. The isoyets map (isolines of precipitation) shows cells of up to 4,000 and 5,000 mm of precipitation per year. According to the Holdridge Life Zone system, these higher precipitation areas are in the Sub-tropical Rain Forest and probably the Lower Montane Sub-tropical Rain Forest.

There is no doubt about the high biological diversity of the forest in this region. These forests constitute the only natural known refuge, at present, for the rare gallinaceous Oreophasis derbianus (horned turkey/pavo de cacho) and also offer habitat for the almost extinct quetzal (Pharomachrus moccino). These forests are an ecotone, which links the bird population of the Interior Highlands and the Pacific Lowlands.

Given the steep slopes and high precipitation rates, one of the main risk from human activity in the zone is the loss of soil because of erosion, especially when these lands are used for annual crops. Furthermore, the loss of species could be a serious consequence of forest cutting.

3.2.5. The Pacific Lowlands

The Pacific plain runs East-West across the country. It is located between the Pacific Ocean shoreline and the main mountain range (Sierra Madre). Total length is approximately 250 km and mean width is about 100 km. Peculiar geographical characteristics include its very flat nature and an outstanding abundance of short river courses, crossing it in a North-South direction.

According to the land capability system, the region includes the best agricultural land in Guatemala. The soils are of volcanic origin, and the topography is flat. The dominant Life Zone corresponds to the Sub-tropical Moist Forest, and to a lesser extent, Sub-tropical Wet Forest. Precipitation is slightly under 2,000 mm per year throughout most of the region, and in some sectors as high as 2,000 and 3,000 mm especially towards the west.

Almost all the zone is dedicated to agriculture and livestock. The three dominant economic activities are the cultivation of cotton and sugarcane, and intensive livestock management for beef production. There are only a few remnants of the original vegetation. The main natural remnants consists of mangrove and swamp areas associated with estuaries.

In these coastal ecosystems, a very rich and abundant fauna develops, especially mollusks, shrimp, fish, and birds. Villar, Kihn and Rosales (1989) indicate coastal ecosystems are the only areas in the country where the Cathartes burrovianus ("guzma amarilla", Lesser Yellow-Headed Vulture) can be found. On the other hand, Villar (1989a) points out that these areas also constitute the only habitat known in Guatemala for over wintering of the Pelecanus erhythrorhynchos (white pelican). Furthermore, these humid areas provide an excellent habitat for innumerable migrant waterfowl species. Due to the local characteristics of drainage and agriculture patterns, agrochemical residues affect the ecologic integrity of these coastal habitats.

3.3. Institutional Responsibilities

Besides FUNDACEN, which has direct responsibilities in the administration of the project, other institutions might be involved in the project activities, especially dealing with the environmental regulation. In the Team's opinion, the actual institutional scenario includes FUNDACEN, as well as some public institutions and NGO's.

3.3.1. The Role and Structure of FUNDACEN

The Penny Foundation (Guatemalan Foundation for Development), or FUNDACEN, is a non-government organization established in September, 1962. A good part of the philosophy that guides their activities are stated in the first paragraph of its Creation Act (FUNDACEN, 1988): "We, with love for the country and with the understanding that

the rural population is the most important heritage of Guatemala, promise, from here on by mutual agreement, to form the 'Penney Foundation' a non-profit organization organized to intend mutual help, with the philosophy that the rural people would pay for the cost and materials of all projects set about for them."

FUNDACEN indicates that its actions are oriented to the fulfillment of the following objectives:

- To instruct people of rural communities on the practical aspects of credit management.
- To increase the income level of its beneficiaries.
- To improve family and communal life conditions.
- To work for the integration of communities to the socio-economic activity of the country.
- To increase and diversify agricultural, artisanal, and industrial production.
- To promote the development of educational facilities.
- To encourage the feelings of citizenship and communal and cooperative life as means of improving material and spiritual status.
- To stimulate the artistic and artisanal capabilities of the people in the different communities.
- To propitiate conditions within beneficiaries communities for the development of leaders who would be willing to accept the responsibility of directing their own lives.
- To support, through artistic shows and expressions, the cultural history of the country.
- To promote the participation of the private sector in the socioeconomic development of the country.
- To support all those activities that will result in the development of the poor citizens of the country.

At present, FUNDACEN adopts a functional structure presided over by a General Assembly. A Directive Council, General Manager, and four specific Directorates subordinate to the General Assembly in that order. The Land Purchase/Selling Unit, one of the four directorates, organize itself into departments: Administrative, Financial, Technical, Judicial, Data Processing, and Engineering.

3.3.2. Relevant Public Institutions

Because of their inherent responsibility in the administration and management of natural resources and the environment, the following organizations are considered in one way or another related to the project being implemented by FUNDACEN:

OCREN:

The Office for the Control of the Reserve Areas of the Nation (OCREN) is a branch of the Agriculture, Livestock, and Food Ministry (MAGA). It holds jurisdiction over the navigable rivers, lakes, and seas. OCREN is the institution implementing Decree 11-80 of the Congress that determines Government and State Property over those spaces, decides which portions are susceptible to grants and rentals, and indicates permissible activities.

Some of the farms already incorporated within the program are in these territories, and more might be included in the future. Therefore, the opinion of OCREN should be considered in cases like the one of Ayarza Lake, where the farm claims ownership on the body of water itself.

DIGEBOS

The General Directorate for Forest and Wildlife (DIGEBOS) is also a branch of MAGA. This is the institution called to implement Decree 70-89 of the Congress (Forestry Law), that regulates all the inherent aspects of managing forests and forest species. Its responsibility includes aspects of forest commercialization as well as afforestation, reforestation, protection of forestry areas, and their sustainable utilization, among others.

DIGEBOS has direct responsibility for the provision of licenses for harvesting and transporting of forest products and sub-products. The application of these regulations includes private forests as well as forests in communal, municipal, or public common land. It provides the authorization for changing land use in forested areas and determines the extent of forest cover that must be maintained in areas dedicated to non-forestry activities, such as agriculture.

CONAMA

The National Commission of the Environment (CONAMA) is an entity that directly depends on the President's office. It was created to advise the government in matters related to the environment. It does not have execution capabilities. Nevertheless, CONAMA is called to implement Decree 68-86 of the Congress. One of the more relevant aspects of the Law (for the purpose of this report) is that stated in article number 8. It requires an environmental impact assessment for all projects likely to have an impact on the environment or natural resources of the country.

CONAP

The National Council of Protected Areas (CONAP) is an entity with judicial legal capacity which directly depends of the President's office. Its main goals are:

- To propitiate the conservation and improvement of the natural patrimony of Guatemala;
- To organize, direct and, develop the Guatemalan System of Protective Areas;
- To plan and conduct a national strategy for the conservation of the renewable natural resources of Guatemala; and
- To coordinate the administration of wildlife (flora and fauna) resources.

CONAP should solve the property delimitation conflicts, when they are within the protected areas or the buffer zones around them.

3.3.3. Non-Government Organizations

Although no other Non-government Organization (NGO), besides FUNDACEN currently participates in the development of the Project, they might in the future. The possibility for additional participation may arise from the need for handling the forest remnants. Especially when FUNDACEN is no longer present at a particular farm. One of these organizations, Amigos del Bosque (Forest Friend Association), expressed interest in helping with such matters, assuming that reasonable cooperation terms could be agreed upon with FUNDACEN. Other NGO's in the country that could be of help to manage and/or advise on the management of the reserved areas include:

- The Guatemalan Natural History Association (Asociación Guatemalteca de Historia Natural. AGHN)
- The Nature Protectors Foundation (Fundación Defensores de la Naturaleza).
- Association for Research and Social Studies (Asociación de Investigación y Estudios Sociales. ASIES)
- Association pro-Safeguard of the Environment (Asociación pro Defensa del Medio Ambiente. APRODEMA)
- Foundation of the Guatemalan, de Valle University (Fundación de la Universidad del Valle de Guatemala).

- Guatemalan Association of Orchideology (Asociación Guatemalteca de Orquideología).

4.0. ENVIRONMENTAL CONSEQUENCES AND MITIGATING MEASURES

In this chapter we make detailed descriptions of the considered alternatives and the consequences in each case. Some effects are avoidable while others are not. we also include a description of the mitigative actions recommended by the team, when it applies.

4.1. Sustainability of Land Use

During field trips we could observe multiple examples in which actual land use corresponds with its potential use. In some of the areas, under the FUNDACEN project, land use was being improved upon as compared with pre-project land use. However in other cases, land use was not suited to land use capabilities, and a risk for non-sustainable utilization exists. The problems identified in the field relating to the sustainable land use are summarized below:

- Inappropriate agriculture practices for the particular conditions of each soil type.
- Annual and permanent cropping in areas with slopes too steep for each activity, without appropriate soil conservation practices.
- Lack of implementation of the basic measures to protect stream ecosystems.
- Lack of generalized applications of appropriate practices for soil conservation-- especially in areas recently incorporated into agriculture production.

These problems principally result from inadequate systems for establishing land capability. The currently implemented process does not follow any sound methodology, nor include considerations from the managerial team.

Parcels are delineated in a sketch map without proper consideration of actual resources distribution within the farms. Resulting parcels are uneven. Some beneficiaries are buying excellent pieces of land while others are acquiring very marginal lots.

Prices, however, are the same for the parcels whether in excellent and poor sites. Furthermore, beneficiaries receiving lower quality sites are still required to plant the crops recommended by FUNDACEN field staff. The combination of lower quality sites and inappropriately recommended crop packages results in some beneficiaries dropping from the program realizing that they will probably not earn enough money to pay back the land loan and support themselves.

Acquisition of land with real agriculture potential is a crucial factor. Once agricultural potential has been established and defined in the field, the farm can be effectively

divided into parcels. An effective system for establishing land capability will provide the basis for a) the appropriate use of the soil and b) the adequate pricing of each parcel.

An additional benefit of matching actual and potential land use would be changing the attitude of the beneficiaries towards the implementation of soil conservation practices suggested by the FUNDACEN field staff. At present, given the actual selection system, the beneficiaries are resistant to those recommendations.

4.1.1. Mitigating Measures

A land capability assessment should be performed prior to dividing the farm into individual parcels. This assessment should be the departure point for a complete "farm development program." We suggest that FUNDACEN, with the help of qualified professionals, try to adapt the methodology developed by the Tropical Science Center in Costa Rica. This methodology is based in the Holdridge Life Zone. The flexible methodology can incorporate available information, collect additional information from field observations, or utilize any combination of available and newly acquired information.

Workshops and case studies should be implemented for the field staff in order to determine the major achievements and problems in the project. Visits to individual farms and discussion of the problems and possible solutions would help in the process of personnel training. Soil conservation, soil management, environmental, and public health education should be other subjects in the workshops.

4.1.2. Environmental Consequences of Each Alternative

If the project continues as it has been implemented until now, additional cases of non-sustainable land use are likely to be encountered. This would lead to a varying extent of soil deterioration through the processes of erosion and leaching of nutrients and organic matter.

Low yields and high production costs are more likely under such circumstances. Additional losses of forest cover would be expected as a means to provide additional land required to replace the damaged areas. River banks are susceptible to overexploitation and water contamination and aquatic habitat destruction will follow.

On the other hand, if the project implements the recommendations of this EA, it is more likely that sustainable land use can be achieved. Optimal yield and lower production could make economic improvement feasible. Therefore, environmental conditions will improve in farms in which the actual land use has exceeded sustainable utilization patterns in the past.

One of the most important effects of attention to land capability assessment would be the allocation of adequate prices to each of the parcels within a farm. Specific weight will be given to the resources available to establish price categories. In this way, the area within the farm with potential for annual crops of high productivity, on soils of little or no slope, with possibilities of irrigation, etc.-- that give higher yield per unit area--will be better priced than the land with steep slopes, or any other strong limitations.

If the no action option is taken the adverse effects pointed out earlier are likely to increase in relation to the implementation of the project in the actual condition, because the land has already being divided in most of the units and there would be no additional technical assistance.

4.2. Tropical Forests

Tropical forest protect soil against erosion, help to prevent flooding, regulate the hydrologic cycle, and generally protect wilderness and the environment. They are a bank of genetic resources, mostly unknown. Actions that encourage or result in deforestation should be identified and addressed systematically on the farms affected by the project. Examples where the relationship with forest could be improved were observed in farms like Comayagua, Xalijá, and Samanzana.

4.2.1. Deforestation

The main cause for destruction of the tropical forest is the clearing of the soil for cultivation. In Guatemala it has been estimated that between 1970 and 1980, 15% of the forest cover was lost (García, et.al. 1984). The same authors estimated that the lost of forest is in the range 2% per year.

Another cause of the loss of the forest cover is the harvest of firewood, mainly for domestic consumption and, to a lesser extent, for industrial use. Finally, there is the use of wood for construction and for other purposes.

It is important to point out that available data indicate a decrease in the use of wood for industrial uses and a decrease in the losses of forest to expand the agricultural land in colonization programs, because of the current scarcity of forest. (Garcia, et. al. 1984).

4.2.2. Forest Remnants

In general terms we could say that the largest forest remnants are located in the Petén-Caribbean Lowlands, the Atlantic Piedmont, and on top of some volcanic cones (which are under legal protection).

Temperate coniferous and broad-leaf forest are present in Guatemala (30% of the national territory). The other major forest formations correspond to the broad leaf sub-

tropical forests in the lowlands (70%). Only a small area in the Izabal Department is considered a tropical forest. At present there is no reliable data on vegetation cover. Nevertheless, for 1986, vegetation cover, including coffee and rubber plantations, comprised between 27 and 41% of the territory (Garcia, et. al.1984). Therefore, the need for sound efforts for the protection of the forest cover in any farm or area that is affected by the FUNDACEN or any other project, is evident.

4.2.3. Consequences of the Forest Loss

The loss of tropical forests, such as those in Guatemala, implies losses of resources and opportunities for development which are, in most cases, irreversible. They might include complete ecosystems with their associated biological diversity and genetic information, timber, soils, water and water quality, protection against flooding and droughts, capability to generate hydro power, tourism and recreational values, opportunities for scientific research, and pharmacological products.

Through the experience in the field, a wide range of inter-relationships between the project and the remnants of forest were identified and can be defined as follows:

4.2.3.1. Farms without a Forest Cover (like some in the IHL)

In these cases, the need of wood for domestic use is evident, and the beneficiaries have to buy it or gather it from adjacent areas.

4.2.3.2. Farms with a Small Forest Cover

In these cases the need for wood is greater than the sustainable capability to provide of the residual forest. Such forests will disappear soon if effective measures are not taken now to manage them as woodlots for sustainable firewood production.

4.2.3.3. Farms with Significant Forest Cover

These farms produce abundant wood which is not commercialized. The timber production capacity of the forest is being ignored, and the forest is being cleared (like that of Comayagua) for inadequate agriculture utilization. The wood is only used as firewood by the beneficiaries of the farm for which the forest is cleared.

For the particular farm of Comayagua, it should be pointed out that the section of the forest being eliminated to establish coffee is located on the slopes of the Volcán Tecuamburro, which has little agriculture potential. In Guatemala, the volcanic cones are places of high endemism and are also considered to be speciation centers. For this reason they have legal protection.

In the north zone, the situation is somewhat different, even though, it has some similar components to the ones described before. Here the hills of the karstic landscape "mosores" are being managed as reserved zones. They are being protected to a certain degree, starting with the Samox farm, where the total of the area has been set aside for conservation. In the farm Samanzana only the areas with gentle topography are being utilized. In Xalijá-Pataté, however,the majority of the natural forest has cleared, including steep slopes, to establish permanent crops. Land slides could be observed in this particular farm.

4.2.4. Mitigating Measures

Several measures could be implemented to reduce pressure on the forest remnants. It has already been mentioned that forests should be put aside for protection when an inventory of the farms natural resources is performed. In addition to this, protection can be provided through:

- Effective management of fuel forests, in areas designated specifically for that purpose and which have that capability.

- Introduction of technological improvements to reduce the consumption of firewood in the houses. Designs for improved stove models are available from different institutions such as ICAITI, CEMAT, and USAC. Some of these models include the Lorena, Chula, and the University of San Carlos stoves. This alternative could be introduced as a component of housing education assistance.

- Protection of the river basins, especially if the area has steep slopes. This will protect the water sources, which in some instances could be utilized in the same farm to enhance agricultural productivity of the good agriculture sites through appropriated irrigation.

4.2.5. Environmental Consequences Each Alternative

If the project continues as it is, we think that in the long run, the following effects will appear:

- The firewood sources within the farm or nearby will be destroyed, and obtaining fuel will be a strong limitation in the development of the program.

- Conflict might develop with nearby properties or communities, which will create legal problems or social frictions.

- Pressure in any adjacent wild area will increase and eventually cause degradation.

If the recommendations of this EA are implemented, we can predict the following scenarios:

1) In areas with an insufficient firewood supply:

   - A decrease in the pressure on neighboring properties and wild areas, because more wood is likely to be produced.

   - A decrease or avoiding of the deterioration of soils used for the firewood production which would otherwise be used for more intensive purposes which exceed their sustainable capabilities.

2) In areas with a sufficient firewood supply:

   - Total protection of the reserve areas.

   - Satisfaction of the firewood requirements of the beneficiaries, providing additional stability to the project.

3) In areas with a surplus of firewood supply:

   - Excess firewood could be commercialized, providing additional income to the beneficiaries.

   - Possibilities of subsistence will increase for the fauna associated to the woodlots.

   - Pressure on surrounding areas of forest remnants would be eased.

3) Finally, if the no action alternative is taken, the following effects could be expected:

   - In the areas where there is pressure for the use of the land, the forest remnants within the farm would continue to be cut until exhaustion.

   - In the areas were there is primary forest and little pressure from the population, there would be fast development, which will eventually put similar pressure on the forest remnants.

- In the farms where overutilization of the soils was identified, the area will continue current use patterns or even more intense land use patterns will develop as a consequence of increased pressure.

4.3. Biological Diversity

Biological diversity is represented by the variety of living resources we see and use daily and the genetic resources they represent. The successful exploitation of agriculture, fisheries and forestry all depend on biological diversity. The maintenance of biological diversity is therefore vital to human welfare not only to improve and maintain our present agricultural varieties but also to preserve choices for agricultural, medical, and industrial opportunities in the future.

Guatemala is an area of high biological diversity and is considered to be one of the world's centers of agricultural origin. A preliminary inventory made by CATIE reported that all Mesoamerican plant species currently useful to mankind (48% of the world total of 104) are present in Guatemala (Azurdia y Gonzalez, 1986).

Examples of the economic importance of the biological diversity in Guatemala's plant life is the existence of wild germ plasm of crucial domesticated food and fiber crops such as avocado (Persea spp), bean (Phaseolus spp), cacao (Theobroma spp) cotton (Gossypium spp), maize (Zea spp), squash (Cucurbita spp) and tomatoes (Lycopersicon and Physalis spp) to name a few. The avocado industry of California and Florida owes its existence to avocado seeds gathered in Guatemala. Notably the genetic material used to combat the US corn blight of the early 70's came from Central America.

The loss of biological diversity is not an inevitable consequence of economic development, but, in fact, its loss undermines the foundation upon which sustainable economic development is constructed and the very basis of human life itself. Thus a nation that has preserved its biological diversity is better prepared to provide for the welfare of it people than a nation whose biological diversity has been impoverished.

Because of its geographic location and geological history Guatemala has a wealth of ecologically diverse environments with remarkably diverse biological resources. The well being and livelihood of a majority of population of Guatemala depends directly on the diversity of renewable biological resources. Thus, in seeking to achieve sound, sustainable agricultural development and expansion in Guatemala, the retention of biological diversity must have a prominent position in any development scheme.

The purpose of the mixed species wood lots and plantings in the living areas is primarily to provide fuel wood and improve the environment of the beneficiaries. Insular theory (Wilcox, 1980; Foster 1980) suggests that the small "islands" of biological diversity represented and encouraged by using mixed species planting in the woodlot and living areas of the beneficiaries will play an important role in maintaining important examples of migratory and resident birds, insects, and small mammals. An additional, and probably more valuable, benefit of woodlots is that removing the pressure exerted over

the natural areas for firewood helps to maintain habitat structure and biodiversity in those areas.

