

# 1. INTRODUCTION

## 1.1 Authority

This is the Final Report prepared by the JICA Study Team in accordance with the Scope of Work (S/W) for the Verification Study on the Master Plan on Sustainable Rural Development for the Reduction of Poverty in the Central Highland Region of the Republic of Guatemala (the Study). The S/W was agreed upon between the Ministry of Agriculture, Livestock and Food (MAGA) of the Government of Guatemala and the Japan International Cooperation Agency (JICA) on March 5, 2001. (Attachment-1)

## 1.2 Objectives of the Study and the Study Area

The objectives of the study are as follows.

- 1) To implement the selected pilot projects in order to verify the prepared sustainable rural development plan for the central highland region by taking into account 1) income increase, 2) improvement of living conditions and 3) conservation and proper use of natural resources.
- 2) To transfer technology to the counterpart personnel of the Government of Guatemala regarding planning and verification of methodology and their procedures.

The study area covers about 6,000 km<sup>2</sup> located in the central highland region consisting of four provinces: Chimaltenango, Sololá, Totonicapán, and Quetzaltenango (see the location map). The model micro-basins where the pilot projects were implemented are shown in the table below.

Province	Municipality	Model Mmcro-basins	Area of micro-basin
Chimaltenango	Patzun	Xeatzan Bajo	9.3 km <sup>2</sup>
Sololá	San Juan La Laguna	Panyebar	5.8 km <sup>2</sup>
Totonicapán	Santa María Chiquimula	Pachum	10.5 km <sup>2</sup>
Quetzaltenango	Palestina de Los Altos	Palestina *	3.2 km <sup>2</sup>

\*: The Palestina area consists of 5 caseríos: Los Cabrera, Los Morales, Los Diaz, Sector I and Los Perez.

## 1.3 Performance of the JICA Study Team

Based on the S/W, the JICA Study Team submitted the Inception Reports to MAGA on September 27, 2001. The report presents the objectives of the Study, scope of the Study, contents and implementation schedule of the pilot projects and the basic approach for the Study. The official meeting was held on the same day and the JICA Study Team explained the content of the Inception Report. The discussion about the report was made between MAGA and JICA Study Team, and both sides

mutually agreed on the content of the report (Attachment-2). The study was carried out stepwise, Phase-I and Phase-II.

(1) Phase-I

The study in Phase-I was carried out during the period from September 2001 to March 2002. Performance of the Study Team during the Phase-I period is outlined as follows:

- 1) Preparation of technical specifications and contract documents.
- 2) Additional survey necessary for project implementation and discussion with community people on details of the projects
- 3) Implementation of Pilot Projects
  - (a) Xeatzan Bajo
    - i) Plan for revolving fund for hand weaving thread
    - ii) Mini-irrigation plan
  - (b) Panyebar
    - i) Coffee production improvement plan
    - ii) Coffee processing plan for work load reduction in mountainous area
    - iii) Rehabilitation plan for drinking water system
  - (c) Pachum
    - i) Plan for increasing use of improved cooking stoves and of saunas “Temascal” (technical supervision only)
  - (d) Palestina
    - i) Potato storage plan
    - ii) Plan for migrants in the coastal area
    - iii) Municipal community health activity plan
- 4) Preparation of Monitoring Report (I)

On December 27, 2001, the Monitoring Report (I) that explains the progress during the period from September 25 to December 20, 2001 was prepared and submitted to the Government of Guatemala. The official meeting was held on December 27, 2001 and both sides mutually agreed on the contents of the report. (Attachment-2)

- 5) Benchmark survey
- 6) Preparation of Mid-term Evaluation Report

On March 15, 2002, the Mid-term Evaluation Report that explains the progress and mid-term evaluation of the pilot projects for the period from September 25 to March

5, 2002 was prepared and submitted to the Government of Guatemala. The official meeting was held on March 15, 2002 and both sides mutually agreed on the contents of the report. (Attachment-2)

(2) Phase-II

The study in Phase -II is being carried out during the period from May 2002 to March 2003. Performance of the Study Team during May 2002 to January 2003 is outlined as follows:

1) Implementation of Pilot Projects

(a) Xeatzan Bajo

- i) Plan for revolving fund for hand weaving thread
- ii) Mini-irrigation plan (monitoring only)
- iii) Water quality improvement plan

(b) Panyebar

- i) Coffee production improvement plan
- ii) Rehabilitation plan for drinking water system
- iii) Water quality improvement plan

