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# “WE DID THIS OURSELVES”

A CASE STUDY OF THE INAFOR/CARE/PEACE CORPS  
SOIL CONSERVATION AND FOREST MANAGEMENT PROGRAM  
REPUBLIC OF GUATEMALA



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**A Case Study of the INAFOR/CARE/Peace Corps  
Soil Conservation and Forest Management Program  
Republic of Guatemala**

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## ABSTRACT

During November, 1987, the authors conducted a case study of the INAFOR/CARE/Cuerpo de Paz (ICCP) soil conservation and forest management program operated in Guatemala by three cooperating institutions--the Guatemalan National Forestry Institute (INAFOR); CARE, a private international development organization; and the United States Peace Corps. This document describes the development of the ICCP program, its infrastructure and administration, and its successes.

The ICCP program is focused on improving the well-being of Guatemalan subsistence farmers through two methods: (1) introducing soil conservation techniques that increase and sustain crop yields and (2) on-farm tree plantings that improve access to forest resources. Soil conservation techniques employed include bench terraces, gully reclamation, infiltration ditches, live and dead barriers, and composting. Reforestation systems include agroforestry, forest tree and fruit tree nurseries, and live fencing.

Using these techniques, the ICCP program has achieved success that is visible both on the ground and in the statements of the program's beneficiaries. Participating families have seen increases in crop yields, improved access to fuelwood, and easier access to timber and other forest resources. At the present time, the program is working successfully in 13 Guatemalan departments, with 10,661 active participant farmers in 393 communities. The program aids the efforts of 193 agroforestry committees and 250 tree nurseries through the support of 80 local extensionist-promoters and 28 U.S. Peace Corps Volunteers. The ICCP program now produces 3.5 million trees each year.

The INAFOR/CARE/Peace Corps program uses Food-for-Work supplied to CARE by the U.S. Agency for International Development (USAID) as an incentive to convince subsistence farmers to attempt soil conservation and reforestation practices on their individual land holdings and on communal land they share with other families. The use of Food-for-Work in individual years has ranged as low as 149,000 pounds and as high as 1,659,000 pounds during the 13 years of the program's existence. The authors describe some of the advantages and disadvantages of using food as an incentive in the program and list specific questions that organizations should answer before employing Food-for-Work in natural resource projects. The authors conclude that Food-for-Work can be a powerful tool in such projects when accompanied by proper planning, clear-cut goals, and solid education and extension work.

The case study also describes the various factors responsible for the success of the ICCP program, focusing on cooperation between the three participating institutions and on the adaptability of conservation systems and extension efforts. The authors also describe positive impacts of the ICCP program on communities and on personnel of the institutions involved.

The document concludes with detailed descriptions of some of the dozens of communities visited by the case study field team and with a list of the 71 individuals they interviewed.

## INTRODUCTION

As the world draws closer to the 21st century, economic necessities and population growth are placing increasing demands on the renewable natural resources of developing nations. In reaction to these demands, national, international, and private voluntary organizations are focusing more attention on the proper use and development of these vital resources--soils, forests, water, and wildlife. But far too few of these development programs can be pointed to as examples of success. Too many are measured by their failures--resources wasted, projects left unfinished, or communities left disappointed by unfulfilled potential.

This case study describes one of the successes, a soil conservation and forest management program that is carrying the Central American Republic of Guatemala toward the sustainable use of its natural resources by showing both local communities and development organizations that, with adequate planning and the proper use of incentives, both people and resources can prosper.

## DEVELOPMENT OF THE ICCP PROGRAM

A 1972 study conducted by the Organization of American States (OAS) drew attention to the alarming deterioration of Guatemala's soil and forest resources, in particular in the Guatemalan Highlands (the Altiplano), where agricultural practices have not generally incorporated soil conservation measures. The result has been a decline in soil productivity due to soil erosion. This problem has been exacerbated by overcutting of forests for fuelwood and by Guatemala's growing demand for lumber. During past decades, large expanses of forest in the highlands have been converted to pasture and range land, much of which is overgrazed. As well, parents have divided their landholdings among their children, and average farm size has decreased accordingly. Many marginal areas have been converted from forest to the production of subsistence crops such as maize and beans.

The OAS study recommended a concerted effort to improve the nation's use of soil, crop, pasture, range, forest, and watershed resources and suggested the development of a network of trained forestry extensionists (promotores forestales) who would work with volunteers of the United States Peace Corps to promote community participation in soil conservation and forest management activities.

As a result of this study, Guatemala's National Forestry Institute (Instituto Nacional Forestal, INAFOR) signed an agreement with the Peace Corps to begin a grass roots reforestation and soil conservation program aimed at Guatemala's subsistence farmers. Program personnel decided to concentrate on the Guatemalan highlands as recommended in the 1972 OAS study.

At the end of 1973, a group of about 10 Peace Corps Volunteers (PCVs) were situated in communities located throughout the Guatemalan highlands. The PCVs were charged with selecting and training a promoter (an extensionist-leader) from their assigned communities and training him in reforestation and soil conservation techniques. Once trained, the promoters began to share their training with other farmers in nearby communities. In exchange, they were hired as salaried employees of INAFOR.



However, it soon became obvious to both the PCVs and promoters that INAFOR's budget restrictions made it difficult for the organization to provide the resources and logistical support the program needed to succeed at creating tree nurseries and carrying out reforestation and soil conservation projects. The volunteers and promoters also found that farmers were resistant to changing their agricultural practices and planting trees. At the end of 1974, a third institution, CARE, joined the program and agreed to use Food-for-Work provided through the USAID as an incentive to convince farmers to try out new reforestation and soil conservation practices. CARE also agreed to provide materials and logistical support to the program.

In 1974, the renamed INAFOR/CARE/Peace Corps (ICCP) program began its inter-organizational cooperation in earnest with pilot projects in four sites in highland Guatemala. By September, 1975, a group of 18 PCVs had moved to sites in six Guatemalan Departments--Quiché, Solola, Totonicapán, Quetzaltenango, Huehuetenango and San Marcos. Some PCVs who already had experience with the program extended their tour of duty; others transferred to the program from different assignments. Soon, the program was in place in 25 sites in the Guatemalan highlands. The program gained momentum and began to grow.

The success of the Food-for-Work incentive soon prompted CARE to sign an agreement with INAFOR that expanded activities to 35 communities. An equal number of PCVs were assigned to work within these sites. Gradually, between 1976 and 1978, the number of target communities grew to 50. In most sites, PCVs and promoters worked with community groups that already existed--local cooperatives, church groups--to train farmers and promote conservation activities. In other communities, they helped create groups geared specifically toward the program's goals.

As the ICCP program developed, it became increasingly clear that the combination of three different institutions working together was a major factor in the program's success. Additionally, ICCP personnel noted the positive aspects of securing community involvement in the program by taking on a citizen of the community as an extensionist-promoter. Selected from the population of the local community, many promoters have little formal education and little chance for employment. But these are individuals who understand the workings and needs of their communities from having lived there all their lives. Many are bilingual, speaking both Spanish and an indigenous Mayan language. The ICCP program offers these individuals not only employment but also the opportunity to develop new skills and confidence through training courses and frequent workshops.

Other aspects of the ICCP program were less successful, and project personnel recognized the need to adapt their efforts to the needs of local communities. During its early years, for example, the ICCP program tended to concentrate on establishing large central nurseries in towns that serviced the target communities. These nurseries required high labor inputs, transportation of sand and soil from outlying areas, and the distribution of seedlings to distant sites. As a result, PCVs and promoters found that they spent more time working in the central tree nurseries than in the target communities themselves. This realization would eventually lead to the creation of viveros volantes, smaller decentralized tree nurseries located in the target communities themselves.

Early program personnel also tended to focus on the creation of woodlots and forest plantations rather than on integrated agroforestry systems. Much of their effort was geared toward the production of timber rather than multiple-use trees. In reaction, landowners located the plantations on nonproductive land that would not support agriculture. The plantations were difficult to establish and grew slowly. This problem, too, was addressed through the integration of multiple-use trees with annual crops, and the program continued to adapt and improve.

Eventually, personnel at each site developed a cycle of activities based on local social and environmental conditions. They began to specify periods for nursery production, soil conservation, reforestation and extension work. Problems continued to be identified and resolved. Program personnel quickly realized that the communities had little voice in the way projects were carried out. Most decisions about which trees to produce, where to construct terraces and infiltration ditches, and how much food to utilize, were still being made by the promoter and the PCV. To counter these problems, personnel initiated radio programs and training courses that emphasized local conditions and sought better input from the communities themselves. ICCP program team members learned to place as much attention on social organization as on the technical aspects of the program. Thus, INAFOR, CARE, and the Peace Corps learned to adapt the program through both their failures and their successes.

Until mid-1979, the political climate in Guatemala allowed the ICCP program to prosper. But during that year, the country began to experience a spasm of violence that would continue until an elected democracy was established in 1986. As the political situation became increasingly unstable during the early 1980s, the Peace Corps withdrew its volunteers from the Guatemala highlands and relocated them to the Oriente--the drier, south-eastern departments of the country. There, the PCVs began the same process of selecting promoters from local communities, establishing tree nurseries, and initiating soil conservation practices.

Most sites in the violence-wracked highlands continued to function through the work of indigenous promoters and INAFOR coordinators, but some were shut down because organized working groups in indigenous communities were viewed by some military leaders as communist-inspired. During the early 1980s, several nursery workers were accused of being communists and were killed by unknown assailants.

Meanwhile, in the Oriente, the ICCP program amplified its geographical coverage to include five Guatemalan departments. INAFOR assigned regional personnel to work as coordinators. At first, ICCP program personnel found it more difficult to work in the Oriente. The region is lower in elevation than the highlands and is marked by a prolonged dry season. Soils are shallow and covered with rocks, and rainfall is scarce. Erosion has been severe, and environmental degradation has been aggravated by deforestation and overgrazing of cattle. Most of the pine forests have disappeared, and fuelwood shortages are chronic in many areas. Many of the soil conservation techniques and tree species identified for the highlands were poorly adapted to the region.

ICCP personnel discovered that social conditions were also different in the warmer, lower mountains of the Oriente. Farmers in the Oriente were more individualistic; they tended to cooperate less with their neighbors--a fact that made it difficult to form community groups. Land tenure was different from the highlands as well. In the Oriente, many subsistence farmers do not own their land, but rent it from large landowners. ICCP personnel found it difficult to convince farmers to establish soil conservation and forests on land they did not own.

As a result, program teams began to develop alternative systems for the region. They initiated dialogues between landowners and farmers to secure users' rights to agricultural improvements. They seized upon the idea of creating agroforestry systems--systems in which farmers could produce trees on their agricultural plots in combination with food and cash crops. They obtained good results by planting trees in the same fields with corn and legumes such as beans. Teams developed live barriers from tree species such as Leucaena sp. and Gliricidia sp. and planted native bushes and grasses for soil conservation. They helped farmers construct dead barriers from rock and crop residues.

In 1983, the program benefited from the comments of the Chemonics International Consulting Division, hired by CARE to evaluate project operations. Chemonics suggested that the project be decentralized and streamlined and that team members focus greater emphasis on multiple-use tree species and additional work on training and extension.