4.3.1. Wood Lots, Biological Diversity and Environmental Improvement

Wood lots can not only provide the construction, fencing, and fuel wood needs of the beneficiaries but also biological diversity and valuable habitat for migratory and resident birds, insects, and mammals. They can improve the environment by providing wind and dust break, shade, beautification, and recreation sites--thus improving both the physical and mental health of the project beneficiaries. To function as multipurpose wood lots, they must be composed of not only the fast growing exotic species favored by foresters (e.g., Eucalyptus, Poplus, Salix and certain fast growing pines) but also the generally slower growing, but culturally preferred and recognized, biologically important native species. For example the house-wives interviewed preferred oaks and alder to the faster burning Eucalyptus or pines species. The native species not only provide familiar fuel and construction material to the beneficiaries but also a source of food and shelter for resident and migratory birds, insects, and mammals. They can also provide an important site for solitude for reflection and recreation for the low income farmers and their families.

Therefore, the Team recommends that in cases where woodlots and environmental improvement are needed, fast growing fuel wood species be interplanted with slower growing native species and, where appropriate for environmental improvement of living and recreation areas, fruit trees. It is expected that the fast growing fuel wood trees will provide immediate fuel wood, shade, and windbreaks which can be removed at the discretion of the beneficiaries as the slower growing native species begin to fill in the canopy and require more room.

Such a system would provide not only the immediate short term needs of the beneficiaries (fuel, shade and windbreaks) but also the long term environmental improvements (biological diversity, native habitat for migratory and resident wildlife).

4.4. Down Stream Effects

The down stream effects of poor natural resources management practices are well documented. When forest is eliminated and crops or pastures are established, especially in areas not suitable for these activities, there is a substantial reduction in the regulating effect of vegetation on the hydrological cycle. The increase in sediment loads and the change in the natural hydroperiod in the rivers, lagoons and swampy areas of the region, reduces water quality, fisheries, and navigation and increases the risk of floods--which affects infrastructure as well as crops and livestock. The community of organisms connected with the aquatic environment is modified in response to the new pattern of matter and energy flows. Food chains, whose final link is usually the human population, are broken.

The empirical information available indicates that when changes in land use begin, the effects on the soil and the aquatic ecosystems are of relatively little importance. As a greater proportion of the watershed is affected, the effects become more noticeable. In large watersheds the critical point appears to be about 50% of the area under tree cover. If tree cover is greater than this, the effects on the quality of the water and the aquatic system in general are not very evident. However, once this limit is passed, changes occur rapidly and both the aquatic system and the environment in general deteriorate very rapidly. The effects are accelerated if the forest cover is removed from areas with steep slopes and heavy rainfall.

4.4.1. Management of Stream Corridors

The programs for soil conservation--protection against erosion and protection of upper watersheds--will have little effect on the conservation of the quality of water and the aquatic environment in general if there is no integrated management of water courses of all sizes. In order to achieve this, rivers, streams and brooks must be viewed as corridors which include not only the channels along which the water flows but also the riparian vegetation. This vegetation has a tremendous influence in the magnitude and periodicity of the flow of water, nutrients, sediments, and organic matter entering the stream.

Protection of stream corridors has proved to be a very efficient means of controlling the main disorders in the hydrological cycle caused by poor natural resource management, and in maintaining the quality of the aquatic habitat (Dickinson, 1989). Several beneficial effects are achieved by the presence of these buffer strips at the land-water interface:

- Filtration of a high proportion of the sediments carried along by the runoff from agricultural land,
- Reduction in the erosion of river banks and sides,
- Buffering of the peak freshets which cause flooding,
- Control of accelerated eutrophication in bodies of water,
- Safeguarding of the productivity of fishing activities down stream, and
- Maintenance of high biological diversity in the corridor, both in its aquatic and terrestrial components, due to the intrinsic diversity of habitats which characterizes interfacing ecosystems.

In Guatemala, there are regulations which establish that protective vegetation must be preserved along the sides of all water courses for the purpose of maintaining the stability of stream banks and reducing the sediment load. FUNDACEN has adopted a policy of maintaining a buffer area of at least 20 meters on each side of streams. Unfortunately, this essential regulation is not being enforced.

Several parameters determine the efficiency of buffer strips. Wider strips are required for steep slopes. The efficiency of a buffer strip is greater when plant diversity is high, which is a characteristic of most integrated systems. This is because the diversity of growth patterns and root systems produces a greater filtering effect. At the same time higher diversity of habitat structure results in increased species abundance and biological diversity. Management and preservation of stream corridors of natural vegetation will have a large impact on the preservation of biological diversity and the reduction of negative environmental effects in down stream ecosystem.

The combination of stream corridors, connecting other protected areas which have very strong limitations for agricultural development or are currently under a forest cover, provides a valuable opportunity for maintaining nationwide biological diversity as well as on individual farms.

4.5. Cost Estimate for Implementing the Mitigating Measures

The costs for implementing the mitigating measures considered in alternative two include the salary and perdiem of the natural resources management advisor, acquisition of field equipment for the determination of the land use capability, and audio-visual materials and equipment for the Environmental education program. FUNDACEN has enough infrastructure to implement the rest of activities related with these recommendations. The costs are roughly estimated as follows:

Land Use Planning and Management Seminars:

		US $
• Instructors' Salary	2,000/wk x 20 weeks	40,000
• Perdiem	700/wk x 20 weeks	14,000
• Travel	1,000 x 5 trips	5,000
	Sub-total	59,000

Field Equipment:

• 15 sets including: clinometer, altimeter, compass, soil sampler, metric tape, and PH meter. At US $ 1,000 each	15,000

Audiovisual Aids:

Equipment:

• 5 slide projectors	3,500
• 5 overhead projectors	5,000
• 2 35 mm Cameras	1,500
Sub-total	10,000

Materials:

• Film and Development	1,800
• Posters production: 10 posters x 1000 copies	5,000
Sub-total	6,800
TOTAL COST	90,800

5.0. CONTRIBUTORS

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6.0. REFERENCES CONSULTED

Azurdia C. A. and M. González. 1986. Los recursos genéticos de algunos cultivares nativos de Guatemala. Rev. Universidad de San Carlos de Guatemala, Perspectiva 8:180-189.

Bukasov S. M. 1981. Las plantas cultivadas de México, Guatemala y Colombia. Trad. of the english version of M. H. Byleveld by J. León. CATIE, Turrialba, C. R.

CATIE-GTZ. 1979. Los recursos genéticos de las plantas cultivadas de América Central. Trad. J. León. CATIE, Turrialba, C. R.

CICP/ECOTENIA. 1988a. Environmental Assessment of the Highlands Agriculture Development Project (HAD) (A.I.D. 520-0274). Project Amendment - Phase II. Guatemala City, Guatemala.

_____. 1988b. Environmental Assessment of Pesticide Use in USAID/Guatemala Office of Rural Developments Projects. Guatemala City, Guatemala.

Dickinson, J. and F. Tracy. 1989. Stream Corridors in Watershed Management. Prepared by DESFIL for USAID. Contract #527-0000-C-00-7841-00.

Dourojeanni M. J. 1981. Impacto ambiental de las carreteras en los bosques tropicales de América Latina. In. T. Gutiérrez (ed.). Seminario sobre proyectos de investigación para el manejo de los recursos naturales renovables del bosque tropical húmedo. Dir. Gral. Forestal y de Fauna. Perú.

FLACSO-Guatemala and Land Tenure Center of the University of Wisconsin. 1989. Land Market Survey, Research, Results, and Reports. Draft for Discussion. Guatemala City, Guatemala.

Foster R. B. 1980. Heterogeneity and Disturbance in Tropical Vegetation. In. Soulé M. E. and B. A. Wilcox (eds.). Conservation Bilogy. Sinauer Associates, U.S. pp.75-92.

García E. L., et al. 1984. Perfil Ambiental de la República de Guatemala. Universidad Rafael Landivar. Instituto de Ciencias Ambientales y Tecnología Agrícola. Contrato U.R.L./AID-Guatemala/ROCAP No. 596-0000-C-00-3060-00.

Holdridge L.R., 1967. Life Zone Ecology. Tropical Science Center. San José, Costa Rica.

Kihn H. 1990. Comunicación personal. Investigador del área de fauna silvestre. Centro de Estudios Conservacionistas, Universidad de San Carlos de Guatemala.

Leonard H. J. 1987. Natural Resources and Economic Development in Central America. A Regional Environmental Profile. Executive Summary. report prepared for the International Institute for Environment and Development.

McBryde, F. W., 1947. Gegrafía Cultural Histórica del Suroeste de Guatemala. Tomos I y II. Seminario de Integración Económica. Guatemala.

Saunders G. B., A. D. Holloway and Ch. O. Handley. 1947. Los peces y la vida silvestre de Guatemala. Ministerio de Agricultura, Guatemala. Mimeog.

Simmons, Ch. S. et al, 1959. Clasificación de Reconocimiento de los Suelos de la República de Guatemala. Instituto Agropecuario Nacional. Ed. "José Pineda Ibarra". Guatemala, C.A.

Stewart, S. O., P. Fairhurst, and G. Pedroni. 1987. Evaluation of Commercial Land Market Project. (PIO/T No. 520-0000. 1-3-70030). Guatemala City, Guatemala.

Suárez de Castro, F. 1980. Conservación de Suelos. Ed. IICA. San José, Costa Rica.

USAID/Guatemala. 1987. Commercial Land Markets II. Project Paper. Project Number: 520-0343. Guatemala City, Guatemala.

USAID/WDC. 1988. Environment and Natural Resources. A.I.D. Policy Paper. Bureau for Program and Policy Coordination. Washington, D.C.

USAID/WDC. 1980. A.I.D. Handbook. Vol. 3. Washington, D.C.

Villar L., H. Kihn and L. Rosales. 1989. Cathartes burrovianus, nuevo registro para Guatemala. In. El Volante Migratorio, No13. Inst. Nal. Forestal y de Fauna. Perú.

Villar L. 1988. Los pelícanos blancos y La Palmilla. Diario de Centro América, pp8-9. Guatemala, abril 13.

_____. 1989a. Aves de las selvas pacíficas subtropicales. Diario de Centro América, p8. Guatemala, mayo 17.

_____. 1989b. Aves de las tierras altas. Diario de Centro América, p9. Guatemala, junio 7.

_____. 1989c. Al comer pacayas... Diario de Centro América, p8. Guatemala, nov.22.

Wilcox B. A. 1980. Insular Ecology and Conservation. In. Soulé M. E. and B. A. Wilcox (eds.). Conservation Biology. Sinauer Associates, U.S. pp.95-117.

ANNEX 1:

PROCESO DE EVALUACION DE OFERTAS PARA COMPRA DE UNIDADES PRODUCTIVAS (FINCAS) EN EL PROGRAMA COMPRA-VENTA DE TIERRA DE LA FUNDACION DEL CENTAVO

INTRODUCCION:

El proceso de evaluación de ofertas de fincas a ser consideradas para su posible negociación dentro del Programa Compra-Venta de Tierra que la Fundación del Centavo inició en el mes de Septiembre de 1984, es una de las etapas más importantes en el modelo de trabajo implementado, pues de una buena evaluación de compra de fincas depende el éxito a obtener en el desarrollo de los proyectos agrícolas.

Este proceso se ha diseñado para que en él participen diferentes profesionales y varios criterios técnicos, con el propósito de que la decisión tomada sea la más acertada para garantizar el éxito deseado.

El procedimiento de selección y compra de fincas consta de las siguientes etapas:

1º INVESTIGACION DE FUENTES DE OFERTAS:

Se inicia con la investigación de las diferentes fuentes de ofertas de fincas en el mercado informal de tierra del país, entre las que podemos mencionar: Anuncios clasificados de periódicos, corredores de bienes raíces, propietarios de inmuebles, grupos interesados en ser beneficiarios del Programa Compra-Venta de Tierra de la Fundación, Asociaciones Nacionales de empresas agrícolas o cualquier otra fuente que llene este cometido.

2º CLASIFICACION Y PRIORIZACION DE OFERTAS:

Una vez recabadas las ofertas, éstas son analizadas, clasificadas y priorizadas por el personal específico con que cuenta el Programa quienes tienen pleno conocimiento de las diferentes zonas del país, por lo que pueden determinar anticipadamente si alguna finca dada su ubicación geográfica no reune condiciones para ser tomada en cuenta o se encuentra en zonas de desarrollo agrario como Franja Transversal del Norte o Petén, lugares que por política institucional no se encuentran consideradas en esta fase del Programa.

Otros aspectos que previo a la visita de reconocimiento pueden ser analizados son: La extensión de la tierra y el status de tenencia.

3º SELECCION DE FINCAS PARA REALIZAR LAS VISITAS DE CAMPO:

Las fincas seleccionadas son visitadas y recorridas por personal con amplia experiencia en este campo, con el objeto de determinar aspectos como: Su uso actual, su inven

tario de recursos y principalmente su uso potencial, el que sirve de base para determinar la factibilidad de establecer proyectos productivos de alta rentabilidad.

Durante esta visita a la finca el personal encargado también efectúa un sondeo en la zona para conocer los niveles de precios de la tierra y conocer si existen grupos interesados en participar en el Programa.

Para recabar la información en el campo, se utilizan formularios que se han diseñado previamente, siendo estos: el Formulario de Socio-Economía de la Finca y el de Potencialidad de Uso, adjuntos a éste informe.

4º ELABORACION DEL INFORME DE LA VISITA DE CAMPO A LA FINCA:

Los datos recabados en los formularios mencionados en la etapa anterior, sirven de base para preparar el informe general de la visita a la finca, el que tiene como contenido mínimo:

1. Nombre de la Finca
2. Nombre y Dirección del Propietario
3. Acceso
4. Extensión
5. Precio Propuesto por el Propietario
6. Descripción General
   - 6.1 Uso Actual
   - 6.2 Topografía y Suelos
   - 6.3 Recursos Hídricos
   - 6.4 Clima
   - 6.5 Infraestructura
   - 6.6 Red Vial
   - 6.7 Instalaciones
   - 6.8 Equipo

7. Linderos y Mojones
8. Uso Potencial
9. Aspecto Social de la Finca
10. Análisis Preliminar de Factibilidad de la Finca
11. Recomendaciones

5º EVALUACION DEL INFORME DE VISITA DE CAMPO A LA FINCA:

El informe general de visita a la finca pasa al Director del Programa, quién después de conocerlo lo traslada a la Gerencia General de la Fundación del Centavo con un informe del Departamento de Informática, donde se procesa la información y ponderan las diferentes variables para analizar en forma electrónica el grado de ajuste que presenta la finca a los lineamientos preestablecidos en el Programa Compra-Venta de Tierra.

Posteriormente, el Gerente General y el Director del Programa Compra-Venta de Tierra planifican una visita a las fincas con potencial agrícola adecuado o en su caso descartan las fincas que no reunen las condiciones mínimas de ajuste al Programa.

6º VISITA DE CORROBORACION A LA FINCA:

El Gerente General conjuntamente con el Director del Programa, realizan una visita a la finca para corroborar la información presentada en el informe general. Del resultado de esta visita depende la iniciación de negociación con el o los propietarios, para tratar principalmente aspectos como Precio y la Forma de Pago que tiene normado el Programa, enviando posteriormente al Propietario la oferta de compra por escrito.

7º PRESENTACION DE OFERTA AL CONSEJO DIRECTIVO:

Negociada la finca y aceptados los términos de la misma en primera instancia por el Propietario, el Gerente General la presenta al Consejo Directivo de la Fundación del Centavo, quién realiza un análisis participativo previo a aprobar o descartar la compra.

En algunos casos el Consejo Directivo requiere de una ampliación del informe o nombra una comisión para realizar una visita a la finca.

8º APROBACION DE LA COMPRA POR EL CONSEJO DIRECTIVO:

El Consejo Directivo aprueba la compra de una finca en Sesión General, quedando constancia de este acto en el Libro de Actas del mismo, aprobación que se hace constar en la escritura de Compra-Venta de la Finca.

9º INVESTIGACION DEL STATUS LEGAL Y FISCAL DE LA FINCA:

Este proceso de investigación se efectúa principalmente para confirmar: El nombre del propietario, área registrada, número de matrícula fiscal, hipotecas, gravámenes, deudas, cuotas del Seguro Social, pasivo laboral de los trabajadores si los tuviese. Esta actividad está a cargo del Procurador General con que cuenta el Programa, quién informa al Director del mismo de la situación actual de la finca previo al faccionamiento de la escritura de Compra-Venta.

10º FACCIONAMIENTO DE LA ESCRITURA DE COMPRA-VENTA:

El Presidente del Consejo Directivo de la Fundación del Centavo, tiene la representación legal de la Institución por lo que es la persona que suscribe la escritura de Com

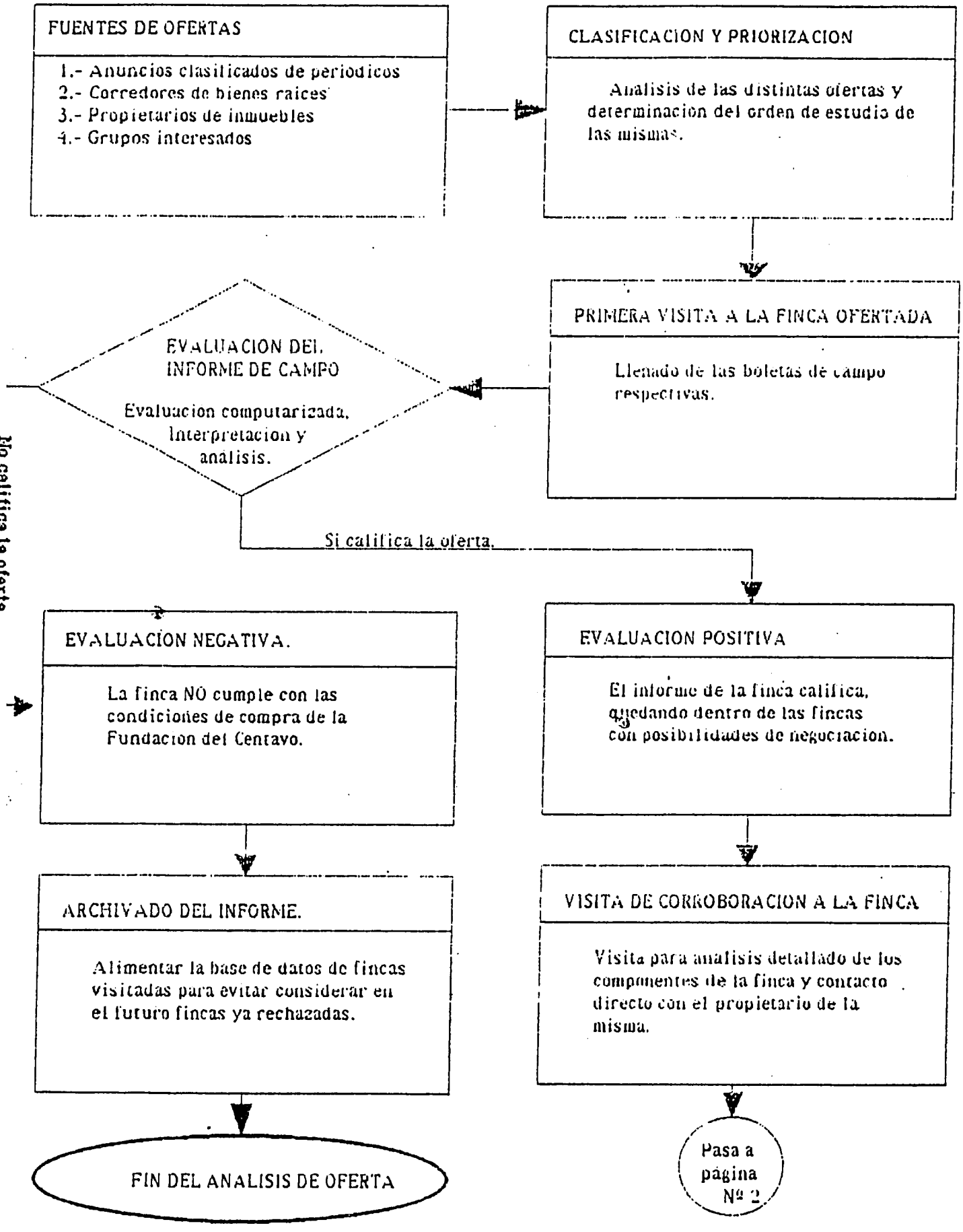
pra-Venta de la finca, con lo cuál se da por finalizado el proceso de negociación de fincas.