(c) Pachum

- i) Plan for increasing use of improved cooking stoves and of saunas “Temascal” (monitoring only)

(d) Palestina

- i) Model potato farm project
- ii) Plan for the migrants in the coastal area
- iii) Municipal community health activity plan (monitoring only)
- iv) Water quality improvement plan

2) Preparation of Monitoring Report (II)

On August 13, 2002, the Monitoring Report (II) that explains the progress of the pilot projects for the period from May 7 to July 31, 2002 was prepared and submitted to the Government of Guatemala. The official meeting was held on the same day and both sides mutually agreed on the contents of the report. (Attachment-2)

3) Preparation of Evaluation Report

On December 2nd, 2002, the Evaluation Report that explains the evaluation of the pilot projects was prepared and submitted to the Government of Guatemala. The

official meeting was held on the same day and both sides mutually agreed on the contents of the report. (Attachment-2)

4) Preparation of Draft Final Report

On January 28, 2003, the Draft Final Report was submitted to the Government of Guatemala. The official meeting was held on the same day and both sides mutually agreed on the contents of the report. (Attachment-2)

#### **1.4 Technology Transfer**

According to the plan of operation for the Study, the Study Team implemented, followed-up and monitored the pilot projects in close cooperation with the Guatemalan counterparts. Technology transfer to the counterparts was undertaken through on-the-job training in the course of the Study. Also, discussion has been constant about the findings and problems arising during the process of these projects so that solutions would be formed under complete understanding between the JICA Study Team and MAGA. The counterpart personnel and the JICA experts who took part in the Study are shown in Table 1.4 (1).

## **2. PROJECT BACKGROUND**

### **2.1 Background of the Study**

After the signing of the Peace Agreement in December 1996, the Government of Guatemala has considered rural development as one of the most important issues under the National Development Plan, especially the assistance for small farmers in the central highland region. Since then the Government has given its highest attention to promoting poverty alleviation in rural areas .

The population under the absolute poverty line is estimated at 71% of the total population in Guatemala, which is one of the highest rates in Central America. Most of the population below the poverty line is concentrated in the rural area in the central highland region where the majority of the population is indigenous people. People are generally small-scale farmers and have very limited farmland. The farmers do not have sufficient farming knowledge or facilities and rely on traditional rain-fed farming. Due to this fact, many of the farmers are not able to earn sufficient income from farming and, therefore, need to work as hired labors in large-scale plantations (fincas) or migrate to urban areas seeking additional income sources.

Besides the severe conditions of agriculture, other basic infrastructures are also insufficient in these rural areas. Poor access to safe drinking water and to health services are the major reasons for the high rate of morbidity and mortality. In addition, due to insufficient food availability, about 66% of the rural population is malnourished. Excess firewood collection and improper land use have accelerated deterioration of forests and this has caused soil erosion in steep areas and negatively affected living conditions and agricultural productivity.

Under such conditions, formulation of a master plan for sustainable rural development with proper management of natural resources becomes an urgent necessity. In July 1998, the Government of Guatemala requested the Government of Japan to extend technical assistance for the Study. In response to the request, the Government of Japan dispatched the Preliminary Study Team to have a series of discussions with the Government of Guatemala and both sides mutually agreed on the Scope of Work (S/W) in July 1999. As a result of a full investigation for over one year from January 2000 until July 2001, the master plan for the rural development was formulated by the Study Team. In the master plan study it was recognized that a verification study of the master plan was necessary through implementation of the pilot projects proposed in the said master plan in order to

prove the viability of the plan, reveal unforeseeable restrictions and finalize the master plan. In accordance with this necessity, the Government of Guatemala requested that the Government of Japan provide technical assistance for implementation of the pilot projects. In response, the Government of Japan dispatched the Advisory Study Team for discussions with the Government of Guatemala, and both sides mutually agreed on the Amended Scope of Work in March 2001 that states the implementation of the selected pilot projects.

## **2.2 Master Plan and the Pilot Projects**

The Master Plan for Sustainable Rural Development prepared by the Study Team is to be improved with the feedback of outcomes of the pilot projects. For this purpose, implementation of the pilot projects was proposed under the Master Plan. The objectives of the pilot projects are as follows.