New types of incentives beyond Food-for-Work were introduced as well. Teams found that some communities preferred to receive fruit trees, coffee shade trees, and young coffee plants rather than Food-for-Work. Extension programs began to adapt to local conditions in the Oriente, and additional input from communities was introduced into program planning and operation.

Some of the lessons learned from the agroforestry systems introduced in the Oriente were applied to ongoing sites in the highlands as well. However, ICCP personnel knew that the success of agroforestry systems depends on local environmental and social conditions. In the highlands, they learned to place greater emphasis on fuelwood and multiple-use species instead of trees for timber. By 1984, when political violence in the highlands began to subside, program activities began to increase once again.

In 1986, the ICCP program expanded to include communities in the Department of Alta Verapaz, a warm, humid zone in north-central Guatemala. There, teams began to work with traditional indigenous communities less accustomed to outside assistance. They developed new forms of agroforestry and learned to deal with the special problems of shifting cultivation.

During that same year, 1986, a drought spread over much of Guatemala. Conditions in the Oriente, especially among small farmers, became extremely difficult. Food-for-Work took on new importance as food crops failed in community after community. In the Municipality of Ipala, Department of Chiquimula, farmers constructed 30 hectares of rock barriers on communal farm land to earn Food-for-Work. In one year, Food-for-Work assistance in Guatemala doubled to more than one and one-half million pounds of food.

During this period, the ICCP program was hindered by further cuts in the INAFOR budget--cuts that caused CARE to reassume many responsibilities it had formerly turned over the forestry institute. Despite the budget cuts, however, INAFOR's official interest in the program increased, and the program continued to expand in new directions.

Today, the ICCP program is working successfully in 13 Guatemalan departments, helping improve soil conservation and forest management with 10,661 farmers in 393 communities. The program aids the efforts of 193 agroforestry committees and 250 tree nurseries through the support of 28 PCVs and 80 promoters. Almost all PCVs are linked with promoter counterparts, though in 52 sites, promoters work without the assistance of PCVs. Most of these promoters were trained, however, by PCVs. According to ICCP program documents, the program produces around 3.5 million trees each year.

### STRUCTURE OF THE ICCP PROGRAM

The ICCP program is headed by a National Council (Consejo Nacional) that defines the program's directions and makes decisions which affect national activities. The National Council is composed of INAFOR's Sub-Director General and Director of Forest Development, the Project Manager and Associate Project Manager of CARE, the Associate Director of the Peace Corps, Regional Directors of INAFOR, and an INAFOR National Program Coordinator.

INAFOR provides salaries for the national coordinator and for regional and subregional coordinators. Regional Coordinators are responsible for a number of sites--some of them up to 17--and supervise the subregional coordinators, who provide more direct assistance to the promoters and PCVs. INAFOR also pays salaries for community promoters and provides the use of vehicles originally donated by CARE. INAFOR also provides supervision and labor for the transport of materials and food rations.

Promoters are paid according to their level of experience, with individuals in the top level earning a salary of Q300 (US\$120) per month--an excellent rural wage in Guatemala. But in at least two communities of the Oriente's Region VI, local participants have elected an honorary promoter from their ranks. These honorary promoters assist the salaried promoter and are paid in food-for-work.

According to Ing. José Miguel Barillas, chief of INAFOR's Department of Agroforestry and the head official of INAFOR's involvement in the ICCP program, "The ideal situation would be two to three promoters per site, but our budget simply won't permit us to expand that much."

CARE is responsible for importing and making available Food-for-Work donations from USAID, providing material and equipment needed to effect projects on the community level, providing funds for training technical personnel and promoters, and for overall planning of program development. CARE periodically evaluates the program and suggests improvements. According to CARE's ICCP Project Manager, Dr. Kirsten Johnson, as the program develops in the future, CARE will also assist families by helping create marketing cooperatives and by helping find markets for community products.

The U.S. Peace Corps trains and assigns individual volunteers to participating communities, provides their stipends and transportation costs, supervises their activities, and periodically assists CARE and INAFOR in evaluating program goals.

#### HOW THE PROGRAM OPERATES

On entering a new target community, ICCP program personnel organize a pre-meeting to talk with community leaders and local farmers about their needs and to describe the program's basic aspects. Following this pre-meeting, they organize a full community meeting to bring together the community's farmers, frequently starting off with a movie that may be unrelated to the program--a soccer movie, for example--in order to gather a large audience. Then, ICCP representatives explain the details of the program showing slides and talking about how conservation and reforestation techniques can conserve soil, produce fuelwood and lumber, and increase crop yields. At the conclusion of the meeting, the audience sets a date for another group meeting. At some of these subsequent meetings, the ICCP team may enact short plays, taking the roles of farmers and program team members to show the audience how Food-for-Work functions within the system.

As interest develops in the program, ICCP team members travel with a dozen or more of the most interested farmers to visit sites where projects are already underway. The farmers are urged to talk with families that are involved in the program and hear their opinions directly. Then, the farmers return to their communities to talk among themselves and to tell others what they have seen.

At that point, the ICCP team begins to make appointments with individual farmers to begin work on their land. They use these initial works as demonstration plots to show the community's farmers the range of options available to them. As interest spreads in the community, the ICCP promoter makes return visits, further explaining the project, and helping interested farmers establish more soil conservation systems on their land.

Of course, the program does not always move so quickly. "The biggest problem we have," said one PCV, "is convincing the people that what we're doing is to their own advantage. We can go in and talk to a community about setting up a tree nursery and tell them we'll provide the seed and the bags and everything else they need, and we sometimes get no reaction. If someone said that to me, I'd say, 'Great, let's do it,' but they sometimes sit there and remain lukewarm to the idea."

"But then," added another PCV, "when you mention that they'll get paid in Food-for-Work, they suddenly jump up and get excited about it."

One of the first goals of the ICCP program when it enters a new community is to help create a local committee or begin work with a committee that already exists. In order to become a new legal group, the committee must elect officers and obtain legal status from their municipality and from their department capital (cabecera). The committee must list its members and the purpose of its creation in the book of acts of both the municipality and department, an act which then makes the committee subject to auditing by

government institutions. Once established, the committees serve to guide the ICCP program within their individual communities. They decide where the nursery should be built, how it will operate, who will work there, the number and types of seedlings to produce, how the seedlings will be distributed, and where communal reforestation efforts will take place. Local committees also make decisions about soil conservation projects that affect the community as a whole.

#### THE USE OF FOOD-FOR-WORK

Food-for-Work is provided to participants in the ICCP program as an incentive to gain their cooperation. Program representatives view Food-for-Work as a short-term incentive which will prompt families to begin soil conservation and forest management techniques on their land. But the key phrase here is "short-term." According to ICCP team members, after the families begin to see the long-term results of these techniques--prevention of soil erosion, better harvests, higher income, and more fuelwood--Food-for-Work should be withdrawn.

The use of Food-for-Work in Guatemala has ranged as low as 149,000 pounds in fiscal year 1984 to a high of 1,659,000 pounds in fiscal year 1987. Except for drops in fiscal years 1983 and 1984, due largely to political problems in Guatemala, food use has tended to increase through time, partly because the number of participating communities has also increased.

In providing Food-for-Work as a short-term incentive, the ICCP program has adapted rations to the needs of local communities. Until April, 1986, the allotted food ration was 5.25 pounds. During that month, the ration was increased to 7.25 pounds, a move that, as one INAFOR coordinator noted, "caused an increase in the families' interest as well." Today, depending on the availability of commodities, the daily ration usually consists of the following food products:

maize (corn)	2.00 pounds
rice	2.00 pounds
wheat flour	2.00 pounds
red beans	1.00 pound
<u>soybean oil</u>	<u>0.25 pound</u>
<b>TOTAL</b>	<b>7.25 pounds</b>

Considerable emphasis has been placed on providing food that local communities need and will use. When first introduced, the Food-for-Work system provided bulgur wheat and cornmeal, but field workers quickly discovered that participating families had little use for these items, and the two products were dropped.

An INAFOR representative pointed out some of the problems that can occur with Food-for-Work programs that are not as careful in the selection of food resources. "The classic example," he said, "concerns the cans of processed cheese that some other organizations provide. Once the cans have been opened, they require refrigeration. But few rural families in Guatemala have refrigerators, so you'll see the cans of cheese for sale on the streets of

Guatemala City. That's not an appropriate food for rural communities." In contrast, the ICCP program utilizes food resources that rural communities recognize and utilize--"food that they can actually use," said the INAFOR spokesman.

CARE provides Food-for-Work in two different ways, and the amount of food allotted for particular activities varies from site to site. By one system, farmers receive food according to the number of days they work on soil conservation or reforestation activities. Under the second system, farmers receive food by completing specific tasks, for example, by filling a specific number of plastic bags for tree seedlings in the community tree nursery or for constructing a certain number of terraces. The quantity of work that must be completed is determined by the PCV and promoter, with the guidance of INAFOR coordinators.

Although the number of man-days worked are a function of terrain and soil conditions, the average number of man-days required to complete different soil conservation projects per cuerda (1,118 meters<sup>2</sup> or 0.1118 hectares) are as follows:

Contour infiltration ditches	10-15 man-days
Terrace construction	50-70 man-days
Dead barriers (rock walls on contours)	20-25 man-days

This second system has allowed some participants to receive more than one ration per day by working extra hours to complete more of the assigned activity. But, as a CARE technical advisor pointed out, if the required tasks are not realistically established, some beneficiaries may receive large amount of food per day or too little. ICCP team members have reported that problems occur in cases where food is distributed too liberally, with the result that people have worked to receive the food rather than to achieve long-term goals.

The use of Food-for-Work in a community is determined by the local ICCP team, frequently the local promoter and the PCV, but also sometimes by the INAFOR subregional coordinator as well. The team's decisions are based mainly on their personal experiences with the use of food as an incentive. In most sites, program team members have established norms to regulate the amount of food provided, but site personnel are left with the final decision on how much food to deliver. One PCV explained that her team leaves it up to the community to decide how much food workers should receive. "It gives them a greater sense of responsibility for the project," she added.

Not all sites use Food-for-Work for both soil conservation and the establishment of community tree nurseries. In some sites in the Oriente, for example, Food-for-Work is provided only for projects that benefit the entire community--establishing a tree nursery, planting live fences on public land, or reforesting a watershed that protects the community's water supply. In these communities, food is not provided to farmers who establish soil conservation measures on their individual holdings. However, community members who assist the farmer in working on his land do receive Food-for-Work for their labor.

Instead of providing food to individual farmers who install soil conservation techniques on their land, the team may provide fruit trees and coffee trees as an incentive for their work. A number of tree nurseries have also been created without the use of Food-for-Work, chiefly by providing fruit trees or coffee trees as incentives to nursery workers.

Using Food-for-Work only in the case of communal projects appears to have a side effect, however. One PCV in the Oriente admitted that in communities where there is no communal land, some families have asked if they could each donate a small plot of land to create a community fuelwood lot and thereby obtain the food incentive.

Because field teams--the INAFOR coordinator, the PCVs, and the promoters--are free to choose whether or not to use Food-for-Work and how much to use when they do (within parameters stipulated by the CARE program manager), one PCV has turned over management of food deliveries to her counterpart promoter. Every three months, the promoter provides a list of the days worked for each individual and the amount of food they should receive, and the promoter delivers it to the community.