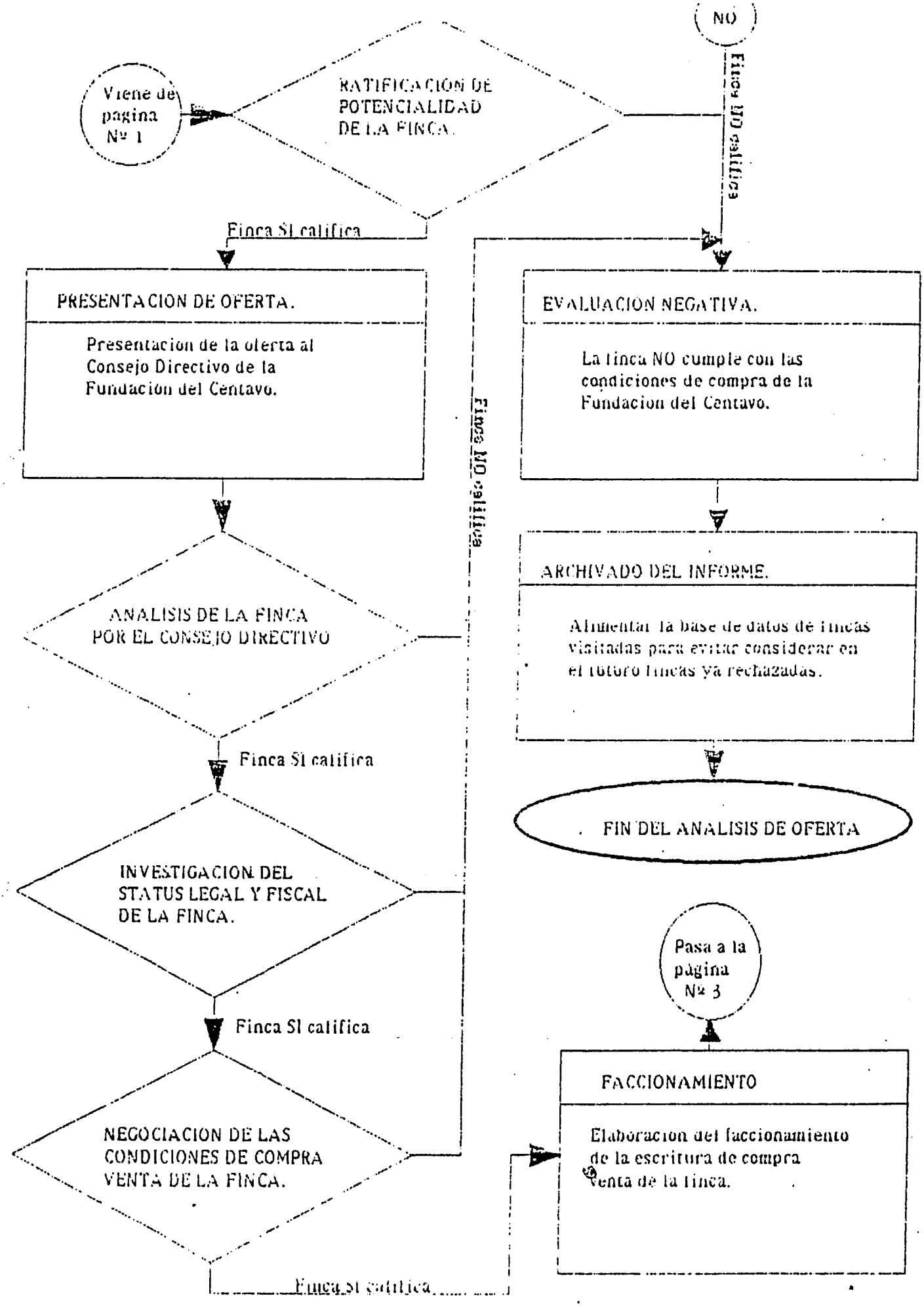
Guatemala, Noviembre de 1987

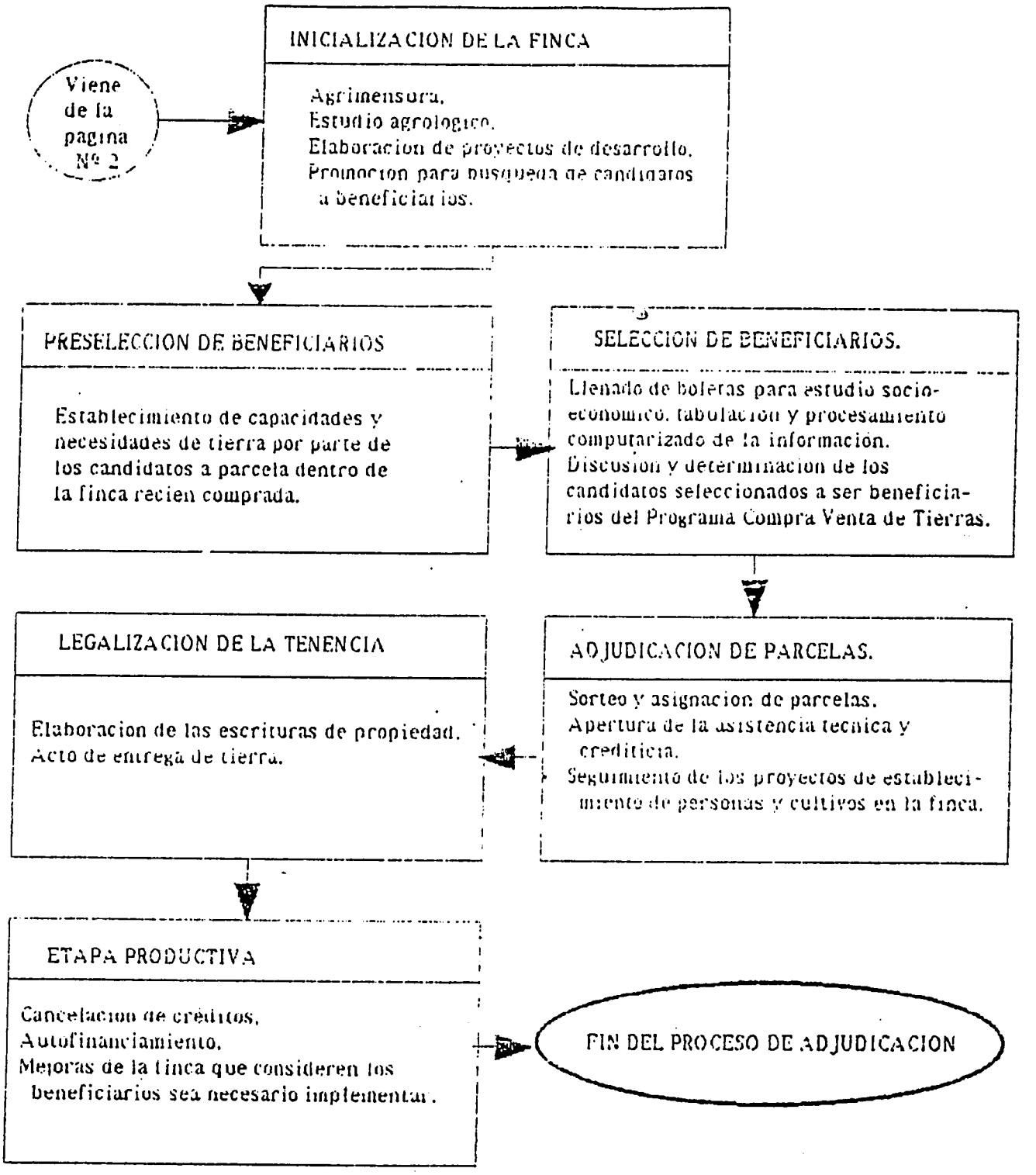
Fundación del Centavo

Programa Compra Venta de Tierras

Diagrama de Flujo para los criterios de selección y compra de fincas.




Viene de pagina Nº 1
RATIFICACION DE POTENCIALIDAD DE LA FINCA.
NO
Finca NO califica
Finca SI califica
PRESENTACION DE OFERTA.
Presentacion de la oferta al Consejo Directivo de la Fundacion del Centavo.
EVALUACION NEGATIVA.
La finca NO cumple con las condiciones de compra de la Fundacion del Centavo.
Finca NO califica
ARCHIVADO DEL INFORME.
Alimentar la base de datos de fincas visitadas para evitar considerar en el futuro fincas ya rechazadas.
ANALISIS DE LA FINCA POR EL CONSEJO DIRECTIVO
Finca SI califica
FIN DEL ANALISIS DE OFERTA
INVESTIGACION DEL STATUS LEGAL Y FISCAL DE LA FINCA.
Pasa a la página Nº 3
Finca SI califica
FACCIONAMIENTO
Elaboracion del faccionamiento de la escritura de compra venta de la finca.
NEGOCIACION DE LAS CONDICIONES DE COMPRA VENTA DE LA FINCA.
Finca SI califica


Viene de la pagina Nº 2
INICIALIZACION DE LA FINCA
Agrimensura.
Estudio agrologico.
Elaboracion de proyectos de desarrollo.
Promocion para busqueda de candidatos a beneficiarios.
PRESELECCION DE BENEFICIARIOS
Establecimiento de capacidades y necesidades de tierra por parte de los candidatos a parcela dentro de la finca recien comprada.
SELECCION DE BENEFICIARIOS.
Llenado de boletas para estudio socio-economico, tabulacion y procesamiento computarizado de la informacion.
Discusion y determinacion de los candidatos seleccionados a ser beneficiarios del Programa Compra Venta de Tierras.
ADJUDICACION DE PARCELAS.
Sorteo y asignacion de parcelas.
Apertura de la asistencia tecnica y crediticia.
Seguimiento de los proyectos de establecimiento de personas y cultivos en la finca.
LEGALIZACION DE LA TENENCIA
Elaboracion de las escrituras de propiedad.
Acto de entrega de tierra.
ETAPA PRODUCTIVA
Cancelacion de creditos.
Autofinanciamiento.
Mejoras de la finca que consideren los beneficiarios sea necesario implementar.
FIN DEL PROCESO DE ADJUDICACION

"Proceso computarizado para selección de fincas."

Para la selección de las distintas fincas del Programa Compra Venta de Tierras se siguen los siguientes criterios:

Se pondera la utilidad de la finca con el area de la misma multiplicado por cien (100).

La ponderación para uso actual es del area de la finca multiplicado por setenta y cinco (75).

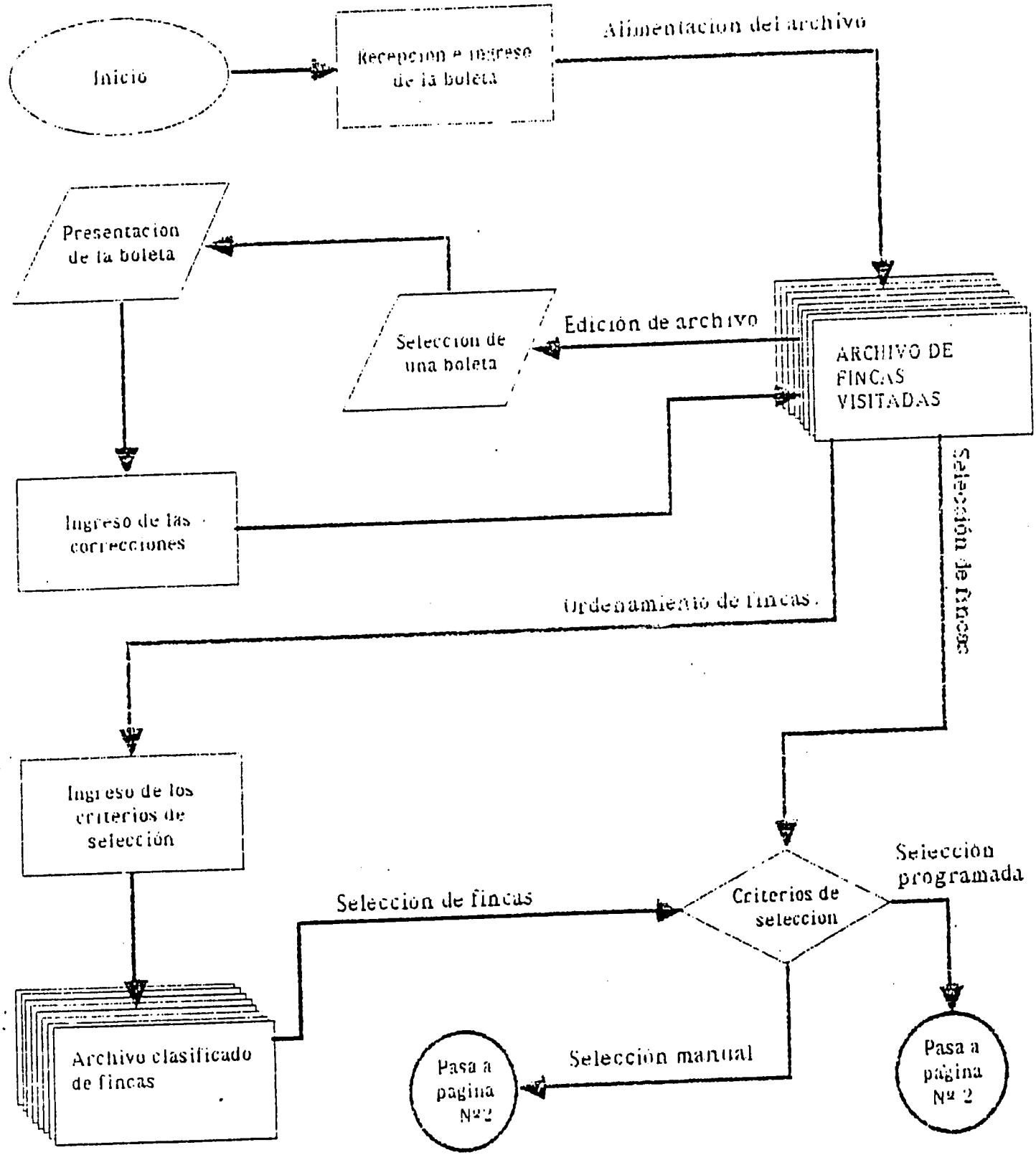
Los otros componentes como precio, ubicación, tipo de suelos, instalaciones, recursos hídricos, ubicación, etc. están clasificados por escala, dando esto diferentes puntuaciones.

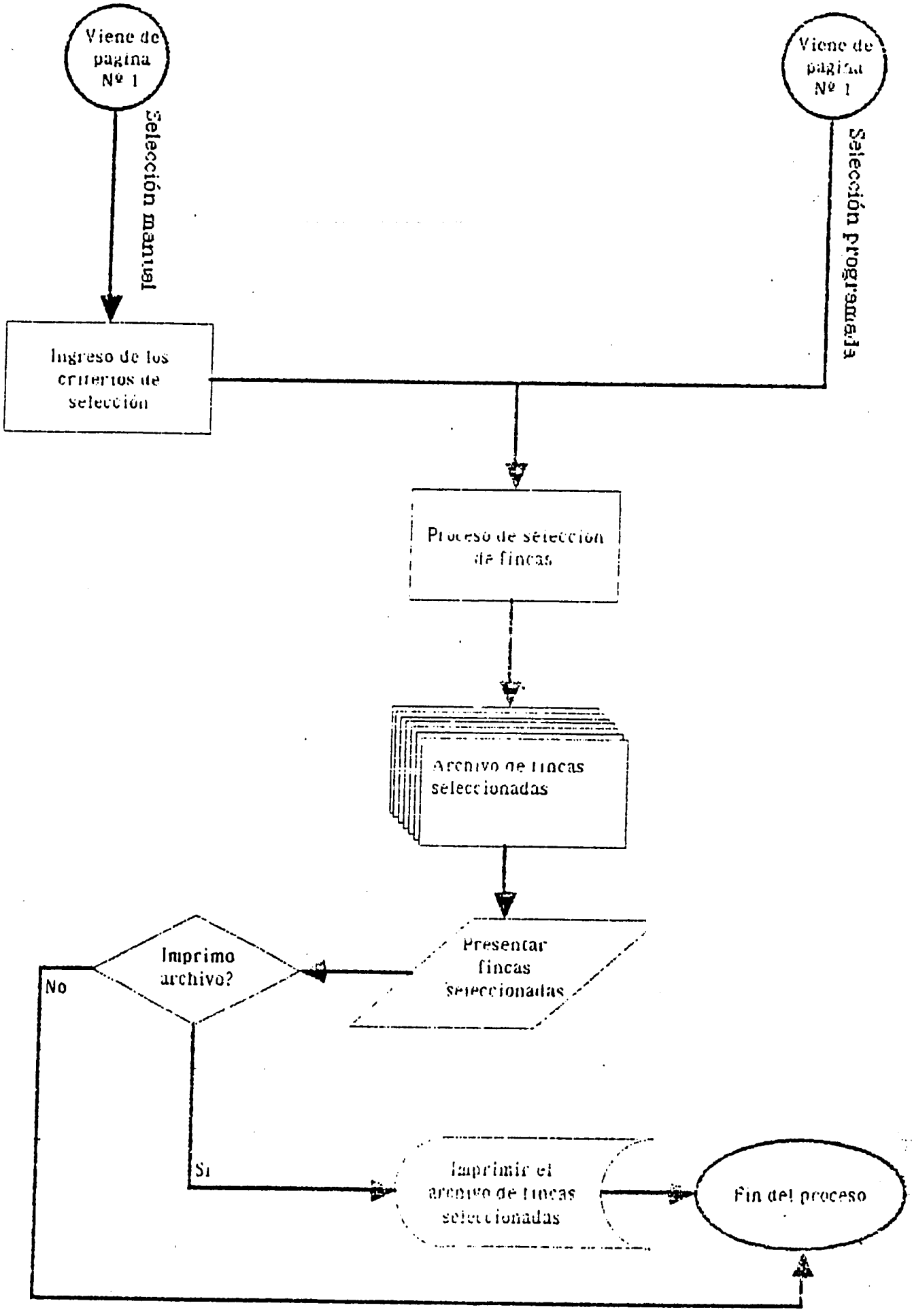
A cada finca se le tipifican las ponderaciones y luego se les define un grado de probabilidad normal, la que al multiplicarse por cien (100) determina un valor entre cero (0) y cien (100) clasificando de esta manera a las fincas. Quedando con mas posibilidades de negociación aquellas que se aproximan a cien (100) y menos las que están cercanas a cero (0).

Fundación del Centavo

Programa Compra Venta de Tierras

"Proceso computarizado para selección de fincas"




Viene de pagina Nº 1
Selección manual
Viene de pagina Nº 1
Selección programada
Ingreso de los criterios de selección
Proceso de selección de fincas
Archivo de fincas seleccionadas
Presentar fincas seleccionadas
Imprimo archivo?
No
Si
Imprimir el archivo de fincas seleccionadas
Fin del proceso

FUNDACION DEL CENTAVO
PROGRAMA COMPRA -VENTA DE TIERRA

POTENCIALIDAD DE USO

FECHA: _____

1. INFORMACION GENERAL DE LA FINCA

1.1 Nombre de la Finca: _____

1.2 Ubicación: _____

1.3 Región: _____

1.4 Area de la Finca: _____

1.5 Acceso a la Finca: Kms. Asfalto _____ Kms. Terracería _____

Kms. a pie _____

1.6 Colindancias:

Norte: _____

Sur: _____

Este: _____

Oeste: _____

1.7 Distancia al Municipio más cercano: _____

1.8 Tiene Hipoteca la Finca: SI ☐ NO ☐

1.9 Instituciones Acreedoras: _____

Montos de los gravámenes: _____

2. INFORMACION GENERAL DEL PROPIETARIO:

2.1 Nombre del Propietario: _____

2.2 Domicilio: _____ Tel. _____

3. PRECIO SOLICITADO POR LA FINCA:

_____

REGION:

1 = Altiplano	2 = Boca Costa Sur	3 = Sur Oriente
4 = Verapaces	5 = Sur Occidente	6 = Oriente
7 = Nor Oriente	8 = Nor Occidente	9 = Norte
10 = Sur	11 = Zona Central	

4. **ECOLOGIA DE LA FINCA:**

4.1 Altura de la Finca: _____ msnm

4.2 Período de Lluvias: _____

4.3 Período de Heladas: _____

4.4. Topografía de la Finca: Plana: _____

Ondulada: _____

Quebrada: _____

5. **USO ACTUAL DE LA FINCA:**

5.1 Total de área utilizada: _____ Has.

5.2 Cultivos permanentes: _____ Has.

5.3 Cultivos estacionales: _____ Has.

5.4 Bosque: _____ Has.

5.5 Area marginal: _____ Has.

5.6 Otras Areas: _____ Has.

6. **RECURSOS NATURALES DE LA FINCA:**

	NUMERO	CAUDAL APROX.	ESTADO
6.1 Hidrografía:			
6.1.1 Ríos			
6.1.2 Nacimientos			
6.1.3 Lagunas			
6.1.4 Otras			

6.2 Bosque: (Composición)

ESPECIE	EDAD

ESTADO: 1 = Permanente 2 = Intermitente

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6.3 Suelo:

Texturas _____

_____

_____

6.4 Factores Limitantes:

Pedregosidad _____

Arenas _____

Drenajes _____

Otros _____

7. CULTIVOS EXISTENTES EN LA FINCA:

Cultivo			
Edad (años)			
Variedades			
Area			
Dist. Siembra			
Est. Fitosanitario			
Pronóstico Cosecha			
Semilleros			
Almácigos			
Precio de Venta			
Cuota de Exportación			

8. INSTALACIONES DE LA FINCA:

TIPO	NO HAY	ESTADO	NUMERO
Casa Patronal			
Ranchería			
Instalaciones M.O. Event.			
Beneficio Húmedo			

8. INSTALACIONES DE LA FINCA: (Continuación)

TIPO	NO HAY	ESTADO	NUMERO
Beneficio Seco			
Patios			
Represas			
Agua Potable			
Energía Eléctrica INDE			
Energía Eléctrica Propia			
Energía Hidráulica			
Escuela			
Enfermería			
Bodegas			
Oficinas			
Talleres			
OTras Instalaciones			

9. EQUIPO DE LA FINCA:

_____

_____

_____

_____

_____

_____

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_____

_____

_____

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10. USO POTENCIAL:

_____

_____

_____

_____

_____

11. RECOMENDACION DE COMPRA: SI ☐ NO ☐

CONSIDERACIONES:

_____

_____

_____

_____

_____

12. RAZONES POR LAS CUALES SE "APROBO o DENEGO" LA COMPRA DE LA FINCA:

_____

_____

_____

_____

_____

_____

PERSONA RESPONSABLE DE LA APROBACION O NEGATIVA DE LA COMPRA DE LA FINCA: _____

_____

(f) _____
PERSONA QUE REALIZO LA VISITA

FUNDACION DEL CENTAVO
PROGRAMA COMPRA VENTA DE TIERRAS

SOCIO ECONOMIA DE LA FINC.