- Monitoring and evaluation of technical soundness of the projects
- Monitoring and evaluation of implementing organizations and supporting systems for the Projects and their management (operation and maintenance)
- Monitoring and evaluation of improvement of the people's capability in solving problems and constraints

The pilot projects to be implemented were selected from the 59 approaches proposed in the Master Plan. The selection was made based on several criteria: farmers' intention, economic efficiency, possibility of project realization and expected demonstration effect. As a result, 18 pilot projects were selected as listed in the table below. However, modification and suspension of some of the pilot projects that were proposed in the Master Plan were made due to strong requests from the beneficiaries, insufficient construction time and security problems.

Model Area	Pilot Project	Implementation Period	
		Phase-I	Phase-II
Xeatzan Bajo	Plan of revolving fund for hand weaving thread	o	o
	Mini-irrigation project	o	o
	Water quality improvement plan for the existing drinking water supply	-	o
Panyebar	Coffee production improvement plan	o	o
	Plan for workload reduction in mountainous area through coffee processing	o	-
	Rehabilitation plan for drinking water system	o	o
	Water quality improvement plan for the existing drinking water supply	-	o
Pachum	Reforestation plan	*	*
	Layer-chicken Raising Plan for Women's Group	*	*
	Water quality improvement plan for the existing drinking water supply	*	*
	Plan of extension use of improved cooking stoves and of sauna baths "Temascal"	o	o
	Plan for installation of minimal pharmacy units	*	*
Palestina	Potato storage plan	o	-
	Plan for model farm on potato production	-	o
	Mini-irrigation project	**	**
	Plan for migrant people to the coastal area	o	o
	Water quality improvement plan for the existing drinking water supply	-	o
	Municipality community health activity plan	o	-

\*: Because of security reasons, these projects were suspended.

\*\* : Since an argument between the project area and the surrounding communities was not settled, the project was canceled.

#### (1) Plan for Workload Reduction in Mountainous Area through Coffee Processing

The manual operated pulping machine that had been originally planned was changed to an engine-operated one. The strong request for the change was made from the representatives of the beneficiaries on 23 October 2001. In response to this request, the Study Team made an analysis of the engine-operated machine in terms of (a) labor availability, (b) operation and maintenance cost and their capacity to pay, (c) organization for operation and maintenance and (d) initial investment cost of oil and gasoline necessary for engine-operated machine.

As a result of the analysis, installation of an engine-operated machine is considered to be reasonable from labor availability. The operation and maintenance cost is within the range of the beneficiaries' capacity to pay. The

prepared operation and maintenance system is considered to be manageable and within the capacity of the beneficiaries. The amount of initial investment is within the beneficiaries' capacity to pay.

Based on the results of discussions with the representatives of the coffee association about the analysis mentioned above, the JICA Study Team further explained the (a) increase of operation and maintenance cost, (b) necessity of establishing the operation and (c) payment of initial cost by beneficiaries themselves on 9 December 2001. Afterwards, all the beneficiaries discussed among themselves and confirmed their willingness to have an engine-operated pulping machine clearly understanding the 3 points mentioned above (the minutes of meeting is attached in Attachment-3). JICA Headquarters approved change to an engine-operated machine from manual operated one.

## (2) Potato Storage Plan

The potato storage plan in the Palestina model area originally included operations both at the farm level by simple storage and at the association level by installation of cold storage. However, since commencement of the project was delayed due to the security problems in Guatemala, it became impossible to allocate sufficient time for monitoring operation of the cold storage. Therefore, construction of the cold storage was not implemented and only the storage system at the farm level was implemented. As a result, the farmers' group association consisting of a potato section and irrigation section was not set up. This was confirmed by MAGA during the discussions on the content of the Inception Report.

The storing amount was modified from the 3 classes of 5, 10 and 20 qq in the original plan to the 2 classes of 10 and 20 qq. Based on the analysis, it is understood that the storing of 5 qq of potato is not profitable or attractive for the farmers to work on. The material cost of a silo is estimated at around Q200-250 per unit while it gives a profit about Q250 (Q50/qq of profit is assumed), which means the net profit of storing 5 qq is almost negligible.

## (3) Suspension of the Pilot Projects in Pachum Model Area

Among the five proposed pilot projects, 4 projects were suspended due to the security problem. It was agreed between JICA and MAGA that Totonicapan MAGA Office implement only the plan for improved stoves and sauna baths under supervision of the JICA Study Team. The other four projects were suspended.



On 20 November 2001, JICA Guatemala Office, JICA Study Team and MAGA held a public meeting in the Pachum area and explained the causes of suspension of the pilot projects. About 75 people participated in the meeting and the suspension of the pilot projects was agreed on without criticizing opinions. The details of the discussion are shown in the Attachment-4.