CARE staff members make it clear that they are unconcerned about whether the farmer who receives Food-for-Work uses the products to feed his family or sells it to other families. "After the family gets the food," said one CARE representative, "it's up to them to decide how to use it. Once the farmer has received the ration, he has received the incentive for his efforts. We don't try to tell him what to do with the food itself."

Food used in the Food-for-Work program enters Guatemala at ports on the Atlantic Coast, where it must be stored while paperwork is completed to permit entry into the country. Upon clearance, the food is shipped to the main CARE warehouse in Guatemala City. From there, it is transported to program sites on a quarterly basis in two trucks donated to INAFOR by CARE. The trucks distribute the food to each site if large quantities are involved, or in the case of smaller amounts, leave it at INAFOR regional offices for distribution to sites in pick-up trucks. In areas where communities are isolated, food must be transported by pack animals or carried on peoples' backs.

Once delivered to a site, food is usually stored in a small storehouse constructed near project nurseries, although it may also be stored in the houses of PCVs or promoters. ICCP personnel take care to store the food properly and to deliver it to beneficiaries as quickly as possible. "We make a special point to keep the stored food away from pesticides or anything else that might harm it," said an ICCP team member.

PCVs and promoters distribute the food to participating families according to rules they established with the input of the local community. Food may be distributed at the end of each day of work, or by the week or month. Rations are distributed in plastic bags when allotted for daily or weekly work or in bulk in the case of monthly deliveries. In most regions, PCVs and INAFOR coordinators wait until workers have built up a dozen or more rations before distributing them. "That prevents us from having to hand out rations every day," explained an INAFOR coordinator.



## Advantages of Food-for-Work

The advantages of using Food-for-Work in the ICCP program appear to be many. One PCV noted that, "It's very easy to use Food-for-Work to get a lot done. The promoters especially like to have Food-for-Work to fall back on. But we always tell people that the food is just a beginning incentive. And once the long-term benefits of soil conservation are visible, some farmers don't even care about the food anymore. By then, they've seen the long-term advantages to soil conservation and what we're trying to do here." And in some nurseries, the PCV continued, "The farmers are not there just for the Food-for-Work. They want the trees. In some nurseries, Food-for-Work doesn't even enter into it."

One of the best aspects of the Food-for-Work system, according to INAFOR's head of the ICCP program, is that Food-for-Work "is not a payment; it's an incentive." "We work in independent--not dependent--communities," he said. "We don't want to force people to become dependent on outside food sources."

A promoter in Region VI further explained the benefits of Food-for-Work: "The farmers want to put these soil conservation techniques on their land, but by themselves they can't get enough workers together to do it. People have to earn enough to eat before they'll work. But by using Food-for-Work, the farmers can hire the workers they need to put in soil conservation measures. In the long-run, the individual farmer is the one who benefits, but then he turns around and works as a paid laborer on the land of the others. So all the farmers can get the short-term benefits of both the food and the long-term benefits of the soil conservation techniques."

The use of Food-for-Work can provide still another advantage to participating communities. Because farmers can earn food working to install soil conservation techniques, they are less inclined to migrate to other areas of Guatemala to work as wage laborers. One Region VI promoter put it this way: "Before the ICCP program began here, the farmers had to migrate to the coast or into the Department of the Petén to work as day laborers. But they didn't do that because they enjoyed it. Now, earning Food-for-Work, they have their payment here and they don't migrate. That has all sorts of benefits for their families and for the community."

The ease with which Food-for-Work prompts community members to join the ICCP program was illustrated by the case of Vlaimior Rodas Cifuentes, a 15-year-old interviewed in Cabricán, Department of Quetzaltenango. Rodas stated that he was happy to walk two hours to work each day in his community's tree nursery, and two hours back, in exchange for the food his labor earned.

Food-for-Work can also prompt the cooperation of farmers who do not own the land they farm. One CARE advisor pointed out that because many farmers in the Oriente rent the land they work rather than own it, "We've seen some resistance to the ICCP program because the owner can take over the land whenever he wants."

But Food-for-Work can sometimes overcome such problems, he explained. "Although only 25 percent of farmers have clear title to their land, this situation has not hindered the program. Food is a good incentive to farmers

who don't have title because they get an immediate return for their work. And because of that, we're seeing up to 10 percent increases in harvests in just one year because of the soil conservation techniques they're initiating."

At the same time, an INAFOR representative pointed out that the ICCP program has not attempted to work on Guatemala's southern coast, "because the area is characterized by single landowners with large holdings. Rather than placing our efforts there, we concentrate on working with farmers who have scarce resources."

### Disadvantages of Food-for-Work

This is not to say that Food-for-Work has no disadvantages. According to some ICCP team leaders, the function of Food-for-Work is not always clear to participating families. As one Region VI worker stated, "Considering the poverty here, the food is a great incentive for people to cooperate with the program. But there are some families who work just for the food and not for the benefits the work brings them. And then," he continued, "there are always a few families in every community who don't want to participate--despite the Food-for-Work--because of social problems with other members or because they're suspicious of the program's goals."

Nor are all PCVs happy with the use of Food-for-Work. One complained that providing food as a short-term incentive prevents farmers from focusing on the benefits of the natural resource techniques they are using. "It's paternalism," he said. "That's the bottom line." But the same PCV added that the community members themselves love the Food-for-Work program. "They keep coming to me with suggestions for projects to start so they can get the food incentive."

This volunteer concluded that he is happy to use Food-for-Work for projects that show quick results, because people can see the benefits immediately. But he continues to resist it for long-term aspects of the program.

Another PCV noted that, "I'd rather have low production numbers and have good community participation than get high production numbers by giving bribes, which is how I see Food-for-Work." This volunteer has focused instead on using fruit trees and coffee trees as incentives for farmers to work in tree nurseries and begin soil conservation techniques. "We're not producing 100,000 trees per year," the volunteer added, "but we're advancing, and that's what's important."

Most PCV resistance to Food-for-Work appears to revolve around attitudes they held before beginning work with the ICCP program. In the words of one volunteer, "My problems with Food-for-Work are theoretical. I want to be sure that the community I'm working with understands why they are installing soil conservation techniques. I don't want to think what that they're working just to get paid with food." "But at the same time," he continued, "where you don't have a strong community group--or don't have a group at all--the only way you can get things done is to give Food-for-Work."

An ICCP promoter said that he had no problems with Food-for-Work as long as it is accompanied by solid education. "Without educational work it would be a poor practice," he said. "It's better to have education and no food than to have food and no education."

Nor are all farmers dedicated to the idea of receiving Food-for-Work. An INAFOR regional coordinator pointed out that, "There are some communities in areas like the Department of Santa Rosa where the ICCP program doesn't take root because the people are making enough money from coffee production and don't need the food. But they will accept trees to shade their coffee. And in the same regions, there are always some families who really need the support, and they're happy to join the program."

The use of Food-for-Work can also produce social problems in some communities. "It has caused arguments between some of the communities," one PCV said. "People start saying, 'He got more food than I did,' and it can cause all sorts of rumors. And one time a farmer got angry with the promoter about the food rations, and everyone quit working on the program."

### Competition With Other Projects

Of course, the ICCP program is not the only agricultural development project working in Guatemala. Other organizations also work in the country, and some have been effective in promoting soil conservation techniques, especially hillside terraces. But this has sometimes caused problems in the development of the ICCP program.

According to a CARE technical advisor, the most harmful aspect of this inter-organization competition appears, "when an organization comes into a community and gets the people organized and makes big promises, then never follows through on them." Actions such as these, according to the advisor, "make people very suspicious of those who come in with real goals of helping."

One INAFOR coordinator also noted that, "We've had some trouble when municipalities obtain free food rations from international groups and simply give it away to people, although these systems are sometimes accompanied by graft and only happen sporadically. But it's hard to get things done on a long-term project when another group is giving away food as a gift."

A few development organizations in Guatemala pay farmers in cash to install soil conservation structures on their land--up to Q7 (US\$2.80) per day in what they call "social payments" (pagos sociales). "As a result," said one INAFOR representative, "we've seen cases in which farmers will go out and cut down a forest to put in terraces so they can earn the salary these organizations provide."

According to ICCP team members, these competing organizations are mainly interested in creating employment in a country where unemployment reaches 40 percent of the adult population. "They're not really interested in soil conservation techniques," said one INAFOR representative. "And they don't have an educational program. They don't teach the farmers why they're working on terraces or live barriers or infiltration ditches."

In contrast, the representative continued, the ICCP program places a heavy emphasis on education and extension. "But it's hard for us to carry out a well-organized program when we have other groups competing with us for the attention of the farmers. Because, given the opportunity," he concluded, "farmers will always take a salary over a food ration."

"We haven't been able to build terraces for two years now," added another INAFOR regional head, "because the people we've always worked with have gone into another program where they receive cash payments." In some cases, he added, communities have constructed terraces on the land of absentee landlords--to no end--simply to create work and receive a salary.

In another region of Guatemala, an ICCP participant noted that, "We've had cases where we've worked with a community for years and reached a good level of extension and education, and one of these competing organizations will come along and buy away the community with cash payments. Then, our years of work are lost because of their poor use of short-term incentives. These groups haven't thought enough about their use of incentives."

At the same time, the use of cash payments may backfire on the organizations that promote them. "Political factors can enter into them and people find that they have to be members of the proper political party to qualify for social payments," said one individual.

Food-for-Work and cash as incentives are similar in some respects. Both must be programmed effectively and efficiently to produce the desired effect. Also, both can be mismanaged to disastrous results.

In reaction to such problems, another CARE representative pointed out that using money rather than food as an incentive would have certain advantages. "To begin with," he said, "it would only take one truck delivery. But we feel that if we provide food as an incentive to farmers to build rock barriers or terraces on their land, we're paying them for the loss of time they incur. Dedicating their time to those techniques frequently means that they're losing money because so many farmers work as wage laborers."

"In many cases," he continued, "farmers have to decide whether they're going to migrate to the coast to harvest coffee or stay at home and work on soil conservation projects. So, providing them with a food ration plus the improvement of their own land is a real incentive for them to stay at home and work with us."

#### Other Problems With Food-for-Work

Some individuals pointed to problems with insect infestations in the rations provided through Food-for-Work. As one PCV noted, "The rice is always great, but the beans sometimes arrive with weevils in them, and the corn always does."

The problem of insect infestation, explained an INAFOR spokesman, is one of poor storage in the Guatemalan port of delivery. "The food sometimes sits in the warehouses too long before it can be delivered to the CARE program,"

he said. "It's a problem beyond the control of INAFOR or CARE or the Peace Corps. What we really need are special food warehouses and quick delivery."

Indeed, food storage has been a significant problem in the ICCP program. As noted, if the food is not properly stored, it may deteriorate through infestation by insects, rodents, or fungus. ICCP staff members also point out problems with the large amount of paperwork involved--producing delivery notices and conducting inventories, for example.

A CARE technical advisor indicated that it is sometimes difficult for the program to deliver the food on a timely basis. "Although the system is well-established," he said, "we have problems with vehicles breaking down and problems with fuel. Overall, dealing with food can be very time-consuming, and it can detract from other activities that program personnel could be doing to make the program more productive."