1. Nombre de la finca _____

2. Número de mozos colonos _____

3. Cantidad mano de obra eventual que se contrata durante el año _____

_____

4. Procedencia de la mano de obra eventual _____

_____

5. Cuenta con administrador: SI _____ NO _

6. Poseen terreno los colonos para siembras estacionales: SI _____ NO _

Extensión _____ _____

7. Posee la finca áreas que se arrendan _____

8. Organizaciones de trabajadores _____

9. Pasivo Laboral:

Tiempo _____ Monto _____

10. Prestaciones

Salario: _____

7o. dia: _____

Vacaciones _____

11. Instalaciones de uso público:

Iglesias

Campos de Foot Ball

Areas de recreo

ANALISIS ECONOMICO

Precio pretendido por el propietario _____

Precio Propuesto: _____

Precio por hectárea: _____ Precio por parcela ( ) Hectarea _____

Número posible de beneficiarios _____

AÑO	AMORTIZACION TIERRA	INTERESES TIERRA	COSTO PRODUCCION	INTERESES PRODUCCION	TOTAL ANUAL	ACUMULADO	INGRESOS	UTILIDAD

UTILIDAD PROMEDIO ANUAL

USO DE LAS PARCELAS

AÑO	CULTIVOS	AREA	PRODUCCION	INGRESO POR PRODUCCION	COSTO DE PRODUCCION	INGRESO ANUAL
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

FUNDACION DEL CENTAVO
PROGRAMA COMPRA-VENTA DE TIERRA

VISITA DE CONFIRMACION DEL

INFORME GENERAL DE LA FINCA

Fecha _____

1. Información General de la Finca

1.1 Nombre de la Finca _____

1.2 Ubicación _____

_____

1.3 Area de la Finca _____ Hectáreas _____

Areas _____ Centeáreas equivalentes a _____

caballerías.

1.4 Acceso a la finca Kilómetros de asfalto _____ kilómetros de

terracería _____ kilómetros a pie _____

1.5 Colindancias

Norte _____

Sur _____

Este _____

Oeste _____

1.6 Tiene hipoteca la Finca? SI _____ NO _____

1.7 Instituciones acreedoras _____

_____

1.8 Monto de gravámenes _____

_____

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2. Información General del Propietario

2.1 Nombre _____

_____

2.2 Domicilio _____ Tel. _____

2.3 Aceptación de mecanismo de pago PCVT SI _____ NO _____

2.4 Forma de Pago propuesta _____

_____

_____

_____

_____

3. Observaciones Generales del Inmueble

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ Vo. Bo. _____

Director Programa CVT Gerente General Fundacen

ANNEX 2:

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

LAC-IEE-88-07

ENVIRONMENTAL THRESHOLD DECISION

Project Location	:	Guatemala
Project Title	:	Commercial Land Markets II
Project Number	:	520-0343
Funding	:	$10.5 million (G)
Life of Project	:	4 years (FY'88-92)
IEE Prepared by	:	Frank Zadroga REMS/ROCAP
Recommended Threshold Decision	:	Positive determination
Bureau Threshold Decision	:	Concur with Recommendation
Comments	:	An Environmental Assessment focusing on issues identified in this IEE, and especially pesticide use is required.
Copy to	:	Anthony Cauterucci, Director USAID/Guatemala
Copy to	:	Roberto Figuero, EO USAID/Guatemala
Copy to	:	Richard Steelman, USAID/Guatemala
Copy to	:	Frank Zadroga, REMS/ROCAP
Copy to		Donald Boyd, LAC/DR/CEN
Copy to		IEE File

Date JAN 25 1988

James S. Hester
Chief Environmental Officer
Bureau for Latin America
and the Caribbean

INITIAL ENVIRONMENTAL EXAMINATION

Project Country	:	Guatemala
Project Title and	:	Commercial Land Markets II (520-0343) (Grant Agreement)
Life of Project	:	4 Years (FY'88-92)
LOP Funding	:	$ 10.5 million (Grant)
IEE Prepared by	:	Frank Zadroga, REMS/ROCAP
IEE Cleared by	:	Roberto Figueroa/EO, USAID/G
Funding	:	$8.5 million Grant

Recommended Threshold Decision: Positive determination; the project will carry out an Environmental Assessment emphasizing the issues identified in this IEE.

Concurrence

Anthony J. Gauterucci
Mission Director
USAID/G

5 April 1988
Date

I. BACKGROUND

Land concentration in Guatemala has resulted in the improper use of large expanses of land. The Commercial Land Markets Project has supported a non-profit organization, the Penny Foundation, which buys underutilized land and sells it to rural poor. This land market service is intended to increase agriculture production as well as the incomes of small farmers participating in the Project. The Commercial Land Markets Project (520-0343) was funded with a grant of $1 million in 1985, followed by another of $1 million in 1986. An additional grant of $8.5 million is proposed to expand the Foundation's land purchase program and make it self supporting. Project approval would give a four-year extension of the Project thru August 31, 1992. The Penny Foundation will contribute $3,500,000 over the life of the project as its required counterpart contribution.

II PROJECT DESCRIPTION

The Goal of the Project is to achieve greater participation by Guatemala's rural poor in sustained, real economic growth. The goal is consistent with USAID/G's FY 1986 Country Development Strategy Statement and subsequent Action Plans.

The Sub-goal of the Project is to increase the cumulative value of agriculture through a program of better land utilization. The Project's activities are expected to result in the transfer of the Commercial Land Market experience to other organizations and lead to the resolution of other constraints to secure land titles, land financing and other land-related activities in Guatemala.

The Project Purpose is: to establish and expand the Penny Foundation's voluntary land purchase/sale program as a self-supporting activity capable of increasing agricultural productivity and incomes of the rural poor, and to identify and promote additional instruments to increase production and intensify the use of agricultural land.

By the end of the Project, the Penny Foundation's land program proposes to be self supporting. The Penny Foundation will be selling annually 1,350 hectares in parcels to an estimated 360 beneficiary families.

The Project has five major components that all contribute to the overall action of purchase of underutilized land and its sale to and adoption by the rural poor. These are:

1. Land purchase and sale;
2. Farm Management;
3. Production Credit;
4. Administration and Management; and
5. Research

Specific project outputs include the purchase of a total of 9,000 hectares of land over the life of the project and its parcelization and transfer to rural poor. Annual outputs are estimated at the purchase of 1,350 hectares of land and the sale of 360 farm parcels to beneficiary families. Parcels sold to beneficiaries will average approximately 2.8 hectares (7 acres) and be cultivated intensively in any one of several crops, including: corn, wheat, sesame seed, mangoes, coffee, cocoa, pineapple, caulifower, brussels sprouts, broccoli and other commercial fruits and vegetables. Most lands purchased by the Penny Foundation were previously underutilized and/or fallow. Many of the farms have marginal or forest lands on the property even though the Foundation attempts to buy commercial agricultural lands. Occasionally properties have been purchased with a predominantly limited (i.e., forestry or permanent crops) land use capability. The size of properties purchased to date vary from slightly more then 10 to over 1,200 hectares.

Under the farm management component, the Foundation will hire an estimated 48 agricultural technicians and 12 agronomists to provide technical assistance free of charge to project beneficiaries; in addition, they will provide technical skills for farm planning and management before lands are parceled out.

Production credit totaling $4.37 million will be used to support each farmer/beneficiary of the program. Credit funds are used for farm materials (fertilizer, seed, pesticides, root stock, etc.) and a subsistence wage. Farm materials are generally purchased by the Foundation and delivered to each farm.

The project research component will produce reports on: (1) methods to expedite the processing of parcel titles in the National Land Registry; (2) need, goals, feasibility and method for reform of the Registry; (3) institutions and/or financial mechanisms identified to establish long-term financing for small and medium-sized farm purchases and design of a follow-on project; (4) three additional organizations identified and contacted to manage land financing programs, and proposals for programs with these organizations; (5) a baseline survey and two follow-up surveys of a sample of farms and beneficiaries in the Penny Foundation program: (Campesinos selected from other rural organizations or communities will be surveyed as a control group and included in the analysis and report.); (6) policy and project implications drawn from studies of at least three additional land-related problems, including other land transfer mechanisms such as land rentals, and additional or alternative sources of rural income and employment for the land poor and landless campesinos.

III. ENVIRONMENT AFFECTED

The Commercial Land Markets II Project does not establish any geographic restriction for land purchase.

Conversations with Foundation staff indicated that factors such as project experience, administrative and logistical limitations, land prices, and general environmental conditions naturally restrict project land purchase from certain areas such as the Peten, where productive agricultural lands are scarce, and the southern coast, where land values are excessively high. Officially, however, land purchase, sale and development could occur anywhere in Guatemala with its tremendous environmental diversity (see Guatemala Country Environmental Profile).

IV. POTENTIAL ENVIRONMENTAL CONSEQUENCES

The Commercial Land Markets II Project as proposed has both positive and negative environmental consequences. Project components and actions, as currently contemplated, will assist in intensifying land use, agricultural productivity and in improving the welfare and incomes of beneficiary rural poor.

In order to sustain these productivity and social welfare benefits and to avoid undesirable environmental impacts, certain environmental and impact mitigation measures are needed, as outlined in Section V.

The project proposes to procure and use pesticides and other agrochemicals, several of them under special review or in the restricted category. This could lead to human health and environmental contamination impacts directly affecting project beneficiaries, or other downstream users and natural ecosystems in the project area of environmental influence.

The purchase, sale and use by the Penny Foundation of properties raises the issue of sustainability of land use. Improper planning and management of land resources could lead to soil and water resource degradation, the establishment of farms which are not economically sustainable, and production systems which either over or under utilize the land resources. Farm planning and management should be carried out in accordance with land use capabilities; farm system approaches may be necessary instead of monocultures under certain environmental and socio-economic conditions.

The sale and development of properties could lead to the unjustified cutting of forest lands and destruction of biological resources. Many, if not most, of the properties managed by the Penny Foundation have fragile or marginal lands that require either protection or controlled management in order to conserve their biological resources. Likewise, many properties produce goods and services on a communal level and should be managed and/or protected as commons. Watersheds yielding water for drinking or irrigation, and forest reserves

yielding fuelwood, sawtimber, game and other resources are the two most common examples. Improper planning and management could lead to the parceling up of entire properties and the undesirable destruction of biological and communal resources.

V. MAJOR ENVIRONMENTAL CONCERNS

The following four areas of concern have been identified with respect to this project:

1. Pesticide procurement and use;
2. The sustainability of land use and the management of Foundation properties in accordance with land use capability;
3. The protection of biological and tropical forest resources; and
4. The conservation of communal natural resources including woodlots, forest reserves and water supplies.

Without proper environmental impact assessment, the identification of mitigative measures, and the carrying out of the necessary environmental management practices, significant impact could result compromising the achievement of the project goal and purposes.

VI. CONCLUSIONS AND RECOMMENDATIONS

According to the A.I.D. environmental procedures Section 216.2(a) environmental analysis/evaluation is required for all substantive project amendments, as well as new projects. Furthermore, in the case of the Commercial Land Markets II Project, significant potential impact could result from the procurement and use of pesticides and the clearing and development of tropical forest lands. Both of these actions require the preparation of an Environmental Assessment (or Impact Statement) per 22 CFR Section 216.3(b) and FAA Section 118, respectively.

USAID/Guatemala will issue a Sequential Project Implementation Letter stating that funds under the

amendment will not be utilized for pesticide procurement until the required environmental assessment has been completed and taken into account. USAID/Guatemala further agrees to modify project amendment implementation plans in accordance with the environmental assessment and subsequent review to be carried out by the LAC/DR/CEO, if it is decided that modifications are necessary.

0055C

SCOPE OF WORK

I. Background

A. General Overview

1. Project Goal

The goal of the Project with the Fundacion del Centavo (Penny Foundation - FUNDACEN) is to increase the scope of the FUNDACEN voluntary land purchase/sale program as a self-sustaining activity capable of increasing the agricultural productivity and income of the rural sector in Guatemala and to identify and promote additional means to increase production.

2. Project Purpose

The purpose of the FUNDACEN project is to purchase on the average of 1,350 hectares of land per year during LOP for eventual re-sale, benefiting approximately 3,000 landless and land-poor families. An integral part of the land purchase/sale program is the provision of timely technical assistance and production credit by FUNDACEN using USAID project funds, to ensure that the program beneficiaries acquire the requisite guidance, technical skills and financial resources to enable them to repay their land loans.

3. Project Description

Since August 1984, USAID/Guatemala has provided three grants to FUNDACEN to expand and enhance the land purchase/sale program. Under the latest amendment to the Project, Phase II, total project funding was increased to $10.5 million and the PACD was extended to August 30, 1992.

The Project has two basic components: the FUNDACEN land purchase/sale program and the USAID Research Component to undertake studies of the Guatemalan land market in order to identify alternative means of providing the rural landless and land-poor access to the land market.

Thus far FUNDACEN has been successful in pursuing its goal consistent with its role as a non-profit integrated rural development institution. FUNDACEN has purchased 28 farms with a total area of approximately 6,198 hectares, benefiting over 1,700 families. The farms are located in the Central Highlands, Pacific

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Piedmont, South Coast, Eastern Highlands and Alta Verapaz. The majority of the farms that have been purchased are characterized as former abandoned pasture, neglected plantations of coffee, cardamom, mango, bananas, etc. As part of the development of the farm and the settlement of the beneficiary families, FUNDACEN prepares a detailed development plan based upon an agronomic study and inventory of the available natural resources located on and near the farm. Water sources and marginal lands are identified and set aside as communal watershed and forest reserves. The remaining area is subdivided based upon the soil conditions and physical characteristics of the land. The size and location of the individual parcels is then determined, together with the location of the urban area.

The average size of the individual parcel is 2.8 hectares. With technical assistance of the FUNDACEN agronomist, the former farm laborers are introduced to modern intensified agricultural production technology for the cultivation of export oriented crops. Approximately 80% of the land purchased has or will be dedicated to the production of coffee.

B. Potential Negative Environmental Effects

The Initial Environmental Examination (IEE) for Commercial Land Markets II stated that the following areas of concern have been identified in the design of this Project:

1) Pesticide procurement and use;

2) The sustainability of land use and communal natural resources; and

3) The protection of biological and tropical forest resources.

An EA on pesticide procurement and use under this Project was completed in November 1988. This EA was approved by the Chief Environmental Officer on May 12, 1989. The EA to be conducted under this contract will therefore limited to: sustainability of land use and communal natural resources; and the protection of biological and tropical forest resources.

C. Environmental Regulations

According to A.I.D. Regulation 16, Part 216.3(b) and FAA Section 118, an Environmental Assessment (EA) is required for USAID-financed activities involving the procurement and use of pesticides and the clearing and development of tropical forest lands, respectively.

To be consistent with sound natural resources management, to protect human health and environmental quality and to comply with existing Guatemalan and U.S. regulations, an Environmental Assessment following the guidelines set out in the A.I.D. Regulations will be carried cut under this Project.

II. General Objectives

The Contractor will submit in form and substance acceptable to A.I.D. an Environmental Assessment of the Commercial Land Markets II Project. This EA shall follow the guidelines contained in A.I.D. Regulation 16 and the Summary Outline contained in Annexes A and B of to this Scope of Work.

The Scope of Work will be limited to the following areas of concern that have been identified as having potential negative environmental effects:

a. The sustainability of land use and communal natural resources; and

b. The protection of biological and tropical forests resources.

As the EA on pesticide procurement and use was completed in November 1988 and approved by CEO Hester on May 12, 1989, the Scope of Work of this EA will not include pesticide procurement and use. Exclusion of this element has been authorized by LAC/CEO Hester in State cable 244455, dated August 2, 1989.

This EA shall include:

A. Identification of potential environmental problems resulting from Project activities;

B. Evaluation of the environmental, economic and social costs and benefits of the current practices related to these activities;

C. Recommendation of specific measures to mitigate the potential negative environmental impacts under the Project;

D. Evaluation of institutional capabilities and constraints for the effective implementation of recommended measures.

III. Specific Tasks to be Performed

A. Review of Existing Information:

The Contractor shall identify, collect, review and document existing literature and data as they apply to the Project and the EA, and interview specialists involved in the design and implementation of this Project. Special emphasis shall be placed on the analysis of potential negative environmental effects of this Project.

B. Identification of Data Gaps:

If insufficient information exists after Activity A, the Contractor shall prepare a list of the significant data gaps and indicate what limitations in the EA are likely to result. The Contractor shall also indicate possible additional needs such as baseline information collection to measure impacts related to the Project.

C. Description, Discussion and Prioritization of Alternatives:

The Contractor shall describe viable alternatives related to the implementation of this Project. These alternatives shall include environmental, ecological, social, cultural, economic and other related criteria.

D. Determining the Environmental Consequences of the Alternatives:

This will include a discussion of short term impacts, both direct and indirect.

E. Identify Mitigative Measures:

These measures shall be implementable for each alternative, given the availability of financial and human resources, institutional capabilities, time constraints and technological capabilities.

F. Briefing and Debriefing Sessions to USAID:

This will be undertaken to review the EA draft and final report in accordance with the workplan described in IV below.

G. Reporting:

The contractor will maintain regular contact with USAID/Guatemala throughout the EA assignment and will inform of any unforeseen problems beyond the contractor's control that may prevent timely and successful completion of the EA.

IV. Reports and Deliverables

A. Workplan:

A detailed workplan for this EA, outlining all tasks and the time table for completing them, based on discussions and briefing sessions with USAID/G will be presented to the Chief of the Office of Rural Development for approval (ORD) within 2 days of arriving in country (five copies in English). Two (2) copies of this workplan will be presented to Ing. Jorge Cabrera of the Comision Nacional del Medio Ambiente (CONAMA) in Spanish by the fourth day of arrival.

B. Progress Reports/Progress Meetings:

Five copies of brief reports of progress and definements/modifications of workplans will be presented in English to the Chief of ORD or his designee every other Monday during the term of the contract. The team leader shall meet every other Monday with the Chief of ORD or his designee to discuss project progress on the EA.

C. Draft Full Environmental Assessment:

The draft document conforming to the outline provided for the final EA of the Commercial Land Markets II Project, including an executive summary, appendices, recommendations and supporting data will be prepared in English. A section will proposed mitigative actions. This section will contain distinct short-, medium- and long-term activities with a calendar for completing them and a responsible party for their completion being named. Ten copies in English will be printed and delivered to the Chief of the Office of Rural Development, USAID/G for his approval. The draft will be submitted in accordance with the Workplan described in IV A above.

D. Oral Presentation of EA Document:

The team will present the draft document to the Mission according to the work schedule. At this time, the Mission may provide its comments and suggestions for analysis and possible additional incorporation into the final document.