(4) Suspension of Mini-irrigation Project in Palestina de Los Altos

Mini-irrigation Project in Palestina de Los Altos was suspended because coordination with the communities near the project area could not be settled. Detail background is explained in section 3.5.3 Mini-irrigation Project. (Attachment-5)

### **3. THE PILOT PROJECTS**

#### **3.1 General**

##### **3.1.1 Objectives**

In the Study, it was planned that the master plan of rural development, which was formulated by the study team in the period from January 2000 to July 2001, should be polished up by reviewing outcomes through implementation of pilot projects. In this context, 14 pilot projects were selected and implemented among the 18 pilot project proposed in the master plan.

The pilot projects had been carried out for the following purposes:

- Monitoring and assessment of technical soundness of the Project through the implementation of the pilot projects
- Monitoring and assessment of organization for implementation and support systems for the Projects and its management (operation and maintenance) through the implementation of the pilot projects
- Monitoring and assessment of improvement for the farmers' capability in solving problems and constraints through the implementation of the pilot projects

##### **3.1.2 Implementation Schedule**

The pilot projects were implemented in two phases, phase-I (from September 2001 to March 2002) and phase-II (from May 2002 to December 2002). Out of 14 projects, nine pilot projects were commenced and one project, i.e., mini-irrigation project in Palestina de Los Altos, was canceled because of security reasons in phase-I. In phase-II, the rest of the four projects were newly commenced. The following table shows periods of the sublet contracts for carrying out the 14 pilot projects. A brief introduction of the 14 pilot projects, those Project Design Matrices, evaluation on PCM and overall evaluation results are shown in the "Project Design Matrices (PDM) and project profiles" of the attachment of this main report.

Area / Project No. / Project [sublet company/organization]	Phase-I		Phase-II	
	Start	Completion	Start	Completion
<i>Xeatzan Bajo</i>				
01. Plan of revolving fund for hand weaving thread [CEIDEC / ECODESA]	12/07/01	03/17/02	05/07/02	11/29/02
02. Mini-irrigation plan [AMANCO S.A.]	12/21/01	03/17/02	05/07/02	09/30/02
03. Water quality improvement plan [HIDROTECNIA S.A.]	-	-	09/04/02	11/29/02
<i>Panyebar</i>				
04. Coffee production improvement plan [REINSA]	12/07/01	02/03/17	05/07/02	11/22/02
05. Coffee processing plan for workload reduction in mountainous area [INDUSTRIA SAN CARLOS]	12/26/01	02/10/02	-	-
06. Rehabilitation plan for drinking water system [AMANCO S.A.]	12/26/01	03/17/02	05/07/02	11/26/02
07. Water quality improvement plan [HIDROTECNIA S.A.]	-	-	09/04/02	11/29/02
<i>Pachum</i>				
08. Plan for extension use of improved stoves and sauna baths (*1)	11/20/01	03/15/02	-	-
<i>Palestina</i>				
09. Potato storage plan [FUNDIT]	12/20/01	03/15/02	-	-
10. Plan on model farm on potato production [FUNDIT]	-	-	08/16/02	12/02/02
11. Mini-irrigation plan (*2)	-	-	-	-
12. Plan for migrant people to the coastal areas [FUNDAP]	12/26/01	03/17/02	05/07/02	11/29/02
13. Municipality community health activity plan (*3)	12/03/01	03/07/02	-	-
14. Water quality improvement plan [HIDROTECNIA S.A.]	-	-	09/04/02	11/29/02

(\*1) The plan was implemented directly by the provincial office of MAGA Tonicapán under supervision of the study team.

(\*2) Mini-irrigation plan in Palestina was cancelled during Phase-I due to the security reason.

(\*3) The sub-contract work was divided into 4 components: Training program-I, Training program-II, Procurement of medicine and Construction of MPU sheds. The date of start and completion for each component is as follows.

Components	Start	Completion
a) Training program-I	02/02/25	02/03/01
b) Training program-II	01/12/03	02/01/11
c) Procurement of medicines, etc.	02/03/04	02/03/07
d) Construction of MPU	01/12/19	02/02/15

### 3.2 Xeatzan Bajo Model Area

#### 3.2.1 Plan of Revolving Fund for Hand Weaving Thread

##### (1) Background

The majority of women in Xeatzan Bajo area are engaged in production of traditional Mayan women’s blouses called Huipil. They purchase a small quantity of thread material at a higher price from retailers due to their limited capital, which results in higher production cost. Under the project, thread material is provided to the women’s association as an initial investment for the revolving fund. With the fund, the women’s association jointly purchases thread in order to reduce the production cost. In addition, educational training is conducted to enhance women’s capability.