Another problem encountered concerns the role of women in the ICCP program. A male PCV in Obrajelo noted that he found it difficult to work with women in his community, "mainly because of cultural problems," while a woman PCV in a nearby site of the same Guatemalan department found it easy to work with women. It was the women of one community who formed the entire work group, she explained. "And it's the women who are asking for work so that they can earn the food," she said.

As well, in the highlands of Guatemala, a region populated mostly by indigenous groups, women seem to play a much larger role in the ICCP program, at least in tree nursery work. In the communities of Huitán and Cabricán, Department of Quetzaltenango, women are the primary tree nursery workers. They create the infrastructure for the nurseries, plant the seed beds, fill the plastic bags, and take charge of watering and transplanting the young trees. In many communities, the women are aided by young boys who, like the women, receive Food-for-Work for their labor. Here, one CARE representative pointed out, there is some question as to whether the workers are aiming at the long-term goals of tree production or simply working each day for food.

### Resolving the Problems of Food-for-Work

Many of the conflicting opinions expressed by ICCP field teams about the use of Food-for-Work appear to have their basis in a lack of understanding about the role of food incentives in natural resource projects. "We sometimes have trouble distinguishing between Food-for-Work as an incentive to families and Food-for-Work as a tool to get people working on a specific task," said one CARE representative.

"It's clear that in some cases, the farmers view Food-for-Work as a form of payment for their labor," said another ICCP team member. "And in other cases, farmers start to see the long-term benefits of the work they're doing on their land, and they can put the use of food into perspective."

Some of the ICCP teams themselves are not clear about the use of Food-for-Work in the program, according to one PCV. "The situation gets confused by their personal feelings and by the fact that the food can be phased out in some communities, but is needed for longer periods in others."

"The case of farmers in the Oriente installing improvements on rented land," added a CARE representative, "is a red flag that the people are working for the food instead of for long-term benefits, because the capital improvements go to the landowner." This may or may not be a good thing, she pointed out. "The benefits may be good for the natural resources, but it's obvious that the driving force is the food."

Taking all these considerations into mind, it seems clear that several questions must be kept in mind when considering whether or not to incorporate Food-for-Work into natural resource development projects. Among the most important are: Is the food needed by local communities? What will its impact be? Are the program's long-term goals clear enough that families will see Food-for-Work as only a short-term incentive to long-term goals?

Only by considering these questions on the basis of local conditions and requirements can project personnel properly deal with Food-for-Work in their natural resource programs.

Individuals considering the use of Food-for-Work in natural resource projects should keep in mind that Food-for-Work is a resource to be used until the long-term incentives of peoples' work begin to show themselves. "We have to remember that we're working on a development program, not a Food-for-Work program," as one CARE staff member put it. "Our goal is to help people improve their lives in the long run, not just to feed them for a week or a month. And Food-for-Work can be a good short-term tool in achieving that goal."

"If a project is able to overcome the difficulties of using Food-for-Work," said another CARE employee, "it can be a powerful incentive. Food-for-Work has allowed small farmers to take the risks associated with new or unknown practices. And some communities that previously never cooperated among themselves can come together in program activities because of the food incentive."

"On the other hand," the CARE employee continued, "when Food-for-Work is used indiscriminately, it can cause entire communities to become dependent on the food rations. We've seen cases in which the communities stopped participating in the program when the food stopped arriving. We try to handle these situations on a community by community basis and keep assisting the families so they can meet their basic human needs and improve their lives."

#### INFRASTRUCTURE OF THE PROGRAM

The long-term benefits the ICCP program is designed to effect are improved soil conservation and agroforestry techniques that will improve the lives of Guatemala's rural families by increasing their crop yields and access to forest resources. To achieve these goals, farmers and ICCP team members have a wide range of soil conservation and reforestation techniques from which to choose.

In the Oriente Departments of Jutiapa, Chiquimula, and El Progreso, the ICCP program has had excellent success in achieving soil conservation through the use of "dead barriers" and agroforestry systems. Through this technique,

rock walls or crop residues are piled up along the contours of cultivation areas to catch eroding soil and hold moisture in the ground, and trees are planted below the barriers and/or interspersed throughout the field. This technique is usually combined with the use of organic fertilizers produced from crop residues.

A CARE regional technical advisor explained that before the program began in the area, farmers traditionally planted their maize crops in rows leading down the slope of their fields, using short fallow periods or no fallow periods at all. Today, in these communities, he explained, "the program has installed dead barriers and agroforestry systems on hillside maize fields. Volcanic rocks that once covered the fields have been used to build walls along the field's contours." Between these barriers, chinaberry trees ("paraiso," *Melia azedarach*) are planted two meters apart. The rock barriers catch soil that erodes down the hillside, creating semi-terraces and holding moisture within the soil. The trees are periodically pruned and the stems and leaves used as organic fertilizer on the field.

As the farmers point out, the trees do not create enough shade to harm their maize harvests. After only three years, the farmer can harvest the trees for poles used in house construction and sell them for Q5 to Q8 each (US\$2.00 to 3.20). If the farmer waits five years to harvest the trees, he can obtain poles (*vigas*) to support a house roof or sell them for Q20 (US\$8) each.

The benefits of the dead barrier/agroforestry system are obvious to farmers who use the technique. Farmer "Checha" Morales Augustín pointed to the difference between his fields with rock barriers and trees and those still planted under the traditional system. "You can see the difference in how well the maize grows," he said. "And it's easier to clean and plant the fields because the rocks are out of the way. It was much more trouble to work here with rocks all over the soil."

The CARE regional technical advisor echoed this benefit of constructing rock wall barriers. "Before we began the program here, some farmers had already begun piling rocks into pyramids in their fields--but just so they could get to the soil."

PCV Aaron Hoopingarner, working in the Department of Chiquimula added to these statements, "The farmers like having the rocks off their land," he said. "The soil has really piled up behind the barriers and the people are now saying we need to build them higher to catch more soil."

Cesar Morales Augustín pointed to another advantage to building dead barriers with rocks from his fields. "Before we removed the rocks, slugs would hide under them and come out at night to eat the bean leaves. Now, with the rocks piled up in dead barriers, we've had almost no problem with slugs."

Temporary dead barriers can also be constructed with crop residues. Under this system, maize stalks and other organic material is piled in rows along the contours to catch eroding soil. As the residue decomposes, the farmers turn it into the soil for use as organic fertilizer. One farmer noted that, in the past, he burned the residue from each year's maize crop.

"But now we know how foolish that was," he said. "From now on we're going to mound up the maize stalks as dead barriers and put them back into the soil as fertilizer. That way, we're saving the soil and increasing our harvests at the same time."

Live barriers are also used in the program's soil conservation techniques. Under this system, rows of plants are introduced into fields, planted to follow the contours, in order to create semi-terraces and retain eroding soil. Live barrier plants used in this system include pineapple, sisal (agave), and aloe vera.

In the community of Los Morales, Guastatoya, Department of El Progreso, community members have created a seed bank for aloe vera plants, which they use as live barriers on sloped land. Beyond serving as a soil conservation tool, the aloe plants are also valuable on their own. "There's already a good market for the plants in Guatemala," said a CARE representative, "and the community gets 40 centavos (US\$0.16) for each mature plant." Community members are now experimenting with the plants to determine how much shade they will tolerate so that the plants can also be grown beneath tree crops. A Peace Corps Volunteer from the region is organizing a training course to teach community members how to use aloe plants in producing soap, shampoo, and capsules for treating gastritis.

Agricultural terracing systems have also been utilized effectively in the ICCP program. Farmers create bench terraces on their land by leveling the soil into a series of horizontal stair-step structures to create flat cultivation surfaces on sloped land. The terraces prevent soil erosion and capture water run-off so that it seeps into the soil to benefit crops. Since 1979, the ICCP participants have constructed 743 hectares of agricultural terraces. The terracing systems also utilize organic fertilizers produced by composting organic matter at farmers' houses or in their fields, depending on where organic matter is available and on the distance from house to field.

Ponciano Escalante, a farmer in the Department of Quetzaltenango, made clear his support of the terracing system he has installed with the aid of the ICCP program. Escalante has equal amounts of land in ICCP terraces and under the traditional, sloped-land system. "The thing we've noticed about the terraces," he said, "is that the soil is still there after the rainy season." "Before installing terraces on his fields," he continued, "the soil washed away with the run-off when it rained. Now, as you can see, the soil is still there."

Although Escalante noted that his yields have so far remained about the same as they were before he built his terraces, he pointed to the main advantage of this soil conservation measure. "I've still got the soil here on the terraces, and where I didn't install terraces, the soil is eroding away. That will make a big difference in the years to come."

Farmer Leopoldo Ajosola, of Santa Apolonia, Department of Chimaltenango, is also a convert to ICCP's terracing system. He noted that his maize yields are much higher on his terraced land and says he expects them to improve even more in the future. As he stated, "Before I built the terraces, the rains washed more topsoil away every year. Now, with these terraces the topsoil stays in place, and it stays moist because the water soaks into the soil."



He also said that he finds it easier to work on the flat soil of the terraces than on the sloped land that is still unterraced.

Ajosola can also plant and harvest two crops per year on his terraced land as opposed to one crop per year on his unterraced land, because of the extra moisture the terraces provide. He has also been able to plant alternative crops with higher values--such as snow peas and strawberries--and increase his income. Both of these crops must be planted on level land like that provided by his new terracing system.

The ICCP program has also been successful at halting gulley erosion through the construction of stone dikes and infiltration ditches. Near the town of Cabricán, Department of Quetzaltenango, a Catholic priest approached ICCP representatives for aid in halting massive gulley erosion on six hectares of land the church had purchased for distribution to local farmers. Through a combination of dikes, infiltration ditches, and reforestation, the ICCP program has been able to halt the erosion, using Food-for-Work as an incentive to workmen.

"The project has been a real success," said a CARE representative. "The work is halting the growth of the gulley, and we've got new eucalyptus, alder, and cypress trees growing here now." "As the area recuperates further," he said, "the church will turn the area over to local families for fuelwood and grazing."

Another key aspect of the ICCP program is the installation of tree nurseries in municipal towns and rural communities. Based on local needs and environmental conditions, committee members in individual communities select the tree species they want to produce in their nurseries, then with help from ICCP team members, construct the nursery, collect the seeds, and begin planting the seedlings. Since 1979, ICCP participants have produced 25.4 million forest tree seedlings and 228,000 fruit tree seedlings. More than 22 million young trees have been distributed to rural families.

In response to past experiences, most tree nurseries have now been decentralized to phase out central municipal nurseries in favor of smaller nurseries located within the target communities themselves. This move has been accompanied by the increased participation of program beneficiaries, who are now producing seedlings locally rather than receiving them from distant towns.