E. Final Full Environmental Assessment:

The final document conforming to the outline provided for this EA, including an executive summary, appendices and recommendations, will be prepared in English, and twenty copies will be delivered to the Chief of Rural Development, USAID/G. Within the EA, a section will deal with the proposed mitigative actions. These will be presented as distinct short-, medium- and long-term activities with a calendar for completing them and a responsible party for their completion being named. In addition, twenty copies will be prepared

in Spanish, printed in letter quality type and delivered to the Chief of Rural Development one month after delivery of the final English version.

V. Personnel Requirements

A. General Requirements

The contractor will provide a core two-person EA team, which will be complemented by Guatemalan expertise in technical areas related to the Project's environmental impact. At least one of the team members shall possess experience in the writing, preparation and publication of Environmental Assessments. This team member will be appointed team leader to assume all responsibilities necessary to produce a document acceptable in form and in content to USAID/G.

The core team shall be assisted by personnel with other technical knowledge including an understanding of the sustainability of land use and communal natural resources and the protection of biological and tropical forest resources. Each of the team members will have credentials in more than one of these categories and all will have advanced educational degrees in their respective fields. The team members should be fluent in both English and Spanish.

B. Specific Personnel Requirements

1. Sustainable Agricultural Specialist/Proposed Team Leader (U.S.):

This individual must have experience developing and designing sustainable agricultural systems. Knowledge of broader natural resource management issues is essential, with field experience in soil and water management, erosion control and other mitigation measures to protect water sources, key tributaries and downstream effects of agricultural intensification. This individual should be able to assess and evaluate impacts of agricultural intensification on overall land use, natural forests and the conservation of biological diversity, and recommend mitigations to reduce negative impacts. A Spanish FS level of S-2+, R-2+ is required.

2. Tropical Biologist (U.S. or Guatemalan)

This individual shall have extensive field experience in tropical ecology/biology and a thorough understanding of the population dynamics and population biology of tropical plants and organisms. The candidate shall have field experience in tropical forest management and basic scientific training in the biological

disciplines, e.g., plant ecology, vegetation ecology, wildlife biology. This individual should be able to assess and evaluate impacts of agricultural intensification on biological and tropical forest resources, and recommend mitigations to reduce negative impacts. A Spanish and English FS level of S-2+, R-2+ is required.

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ANEXO 4: INFORME GENERAL DE LAS FINCAS VISITADAS:

A continuación se presenta una breve descripción de las fincas visitadas durante los viajes de campo. Se ha hecho un esfuerzo para indicar las recomendaciones específicas para cada finca en base a las observaciones realizadas por el equipo de trabajo. Las fincas visitadas fueron seleccionadas en colaboración con el personal de FUNDACEN. Los criterios más importantes seguidos en la selección de las mismas fueron la incorporación de la mayor diversidad posible de ambientes, cultivos y prácticas agrícolas.

1.0 ZONA DEL ALTIPLANO CENTRAL

Para los efectos de este trabajo, llamaremos "altiplano", a una amplia zona de la república de Guatemala ubicada sobre la cima del complejo montañoso central. Su altura media es de alrededor de 2,000 msnm. La sección occidental, con picos que sobrepasan los 4,000 metros de altitud, resulta significativamente más elevada que la oriental. Las fincas visitadas en esta sección del territorio guatemalteco fueron: María Linda, Choaquec, Panimaquín, Popabaj, San Antonio El Florido y La Panchita.

En la asociación vegetal original, las masas forestales dominantes de la zona fueron los bosques de coníferas, las encinadas y los bosques mixtos (pino-encino); han habido también asociaciones significativas de "ilamos", betulácea del género Alnus. Sin embargo, en estas fincas como en todo el entorno actual, prácticamente se encuentran sólo remanentes aislados de estas comunidades. Literalmente todo ha sido substituido por cultivos de hortalizas, legumbres y granos.

En todas las fincas es notoria la abundancia de los pequeños roedores que localmente se denominan "taltuzas" (Orthogeomys hispidus, seguramente); de acuerdo a informantes locales también es digna de mención la abundancia relativa de conejos (posiblemente Sylvilagus floridanus), ardillas (seguramente Sciurus deppei), armadillos, (Dasypus novemcinctus) y tacuazines (Didelphis marsupialis).

Según Villar (1989b), en estos territorios deben existir unas 225 especies de aves (un poco más de un tercio del total de especies del país), cantidad descompuesta en 125 residentes y 100 migratorias. Sin embargo, siempre de acuerdo a Villar (op.cit.), allí hay 25 especies que tienen su habitat primario en los bosques de la zona y unas 20 representan a especies que sólo viven en los altiplanos. En atención a que la casi totalidad de las migratorias que ocupan esta zona requiere de los bosques para su estadía invernal, creemos que los escasos remanentes de vegetación original que aún persisten están desempeñando un importantísimo papel en el sentido de proporcionar un mínimo de habitat necesario para la supervivencia de estas especies y en general de las especies animales en la zona.

1.1. Finca María Linda

Esta finca está ubicada en el Municipio de San José Chacayá, Departamento de Sololá. Su extensión total es de 27.19 has y ha sido dividida en diez parcelas, de las cuales solamente tres están siendo utilizadas en la actualidad.

Esta finca tiene tres años de estar en manos de la Fundación; sin embargo, no se ha logrado consolidar el grupo campesino de trabajo. Trece beneficiarios han participado pero se han retirado. Todos ellos han sido de la etnia Cakchiquel. Se argumenta que los beneficiarios que han ingresado al sistema no han tenido voluntad de trabajo. No existe un núcleo urbano en la finca misma, sino que los beneficiarios viven en la cercana población de San José Chacayá.

1.1.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Húmedo Montano Bajo Sub-tropical - Asociación Fría-. La elevación promedio es de 2,300 msnm., la precipitación anual media del orden de los 1,000 mm. y la temperatura promedio anual de 14-15 °C.

1.1.2. Suelos y Uso de la Tierra

Los suelos son franco arcillosos, desde ácidos hasta ligeramente ácidos (pH entre 5.5 y 6.5). La topografía en general es quebrada, con una pendiente general del 40%. Aproximadamente tres hectáreas y media tienen pendientes del 10 al 25%. La finca posee además unas tres hectáreas con pendientes en el orden del 100% o más.

La asociación original debe haber sido un bosque mixto (50% Pinus y Quercus). Hace unos 15 años, se extrajo carbón, madera en troza, madera aserrada y leña. Actualmente la cubierta forestal es del orden del 45%. Este remanente boscoso se localiza sobre las pendientes más fuertes y ha sido fuertemente intervenido. Sin embargo aún desempeña importantes funciones entre las que podemos destacar: el mantenimiento de dos fuentes de agua que existen en la finca, refugio para varias especies de aves y el abastecimiento de leña.

El sotobosque se encontró quemado en algunas partes y según parece es una práctica que se realiza con alguna frecuencia. Aparentemente ésto facilita por un lado la extracción de leña y por otro favorece el rebrote que es utilizado para la alimentación de cabras. Los funcionarios de FUNDACEN y uno de los beneficiarios, atribuyeron este hecho a que como no hay gente en la finca, los vecinos son los que se aprovechan del bosque. Algunos sectores de este bosque remanente están siendo talados para habilitar tierras agrícolas a pesar de que la pendiente es muy fuerte para ello.

Antes de que la finca fuera comprada, en sus terrenos se sembraba maíz, árboles frutales y pastos para ganadería. Actualmente, se usa para granos, hortalizas y legumbres diversas. Los planes de los técnicos de FUNDACEN consisten en llevar la finca a cultivos tales como hortalizas, frutales y bosques energéticos. Creemos que la finca tiene éste potencial, así como en la producción de elementos ornamentales y madera.

La mitad de los suelos cultivables se encontraron con hortalizas, sembradas según el esquema tradicional de terrazas. Estas son sostenidas con piedras, dado que el suelo es relativamente rocoso. De esta manera no sólo se limpia el terreno de ellas sino que además el mantenimiento subsecuente de cada unidad requiere menos esfuerzo.

1.1.3. Conclusiones y Recomendaciones Generales

No se observó la existencia de procesos fuertes de erosión, pues el sistema de terrazas constituye un excelente método de conservación de suelos. La erosión, en todo caso, resulta muy leve y de tipo laminar.

Existe sin embargo riesgo de erosión si las áreas que están siendo incorporadas a la producción agrícola no son rápidamente protegidas con terrazas. Otro riesgo importante es que la intervención del área boscosa continúe aumentando, eliminando cada vez más área del mismo.

Es prioritario en esta finca consolidar un grupo de trabajo adecuado. Cuando los beneficiarios estén completos, su misma presencia disminuirá la utilización indiscriminada e irresponsable del área forestada, por terceros.

El área forestal que se encuentra en su mayor parte en pendientes superiores al 60% debe ser mantenida y/o mejorada mediante la replantación de árboles maderables o frutales. Su principal función debe ser como hasta ahora asegurar la disponibilidad de agua para irrigar las tierras menos quebradas y más fértiles, aguas abajo de los manantiales.

Todos los esfuerzos posibles deben realizarse, para mantener y aumentar el concepto de la protección del suelo y la utilización de terrazas. La educación ambiental de los beneficiarios es sin lugar a dudas la mejor alternativa para lograrlo.

1.2. Finca Choaquec

Está localizada en el Municipio de San Andrés Semetabaj en el Departamento de Sololá. La finca comprende un total de 30.59 has. que han sido divididas en 15 parcelas, todas las cuales están siendo actualmente utilizadas por sus respectivos beneficiarios, quienes viven en varias aldeas en los alrededores dado que no existe un área habitacional en la finca misma. Los beneficiarios pertenecen a la etnia Cakchiquel

1.2.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Húmedo Montano Bajo Sub-tropical (Asociación Frío), su elevación es de 2,100 msnm., con una precipitación promedio del orden de los 1,000 mm. y temperatura media anual de 14-15 °C.

1.2.2. Suelos y Uso de la Tierra

Los suelos son franco arcillosos. La topografía es relativamente suave en relación al entorno general del altiplano. La finca está compuesta por algunas planicies y areas de ladera de hasta 40 % de pendiente. La cubierta forestal original era principalmente de pinos, probablemente Pinus oocarpa y P. tenuifolia y unos pocos Quercus. En la actualidad la cobertura forestal es solamente de un 18%.

Antes de que fuera comprada por FUNDACEN, la finca fue sembrada de maíz. Actualmente, la finca produce además del maíz cultivos hortícolas, tales como Col de

Bruselas y Brócoli. Las prácticas de conservación de suelos y control de erosión incluyen exclusivamente las curvas a nivel en las áreas con pendientes más fuertes.

En la finca no existe un bosque comunal, sino remanentes aislados en las parcelas individuales. En las areas de laderas, las cuales se encuentran relativamente limpias de cultivos, y en un barranco natural que delimita parte de la citada finca, se observan procesos de regeneración natural del pino. El sotobosque es denso y también se aprecia regeneración de Quercus. La impresión es que se trata de un bosque sucesional en dirección a una asociación más estable de encino con pino y de algunas otras especies de hoja ancha, como el ilamo (Alnus sp.) y "guayaba de monte" (Psidium sp.).

1.2.3. Conclusiones y Recomendaciones Generales

No se aprecia una degradación fuerte, ni un impacto negativo que provenga del uso que se ha dado al suelo y a los recursos en esta región, por lo menos en lo que se han desarrollado hace más de 50 a 100 años. El uso y mantenimiento de suelos, a pesar de que puede mejorarse, se ve bastante estable. El mayor riesgo probablemente proviene de la incorporación a cultivos anuales de pequeñas áreas con pendientes cada vez mayores.

Este comportamiento es de esperarse a medida que aumenta la presión para amortizar la deuda contraída. La mejor alternativa sería estabilizar las áreas de cultivos anuales en las partes más planas y aumentar la intensidad del uso de la tierra en las áreas más quebradas con cultivos permanentes entre los cuales podría incluirse la leña.

Las parcelas con mayores limitaciones y mayor cobertura arbórea podrían producir la leña para vender al resto de los beneficiarios de la finca. A su vez estos pueden proporcionar el maíz u otros cultivos que los productores de leña no puedan producir en suficiente cantidad. Programas de educación ambiental que permitan comprender los beneficios del aprovechamiento sostenido de las especies forestales y de la conservación de los suelos, serían de gran ayuda para el mantenimiento de esta comunidad de beneficiarios.

1.3. Finca Panimaquín

Ubicada en la Aldea Panimaquín del Municipio de Patzún, Departamento de Chimaltenango. Esta es una pequeña finca de 10.88 has., la cual ha sido dividida en cuatro parcelas y ha beneficiado a cuatro familias de la etnia Cakchiquel. Este grupo ha estado trabajando en la finca por un período aproximado de tres años. Inicialmente tenían sus viviendas en un terreno vecino a la finca, pero fueron obligados por el ejército a abandonar ese sitio y establecerse en las aldeas vecinas.

1.3.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Húmedo Montano Bajo Sub-tropical (Asociación Fría). La elevación es de 2,350 msnm. con una temperatura anual promedio de 18-20 °C y precipitación del orden de los 1200 mm. por año. Durante nuestra visita fue notoria la intensidad de los vientos que pueden haber alcanzado en ese momento más de los 50 KPH.

1.3.2. Suelos y Uso de la Tierra

Los suelos son franco arcillosos, profundos y con un alto contenido de materia orgánica. Al, igual que la mayor parte del altiplano la topografía es accidentada, encontrándose pequeñas áreas planas y áreas con pendientes hasta de 65%. En las áreas que han sido tradicionalmente utilizadas para cultivos anuales se pueden observar buenas prácticas de conservación de suelos, incluyendo curvas a nivel, acequias y terrazas sostenidas con barreras vivas de gramíneas. Sin embargo la tendencia a incorporar nuevas áreas rápidamente está ocasionando que éstas sean sembradas sin las medidas de protección adecuadas. Así observamos cultivos de arveja china en pendientes de hasta 65% sin más protección que las curvas a nivel.

La cobertura vegetal original fue probablemente un bosque mixto de pino, cipreses, ilamos y encinos. Actualmente se encuentra con cobertura forestal solamente un 20% (aproximadamente 2 has.) del área de la finca.

Antes de que fuera comprada la finca era sembrada de maíz. En la actualidad se siembra además del maíz, otros granos básicos, hortalizas (col de Bruselas, coliflor) y legumbres (arveja china). Existen además planes para incorporar algunos cultivos de frutas.

1.3.3. Conclusiones y Recomendaciones Generales

El uso de la tierra es relativamente adecuado, pero existe la posibilidad de que esta situación no sea permanente. El incremento de la presión sobre la tierra con mayores limitaciones para poder amortizar las deudas de los beneficiarios puede llevar a una incorporación de dichas áreas a la producción de cultivos en limpios sin las medidas adecuadas de protección de suelos. Causando además una disminución indeseable del área bajo cobertura forestal.

En general podemos recomendar: Plantar barreras vivas para evitar la acción del viento, no sustituir terrenos boscosos por campos agrícolas, evitar la habilitación de pendientes de alto riesgo erosivo e incorporar la educación ambiental en el paquete de transferencia de tecnología.

1.4. Finca Popabaj

Localizada en la Aldea Popabaj del Municipio de Patzún, en el Departamento de Chimaltenango. La finca ha estado en manos de Fundacen aproximadamente por tres años. Tiene una extensión de 38.1 has. y ha sido dividida en 18 parcelas de las cuales se encuentran actualmente en utilización 14. Los beneficiarios son de origen Cakchiquel y habitan en las aldeas vecinas dado que no existe un poblado en la finca misma.

1.4.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida: Bosque muy Húmedo Montano Bajo Sub-tropical (Asociación Fría). La elevación promedio es de 2,000 msnm. la precipitación

del orden de los 1,200 mm. anuales en promedio y la temperatura promedio anual de 18-20 °C.

1.4.2. Suelos y Uso de la Tierra

Los suelos son de textura franco arcillosa, profundos y de alto contenido de materia orgánica. La finca se ubica en la parte media-alta de un valle de montaña. Su topografía es por ello accidentada y con pendientes que en promedio alcanzan la cifra de 30% (más baja en algunos sitios, pero realmente alta en muchos más).

La cobertura vegetal de la asociación original estaba dominada por Alnus spp., Quercus spp. y Pinus tenuifolia. En la actualidad la cubierta forestal se extiende a un 36% del área. El bosque remanente ha sido fuertemente intervenido y es ahora un bosque ralo. Parte de ese bosque ralo ha sido habilitado para cultivos anuales, sin embargo el bosque permanece en los nacimientos de agua (de los cuales hay dos, muy pequeños pero permanentes). Incluso es la única finca donde se observó riego por aspersión, utilizando gravedad para proveer la presión suficiente.

Antes de que fuera comprada la finca por FUNDACEN, pequeñas áreas eran habilitadas para el cultivo de granos básicos. En la actualidad además de los granos básicos se siembran hortalizas y papas.

Al igual que en las fincas anteriores se observó que el área que ha sido tradicionalmente sembrada con cultivos anuales tiene buenas prácticas de conservación de suelos. Sin embargo las áreas de más reciente incorporación tienen por lo general mayores pendientes y no se han ejecutado obras de control de erosión.

1.4.3. Conclusiones y Recomendaciones Generales

Un problema serio que se presenta en esta finca, es que no hay un buen acceso, en invierno no puede entrar ningún tipo de vehículo para sacar la cosecha. Esto dificulta el cultivo de especies perecederas altamente rentables.

Es necesario poner más atención al manejo del bosque remanente. Desarrollar las obras para la conservación del suelo, a medida que las nuevas áreas van siendo incorporadas a la producción y desarrollar algún tipo de programa de educación ambiental.

1.5. Fincas San Antonio El Florido y Panchita (Patzún)

Estas dos fincas constituyen una sola unidad administrativa. Los beneficiarios tienen sus casas de habitación, las cuales fueron financiadas por la fundación, en la finca Panchita con una pequeña parcela agrícola. El área agrícola es complementada con una segunda parcela ubicada en la finca San Antonio. Ambas fincas se comunican por un camino peatonal, el cual puede ser recorrido en unos diez minutos caminando. Existen en el asentamiento problemas de deposición de basuras y aguas servidas.

Ambas fincas se encuentran en el Departamento de Chimaltenango, Municipio de Parramos. El área conjunta es de 19 Has. y son utilizadas por diez beneficiarios con sus respectivas familias, todos de origen Cakchiquel. Este asentamiento se inició hace unos tres años aproximadamente.

1.5.1. Clima y Zona de Vida

Ambas fincas se encuentran en la Zona de Vida- Bosque húmedo Montano bajo Sub-tropical (Asociación Fría). La precipitación promedio anual es del orden de los 1,100 mm., la temperatura promedio anual de 20-21 °C y se encuentran a una elevación de 1,750 msnm.

1.5.2. Suelos y Uso de la Tierra

El suelo es de textura franco arenosa, con profundidad de aproximadamente un metro en áreas planas y unos 50 cms. en las laderas. Entre las medidas de conservación de suelos se ha trabajado con curvas a nivel y acequias de ladera, pero su mantenimiento es difícil, debido a la intensidad de la lluvia y a lo liviano del suelo. La topografía es relativamente plana en aproximadamente 60% del área. El resto tiene laderas con pendientes que van hasta el 65 %. Estas últimas áreas están también siendo utilizadas para la siembra de maíz sin más protección que la siembra en curvas de nivel. Se puede apreciar en dichas laderas el inicio de la formación de cárcavas, además de evidente erosión laminar.

La cubierta vegetal original era un bosque de pinos. Actualmente un 18% de la superficie puede estar cubierta por bosque fuertemente intervenido y ralo, que es utilizado por la comunidad para suplir sus necesidades de leña. Antes de que fuera comprada la finca por FUNDACEN, existía en ella un cafetal con sombra de gravilea, con aguacate y níspero (Eryobotria japonica). El cafetal fue eliminado por ser muy viejo pero no fue renovado en su totalidad y se derribó para leña la sombra de gravilea.

Un factor importante en la producción, según se nos informó, en esta área han sido las heladas. Las cuales han ocasionado cuantiosas pérdidas en ambas fincas en los últimos dos años. Este comportamiento ha afectado la capacidad de pago de los beneficiarios. En tres años de trabajo sólo se ha pagado el 10 % del valor de la tierra, y a pesar de que se considera que el suelo es muy productivo, es evidente que al término de los 10 años supuestos por los programas de la Fundación para el pago de las tierras, no se habrá cancelado la tierra ni los préstamos para el levantamiento de cosechas y construcción de viviendas.