##### (2) Objectives of the Study

The main objectives of the project are as follows:

- To reduce production cost of Huipil through joint purchase
- To enhance the women’s capacity

##### (3) Components and Schedule

The project consists of 5 components as explained below.

- (a) Formation of women’s association
- (b) Market survey
- (c) Procurement and provision of thread and equipment
- (d) Literacy training and basic training for organization management
- (e) Monitoring

Component	2001			2002										
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Establishment of association				■	■	■								
Market survey			■	■	■									
Procurement and Provision of thread						■								
Training				■	■	■						■	■	■
Monitoring									■	■	■	■	■	■

### (3) Monitoring Results

Monitoring indicators are shown in the table below.

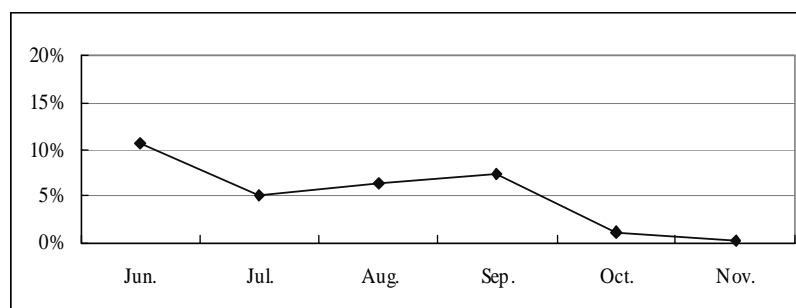
Item	Frequency	Data Collection
(a) Discrepancy between stock in records and actual stock	Once a week	NGO/Association
(b) Discrepancy between account books and actual cash holding	Once a week	NGO/Association
(c) Cost reduction of Huipil production	Once a year	NGO/Association

#### (a) Stock inventory

Inventory was taken 13 times during the period from June 10 to November 19. The result of the inventory survey is summarized below and details are shown in Table 3.2.1 (1).

Month	Period	Difference*
June	Jun.10 ~ Jul.05	10.74 %
July	Jul.05 ~ Jul.20	5.03 %
August	Aug.16 ~ Aug. 26	6.44 %
September	Sep.04 ~ Sep.24	7.45 %
October	Oct.12 ~ Oct.28	1.16 %
November	Oct.28 ~ Nov.19	0.13 %

\*: The percentage of difference (in absolute value) between actual stock and the expected stock balance against the expected stock balance.



In June, the difference was actually about 10% in average and the status of stock control was in quite poor condition. To cope with this problem, the following points were changed.

- (i) One shopkeeper was employed to make the responsibility in stock control clearer.
- (ii) Most of the stock was moved into the shelves with locks. Only the necessary amount for 1~2 week sale was kept on display.

These countermeasures were taken in October 2002; since then stock control has been improved and the difference reduced significantly.

(b) Financial condition

Cash control

Discrepancy between cash holding and balance in the account book was checked 4 times from August 2, 2002. The results are shown below.

(Unit: Q)

Date	Balance in Book	Actual Cash-holding	Difference
August 2	2,038.48	105.67	-1,932.81
October 17	395.85	395.50	-0.35
October 31	916.30	916.30	0.00
November 21	1,255.51	1,253.50	-2.01

On August 2, 2002, there was approximately Q2,000 of difference between actual cash holding and the balance in the book (lack of Q2,000). For this problem, the following points were changed.

- (i) One shopkeeper was employed to take care of shop.
- (ii) The account book was changed from a small unformatted notebook to a formatted account book that is easily available in the market.

The new system started from October 4, 2002. After the introduction of the new system, cash control was dramatically improved and the discrepancy between cash holding and the balance in book became almost nil.

Sales:

Sales records from August to November are summarized below.