According to a CARE technical advisor, one of the problems with the ICCP program in its initial stages was failure to select the proper species of trees for specific areas. In reaction, program staff members have dedicated considerable energy to identifying tree species that are adapted to the areas where they will be planted. In some arid regions of Guatemala, the program has focused on "dry nurseries," in which tree seedlings are not watered during the dry season but are allowed to drop their leaves and resprout when the rains return several months later. By adapting species and techniques to local conditions, the ICCP tree nursery and reforestation projects have had positive impacts on problems of deforestation and access to fuelwood in participating communities. More than 369 hectares of woodlots have been established through the program, and an additional 833 hectares of forest plantations are being managed by ICCP beneficiaries. An additional 101

hectares of land have been surrounded by living fences, which are created by using cuttings from resprouting tree species that are planted as fence posts to surround a field or pasture.

One tree nursery worker stated his support of the ICCP reforestation program in these words: "The benefit of the trees is in preventing the disappearance of our forests. We get lumber, fuelwood, organic fertilizer, and all sorts of products from the forest," he said. "Our lives depend on our trees, and we don't want them to disappear."

"The most important aspect about reforestation," added a CARE technical advisor, "is that the effort be economically viable for the farmer. That's the best possible incentive he can have."

## IMPACTS OF THE PROGRAM

### Impacts on Communities

The impact of the ICCP program is visible both on the ground and in the statements of participants. One of the signs of success is the multiplier effect, the transfer of soil conservation and reforestation techniques from farmer to farmer. A promoter in the arid Oriente of Guatemala stated that, "Sometimes when we're at a site working with a farmer, other farmers will show up and look at the results and say, 'Why don't you come to my place tomorrow?' Because of this, we won't even be able to accomplish all the work this year that people have asked us to do."

The appeal of the ICCP program became especially apparent in a conversation that took place between a program representative and a nonparticipating farmer in the Guatemalan highlands. The farmer explained that he had awakened at 4:00 a.m. that morning to walk three hours up the mountain to work a full day for Q3.50 (US\$1.40) on another farmer's land. Now, at the end of the day, he was walking two and one-half hours through the dark to return home so that he wake up and start out again the following morning.

"Have you ever worked with the INAFOR/CARE/Peace Corps program?" the program representative asked him. "We work in this program so that people can improve their yields on their own land." "Then we'll do it for sure," the farmer answered. "That's what we really need to advance in our lives."

### Impacts on the Institutions

The impact on personnel of the three institutions involved in the ICCP program has been as striking as the benefits received by participating farmers. The INAFOR coordinator for Region VI stated that, "With the ICCP project I have the ability to show that I'm capable. It's a prestigious project, and it makes me proud to work with it. It's a dynamic program with new ideas, so I feel lucky to work on it. But at the same time, I have 12 years working for INAFOR, and I still feel very much a part of INAFOR."

INAFOR's involvement in the ICCP project has been so successful that the institute's leaders are considering using their ICCP office as a model to

restructure the entire INAFOR organization. "Because many INAFOR staff members tend to work from their desks in the capital city," explained an INAFOR representative, "they don't get an accurate picture of what's going on in the communities they're trying to affect." "By contrast," he said, "INAFOR's ICCP staff members work directly with the communities in the field. They tell us what is actually happening there and what is needed in the field, on the ground. That's a role that INAFOR workers should be filling in all our efforts."

Impacts have also been positive on community promoters. "When I first started working with my promoter," said one PCV, "he was afraid to say anything in front of a group of people. Now he feels confident, and he will stand up in front of a group and give the entire presentation.

"We went to a workshop once," the PCV added, "and the other PCVs thought it was boring. We were talking about basic things like how to make different thicknesses of lines with a Magic Marker. But the promoter walked out talking about how great the workshop was. He kept telling me how much he learned, and said he wanted to write a letter thanking the group for the experience. It really gave him new confidence."

Another PCV pointed out that his counterpart-promoter has developed more than confidence. "He has attained a new status in the community," he said. "In the last few months the community has asked him to head up a whole range of committees--to petition for a bus stop, to start clubs, to be the president of their group. The community really looks up to him."

Many promoters have also turned their position into the chance for personal development. "The promoter in my community is really hardworking," said another PCV. "He has trouble reading and writing, so I write the monthly reports. But the promoter then copies the reports by hand and reads them back to me out loud. Now, he's reading and writing better than he ever has."

The role of the Peace Corps Volunteer has been vital in the development of the ICCP program. "If the PCV is an effective worker," said one CARE employee, "it really makes a difference. The program seems to leap into action much better."

Ing. José Miguel Barillas of INAFOR's ICCP program office explained that a community can sometimes work very well without a Peace Corps Volunteer if it has a good coordinator and good promoter because these employees feel more responsibility. "But the community seems to be more motivated when they have a Peace Corps Volunteer," he continued, "because he or she lives among them to represent the program." "As a result," he said, "the people have more confidence. It breaks the ice, and they start to seek out the volunteer to find out how the program works. It facilitates the introduction of the program to the people."

The key element the PCV brings to the program, added an INAFOR spokesman, "is that they live inside the local community, unlike other team members who may come in only once a week." "And the people know that the PCV does not live in luxury," the spokesman continued. "They live like the people in the community and they sometimes suffer like they do. The people

know that the volunteers are there because they want to help, and because they want to understand their lives."

As INAFOR coordinator Edgar Palma noted, "We've sometimes seen that in areas where the project was moving slowly, a dynamic Peace Corps Volunteer will come into the program and our progress just leaps forward." "The PCV brings in enthusiasm and energy," Palma explained, "and it stimulates us all."

A local promoter added that, "It's always better to have a Peace Corps Volunteer working with us. I've learned a lot working with them myself, and the people really accept them."

Having a Peace Corps Volunteer in an ICCP community carries still another advantage. Volunteers have access to the Peace Corps' Small Project Assistance Funds (SPAF), created in 1983 to provide small sums of money to carry out vital projects within individual communities. The USAID provides \$40,000 to \$120,000 in SPAF funds each year within Guatemala. To obtain project funds, the volunteer must submit a project proposal that is reviewed on a competitive basis by a committee of other Peace Corps Volunteers.

The SPAF funds are a big advantage to the ICCP program, said an INAFOR representative. "The classic example is the municipality of Obrajuelo in the Department of Jutiapa," he noted. "The community was a little resistant to join the program's soil conservation and forest management efforts. But when the local Peace Corps Volunteer got SPAF funds to construct a school there, their attitude changed. Now, it's amazing how well the community works with us."

A CARE technical advisor pointed to the main qualities a successful Peace Corps Volunteer must have to benefit the ICCP program. "The volunteer has to understand that the key elements of development are providing know-how and opportunity to the people. They also need to understand the importance of continuity--the importance of helping people set up something that will continue after the volunteer leaves the country."

PCVs involved in the ICCP program appear to have incorporated these concepts well. All showed serious dedication to the program and enthusiasm for its goals. One PCV in the Oriente stated his perspective clearly: "This experience has done a lot for me. It has really improved my social skills."

#### SUCCESSSES OF THE ICCP PROGRAM

Several key factors stand behind the success of the ICCP program in Guatemala. The most important of these is the ongoing cooperation of the three member organizations--INAFOR, CARE, and the U.S. Peace Corps. Employees from all three institutions emphasized that none of the three collaborating organizations could have achieved such success working alone. Only by cooperating have they been able to reach their common goals.

CARE provides not only resources, but also a structured program with long-term administrative skills, said one INAFOR official. "CARE is an

efficient organization, while host institutions in some countries can be bound by red tape and bureaucracy."

Added another INAFOR representative, "The support we get from CARE gives us the ability to work in the field the way we know is necessary, yet CARE never clips our wings."

In turn, INAFOR provides credibility and government support to the program. "There is good government commitment to the program," said a CARE employee, noting that the Government of Guatemala provides Q75,000 (US\$30,000) to the program each year despite current economic strictures.

"We think the ICCP program is a great success," he said. "If you compare all the soil conservation systems in Guatemala, this one really stands out as the best. And the people know it. In one work site, even though we had a severe drought last year, we started out with two farmers and ended the year with 27."

Several ICCP workers indicated that the way the Peace Corps is organized in Guatemala helps the program immeasurably. "It's the best," said one PCV. "Because we have well-defined objectives, there's a lot of group pressure among the volunteers to perform. And because of that, we do."

The successful cooperation of the three participating institutions is a theme that program personnel continually point to. One INAFOR subregional coordinator stated bluntly that, "There's not a region in Guatemala where the relations between INAFOR, CARE, and the Peace Corps are as good as they are here." But this same statement was echoed in all of the regions of the program--a further sign of the success of the three-institution teamwork.

Another key to the ICCP program's success has been its flexibility, "its ability to roll with changes of all sorts," as one CARE employee put it. A subregional coordinator from Region V stated the point succinctly: "We work well together because we're flexible. If the other teams in my region need something and I have it, or I need something and they have it, we exchange them--things like wire and plastic bags--but ideas as well. We're a family here, with the Peace Corps Volunteers, the coordinators, and the promoters, so we work well together."

A CARE representative pointed to community training as the key factor in the program's achievements. "The key to the success of the program," she said, "is good, sustained extension work. And you get that by selecting the coordinators well." "The second step," she added, "is to provide the promoters with good training."

An INAFOR regional coordinator gave his reasons for the program's success in this fashion: "The structure of the program is good, and the farmers have responded because they can see we're serious about helping them. After we've showed up on a site four times, the people begin to understand that we're with them for the long term. But, in turn, we have to be serious, working sometimes from dawn till night."

"The real success of the ICCP program," said Regional Coordinator Rodolfo Guzman, "comes from showing a community what it can do working on its

own. Because the short-term incentives the program provides aren't always going to be there."

Another INAFOR spokesman reiterated the point. "The best ally the program can have," he said, "is a happy farmer, one who is telling his friends and relatives about the success of the techniques he has learned."

## FUTURE PLANS

The major focus of the ICCP program in the future will be on what CARE has called "the process of transference"--finding ways to allow local communities to take over the planning and development of sustainable natural resource projects they have begun so that they will continue on their own without outside incentives. "We plan to progressively transfer more responsibility and management of projects to the communities themselves," said a CARE project leader. "In the future, you'll see lower levels of materials and food going into the communities as local communities take over."

In coming months, the ICCP program will reinforce its efforts to establish strong extension work and to convince farmers that soil conservation and reforestation projects serve their own local interests. Program staff members will also focus specifically on practices and tree species that are of most interest to the participating communities.

"It's critical that the program identify activities that produce positive results over the long term," said the CARE program leader, "and also that it respond to the short-term needs of the participants."

In the future, the ICCP program will seek to assure that trees produced in nurseries become the property of those who produce them. "The project should prevent situations in central nurseries in which work is paid for with food but the workers are not the owners of the trees," stated a 1987 CARE document. "It is also important to select reforestation sites in which participants are guaranteed the products of their work. Ambiguous ownership--whether of trees or land--should be avoided," the document continues. "It is important to avoid situations in which renters carry out reforestation or soil conservation work on land they do not own."

"If your goal is to use natural resources sustainably," the CARE project leader said, "you want people to do it on their own. You don't want to pump in outside resources, including food. Outside incentives are appropriate at the beginning, but not over the long term. Food-for-Work is most appropriate when communities are organizing themselves and receiving training, but not throughout time."

Nonetheless, Food-for-Work incentives have played an important role in the development of the ICCP program. As a CARE technical advisor stated, "Food-for-Work has given small farmers the opportunities they needed to get started. It has benefited the communities by allowing us to show them that the technology exists for improving their well-being. And it has helped farmers come together to work in conservation activities for their own

benefit. When it's used judiciously, Food-for-Work has its place in natural resource projects."