1.5.3. Conclusiones y Recomendaciones Generales

Por las pláticas que tuvimos con los beneficiarios del programa, ellos han visto cómo el bosque que han estado usando como fuente de leña se ha ido disminuyendo en su potencial y estiman que en corto tiempo no podrá abastecerlos de leña. El bosque sin embargo no está siendo manejado en ninguna forma. Por lo tanto, parece lógico sugerir que se siembre y maneje un bosque energético con ilamo, o con otras especies con buena leña y rápido crecimiento en las pendientes y en el área que actualmente está destinada para este fin.

En los primeros años podrá hacerse un cultivo mixto con maíz o frijol. Al 3er o 4to año, los árboles estarán próximos a cosecharse. No corren riesgos con las heladas y la meta será leña no solo para su consumo sino para la venta, por lo que podrán tener fuentes de ingresos para el verano.

Es urgente el desarrollo de programas de educación ambiental y de salubridad pública. Ello aparejado al desarrollo de sistemas de tratamiento de basuras y aguas negras.

2.0 ZONA SUR OCCIDENTAL

Dentro de esta zona administrativa de FUNDACEN solamente visitamos una finca que es representativa del ambiente cálido de la costa del Pacífico donde se ha sembrado por décadas el cultivo del algodón.

Se trata de una zona plana, de relieve suave, con suelos de aluvión volcánico. Inmerso dentro de la llanura del Pacífico guatemalteco, los problemas ambientales generales de la zona, se reducen a destrucción casi total de la cubierta arbórea original, a la ganadería intensiva y extensiva, fuerte manejo de pesticidas para el mantenimiento de macro monocultivos (caña de azúcar, algodón, maíz, granos básicos, pastos).

Las asociaciones boscosas originales posiblemente correspondieron a un bosque latifoliado de alta diversidad. Tal condición es mencionada por Saunders y colaboradores (1947). El trabajo citado es uno de los pocos a nuestro alcance en el que se señalan las ricas condiciones ecológicas primigenias de la zona. En los últimos 50 años, se ha sucedido un cambio dramático en el uso de los suelos de la región.Bajo tales circunstancias debemos señalar la escasa variabilidad biológica presente.

En la zona destacan algunos pocos ejemplos de diferentes tipos de manejo, los cuales se ven y aprecian especialmente exitosos (quizá no desde el punto de vista económico inmediato), y mejor adaptados al ambiente, más sostenibles. Entre estos están las asociaciones culturales de pasto y bosque de conacaste de baja densidad, o pasto y plantación de mango para exportación. Sistemas agro-silvo-pastoriles que a la postre son más rentables y sostenibles.

Sin duda que la zona constituye un habitat apropiado para las aves rapaces, debido a las condiciones imperantes del campo abierto. De hecho, resulta común encontrar viudas, clis-clises y gavilancillos. Los primeros evidentemente planean en busca de carcasas y otros restos de animales, pero acerca de los segundos debemos pensar que basan su alimentación en pequeños roedores y reptiles. Lamentablemente el tiempo dedicado a la inspección es tan corto que no permite evaluar estas circunstancias. En todo caso, el intenso cambio en el uso de la tierra creemos que ha favorecido a algunas especies (como las rapaces), pero necesariamente debemos pensar que se han perdido muchas otras.

2.1. Finca Montelimar

La finca está ubicada en el Departamento de Retalhuleu, Parcelamiento Caballo Blanco. Tiene un a extensión total de 227.38 has. las cuales han sido divididas en 68 parcelas de las cuales están siendo utilizadas por sus beneficiarios 62.

Existe un asentamiento que requiere de un sólido programa de forestación urbana. Existe letrinización; sin embargo las enfermedades, gastro intestinales fundamentalmente, tienen alta incidencia en la población infantil (principalmente). Por otra parte se indicó por parte de algunos de los pobladores del asentamiento entrevistados, que también hay una alta incidencia de problemas respiratorios, cuya causa podrá estar ligada a partículas de polvo en suspensión debido a la erosión eólica y también a partículas de pesticidas y algodón en el ambiente después de que se "chapean" o limpian los terrenos.

2.1.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Húmedo Sub-tropical (Asociación Cálida). La temperatura promedio anual es del orden de los 33 °C y la precipitación de 950 a 1,000 mm. los cuales están sumamente concentrados en unos pocos eventos meteorológicos de gran intensidad. La elevación promedio de la finca es de 55 msnm.

2.1.2. Suelos y Uso de la Tierra

Los suelos son rojizos, ricos en óxidos. Posiblemente del tipo franco arcillosos, aproximadamente de 1 mt. de profundidad. El suelo se nota agrietado y erosionado. La topografía es plana en su mayoría, con ondulaciones suaves. Las pendientes oscilan entre 2 y 15%.

Hay curvas de nivel en toda la finca, se hicieron con tractor. No existen para la finca, datos precisos sobre la estructura del suelo. Se observan cárcavas causadas por erosión hídrica, además hay erosión laminar y eólica. No se evidenciaron esfuerzos en la recuperación de las cárcavas.

Hay muy pocos remanentes de vegetación silvestre, la cubierta forestal actual representa menos del 3%, y éstos se encuentran especialmente ubicados en la zona correspondiente a una microcuenca fluvial. En ésta, hay áreas anegadizas que, a pesar de haber sido intervenidas, aún conservan un alto grado de humedad. En ellas se encuentran palmas de "manaco" y juncales dominados por Typha. Las primeras tienen un alto uso para el techado de construcciones rurales, y los segundos un inmenso potencial en la fabricación de esteras, sombreros y otras artesanías.

Antes de que se comprara la finca se sembraba algodón, que luego se abandonó para pasar a ganadería. El abandono posterior de ésta convirtió el área en un "guamil", el cual se encontraba en un proceso sucesional natural. El uso actual corresponde principalmente a algodón y maíz, con pequeñas áreas de bosque energético y otros cultivos de subsistencia.

Dentro de los campos de algodón crece espontaneamente la especie Fernaldia pandurata, a la que en términos populares se le llama "loroco". Esta planta produce unas flores

blancas que, tanto al estado maduro como de botones florales, constituye la base de una importante tradición alimentaria de Guatemala. Varios autores han hecho ver la estrecha relación etnobiolgica de tal vegetal (CATIE-GTZ, 1979), y se ha insistido en señalar que constituye un germoplasma peculiar e importante. Debido a que en los algodonales de Montelimar se le trata como una maleza agrícola, no se descarta una posible erosión genética en la especie.

También fue posible determinar la presencia de un centro arqueológico pequeño, conformado por al menos tres montículos (cúes) en estado aparentemente intacto, y evidencias de la destrucción de uno o algunos más. Esta situación reviste especial importancia por cuanto constituye uno de los pocos sitios en la planicie costera del pacífico en que aún se encuentran evidencias de los pobladores pasados de la región.

2.1.3. Conclusiones y Recomendaciones Generales

Consideramos que la actividad derivada del Programa de Funcacen en el lugar sólo ha mantenido una situación que ya era de desmedro para la vida silvestre.

En atención a que ya se encuentran beneficiarios viviendo en la comunidad establecida y que están ejerciendo cierto grado de presión sobre la madera combustible, vemos con preocupación que la tala de árboles sea más notoria que la reforestación necesaria. En tal sentido parece raro que incluso el área de viviendas no halla sido sometida a programas de plantación de árboles.

El "palo blanco" (Cibistax donnell-smithii) y el "conacaste" (Enterolobium ciclocarpum), pero especialmente el primero de ellos, pueden ser plantados para postes, leña y madera (en nuestra opinión, sin embargo, el uso de leña de conacaste debe tomarse con cuidado, ya que el alto contenido de sílice que posee su madera hace molesto el uso). También se pueden sembrar, como cultivos rentables: "jocote maran", palmas diversas, "maro", cítricos y "guayabo".

Por otra parte, es importante hacer notar que desde la perspectiva de la optimización en el manejo de los recursos naturales, algunos de los que se encuentran en la finca se están sub-utilizando y algunos otros están perdiendo mucho de su potencial de uso. Tal es el ejemplo del juncal, que mientras en poblados ribereños del lago de Atitlán (Santa Catarina Palop, San Antonio Palop, San Lucas Tolimán, Santiago Atitlán y San Pedro La Laguna, entre otros) es usado como una fuente importante de ingresos en la confección de materiales artesanales de naturaleza utilitaria, en Montelimar son sistemáticamente quemados.

Algo semejante puede ocurrir con el "loroco" (Fernaldia pandurata), el cual puede ser cultivado intensamente como una planta nativa, altamente resistente y con un mercado interno asegurado por la profunda raigambre de su uso culinario, y que podrá ser mantenido en combinación con otras prácticas culturales.

El fenómeno de desconocer los recursos locales resulta inquietante, pues suele ocurrir que se mantenga más la intención de destruirlos en vez de aprovecharlos. Esta situación debe mantenerse en mente puesto que en ciertos casos, como en el de esta finca, los beneficiarios provienen de otras localidades (en su mayoría del altiplano) y por lo tanto

no están familiarizados con el potencial intrínseco de los recursos naturales de una zona determinada, por lo tanto los menosprecian o se sub-utilizan. Este podrá ser el caso de campesinos de oriente, trasladados a áreas como Petén, que al no identificarse con las características intrínsecas del nuevo ambiente, lo desechan tratando de imitar o poner en práctica sus propias prácticas agrícolas, ya que éstas constituyen en sí su bagaje cultural. El impacto ambiental de este fenómeno es importante.

Será conveniente considerar una alternativa que permita convivir con el "loroco" y con el juncal, que tienen un buen mercado local y regional. Por otra parte consideramos que se deben proteger, valorizar e interpretar los restos arqueológicos y fortalecer la educación ambiental.

3.0 ZONA CENTRAL

En esta zona administrativa de FUNDACEN visitamos dos fincas: San Antonio Buena Vista y El Mirador. Los ambientes en ambas fincas son bastante diferentes. La principal similitud entre ellas es que ambas incluyen un buen porcentaje del área total bajo cobertura de café.

3.1. Finca San Antonio Buena Vista

Esta es la más grande de todas las fincas hasta ahora adquiridas por FUNDACEN, con una superficie total de 1044 has. Se encuentra ubicada en el Departamento de Escuintla en el Municipio de Guanagazapa. La finca ha sido dividida en 266 parcelas útiles y aproximadamente unas 250 has. han sido destinadas a áreas de reserva debido a lo empinado del terreno y la presencia abundante de afloramientos rocosos y al suelo superficial.

El centro urbano está más desarrollado que en otras fincas y se aprecian ya comodidades suntuarias, como radios, refrigeradoras a gas, vehículos, tiendas mejor surtidas. Está bastante bien arbolado, tiene letrinas, una buena escuela, bodegas, etc... Cabe decir que las personas viven en lo que fue la ranchería de la finca original. Las casas no son financiadas por FUNDACEN. Un 20% de los beneficiarios son colonos de los tiempos de la finca original.

3.1.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Húmedo Sub-tropical (Asociación cálida). La lluvia es del orden de los 2,000 mm. anuales y la temperatura promedio anual de 28 °C. Se encuentra a una elevación que fluctúa entre 150 y 650 msnm. El comportamiento de la precipitación es sumamente estacional con un período seco del orden de los seis a siete meses.

3.1.2. Suelos y Uso de la Tierra

El sitio corresponde a una región de la Cordillera del Pacífico intensamente meteorizada. El patrón geológico básico es el de una perillanura en estado medio de formación.

Abundan las rocas volcánicas del tipo andesita-basalto, así como tobas y cenizas; estimamos que este material procede del cercano volcán Pacaya. Los remanentes geomorfológicos actuales de las montañas erosionadas, que localmente se llaman "peñones", constituyen un elemento común y relevante del paisaje.

Los suelos son de naturaleza franco arenosa, rocosos, de origen volcánico y con poca erosión apreciable. La profundidad es variable, por lo menos de un metro en unas zonas-las planas o poco pendientes- en las áreas donde aumenta la pendiente, el suelo disminuye en profundidad y aumenta la pedregosidad. El pH es de 6.1 a 6.4 y el contenido de materia orgánica alrededor de 5 %. El agua superficial es abundante, y la napa freática se encuentra a poca profundidad.

Antes de que se comprara la finca, se usó como pastizales y una pequeña extensión como cafetal. Actualmente se están sembrando tanto cultivos anuales como permanentes. Para las areas de cultivos, se están usando los mejores suelos en las planicies y pendientes leves, para cítricos y mango. Las áreas más altas y más pendientes, se tienen sembradas de café. Las zonas muy pedregosas no se están utilizando y se dejan como área de reserva.

En las áreas planas que se destinaron a frutales, las pendientes alcanzan hasta el 12% y en laderas cortas hasta el 30%. En las áreas de café, donde no se observa un proceso fuerte de erosión, se ha trabajado el café en terrazas que se empiezan desde un 5% de pendiente hasta el 70%.

3.1.3. **Vida Silvestre**

Existe en esta finca un área de unas 30 ha. de bosque compacto que se encuentra intervenido. Existe abundante vegetación arbórea dispersa en toda el área, sin embargo la tala de árboles es evidente.

Especialmente a lo largo de uno de los riachuelos del extremo oriental se mantiene un remanente boscoso de abundante biodiversidad. Ya que corresponde a una zona ecológica transicional entre las comunidades de la Planicie del Pacífico y de las Tierras Altas Interiores, la variabilidad resulta enriquecida con la mezcla biológica de ellas.

La asociación original fue un bosque de latifoliadas, característico de las zonas del Pacífico guatemalteco. En las áreas clasificadas como "rocosas" se tipifica un bosque seco. El relieve es muy abrupto, se han creado condiciones propicias para el establecimiento de habitat naturales para rapaces y paserinos del bosque.

El comportamiento del gavilán gris, observado durante la visita, quizá sea el modelo básico de aprovechamiento del habitat: vuela a lo largo de los profundos despeñaderos incluidos en la cuenca forestada, aparentemente dentro de un territorio bien definido. Al filo de tal caen, sobre un árbol en invernación foliar, se descubrieron dos nidos típicos de este grupo de aves; seguramente pertenecen a la especie. Un poco más arriba de la cuenca, en una sección forestalmente desnuda, pero con pastos y milpas, estos gavilanes fueron vistos en actitud de inspección del ambiente. Nuestra interpretación de tal conducta es que en esta finca las rapaces disponen de áreas de refugio y anidamiento en el bosque, y de caza y alimentación en los sitios abiertos.

Sobre los árboles aislados que crecen encima de los peñones observamos varios zopilotes. En vuelo se determina una cantidad significativa de viudas y un poco menos de zopes, y según informes de campesinos que viven en el lugar también hay quebrantahuesos (especie que posteriormente vimos en una zona muy cercana a la finca). Consideramos que allí hay ambientes muy propicios para la reproducción de catártidos.

Varios ejemplos más de la variabilidad y abundancia de la ornitofauna del lugar es la facilidad con que puede encontrarse la paloma de monte, la tortolita, la perica, el pixoy, el pijuy, la aurora, el tolobojo e innumerables chipitos.

Según informantes locales, algunos de los beneficiarios del Programa obtienen de tal bosque pichones de pericas para la venta. En cualquier caso, parece haber un negocio irregular con la captura y comercialización de tales especies para mantener el mercado de mascotas de vida silvestre. Deseamos señalar que guatemala ha incluido a todos sus psitácidos en los listados de la Convención Internacional para el Comercio y Transporte de Especies en vías de Extinción (CITES).

Por otra parte, en el sector de la finca conocido como "La Laguna" hay un pequeño embalse del río El Carmen, de aproximadamente 250 mts cuadrados de extensión. Allí pudo verse un ejemplar de zambullidor realmente escaso en el país. Esta situación es importante porque permite reconocer la relevancia del lugar para proporcionar refugio a numerosas especies de aves.

Otra fauna presente en el área está conformada por iguana verde, iguana negra, tepezcuintle, armadillo, taltuza y conejo. Sin duda que la finca tiene un buen grado de importancia en cuanto a refugio de vida silvestre se refiere. Debemos añadir que, en nuestra opinión, también constituye un área de invernación para aves migratorias de bosque que provienen de norte américa.

Los mayores impactos negativos sobre el ambiente son el saqueo de nidos de psitácidos y los incendios periódicos que según se nos informó, se producen año tras año por fuegos no controlados, durante la época seca. Esta segunda condición puede poner en peligro la diversidad biológica del lugar.

3.1.4. Conclusiones y Recomendaciones Generales

Las actividades no reguladas de los beneficiarios en cuanto a inducción de incendios y a captura de especies protegidas, puede convertirse en un problema ambiental serio. El segundo de los casos no se justifica si reparamos en que quienes lo hacen teóricamente tienen un ingreso económico asegurado con la ejecución de las tareas propias del programa.

No se siguen los lineamientos de mantener una franja de 20 metros horizontales a los lados de los cauces de agua. Se pudo apreciar, que un área mecanizada para cultivos estacionales, colindante con un cauce de agua, se trabajó, hasta la orilla del cauce del río, lo que está causando erosión a cárcavas, que si bien en este momento es apenas incipiente, puede llegar a ser un problema de consideración.

Por otro lado desde el punto de vista de mantener la diversidad biológica y la posibilidad de subsistencia de la fauna nativa, deben dejarse corredores donde puedan circular. En

especial en esta zona donde se combina un área de rocas que alberga un ecosistema de bosque seco con alta diversidad de fauna.

Como una alternativa económicamente productiva podrá intentarse el desarrollo de programas eco-turísticos en el sitio. Hay excelentes oportunidades de ejecutar un sistema de interpretación de la naturaleza, con temática parecida a esta: "la llanura costera", "el mar, depósito de sedimentos aluviales", "la erosión geológica" y "las perillanuras", "historia natural de las rapaces", "los refugios boscosos de las aves migratorias", "el valor de la biodiversidad", etc.

Para mejorar el enriquecimiento de la finca, se recomienda se siembren como sombras alternativas, árboles de maderas finas, los que a la postre y después de varios años podrán ser una riqueza heredable.

3.2. Finca El Mirador

Administrativamente la finca se encuentra en territorios pertenecientes al Municipio de Usumatlán, en el Departamento de Zacapa. Tiene una extensión de 186 has. Los beneficiarios viven en el área de la finca, en un poblado que todavía está pendiente de algunos servicios básicos y el cual debe ser sujeto de un programa de arbolado.

Esta finca se encuentra en un sector del declive de la Sierra de las Minas que drena al valle del río Motagua, en una zona casi permanentemente humedecida por neblinas. Esta condensación de agua depende de los vientos alisios del noreste, que la acarrean desde el océano atlántico. Aún es posible deducir que la sierra en su totalidad, y la finca como una parte de ella, conforma un importante eslabón en el conjunto de elementos que cierran el ciclo hidrológico regional (evaporación Mar caribe-acarreo alisios del noreste-condensación, precipitación-escurrimiento superficial sistema Motagua-deposición Mar Caribe)

La finca se encuentra dentro del área de amortiguamiento de la Reserva de la Biósfera: "Sierra de las Minas" (área protegida: declarada, categoría de manejo: propuesta, Reserva de la biósfera.)

3.2.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Muy Húmedo Sub-tropical (Asociación Fría). La lluvia promedio en mm. anuales, es del orden de los 3,000. La precipitación es bien distribuida, de mayo a febrero, con solamente dos meses efectivamente secos en promedio. La temperatura promedio anual en °C es del orden de los 21-23 y se encuentra a una elevación sobre el nivel del mar de 1,525-1,825 msnm. La presencia de neblina es un factor importante con una incidencia muy frecuente dando origen a un bosque nuboso.

3.2.2. **Suelos y Uso de la Tierra**

El uso de la tierra antes de que la comprara la Fundación, era básicamente de pastizales y maíz. El uso actual es principalmente café, maíz, papa y otros cultivos temporales. Actualmente existen unas 80 has. sembradas de café. La meta es alcanzar las 125 has.

El suelo es arcilloso y con alto contenido de piedras. El pH oscila entre 5.3 y 6.3, tiene un alto contenido en Al, Fe, Mn. Se considera que el exceso de aluminio es tóxico para la planta de cafeto. La profundidad del suelo es de 70-80 cms. luego se encuentra una capa talpetate que efectivamente limita el crecimiento de las raíces. Se observa erosión a cárcavas bastante evidente y reciente. La topografía es accidentada y las pendientes oscilan en general entre el 30 y el 70%. En laderas cortas se pueden observar pendientes superiores al 90%, las cuales o están sembradas de café o están destinadas a serlo.

La mayor parte de este café será sembrado sin sombra. Las áreas donde no se utilice sombra para el café, serán protegidas del viento, por medio de barreras vivas de ciprés, sin embargo este trabajo todavía no se empieza.

Dos cursos de agua que cruzan la finca están siendo fuertemente afectados por los trabajos que se realizan. No se cumple con la protección de 20 metros a orillas de las quebradas, rios o riachuelos. Hay erosión a la orilla de los riachuelos. En una de ellas se encontró, dentro del agua misma, una bolsa de MOCAP, insecticida-nematicida órgano-fosforado de alta toxicidad.