(Unit: Q)

Month	Total Sale	Prime Cost	Net Profit	Profit/Sale Ratio (%)	Working Days	Daily Sale
August	8,291.38	7,265.65	1,025.73	12.4	21	394.83
September	2,345.73	2,041.91	303.82	13.0	9	260.64
October	2,061.80	1,815.60	246.20	11.9	13	158.60
November*	3,781.60	3,395.26	386.34	10.2	18	210.09
Total/Average	16,480.51	14,518.42	1,962.09	11.9	61	270.17

\*: Data is for the period from October 29 to November 18

Due to the intention among the committee members of resigning, there were only 9 working days for the shop in September . There were only 13 working days in October since the newly assigned shopkeeper became seriously sick (typhoid fever)<sup>1</sup>.

Assuming that the fixed cost for operating the shop is Q550 per month (Q150

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<sup>1</sup> Because of her sickness, a shopkeeper was selected from the previous committee members to take care of the shop temporarily. The shop operation restarted on October 28, 2002.

for rent fee of the building and Q400 for personnel cost), the break-even points in terms of sale and working days are calculated as Q4,621.8/month and 17 days/month, respectively. In other words, if the shop operates more than 17 days or sells more than Q4,621.8 per month, the shop operation will be expected to have a profit.

Financial status:

A simple balance sheet and profit-loss statement are as follows. Details are shown in Table 3.2.1 (2).

**Balance Sheet (as of Nov. 18, 2002)**

<i>Debtor</i>		<i>Creditor</i>	
Item	Value (Q)	Item	Value (Q)
Cash	1,053.71	Initial provision**	86,004.00
Ordinary Account	16,220.77		
Checking Account	1,700.00		
Stock	57,975.18	Net profit	-8,549.17
Office equipment	181.00		
Assets unaccounted for*	324.17		
Total	77,454.83	Total	77,454.83

\*: There are several assets unaccounted for due to the lack of operation records. In this item, the snack and drink stock is included.

\*\* : Only thread provision is considered and office furniture initially provided is excluded from the calculation.

**Profit/Loss Statement (Mar.21 to Nov.18, 2002)**

Item	Value (Q)	
1. Total Sale	49,909.69	
2. Prime Cost	45,892.54	
3. Sales Profit	4,017.15	8.0%
4. Operating Income	1.78	
5. Operating Cost	3,576.00	
6. Operating Profit	442.93	0.9%
7. Non-operating Cost*	8,992.10	
8. Net Profit	-8,549.17	

\*: The major components of the cost are stock loss (Q4,701.25) and unrecovered credit (Q4,209.95).

Due to the stock loss and unrecovered credit, the financial status of the shop is in quite poor condition. However, after the change of the shop operation system, improvement of financial condition can be expected.

Since the price margin is quite little for each thread, the ratio of sale profit to total sales is merely 8.0%. Besides, the ratio of operating cost to sale profit is 89.0%, that is, most of the sales profit is consumed by the operating cost. This means that the operation of the shop is almost even. Therefore, financial improvement is necessary through collection of unrecovered credit, strict control of stock and expansion of profit.

(c) Cost reduction of Huipil production

Cost reduction in producing Huipil was surveyed through an interview with 28 sample producers. The results of the survey are summarized below.

**Material cost reduction**

Items* <sup>1</sup>	Unit	Qty* <sup>2</sup>	Before (Q)		After (Q)		Difference (Q)
			Unit price	Value	Unit price	Value	
Segunda aleman	madeja	20	2.50	50.00	2.40	48.00	2.00
Artisela Iris	cone	17	10.62	180.54	9.25	157.25	23.29
Mish (color)	madeja	20	1.00	20.00	0.90	18.00	2.00
Cedalina D M C	ball	30	3.10	93.00	3.00	90.00	3.00
Listón para cuello* <sup>3</sup>	set	1	9.00	9.00	9.00	9.00	0.00
<b>Total material cost</b>				<b>352.54</b>		<b>322.25</b>	<b>30.29</b>

\*1: Typical threads usually used for producing huipil.

\*2: Quantity usually necessary for producing one Huipil (based on interview).

\*3: The item is not yet dealt with in the shop.

**Cost reduction from time saving and transportation cost saving**

	Value	Unit
1. Necessary days for production*1	22.4	days
2. Frequency of going to Patzun*2	3.0	times/huipil
3. Transportation cost reduction*3	<b>30.00</b>	<b>Q/huipil</b>
4. Time consumption for going to Patzun	3.0	hours/time
5. Time consumption for purchasing material*4	9.0	hours/huipil
6. Estimated earnings of women	2.06	Q/hour
7. Time reduction profit	<b>18.54</b>	<b>Q/huipil</b>

\*1: It is assumed that approximately 3 weeks are necessary to prepare one Huipil.