In the analysis of another CARE representative, "Guatemala is becoming increasingly aware of the role of natural resources and small farmers in the country's social and economic structure. Only by establishing natural resource policies that can survive changes in government and work for the benefit of the people will there be a chance for sustained development. The ICCP program has shown that this is possible."

In such a fashion, the INAFOR/CARE/Peace Corps soil conservation and forest management program in Guatemala will continue to make its impact on the nation's renewable natural resources. Organizing communities, training promoters and farmers, and utilizing the particular skills of each contributing organization, the program will continue to adapt and improve, helping bring self-sufficiency and self-respect to Guatemala's subsistence farmers and helping define a new future for the country's vital agricultural and forestry activities.

In the end, as one former Peace Corps Volunteer put it, the people will be able to look up from their work and say to one another, "We did this ourselves."

ANNEX A

MINI-CASE STUDIES

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## MINI-CASE STUDIES

During November, 1987, the ICCP program case study team visited dozens of local soil conservation and reforestation projects in 11 municipalities located in seven different departments of Guatemala. Here, we provide details on only a few of those local projects, specifically two of those to be visited by participants in the 1988 Natural Resource and Food Aid Workshop, which will be held in Panajachel, Guatemala.

Information on other sites visited by the case study field team can be obtained through OTAPS/NR, U.S. Peace Corps, Washington, D.C. and from the RTAT Office, CARE-Costa Rica, San José, COSTA RICA.

### SITE NAME: SANTA APOLONIA

Region V, Departamento de Chimaltenango

INAFOR Sub-Regional Coordinator: Noe Rodriguez Cano  
INAFOR Promoter: José Alfredo Zaníc

The site of Santa Apolonia lies in a very humid lower montane life zone in the Guatemalan Department of Chimaltenango. The region is characterized by low, rolling hills covered with fertile soils. The average elevation is 2,285 meters above sea level, with an average annual rainfall of about 1,800 millimeters.

The ICCP project was initiated in Santa Apolonia in 1975, and currently has one promoter on salary from INAFOR. The promoter works from the central nursery in the community of Santa Apolonia to provide assistance to 13 aldeas --Reisatean, Paralbes, Xcabol, Chuacacay, Xepanil, Patzaj, Xesajeap, Chuaparral-Primero, Chiquex, Chipata/Las Mejoranas, Chua Antonio, Pacutan, and Xecoil. Eight of these aldeas were added to the program in 1987, and today all but Chua Antonio have tree nurseries. Each nursery set a goal of producing 10,000 tree seedlings in 1987, including seedlings produced by bare root methods and in plastic bags.

The majority of the five promoters in the Chimaltenango Department were hired since 1979, and few remember the two PCVs who worked there until they were evacuated during that year in reaction to increasing guerrilla activity. Nonetheless, one promoter noted that the PCVs "were a big help to us," adding that one successfully aided cooperation with the local communities by building a soccer field.

The ICCP program case study field team visited four work fronts in the Santa Apolonia site--the Central Nursery, Plantation Doña Tomasa, the Patzaj Nursery, and Chipata/Las Mejoranas.

At the first of these fronts, the Central Nursery, the team was told that the nursery produced 75,000 tree seedlings during 1986, but that it lost 32,000 to early November frosts. For 1988, work teams set a goal of only 33,000 seedlings, which will include 8,000 seedlings in 5 cm by 20 cm black plastic bags and 3,000 peach trees and the remainder as bare root seedlings.

Forest species include Casuarina equisetifolia, Eucalyptus globulus, Cupressus lusitanica, and Pinus pseudostrabus. All seeds were collected locally.

Seedling production was lower at the Central Nursery for 1988 because production has been shifted to nurseries located in individual communities. However, total production for all sites in the Santa Apolonia region for 1988 is 133,000 tree seedlings, up from the 1986 total of 75,000.

In reaction to the frosts of 1986, all forest tree seedling beds are protected against frost by being covered with cut cypress branches placed on an elevated frame about 35 cm above the seedlings. Only the bed used to germinate peach seeds is without this cover; instead, it is mulched with pine needles. The fruit trees are germinated in seedbeds and will later be transplanted to 15 cm by 20 cm black plastic bags for grafting.

Between two and six men or boys work in the Central Nursery each day, depending on the amount of work required. Each is paid one ration of food per day of work.

At the work front called Plantation Doña Tomasa, located about one kilometer from Central Nursery, the team examined a one-hectare agroforestry demonstration site established in 1980 on privately owned land. The plot was first planted in maize, with alternate rows of Cupressus lusitanica, Alnus acuminata, and Pinus tenuifolia. Planting required the work of 10 men, who labored between 150 and 200 man-days, and they were paid with Food-for-Work. Seedlings were planted in a pattern of two meters by two meters, and crops were sown during the first three years of growth. Maize was planted during the first two years and bean during the third. According to local promoters, the two years of maize produced "good" yields, but the third sowing, of beans, was unsuccessful. The site promoters noted that by the third year, the trees were producing too much shade for proper growth, and the bean plants produced leaves but no pods.

Although all badly formed and defective trees on the plot were marked for thinning during 1986, not all of these marked trees had been cut by November, 1987. Those that had been felled were used for fence posts, fuel-wood, and the construction of a house. Promoter Jose Alfredo Zanic stated that, "The plantation is like capital for the owner. Whenever she needs wood for something, she just comes here to cut it."

The plantation's pine trees have been heavily attacked by pine rust, and those few that have survived are only 3 meters tall with spindly, sparse crowns. Cypress diameter at breast height ranges from 12 cm to 20 cm, and heights range up to 21 meters. Many of these cypress trees are growing through the lower crowns of alder trees and show evidence of having had their leader branches destroyed by being "whipped" by alder branches. In spite of thinning, tree crowns are still reasonably closed.

Recommended management plans for the Plantation Doña Tomasa include cutting the alder trees first to leave the cypress as the final tree crop before the agroforestry cycle begins again.

In the aidea of Las Mejoranas, the field team examined a soil conservation demonstration area established in 1986 on the land of farmer Leopoldo Ajosalo. The site is located on a hill about 85 meters above a river. Slopes on the site range from about 10 percent to 60 percent. Approximately 1.4 hectares of this sloped land are now covered with terraces ranging from one to three meters wide and 0.75 to 1.5 meters tall. All terraces are sloped back into the hill at a five percent grade. Ajosola stated that it took around three days to construct a terrace 2 meters wide by 1.5 meters tall and 24 meters long.

On a typical two-meter wide terrace, seven to eight maize plants were grown in hilled rows parallel to the slope, with about one meter between rows.

Ajosola is convinced that his maize yields are much higher on his terraced land and he expects them to improve even more in the future. As he stated, "Before I built the terraces, the rains washed more topsoil away every year. Now, with these terraces the topsoil stays in place, and it stays moist because the water soaks into the soil." He also said that he found it easier to work on the flat soil of the terraces than on the sloped land still unterraced.

The case study field team also noted the difference in yields produced on terraced as opposed to unterraced soils. On one slope the farmer has constructed terraces that are located next to a maize field planted in the traditional fashion. Although both fields were planted at the same time, maize on the terraced land had grown to two meters in height and ears were large and healthy. Maize on the traditional sloped field seemed stunted at about 1.25 meters, with many undeveloped ears. The site promoter told the field team that several other farmers in the community had also noted the difference in yields and had asked him how they could join the ICCP project.

Food-for-Work was provided to Ajosola and those who assisted him in creating his soil conservation system. These individuals were given one ration of food per person per day. Ajosola now spends part of his time maintaining his terraces, and during the field team's visit asked his promoter if he could be paid in Food-for-Work for this maintenance.

In the community of Patzaj, consisting of about 150 families, local farmers have been working with the ICCP program since 1983. During the last four years, 30 to 35 farmers have worked on soil conservation projects and have received one ration of Food-for-Work per day. The typical work-day begins at 7:00 a.m. and ends at 4:00 p.m.

During 1986, most work focused on construction of contour infiltration ditches. Approximately five hectares of this soil conservation technique were created by a total of 15 farmers.

In 1986, the families decided to establish a tree nursery within the community. The president of the Patzaj ICCP Project Committee provided a plot of land 10 meters by 12 meters, and committee members constructed five terraces to hold the tree seedlings. The site is fenced with barbed wire and chicken wire donated by CARE. The wire is strung on cypress posts donated by

the community. Water for the nursery comes from a gravity-fed system that originates in a creek running beside the nursery site.

Species being propagated are Cupressus lusitanica, Eucalyptus globulus, Casuarina equisetifolia, and Pinus pseudostrobus. Alder seeds introduced from outside the community were planted in the nursery, but failed to germinate. Root stock for 200 apple and peach trees will be brought to the site during late 1987 for grafting.

Seedlings are grown under shade provided by cypress branches laid over a frame mounted about 25 cm above the seedbeds. Seeds are germinated in the seedbeds and, upon reaching 2.5 cm, are removed from the seedbed, and planted in plastic bags. Committee members fill the plastic bags with a mixture of two parts soil and one part sand at the rate of 500 bags per worker per day.

The Patzaj committee has set a goal of producing 10,000 seedlings during 1987. According to the committee president, "There is no problem getting people to work in the nursery. Everyone participates." This attitude is notable because no food has yet been provided for the nursery work. However, participants are scheduled to begin receiving Food-for-Work during January, 1988.

According to one committee member, "Each family receives seedlings according to their needs. We want to make it possible for each family to have their own forest of 25 trees or so."

**SITE NAME: SAN MARTIN JILOTEPEQUE**

**Region V, Departamento de Chimaltenango  
INAFOR Promoter: Santiago Zet Sutuj**

San Martín Jilotepeque is located in a transition zone between the subtropical montane forest zone and dry subtropical forest zone. The terrain is characterized by low, rolling hills with an average elevation of 1,220 meters above sea level. Heavy pressure has been placed on the forest by extensive cutting for fuelwood, much of which is sold by the roadside for use in Guatemala City. During November, 1987, each carga of wood was selling for Q2.50 (US\$1) at the roadside loading point. Although this commercialized cutting is illegal, it provides an important source of income for local farmers.

Within the area of San Martín Jilotepeque, the ICCP program works in four communities to carry out the following tree nursery activities:

## Seedlings Produced

### By Community Nurseries

<u>Community</u>	<u># Nurseries</u>	<u>Grevillea robusta</u>	<u>Other (mostly pine)</u>	<u>Total</u>
Las Lomas	2	9,000	9,000	18,000
Xejuyú	1	3,000	7,000	10,000
Conajal de Medina	1	8,000	4,000	12,000
<u>Estancia San Martín</u>	<u>1</u>	<u>0</u>	<u>6,000</u>	<u>6,000</u>
<b>TOTALS</b>	<b>5</b>	<b>20,000</b>	<b>26,000</b>	<b>46,000</b>

**NOTES:** 1 - 11,000 seedlings were also produced in the central nursery.  
2 - Grevillea is used for agroforestry plantings.