3.2.3. **Vida Silvestre**

La asociación original era la de un bosque nublado típico. Este fue indudablemente un bosque mixto de pino y hoja ancha. Segun puede estimarse de los remanentes que todavía persisten, debió haber estado conformada por pinos (fundamentalmente Pinus oocarpa), encinos (es la única finca en que hemos podido apreciar al menos cuatro especies diferentes de Quercus conviviendo una al lado de la otra) y árboles de "estoraque" (Liquidambar styraciflua, Hammamelidaceae).

El área boscosa actual es de unas 34 hectáreas. La mayor parte del área boscosa se compone de pino y liquidambar. Existe un rodal de pino de alrededor de 21 has. el cual será vendido y aprovechado en forma comunal, por lo que el producto de la venta del mismo se utilizará para el pago casi total de las parcelas de los beneficiarios.

Estos remanentes sin duda constituyen un excelente refugio para la avifauna, especialmente para paserinos migratorios. En esta oportunidad nos fue posible observar la presencia de palomas de ala blanca, abundantes azulejos y numerosos chipitos. Obviamente, también hay buenos refugios para especies residentes. Por ejemplo es evidente la abundancia de trepadores, carpinteros y calandrias.

Si bien estos remanentes boscosos pueden ser considerados como minúsculos en comparación con el habitat que proporcionan los bosques de la cima de la sierra, resulta importante señalar la relación humana que ahora existe en ellos.

De acuerdo a los datos suministrados por el personal de campo de la Fundación, los contornos ya habían sido intervenidos con anterioridad al establecimiento de este proyecto, pero no se haba dado el caso de asentar pobladores en el sitio. Reconocemos que hay ciertos cascos de fincas aledañas que mantienen algún personal en ellas, pero nos parece que hay cierta diferencia entre los trabajadores asalariados con permanencia temporal de ellas y un programa de asentamiento formal al borde mismo de una frontera agrícola.

3.2.4. Conclusiones y Recomendaciones Generales

La finca posee mejores cualidades para un uso forestal que para siembra de café. Debe estudiarse la forma de establecer un bosque tanto para la producción de maderas como leña, bien manejado para evitar presión sobre las áreas silvestres adyacentes.

Debe ponerse especial interés en el desarrollo del núcleo habitacional de esta finca y de las actividades que en ella se desarrollan, por estar al borde de la frontera agrícola y por encontrarse dentro de la zona de amortiguamiento del área protegida de la "Sierra de las Minas" Se sugiere ponerse en contacto con los personeros de la Fundación Defensores de la Naturaleza, quienes están trabajando esta reserva.

4.0 ZONA SURORIENTAL

En esta zona visitamos también dos fincas una de ellas en la boca costa o pié de monte del Pacífico y otra en las inmediaciones de la Laguna de Ayarza, un pequeño lago de origen volcánico que forma parte del sistema de áreas protegidas de Guatemala pero que desafortunadamente no funciona como tal.

4.1. Finca Comayagua

Esta finca se encuentra en el Municipio de Chiquimulilla, en el Departamento de Santa Rosa. La finca tiene una extensión aproximada de 230 has. y ha sido dividida en 57 parcelas. Los beneficiarios del programa, viven en la finca en un centro urbano ya establecido, en el cual no se ha completado la letrinización y en general debe mejorar su arbolado.

La finca se encuentra en el pié de monte de la vertiente meridional de la Sierra Madre, ocupa una sección de las faldas del volcán Tecuamburro. El terreno es naturalmente abrupto con pendientes que a veces alcanza inclinaciones de más de 85%. Algunos puntos, por otra parte, se acercan altitudinalmente a los 1,200 MSNM. Como era de esperarse en una región volcánica, las rocas son abundantes y dominan superficialmente muchos de los campos del paisaje.

4.1.1. Clima y Zona de Vida

Finca Comayagua se encuentra en la Zona de Vida Bosque Muy Húmedo Sub-tropical (Asociación cálida). La temperatura media anual es del orden de los 24 °C y la precipitación de 2,000 mm., con un comportamiento fuertemente estacional. La elevación en la finca fluctúa entre los 600 y 1,500 msnm.

4.1.2. Suelos y Uso de la Tierra

El suelo es de tipo franco arenoso, rocoso y de origen volcánico. Como consecuencia de su ubicación, en las faldas del volcán de Tecuamburro, sobre el pie de monte del pacífico, la topografía es accidentada. Hay pendientes que van desde 30 hasta 85%. Se observó cultivos de café predominantemente en pendientes de 65%, y se tiene pensado habilitar hasta 80 %, sin embargo, en la práctica se encontraron áreas hasta de 85% de pendiente habilitadas para el cultivo de café.

Antes de que la finca se comprara, tenia habilitadas 84 has. para pastos y otras 84 con café. Unas 125 has. eran de bosque cerrado. Actualmente se está transformando toda la finca para café y se ha habilitado 84 has. de bosque tropical para este cultivo. Solamente se ha planeado dejar las areas extremadamente quebradas bajo cubierta forestal, áreas que llaman marginales.

Las áreas con pendientes más fuertes y que habían estado bajo pastoreo se observaron fuertemente erosionadas, a pesar que en muchas de estas áreas, lo pedregoso del terreno, evita en parte una acción más drástica del proceso erosivo. Algunas de estas áreas están siendo sembradas de café, lo cual nos parece un esfuerzo inútil dado que será muy difícil por no decir imposible producir económicamente en esas condiciones.

4.1.3. Vida Silvestre

La cubierta forestal se estima actualmente en un 38%. Para fines de esta evaluación se realizó una visita, ciertamente rápida, a los remanentes boscosos que allí persisten. No pudimos disponer de referencias escritas acerca de los ecosistemas del volcán, información que parece ser absolutamente escasa. Nuestro criterio es que corresponden a bosques primarios, indudablemente muestras de lo que debió ser la vegetación característica del sitio. Esto es importante, pues tales muestras todavía permiten aprender algo acerca de la historia natural de tan rica región.

La comunidad arbórea es latifoliada, de tipo sub-tropical, y con un dosel ubicado alrededor de los 30 metros. Los fustes de algunos de los árboles alcanzan fácilmente los 180 cm. DAP (diámetro a la altura del pecho). Aunque pocos ejemplares, pero todavía se encuentra árboles de maderas preciosas, especialmente de cedro y caoba. En el sotobosque abundan las palmas del género Chamaedorea (un promedio cercano a las 100 palmas por hectárea). Nuestra impresión original es que corresponden a las especies Ch. tepejilote y Ch. elegans. Esta condición es importante, pues tales germoplasmas han sido reconocidos como valiosos en más de una oportunidad (Bukasov, 1940;GTZ-CATIE, 1,970; Villar, 1,989).

Estos remanentes tenían unas dos caballerías de bosque, las cuales han sido reducidas en la actualidad, en un año de trabajo, a la mitad. Como áreas protegidas sólo se tienen consideradas las quebradas, a las que se les llaman "marginales". Aún estos ambientes han sido fuertemente modificados pues no se ha respetado el área de amortiguación de 20 mts.

El bosque latifoliado se localiza en la parte más alta de la finca y al costado oriente de la misma. El mismo se está talando fuertemente para habilitarlo para cultivos de café. En el área de tala se ubica un riachuelo, que nace a pocos metros del lindero de la finca y se constató que la tala llega hasta la orilla misma del cauce de agua, incluso, troncos grandes de árboles que han sido derribados han caído en el cauce. El producto del descombre se vende como leña o se abandona en el terreno para que se pudra y se incorpora como materia orgánica. Según se nos informó, se instalarán despulpadoras, como parte inicial del proceso del café, y las aguas mieles y la pulpa del café, se descartarán directamente al cauce del río, lo cual afectará aún más al mismo.

Observaciones directas de aves sólo fueron posibles para un pequeño grupo de golondrinas que se encontraban anidando. Pudimos escuchar canto de tolobojos, tucanes, carpinteros y chipitos. De acuerdo a informantes locales, la mastofauna más abundante consta de armadillos, pizotes, mapaches, micoleones, tigrillos, zorrillos y comadrejas. La importancia de bosques como los presentes en esta finca para resguardar la biodiversidad de las aves ya fue señalada por Villar (1,989), quien insiste en las características ecotonales entre las tierras altas y bajas adyacentes y en los refugios temporales de migrantes del neártico.

4.1.4. Conclusiones y Recomendaciones Generales

Debe buscarse la forma de cuidar los cauces de agua, de no contaminarlos ni deprimirlos en su capacidad de producción y autorregulación de agua, especialmente cuando se está hablando de las cabeceras de los cursos de agua o de sus trayectos iniciales, para evitar los efectos negativos, aguas abajo.

Se sugiere buscar alternativas de aprovechar germoplasmas regionales, como un rendimiento sostenido y particularmente, de abstenerse de eliminar la cubierta arbórea en regiones como las boscosas de esta finca. Nuevamente la educación ambiental.

4.2. Finca San Cayetano

San Cayetano se encuentra en la jurisdicción de la Aldea de Ayarza, colindante con la laguna del mismo nombre. Esto es parte del Municipio de Casillas en el Departamento de Santa Rosa. Tiene una extensión aproximada de 458 has. y ha sido dividida en 132 parcela. Los beneficiarios viven algunos en la finca y otros en las aldeas vecinas.

4.2.1. Clima y Zona de Vida

Esta finca se encuentra en la Zona de Vida Bosque Húmedo Montano Bajo Sub Tropical (Asociación Fría). La precipitación media anual es de orden de los 1,750 mm. los cuales están bien distribuidos a lo largo del año. La temperatura promedio es de 21 °C. La elevación fluctúa entre 1,350 y 1,750 msnm.

4.2.2. Suelos y Uso de la Tierra

Los suelos son variables desde franco arenosos hasta franco limosos y dolomíticos. El pH está por arriba de 7 y la profundidad puede variar desde un metro en algunos lugares, hasta sumamente superficial en otros. Se observan areas de color blanco y bastante arenoso y se

nota fuerte erosión en carcavas. Las pendientes son fuertes, especialmente en las laderas que descienden hacia la Laguna de Ayarza. Se está sembrando café en pendientes superiores al 85%. Las areas marginales, están definidas aquí como las muy pendientes y otras donde por erosión, prácticamente ya no hay suelo.

La cubierta forestal actual está en el orden del 4% del área total. La asociación original aparentemente estuvo constituida por un bosque mixto de pino y encino. La especie dominante del primero de estos árboles es Pinus oocarpa, y pensamos que la del segundo es Quercus conspersa.

4.2.4. Conclusiones y Recomendaciones Generales

Se observa que toda la cuenca de la laguna, incluyendo el área que la finca en mención tiene sobre su margen , está completamente desforestada. El sembrar de café, permitirá recuperar en alguna forma el ambiente de esta ladera, sin embargo no debe sembrarse en terrenos muy pendientes. Deber también pensarse en manejar muy cuidadosamente los fertilizantes que se utilizarán para el café, para evitar en la medida de lo posible el arrastre de nutrientes a la laguna por erosión y lixiviación.

Debería dejarse en las pendientes fuertes y en los suelos más pobres, que se restablezca la regeneración natural de encino y posiblemente pino para un futuro. En esta región no existe bosque energético, se deber pensar en obtener leña tanto de esta regeneración natural como de las podas de la sombra del cafetal.

Para el cuidado de la laguna, debe evitarse sembrar hasta la orilla de la misma, procurando dejar un área de amortiguamiento, permitiendo que la vegetación ribereña de la laguna se restituya. Puesto que la laguna de Ayarza, pertenece al Sistema Guatemalteco de Areas Protegidas, se sugiere reintegrar la parte del espejo de agua correspondiente, como un bien de dominio público. Por otra parte, de acuerdo a información recabada de primera mano en el sitio, uno de los miembros del Programa en San Cayetano introdujo una variedad exótica de caracol (molusco), de taxonomía incierta para nosotros, al cuerpo de agua de Ayarza. Creemos que este tipo de acciones debe ser prevenido y no incentivado por el personal de FUNDACEN. En este sentido la educación ambiental debe llegar especialmente al personal técnico para evitar este tipo de acciones y otras semejantes.

5.0 ZONA NORTE

Finalmente en la zona norte visitamos tres fincas. Una de ellas en la cuenca media del río Polochic y otras dos ubicadas unos 40 kms. al norte de la ciudad de Cobán, en un área de topografía kárstica y de gran precipitación.

5.1. Finca Sam Green

La finca Sam Green está ubicada en un sector estrecho del valle medio del Río Polochic, en el Departamento de Alta Verapaz en el Municipio de San Miguel de Tucurú. Tiene un

área total de aproximadamente 403 has. y está dividida en 129 parcelas. Existen dos comunidades diferentes las cuales corresponden a dos grupos étnicos también diferentes.

5.1.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Muy Húmedo Sub-tropical (Asociación cálida). La precipitación es del orden de los 2,500 mm. anuales y la temperatura promedio es de 28 °C. La finca se encuentra a una elevación aproximada de 300-400 msnm.

5.1.2. Suelos y Uso de la Tierra

Los suelos son de textura franco arenosa y tienen un alto contenido de piedras. El pH es ácido (4.5-4.6). Las pendientes son fuertes y las laderas largas.

De acuerdo a datos de interpretación cartográfica (Mapa de uso productivo de la tierra) sus terrenos constan de suelos "no cultivables, aptos solamente para fines de uso o explotación forestal, de topografía muy fuerte y quebrada con pendiente muy inclinada. Incluye suelos poco profundos, de textura bastante deficiente, con serios problemas de erosión y drenaje. No aptos para cultivos; no obstante puede considerarse algún tipo de cultivo perenne. La mecanización no es posible y es indispensable efectuar prácticas intensivas de conservación de suelos".

Antes que la fundación la adquiriera la finca se encontraba bajo pastizales y siembra de maíz bajo arrendamiento en pendientes sumamente fuertes para esta actividad y en este tipo de clima agresivo. Actualmente se ha sustituído el maíz por café y algo de cacao en los suelos más profundos en las vegas de los ríos.

Los mecanismos de conservación de suelos están apenas en una etapa incipiente. Con excepción de surcos bien definidos de café, siguiendo las curvas de nivel no hay más obras de conservación de suelos. La erosión es fuerte bajo estas condiciones de manejo y pendientes de hasta el 90%.

La cubierta forestal está muy reducida y puede ser del orden del 15% o menos. En la asociación original, probablemente existió un bosque de pino dominado por P. caribaea. Las pocas áreas consideradas marginales, por las dificultades que presentan para usos agrícolas, están sumamente presionadas por las necesidades del consumo de leña local y para abastecer los beneficios de café. Evidentemente no hay suficiente madera para leña en la propiedad. Los beneficiarios la compran o la consiguen en fincas o terrenos aledaños.

Los ríos están siendo afectados por el proceso del café. La pulpa y las aguas mieles son vertidas directamente y sin ningún tipo de tratamiento al río Polochic. Las márgenes de este río tanto como las del Río Cucanha no se protegen con los 20 metros que se tienen establecidos, de barrera de vegetación natural.

5.1.3. Conclusiones y Recomendaciones Generales

Consideramos que los cultivos de café en esta finca, están sobrepasando los límites de pendiente permisible para su implantación. Esto no sólo dificultará el aprovechamiento y

manejo sino que hará muy susceptible el suelo a pérdida por erosión (la cubierta foliar de un cafetal no es igual que la del bosque, el sistema radicular es menos profundo y el continuo caminar entre las hileras para la recolecta de frutos, podas y otras atenciones, inducen actividades de desmedro edáfico).

En síntesis: se ha intentado comercializar con los cultivos más apropiados, pero se han descuidado las pendientes, la calidad hídrica de los ríos y la disponibilidad de especies forestales productoras de leña. Estos daños podrán minimizarse, respectivamente, con la repoblación forestal de las laderas y las márgenes de las corrientes, el tratamiento más tecnificado de la pulpa y las aguamieles del café, y el manejo de bosques energéticos. Si se asociara el café a especies forestales posiblemente el sistema se vera favorecido y el ambiente más protegido.

5.2. Finca Xalijá-Pataté

Esta finca pertenece a la jurisdicción del Municipio de Cobán en el Departamento de Alta Verapaz. Su extensión superficial es de 349 has. y ha sido dividida en 108 parcelas.

5.2.1. Clima y Zona de Vida

La finca se encuentra en la Zona de Vida Bosque Pluvial Sub-tropical (Asociación cálida). La temperatura promedio anual es del orden de los 28 °C y la precipitación de 4,000-4,500 mm. La elevación promedio sobre el nivel del mar es de unos 300 metros.

5.2.2. Descripción General

Esta finca se encuentra en terrenos de la Cordillera del Atlántico. El relieve es francamente Kárstico. La unidad de producción incluye algunos cerros residuales con pendientes de incluso más del 90%, aunque el promedio se encuentra en alrededor del 75%. Los suelos predominantes son lateríticos, evidentemente con altos contenidos de minerales férricos.

Hasta hace muy poco tiempo, que coincide con la llegada del Proyecto FUNDACEN, el área soportaba un bosque pluvial de alta diversidad biológica. De acuerdo a campesinos allí asentados, casi al momento de iniciar ellos sus actividades en el sitio se ahuyentaron los "guacamayos" (Ara macao) y los "tuacanes" (seguramente Ramphastos sulfuratus). Este hecho es altamente significativo pues la guacamaya es una especie altamente amenazada en Guatemala por pérdida de habitat y cacería (el tucán también es escaso, y su desplazamiento, que obedece a razones semejantes, representa un dramático ejemplo de destrucción de ambientes naturales). Por su inaccesibilidad, la biología regional es poco conocida, pero representa un verdadero relicto de especies de peces, anfibios y reptiles (Kihn, 1990).

El bosque ha sido talado de manera irregular, y las áreas descombradas están habilitandose con cultivos de café y achiote. En muchos lugares, los movimientos de grandes bloques de suelo y el aparecimiento de innumerables deslizamientos, demuestran lo inapropiado que está resultando el cambio de uso. Incluso, un camino recién acondicionado muestra ya graves problemas erosivos en las orillas.

No queremos dejar de nombrar lo que ya ha señalado Dourojeanni (1981) acerca de los impactos ambientales de las carreteras en los bosques tropicales de América Latina: se acarrean problemas de erosión hídrica, alteración del drenaje natural, estímulos a la explotación forestal y a la caza ilegales, deterioro de paisajes y propagación de enfermedades; cree también que se acarrea uso inadecuado de los suelos por agricultura y ganadería migratorias, desperdicio de recursos naturales renovables (bosques en especial) y extinción de especies de fauna y flora, entre otros. Es evidente que algunos de estos impactos ya se están dando.

En síntesis: Xalijá-Pataté ocupa cierto sector de un valle en V, kárstico y con un río corriendo en la parte baja. Se ha procedido de manera poco recomendable: desforestando sus laderas. Nuestra recomendación es que este tipo de ambientes no deben ser modificados ni colonizados en acciones futuras equivalentes, y que en esta finca en particular los descombramientos deberían detenerse de inmediato.

5.3. Finca Samanzana-Samox

La finca Samanzana-Samox está también ubicada en jurisdicción del Municipio de Cobán en el Departamento de Alta Verapaz. La extensión total es de 600 has., solamente para la parte correspondiente a Samanzana. Esa parte ha sido dividida en 170 parcelas. Actualmente se encuentran viviendo en la finca 25 familias quienes están aún como trabajadores, pero que en el futuro serán probablemente los primeros beneficiarios.

5.3.1. Clima y Zona de Vida

La finca se encuentra a una elevación promedio de 300 msnm, en la Zona de Vida Bosque Pluvial Sub-tropical (Asociación cálida). La temperatura promedio anual es de unos 28 °C y llueve prácticamente todo el año para una precipitación total de 4,000-4,500 mm.

5.3.2. Descripción General

El suelo es de textura franco arcillosa a arcillosa. Antes de la compra por FUNDACEN el área de Samanzana se encontraba en potreros y guamiles. La finca Samox tiene una cobertura forestal de por lo menos el 80%. Se ha dispuesto no trabajarla por ser un área montañosa y con bastante bosque primario.

En la actualidad en la finca Samanzana, se encuentran trabajadas unas 100 manzanas, el resto que se considera útil, se encuentra como guamil u otros cultivos faltos de trabajos de limpia. Las áreas marginales, que corresponden a los mogotes, están totalmente cubiertas por bosque sub-tropical primario, típico de la zona. Estas áreas son aproximadamente de 100 manzanas de extensión. El cultivo predominante es el café.