\*2: It is assumed that women go only once a week for purchases.

\*3: Q5.00/one-way x 2 (for round trip) x 3 times

\*4: 3 times/ huipil x 3 hours/time

Source: JICA Study Team, Survey in November 2002

According to the survey, it is estimated that the material cost reduced by 8.6% (Q30.29) per one Huipil. Besides, cost reduction from time saving and saving of transportation cost is estimated as Q18.54 and Q30.0, respectively. Therefore, cost reduction for producing one Huipil is estimated as Q78.83.

(d) Literacy Training

The training course actually started from the second week of August 2002. Forty three (43) women registered for the training in the beginning and 24 women additionally registered at the end of August which raised the number of registrations to 67 women in total.

During the period from the second week of August to the third week of November, about half of the registered women attended the course continuously. Monthly average number of participants and estimated attendance rate is shown



below and details are tabulated in Table 3.2.1 (3).

Month	Registered Women (persons)	Number of Participants (pers./week)	Attendance Rate (%)
August	43	19	43.4
September	67	38	56.0
October	67	28	42.4
November	67	29	43.3
Average	-	29	46.4

#### (4) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Stock control was not properly made and about Q4,701.25 of stock is unaccounted for.	<ul style="list-style-type: none"> <li>- One shopkeeper was employed and takes responsibility for daily operation of the shop so that the responsibility would be clearer.</li> <li>- Most of the stock was moved and kept in the shelves with locks. Only the necessary amount was kept in the display so that daily stock control would be easier.</li> </ul>	Stock control has been improved and the difference reduced significantly
Cash control was not properly made and some of money was actually lost.	<ul style="list-style-type: none"> <li>- One shopkeeper was employed and takes responsibility for daily operation of the shop so that the responsibility would be clearer.</li> <li>- Account book with format was used instead of non-formatted notebook.</li> <li>- Training was made regarding how to keep daily transactions on the account book.</li> <li>- Provision of credit was prohibited and completely stopped.</li> </ul> <p><u>Necessary measures for the future</u></p> <ul style="list-style-type: none"> <li>- A simple financial statement shall be prepared and audited by the third party.</li> <li>- To avoid any suspicion by the community people, financial status shall be reported to the association members and to the community people.</li> <li>- To avoid any misappropriation or robbery, cash shall be deposited to the bank more often.</li> </ul>	Cash control has been improved and the difference has been reduced significantly
Because of unclear operation of the shop, community people started to doubt about misappropriation of money and stock by the committee.	<ul style="list-style-type: none"> <li>- A financial statement regarding cash control and stock inventory shall be prepared.</li> <li>- The financial statement shall be audited by the authority of the community</li> <li>- Reporting on financial condition shall be made through general assembly and displaying the statement at the shop.</li> </ul>	These measures shall be implemented in the future.

People generally do not think about the development of the community as a whole. Hence, without any economic incentive, they are reluctant to work voluntarily for the community.	<ul style="list-style-type: none"> <li>- For any type of work, economic incentive shall be considered according to the workload and responsibility.</li> <li>- In this project, an incentive (Q400/month) is paid for the shopkeeper.</li> </ul>	The shopkeeper starts working continuously.
There are two more thread shops in the community. This might create a competitive situation in the community.	<ul style="list-style-type: none"> <li>- It is necessary to share the demand by differentiating the service between the JICA's shop and other thread shops. For instance, no credit provision or handling different thread type would be potential measures for the JICA's shop.</li> </ul>	These measures shall be implemented in the future.
Community women have a lot of work to do and very little time to spend for operation of the shop.	<ul style="list-style-type: none"> <li>- A shopkeeper was employed for shop operation.</li> <li>- Tasks of committee members were reduced to supervision of shop management and procurement of thread.</li> </ul>	Workload of the committee was reduced and committee members can continue to work.
Profitability of thread shop is quite low and this might affect the sustainability of the project.	<ul style="list-style-type: none"> <li>- Sales shall be expanded by obtaining more customers from outside of the communities.</li> <li>- Rental fee for the building shall be reduced by negotiation with present owner or by finding other location in future.</li> <li>- Price margin shall be revised based on the past sales records. For example, price of highly demanded threads would be raised a little more.</li> <li>- Reduction of prime cost shall be considered by searching for wholesalers who offer more reasonable prices.</li> <li>- Some other daily groceries might be sold in the shop to support the sales.</li> </ul>	These measures shall be implemented in the future.