Two PCVs have worked in San Martín Jilotepeque. The latter of the two worked with the current promoter for one and one-half years--until 1979--but was withdrawn due to increasing guerilla activity in the area. Still, the local promoter stated that the PCV was "a good worker, though he was forced to spend much of his time writing reports and working in the central nursery."

The promoter now spends most of his time in the field visiting each community nursery site at least once each week. One of these fronts is located 24 kilometers from his home base of San Martín, and the promoter must spend a full day on his bicycle to visit the site. The promoter noted that two other communities had asked to join the program and start nurseries.

The Central Nursery for San Martín Jilotepeque is located in the town of that name. It was established in 1977 on privately owned land rented by the municipality for Q60 per year. When the rent amount was increased by Q10 during 1987, CARE agreed to provide this additional amount.

Production at the central nursery is now 11,000 seedlings, down radically from the 40,000 of previous years in reaction to the creation of viveros volantes, small nurseries located in site communities. The central nursery site measures 28 meters by 60 meters and has been fenced with chicken wire and barbed wire. Seedlings grow in 5 cm by 20 cm black plastic bags and were planted directly into the bags. Species include Pinus tenuifolia, Grevillea robusta, and an Inga sp. called chalum. Water is provided by a hand-dug well with a water table of eight meters depth.

Twenty-five men and boys from the community work in the central nursery on a rotating schedule. Normally, only two workers are in the nursery on any particular day. In exchange for one day's work, these individuals receive one ration of food.

The field team also visited the aldea of Xejuyú, where a vivero volante was established in 1987. This nursery site measures 8 meters by 22 meters and is situated on land loaned to the program by a widow who is not a member of the nursery committee. In exchange, she will receive seedlings as payment.

The nursery site is fenced on three sides by strands of barbed wire stapled to cypress posts. On the fourth side, strands of barbed wire were interwoven with maize stalks and connected to living fence posts of Bursera semiruba planted at two-meter intervals.

Seedlings were seeded directly into 5 cm diameter by 20 cm black plastic bags and filled with a mixture of one-half soil and one-half sand. Two 1.5 meter wide beds of plastic bags contain recently-germinated seedlings of Pinus tenuifolia and two contain Grevillea robusta. Many of the bags containing grevillea were not adequately filled or packed with soil. This has caused the tops of the bags to fold over the surface of the soil, a condition that makes it difficult to water the seedlings. The bags were held upright in beds by a frame built of split bamboo tied to stakes driven into the ground.

Seedling production for 1987 is expected to reach 10,000 plants, although only 8,000 had been planted by November, 1987. Water is provided by a well located seven meters outside the nursery enclosure.

Fifty community members have participated in the program by working in the nursery, although no Food-for-Work has yet been provided. However, those working in the nursery will begin receiving food during January, 1988.

CARE technical staff pointed out to community representatives that the species of pine they had planted, Pinus tenuifolia, is not well-suited to the area because of its susceptibility to pine rust, a condition that drastically reduces tree growth and lowers resistance to insects and other diseases.

In turn, the president and members of the nursery committee stated that attending the nursery required considerable work and asked if CARE or INAFOR could provide a salary for someone to work half-time there. They added that they needed a fungicide (Cupravit) with which to spray the seedlings to protect them from "dampening-off" disease. They also requested a pump to bring water from the well to the nursery. The water table lies six meters below the surface.

In answer to these requests, the CARE technical advisor pointed out that the group had received materials and had been assisted by the ICCP program. He indicated that it was important for the community to work together and to take responsibility for their community's development. The promoter also discussed the possibility of initiating a community forestry fund to pay for the cost of producing seedlings, including payment for a part-time nursery worker.

At the nearby site of Piedra de Fuego, the field team viewed a five-hectare agroforestry demonstration plot located on land owned by Manuel Antonio Roca. On gently sloping land (5 percent grade), the farmer had planted maize in rows one meter apart during 1985. Then, he planted

Grevillea robusta throughout the site, using a three meter by three meter interval. The grevillea had an initial survival rate of more than 90 percent, and after two years had reached 7 cm in diameter at breast height (dbh) and six meters in height.

Maize production was reported to be good during 1986, but during 1987-- although the maize had grown to five meters--was not expected to be very successful due to unfavorable weather at time of pollination.

ANNEX B

DATA TABLES

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ACTIVITIES ACCOMPLISHED

1979-1987

FISCAL YEAR (JULY-JUNE)	1979	1980	1981	1982	1983	1984	1985	1986	1987	TOTAL
I. Soil Conservation										
1. Terraces (Ha.)	42	43	67	87.7	90.5	96.5	84.5	78.5	153.2	742.9
2. Conservation Ditches (Ha.)	321.2	816.2	123.2	209	286.9	70.8	78.1	66.5	171.9	2145.8
3. Live/Dead Barriers (Ha.)			3.3	53.9	296.9	24.7	27	96.8	431.6	934.2
4. Compost Bins (600's sq ft)	12.5	8.6	3.6	2.1	3.7	4.1	4	7.7	12	58.3
5. Pasture Grass Planting (Ha.)	20	2.5	8.5	15.5	9.6	11.5	9.6	16.5	37.6	131.3
6. Maintenance of Soil Conservation Structures (Has.)								27.7	250.8	278.5
7. Gulley Stabilization (Ha.)	152	4	4	7						167
8. Contour Planting (Ha.)	135	12								147
9. Tractor Work (Ha.)	10	16								26
II. Reforestation										
10. Forest Tree Seedling Production (millions)	2.3	2.1	3.6	3.1	2	2.7	3	3.3	3.3	25.4
11. Fruit Tree Seedling Production (100's)	10.6	12.5						56.8	148.2	228.1
12. Seedling Distribution (millions)	2.3	2.1	3.2	2.7	2.4	2.7	2	2.1	2.7	22.2
13. Woodlot Establishment (Ha.)							60	68	241.6	369.6
14. Direct Seeding (Ha.)								61	31.7	92.7
15. Plantation Management (Ha.)								279.8	553	832.8
16. Live Fencing (km.)								8.5	92.8	101.3
III. Education/Training										
17. Conservation Demonstrations (#)	1482	928	844	657	890	811	2022	1489	2083	11296
18. In-Service Seminars for Promoters (pers/day)								875	1095	1970
19. In-Service Seminars for Technical Personnel (pers/day)								376	505	881
20. In-Service Seminars (#)					3	5	2			10
IV. Other										
21. Stoves Constructed (#)					498	701	770	665	97	2731
22. Formation of Fire Brigades (#)							6	50	114	170
23. Management Plans (#)								9	161	170

FOOD DISTRIBUTION

<u>FISCAL YEAR</u> (July - June)	<u>QUANTITY</u> (lbs.)	<u>BENEFICIARIES</u> (#)
1978	427,000	11,404
1979	688,000	11,986
1980	691,000	13,820
1981	929,000	18,580
1982	1,008,000	20,160
1983	518,000	10,360
1984	149,000	2,980
1985	948,000	18,960
1986	856,000	17,120
1987	1,659,000	11,060
	<hr/>	<hr/>
TOTAL	7,873,000	136,430

Note: The number of FFW Beneficiaries is calculated at an average of 50 lbs. per worker. This figure was determined from the records where the number of beneficiaries was available.

PRODUCTS UTILIZED

White Flour	* WSDM (Whey Soy Drink Mix)
Soybean Oil	* Pinto Beans
Bulgur	Red Kidney Beans
CSM (Corn-Soya Milk)	Rice
* Sorghum	Corn

\* = minor quantities, under 20,000 lbs. Total.

DISTRIBUTION OF FOOD-FOR-WORK  
BY REGIONS FOR FISCAL YEARS 1986 AND 1987

FY 1986

<u>REGION</u>	<u>QUANTITY (lbs)</u>
1	524,899
2	44,446
5	158,978
6	107,180
7	20,497
	<hr/>
TOTAL	856,000

FY 1987

<u>REGION</u>	<u>QUANTITY (lbs)</u>
1	778,807
2	54,576
3	289,372
6	284,385
7	251,860
	<hr/>
TOTAL	1,659,000

UNIDAD DE MEDIDA PARA  
ACTIVIDADES AGROFORESTALES

ACTIVIDAD	UNIDAD DE MEDIDA	MINIMO	MAXIMO	UNIDADES/ JORNAL MEDIA
Produc. Planta Raíz	árboles	57	112	85
Produc. Planta Bolsa	árboles	28	57	43
Produc. Frutales	árboles	17	28	23
Reforest. Raíz	árboles	200	400	300
Reforest. Bolsa	árboles	50	100	75
Siembra Directa	posturas	300	500	400
Mant. Plantaciones	cdas. 25x25	1	2	1.5
Cercos Vivos Raíz	M.L	400	800	600
Cercos Vivos Bolsa	M.L	100	200	150
Cercos Vivos Estacas	M.L	100	200	150
Cercos Vivos Siem. Dir.	M.L	3000	5000	4000
Terracas Contínuas	cdas. 25x25	15	30	23
Terracas Individuales	cdas. 25x25	5	10	8
Acequias Infiltración	Mts.	10	20	15
Barreras Vivas Pasto	Mts.	10	200	150
Barreras Muertas Piedra	Mts.	3	5	4
Barreras Muertas Rastrojo	Mts.	200	300	250
Abonera	M <sup>3</sup>	1	2	1.5
Curvas a Nivel	Mts.	50	100	75
Siembra Pasto Talud	M <sup>2</sup>	15	30	23
Control Cárcavas	Mts.	2	4	3
Mant. Est. Conserv.	cdas. 25x25	1	2	1.5

## UNIDAD DE MEDIDA PARA ACTIVIDADES AGROFORESTALES

### ESPECIFICACIONES

1. Producción de Planta: Un hombre trabajando seis meses (180 días promedio) a tiempo completo tiene la capacidad de producir cualesquiera de las siguientes cantidades: Raíz desnuda = 15,000, en bolsa = 7,500, frutales = 4,000.
2. Reforestación: Difiere si es en bolsa, raíz, siembra directa y la distancia en que se tienen que transportar los arbolitos.
3. Mantenimiento de Plantaciones: Depende de la zona, del crecimiento de malezas y su conformación.
4. Cercos Vivos: Lo común es plantar los arbolitos o el material a la distancia de dos metros, que es la distancia promedio entre un poste y otro.
5. Terrazas: La cantidad de jornales depende del suelo y la pendiente y si son continua o individuales.
6. Acequias: Si el suelo es arcilloso y pesado el número de jornales es mayor. Otro factor es la profundidad: lo recomendable es 50 cm de profundidad por 40 cm de ancho.
7. Barreras: El número de jornales a utilizar dependerá si es de pasto, piedra, rastro u otro material. La distancia donde se encuentra el material es de suma importancia el cálculo. En las barreras de piedra se considera el ancho y la altura.
8. Siembra de Pasto en Taludes: En terrazas se considera un ancho del talud de 50 cms. En este ancho se pueden incluir tres surcos de pasto.
9. Control de Cárcavas: Difiere si los muros a construir son de piedra, material vegetativo u otro. La tarea se basa en metros lineales promedio que pueda hacer una persona.
10. Mantenimiento de Estructuras de Conservación de Suelos: En terrazas una persona puede dar mantenimiento a una cuadra de 25x25 varas, en acequias oscila de 2 cuerdas como mínimo.