La topografía es Kárstica. Como áreas marginales, se definen a los Mogotes, o elevaciones montañosas, las cuales tienen en esta región la característica de iniciarse bruscamente sobre el terreno, lo cual permite definirlas muy fácilmente.

Los suelos son de arcillosos a franco arcillosos, levemente ondulados, con pendientes de 0 a 5% en la parte correspondiente a Samanzana pero sumamente quebrados y con fuertes pendientes en el área de Samox. En general los suelos son pesados, poco permeables y bastante compactos. Las áreas bajas sufren de anegamientos dada la poca permeabilidad y el mal drenaje general del área. En las areas elevadas, el suelo, sumamente superficial, ya se lavó y quedó solamente arcilla, el pH es ácido.

La cubierta forestal se encuentra casi intacta en las áreas montañosas. En la actualidad se tienen solamente 25 beneficiarios, los cuales no viven en la finca, sino en los poblados aledaños y llegan a trabajar en temporadas de 10 a 15 días. Por otra parte se está trabajando con jornaleros, en tareas de limpia, estaquiado, ahoyado y siembra de café, ya que el almácigo se encuentra hecho y de punto para trasplante. Estos trabajos, se cargarán al precio de las parcelas cuando estas sean entregadas a nuevos beneficiarios.

No se respeta la disposición de dejar 20 metros horizontales a cada lado de las márgenes, sino se llega hasta el límite mismo de la ribera, donde se observa erosión. En la zona se ha fertilizado y se utiliza frecuentemente herbicidas e insecticidas, lo cual causa contaminación de los cuerpos de agua.

El área de la finca Samox es realmente inutilizable para la producción agrícola rentable. Será preferible dedicar esta finca para programas de conservación.

ANNEX 5

NOMINA PRELIMINAR DE LAS ESPECIES DE FAUNA SILVESTRE DE GUATEMALA EN LOS LISTADOS DE CITES*

De acuerdo a criterios contenidos en el Perfil Ambiental de la República de Guatemala (1987), los listados de CITES constituyen "quizá la opinión más calificada sobre evaluaciones científicas de la situacíon refleja, sin duda, la convicción de los autores de que tales listas muestran de alguna manera el grado de amenaza, vulnerabilidad o sensibilidad de ciertas especies de la fauna nacional. Esta situación refleja, sin duda, la convicción de los autores de que tales listas muestran de alguna manera el grado de amenaza, vulnerabilidad o sensibilidad de ciertas especies de la fauna silvestre a modificaciones de hábitat o alteraciones en las poblaciones.

El listado que proporcionamos a continuación es definitivamente provisional, y sólo representa algunas de las formas de la fauna silvestre del país consideradas bajo régimen especial de protección.

TAXON/NOMBRE	NOMBRE COMUN	NOMBRE INGLES
Mammalia		
Primates		
Alouatta villosa	Saraguate	Howler Monkey
Ateles geoffroyi	Mico	Spider Monkey
Felidae		
Felisa concolor	Puma	Cougar
Felis paradalis	Ocelote	
Felis wiedii	Tigrillo	
Panthera onca	Jaguar	Jaguar
Aves		
Piciformes		
Campephilius imperialis	Carpintero	
Falconiformes		
Harpya harpija	Aguila	Harpy Eagle
Galliformes		
Oreophasis derbianus	Pavo de cacho	Horned Guan
Penelopina nigra	Chachalaca	
Colinus virginianus	Godornis	
Cyrtonix ocelatus	Godornis	

Trogoniformes		
Pharomachrus mocinni	Quetzal	Resplendent Quetzal
Psitaciformes		
Phyonopsita haematotis	Cotorra	
Ara macao	Guaca	
Amphibia		
Salientia		
Bufo spp	Sapos	Toads
Reptellia		
Crocodylia		
Crocodilus moreletti	Lagarto chato	
Crocodilus actus	Lagarto	
Caiman cocodrilus	Lagarto	
Rhynchocephala		
Iguana iguana	Iguana	Iguana
Heloderma horridum	Alacràn	Gila Monster
Serpentes		
Boa constrictor	Mazacuata	

*CITES: Convention of International Trade of Endangered Species (Convención Internacional para el Comercio de Especies Amenazadas).

TABLE 1a:

General Location of Farms Visited

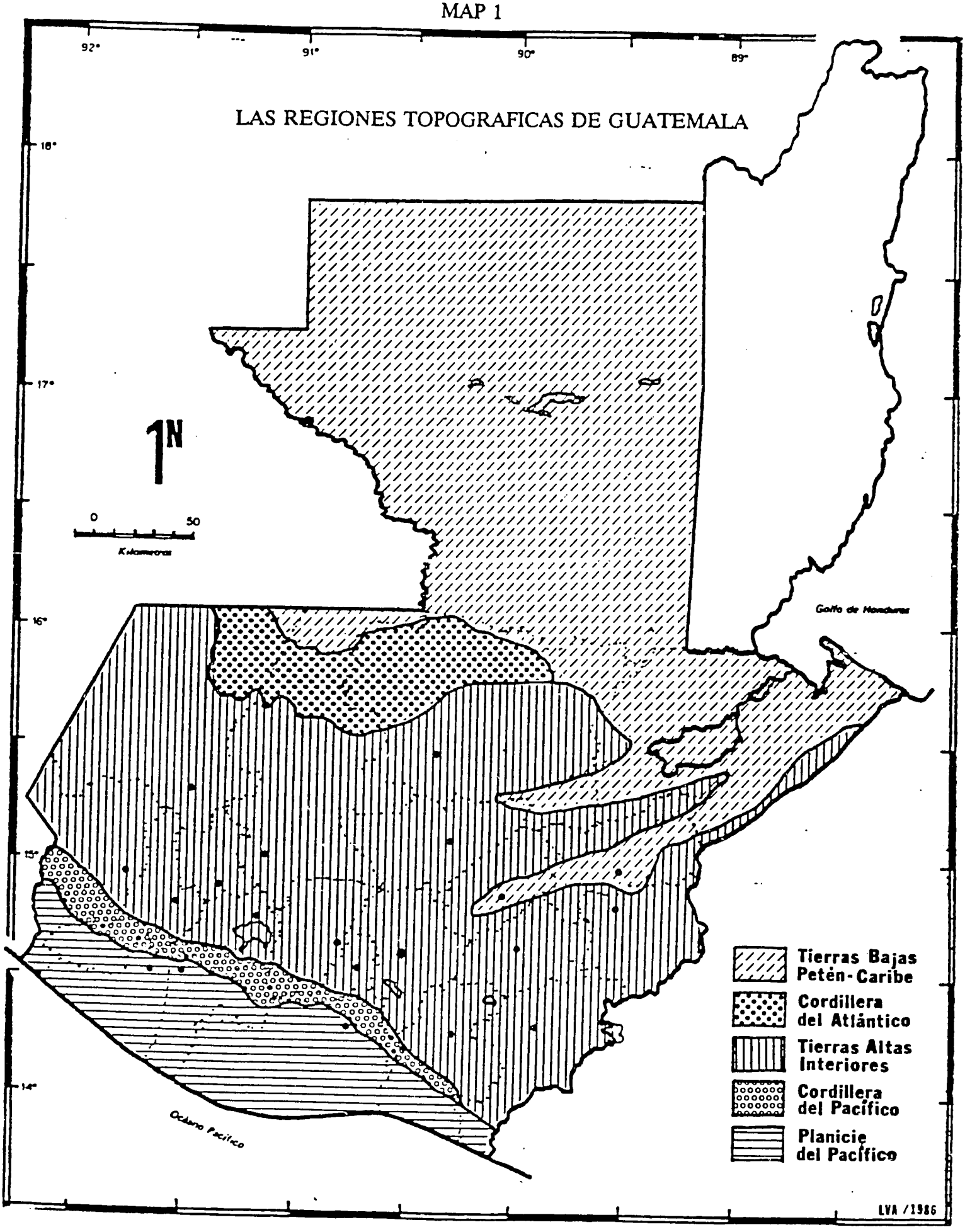
REGION/ZONE	FARM	DEPT	COUNTY	LIFE ZONE	CROP
Highlands Central	María Linda	Sololá	San Jose Chacayá	S-T LM MF (Cold Assoc.)	Vegetable
	Choaquec	Sololá	San Andrés Semetabaj	S-T LM MF (Cold Assoc.)	Vegetable
	Panimaquím	Chimaltenango	Patzún	S-T LM MF (Cold Assoc.)	Vegetable
	Popabaj	Chimaltenango	Patzún	S-T LM WF (Cold Assoc.)	Vegetable
	San Antonio El Florido	Chimaltenango	Parramos	S-T LM MF (Cold Assoc.)	Vegetable
	Panchita (Patzunún)	Chimaltenango	Parramos	S-T LM MF (Cold Assoc.)	Vegetable
South-East	San Cayetano	Santa Rosa	Casillas	S-T LM MF (Cold Assoc.)	Coffee
South-West	Montelimar	Retalhuleu	Parc. Caballo Blanco	S-T MF (Warm Assoc.)	Cotton
Central	San Antonio Buena Vista	Escuintla	Guanagazapa	S-T MF (Warm Assoc.)	Fruit, Coffee
	El Mirador	Zacapa	Usumatlán	S-T WF (Cold Assoc.)	Coffee
South-East	Comayagua	Santa Rosa	Chiquimulilla	S-T WF (Warm Assoc.)	Coffee
North	Sam Green	Alta Verapaz	Tucurú	S-T WF (Cold Assoc.)	Coffee, Cocoa
	Samanzana - Samox	Alta Verapaz	Cobán	S-T RF (Warm Assoc.)	Coffee
	Salijá - Pataté	Alta Verapaz	Cobán	S-T RF (Warm Assoc.)	Coffee

TABLE 1b:

Basic Data of the Farms Visited

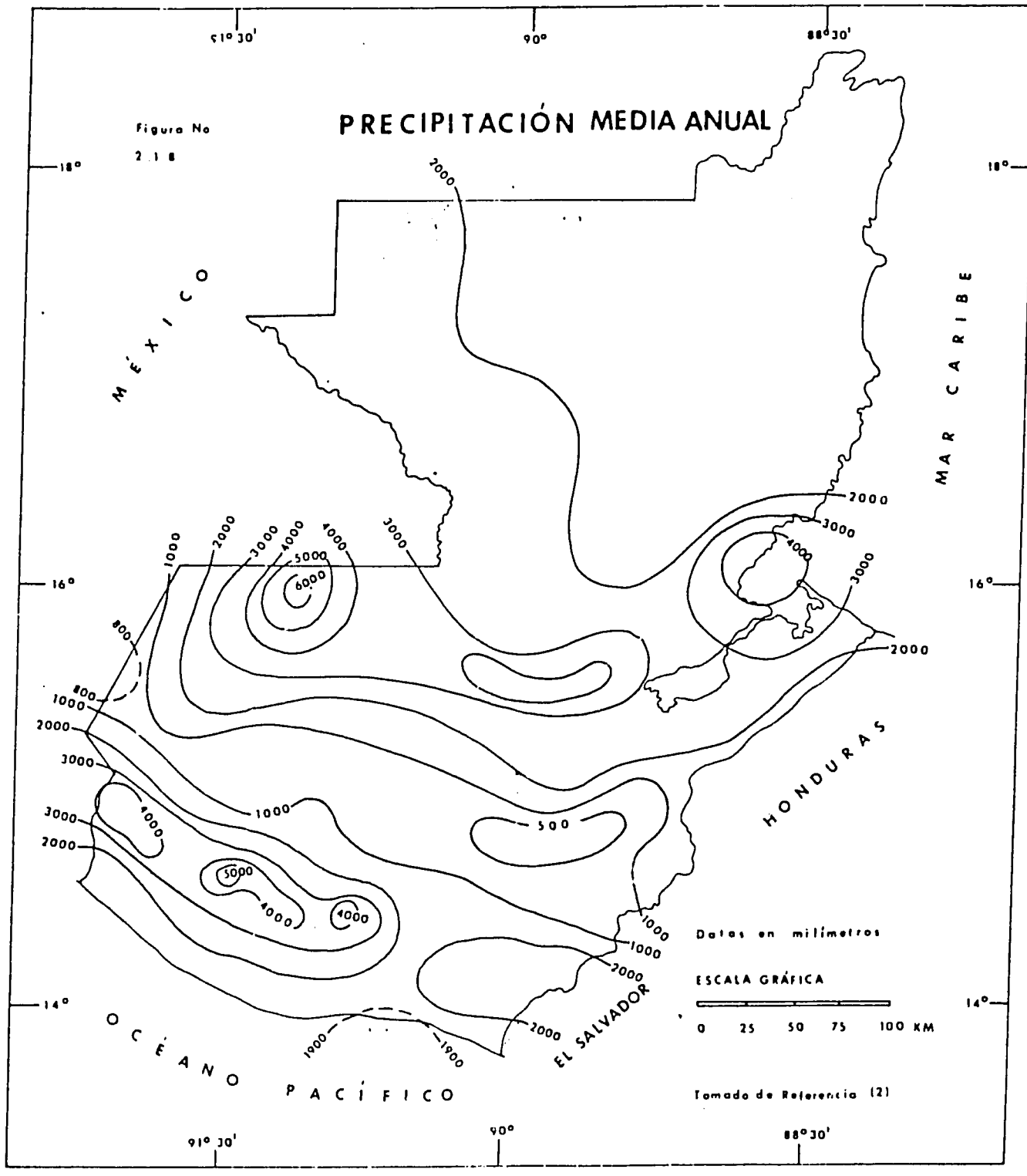
FARM	ELEVATION masl	RAINFALL mm	ToC	LIFE ZONE	SOIL TYPE	SURFACE AREA	FOREST COVER	NUMBER OF PARCELS	BENEFI-CIARIES
María Linda	2,300	1,000	14-15	S-T LM MF (Cold Assoc.)	Clay loam	27.19	45	10	3
Choaquec	2,100	1,000	14-15	S-T LM MF (Cold Assoc.)	Clay loam	30.59	18	15	15
Panimaquín	2,350	1,200	20	S-T LM MF (Cold Assoc.)	Clay loam	10.88	0	4	4
Popabaj	2,000	1,200	23	S-T LM WF (Cold Assoc.)	Clay loam	38.07	36	18	15
San Antonio El Florido y Patzunún	1,750	1,100	21	S-T LM MF (Cold Assoc.)	Sandy loam	19.03	18	10	10
Monte Limar	50	950	33	S-T MF (Warm Assoc.)	Clay loam	227.38	1.23	68	62
San Antonio Buena Vista	150-650	2,000	28	S-T MF (Warm Assoc.)	Sandy loam	1,044.19	3	266	266
Comayagua	600-1,500	2,000	24	S-T MF (Warm Assoc.)	Sandy loam,Stony	229.78	38	57	52
San Cayetano	1,350-1,750	1,750	21	S-T LM MF (Cold Assoc.)	Sandy,Silty loam	458.19	4	132	132
El Mirador	1,525-1,825	3,000	23	S-T WF (Cold Assoc.)	Clay, Stony	185.59	29	57	57
Sam Green	300-400	2,500	28	S-T WF (Warm Assoc.)	Sandy loam,Stony	403.00	17	129	129
Samanzana - Samox	300	>4,000	28	S-T RF (Warm Assoc.)	Clay loam,Clayey	600	60	170	25
Xalijá-Pataté	300	>4,000	28	S-T RF (Warm Assoc.)	Clay loam,Clayey	349	25	108	22

MAP 1

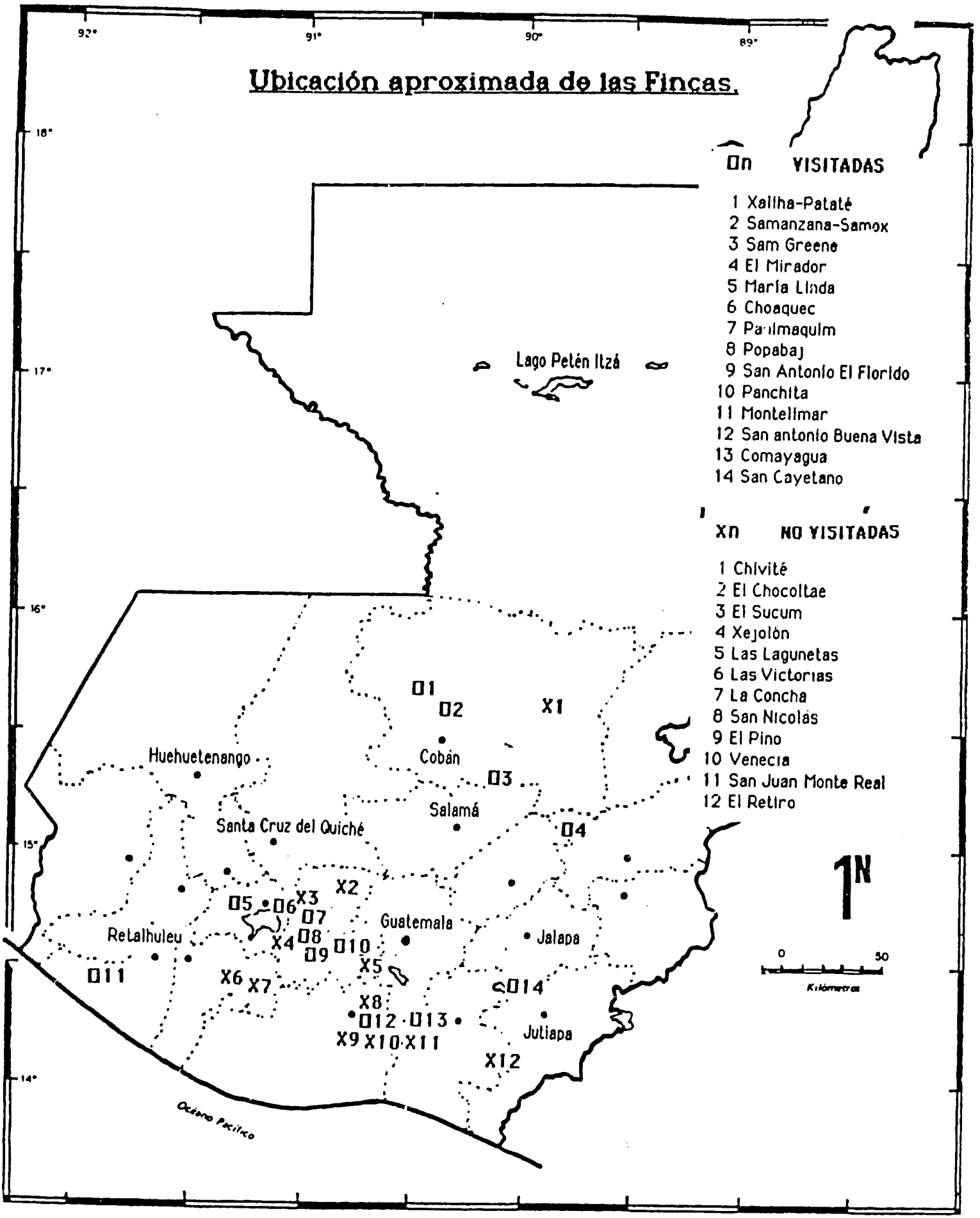

LAS REGIONES TOPOGRAFICAS DE GUATEMALA
92°
91°
90°
89°
18°
17°
16°
15°
14°
N
0
50
Kilómetros
Golfo de Honduras
Océano Pacífico
Tierras Bajas Petén-Caribe
Cordillera del Atlántico
Tierras Altas Interiores
Cordillera del Pacífico
Planicie del Pacífico
LVA /1986

MAP 2

ISOYETAS DE GUATEMALA



MAPA 3


Ubicación aproximada de las Fincas.
92°
91°
90°
89°
18°
17°
16°
15°
14°
Lago Petén Itzá
Huehuetenango
Cobán
Salamá
Santa Cruz del Quiché
Retalhuleu
Guatemala
Jalapa
Jutiapa
Océano Pacífico
01
02
03
04
05
06
07
08
09
010
011
012
013
014
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
On VISITADAS
1 Xalilha-Patalé
2 Samanzana-Samox
3 Sam Greene
4 El Mirador
5 María Linda
6 Choaquec
7 Panimaquim
8 Popabaj
9 San Antonio El Florido
10 Panchita
11 Montelimar
12 San antonio Buena Vista
13 Comayagua
14 San Cayetano
Xn NO VISITADAS
1 Chivité
2 El Chocoltae
3 El Sucum
4 Xejolón
5 Las Lagunetas
6 Las Victorias
7 La Concha
8 San Nicolás
9 El Pino
10 Venecia
11 San Juan Monte Real
12 El Retiro
N
0
50
Kilómetros