SITES VISITED BY THE PEACE CORPS REPRESENTATIVES

AND CARE REGIONAL TECHNICAL ADVISOR

NOVEMBER 16-21, 1987

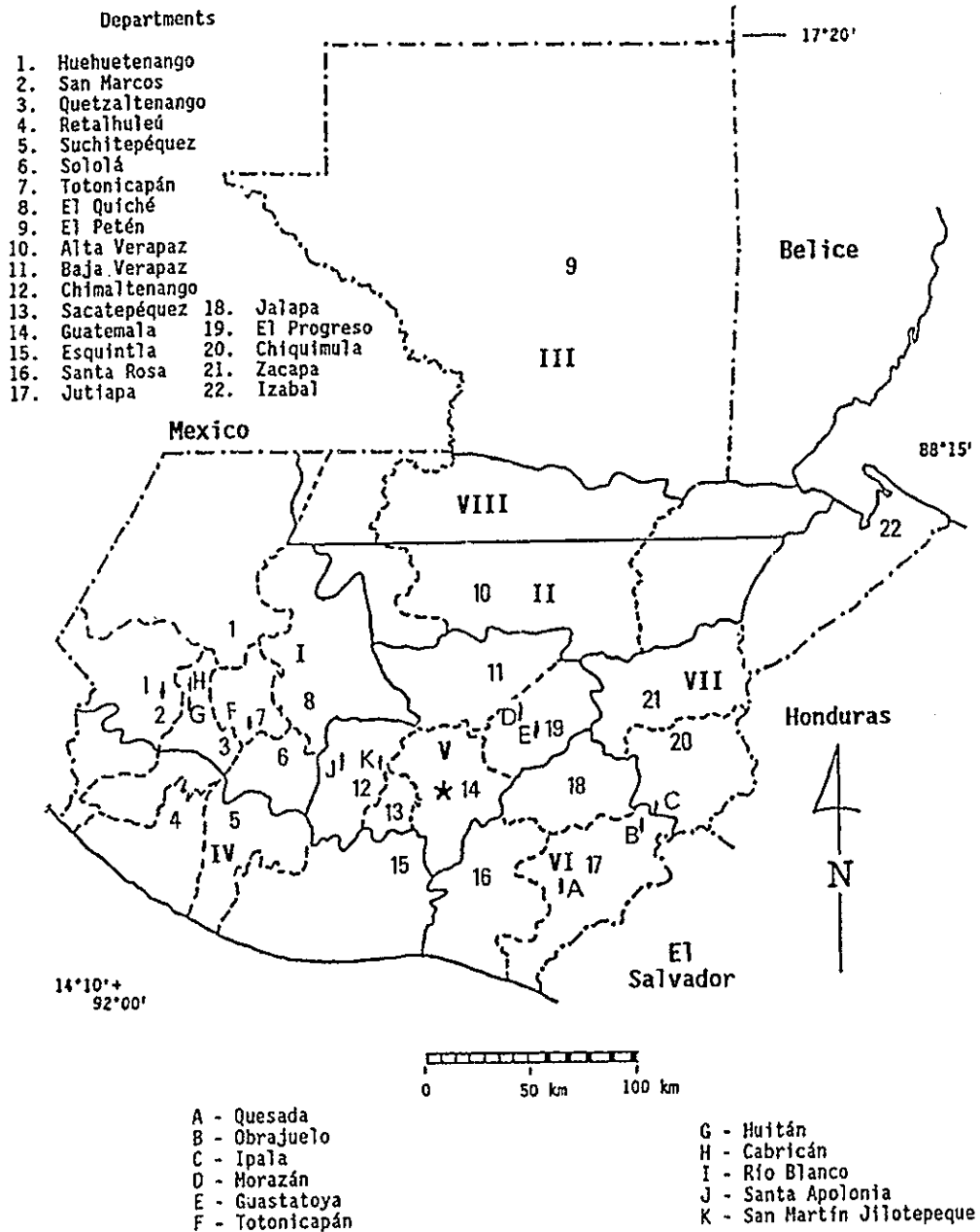
<u>Site</u>	<u>Date Opened</u>	<u>No. Volunteers</u>	<u>No. Promoters</u>
1. Quesada	1979	5	2
2. Obrajuelo	1985	2	1
3. Ipala	1986	1	1
4. Morazan	1985	2	2
5. Guastatoya	1983	1	1
6. Totonicapán	1975	5	10
7. Huitán	1978	2	1
8. Cabricán	1975	2	2
9. Río Blanco	1977	1	2
10. Santa Apolonia	1975	2	2
11. San Martín	1977	2	2

ANNEX C

MAP

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ICCP PROGRAM SITES VISITED BY  
THE CASE STUDY FIELD TEAM, 1987



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ANNEX D

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### INDIVIDUALS INTERVIEWED

Ahpop, Juan  
Committee Spokesman  
Panquix Tree Nursery Committee  
Aldea de Panquix  
Departamento de Quetzaltenango  
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Guatemala

Zet Sutuj, Santiago  
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Municipio de San Martín Jilotepeque  
Departamento de Chimaltenango  
Guatemala

Zapon Juak, Juan Basilio  
Vice-President  
Panquix Tree Nursery Committee  
Panquix  
Departamento de Quetzaltenango  
Guatemala

LISTA DE VOLUNTARIOS DEL CUERPO DE PAZ  
PROGRAMA DE CONSERVACION DE RECURSOS NATURALES

Ing. Basilio Estrada H.

REGION I

Quetzaltenango

1. HOPKINS, Jeffrey  
Sitio y Correo:  
San Francisco La Unión  
Quetzaltenango

2. WHITE, Douglas  
Sitio y Correo:  
San Juan Ostuncalco  
Quetzaltenango

3. WILSON, Mark  
Sitio y Correo:  
Sibilia, Quetzaltenango

Totonicapán

4. MOYER, Douglas  
Sitio y Correo:  
Momostenango  
Totonicapán

5. SAKODA, David  
Sitio:  
Totonicapán, Totonicapán  
Correo:  
Cuerpo de Paz/Guatemala

6. STRICKLAND, Robert  
Sitio y Correo:  
San Bartolo Aguas Calientes  
Totonicapán

REGION V

Guatemala

7. EMMONS, Brett  
Sitio y Correo:  
Churranchito, Guatemala

8. ROUSSO, Kathryn  
Sitio:  
Aldea San José Nacahuil  
San Pedro Ayampuc  
Guatemala  
Correo:  
Cuerpo de Paz/Guatemala

El Progreso

9. CURNOW, Fiona  
Sitio y Correo:  
El Júcaro, El Progreso

10. DAIN, Leonard  
Sitio:  
Guastatoya, El Progreso

11. POWERS, Michael  
Sitio y Correo:  
Morazán, El Progreso

Baja Verapaz

12. KULL, Kathleen  
Sitio y Correo:  
Rabinal, Baja Verapaz

Alta Verapaz

13. VOSTI, David  
Sitio y Correo:  
San Juan Chamelco  
Alta Verapaz

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## REGION VI

Jalapa

14. DUNCAN, Paul  
Sitio y Correo:  
San Carlos Alzatate  
Jalapa
15. LARSON, Barbra  
Sitio y Correo:  
San Luis Jilotepeque  
Jalapa
16. MERRILL, Geoffrey  
Sitio y Correo:  
1a. Calle 4-44, zona 6  
Jalapa, Jalapa
17. NELSON, Terri  
Sitio y Correo:  
San Manuel Chaparrón  
Jalapa
18. O'DONNELL, Michael  
Sitio y Correo:  
Mataquescuintla, Jalapa
19. WILSON, Charles  
Sitio y Correo:  
San Pedro Pinula, Jalapa
20. BEST, Christopher  
Sitio:  
Comapa, Jutiapa  
Correo:  
Cuerpo de Paz/Guatemala
21. FITZGERALD, Gretchen  
Sitio y Correo:  
Quesada, Jutiapa
22. FORD, Patricia  
Sitio y Correo:  
El Adelanto, Jutiapa
23. GRETZINGER, Steven  
Sitio y Correo:  
Aldea Obrajuelo  
Agua Blanca, Jutiapa

24. O'HALLORAN, Cristina  
Sitio y Correo:  
Comapa, Jutiapa
25. POMNITZ, Laura  
Sitio y Correo:  
Atescatempa, Jutiapa
26. RYAN, Kevin  
Sitio y Correo:  
Santa Catarina Mita  
Jutiapa

Santa Rosa

27. FRENCH, Charles  
Sitio y Correo:  
Santa Cruz El Naranjo  
Santa Rosa
28. GARVER, Nancy  
Sitio y Correo:  
Casillas, Santa Rosa
29. McCABE, Kevin  
Sitio y Correo:  
San Rafael Las Flores  
Santa Rosa
30. SCHLIMGEN, Amanda  
Sitio:  
San Juan Tecuaco  
Santa Rosa  
Correo:  
Cuerpo de Paz/Guatemala

## REGION VII

Chiquimula

31. BARSTON, Laura  
Sitio y Correo:  
Jocotán, Chiquimula



32. FITZGERALD, Glenn  
Sitio:  
San José La Arada  
Chiquimula  
Correo:  
Cuerpo de Paz/Guatemala

33. HOOPINGARNER, Aaron  
Sitio y Correo:  
Ipala, Chiquimula

Listado al 31 de octubre de 1987

## GLOSSARY

<u>aldea</u>	A small community of agricultural families												
<u>carga</u>	Guatemalan unit of fuelwood, consisting of the amount of wood one man can carry on a tumpline, normally 20-25 pieces of split wood one meter long												
<u>ICCP</u>	Acronym for the Instituto Nacional Forestal/CARE/Peace Corps program												
<u>INAFOR</u>	Instituto Nacional Forestal de Guatemala												
<u>PCV</u>	U.S. Peace Corps Volunteer												
<u>Promoter</u>	Locally hired farmers, frequently bilingual, who serve as on-site promoters and on-site extension agents for the ICCP program												
<u>Quetzal</u>	The Guatemalan unit of currency, valued at Q2.53 per US\$1 during November, 1987												
<u>ration</u>	The unit of food provided daily through the Food-for-Work program consisting in Guatemala of: <table><tr><td>maize (corn)</td><td>2.00 pounds</td></tr><tr><td>rice</td><td>2.00 pounds</td></tr><tr><td>wheat flour</td><td>2.00 pounds</td></tr><tr><td>red beans</td><td>1.00 pound</td></tr><tr><td>soybean oil</td><td>0.25 pound</td></tr><tr><td><u>TOTAL</u></td><td><u>7.25 pounds</u></td></tr></table>	maize (corn)	2.00 pounds	rice	2.00 pounds	wheat flour	2.00 pounds	red beans	1.00 pound	soybean oil	0.25 pound	<u>TOTAL</u>	<u>7.25 pounds</u>
maize (corn)	2.00 pounds												
rice	2.00 pounds												
wheat flour	2.00 pounds												
red beans	1.00 pound												
soybean oil	0.25 pound												
<u>TOTAL</u>	<u>7.25 pounds</u>												
<u>vivero volante</u>	Tree nurseries created inside target communities, as opposed to central nurseries which serve a number of target communities from a central location												

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