### (5) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Relatively High	<ul style="list-style-type: none"> <li>- Cost reduction is achieved to some extent (reduction of material cost by 8.6%).</li> <li>- Skill in operation and management of the association is improved only for those who engaged in the management.</li> <li>- 29 women continuously attended the literacy training for 3 months and obtained reading and writing skills.</li> </ul>
<i>Effectiveness</i>	Basically achieved	<ul style="list-style-type: none"> <li>- Cost reduction is achieved to some extent (reduction of material cost by 8.6%), which contributes indirectly to income increase.</li> <li>- Skill in organizational management is not sufficiently achieved. Continuous supervision will be necessary for the women to have sufficient skill.</li> </ul>
<i>Impact</i>	Positive impact is expected.	<ul style="list-style-type: none"> <li>- It is considered that reduction of production cost contributed to the income improvement. It is expected that this cost reduction will contribute to poverty alleviation in the central highland region in the long term.</li> </ul>

		- Surrounding areas of the Xeatzan Bajo also enjoy the cheaper price of thread, which means that a larger area starts gaining benefit from the project.
<i>Relevance</i>	High	- Necessity of job opportunity for rural women is still a key issue for the poverty reduction of indigenous people. - Although the market for Huipil is limited, it is still essential work for women and demand would stay at the present level for the time being.
<i>Sustainability</i>	Low	- Financial condition is poor and profit accumulation is not sufficient for future activity. - Supporting system is too weak to provide continuous supervision.

<i>Conclusion</i>	It is observed that income condition and women's capacity were gradually improved after the implementation of the project. However, continuous and close supervision is still necessary in order to make this improvement more certain. On the other hand, the supporting system under the present government is quite weak and provision of continuous supervision would be difficult. From this point of view, it can be considered that the sustainability of the project is low.
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<i>Recommendation</i> [Responsible agency]	The following points shall be followed up for the project to be sustainable. [ a),b),c),d): MAGA, e): Village authority] a) Continuous supervision and training on accounting and stock control. b) Assistance for preparation of simple report on shop operation. c) Assistance in establishment of auditing and reporting system. d) Assistance in finding wholesaler that offers more reasonable price e) Monitoring by beneficiaries, at least, on following items. - Difference between cash holding and balance in the accounting book - Difference between actual stock and balance in stock book - Total monthly sales
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### 3.2.2 Mini-Irrigation Project

#### (1) Background

Most of the land in the Xeatzán Bajo Model Area was used for rainfed vegetable production. The majority of farmers planted vegetables twice a year during the rainy season, some farmers made three harvests per year. A large part of the land in the Model Area was not utilized in the dry season, which is 5 to 6 months long. Crop yields under rainfed condition was very unstable, and because the majority of farmers produced at the same time, farm gate prices were depressed during harvesting in the rainy season. Thus development of irrigation project was the highest priority of farmers in Xeatzán Bajo Model Project Area.

#### (2) Objectives of the Study

The main objectives of the project were as follows:



Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data collector
1) No. of beneficiaries attending the construction work	Everyday during construction period	Irrigation Committee
2) Progress of construction works	Every half month	MAGA/Study Team
3) Total benefits	Before and after 1 <sup>st</sup> crop season	MAGA/Study Team
4) Collection rate of the water charge	At the time of harvest	Irrigation Committee

(a) Number of beneficiaries attending the construction works

Voluntary labor was constantly provided from all the beneficiaries, and no any inconvenience of the labor forces occurred in the construction works. Average number of daily voluntary laborers through all the construction period is over 35 people a day. The detailed information should be referred to in the annex report.

(b) Progress of construction works

The commencement of the construction works was in the middle of December 2002, and the construction work had been performed smoothly. The progress of the construction works was close to the original schedule throughout the construction period without significant delay. The details are shown in Figure. 3.2.2 (1).

(c) Farmers' total benefit

Summary of total farmers' benefits from the irrigating cultivation in the period from April to September 2002 was shown in the following table.

Expenses				Benefit		
Agriculture Input	Freight (Q0.1/lb)	Water Charge (Q2.3/m <sup>3</sup> )	Total (Q)	Total Gross Profit	Total Net Benefit	Average Net (Q/person)
32,466	3,097	10,231	45,794	49,213	3,419	43.3

As shown above, the total net benefit was only Q3,419 for 79 farmers. Reasons for this low profit are considered to be as follows;

- Low productivity: It was the first time the farmers in Xeatzan Bajo cultivated Zucchini and French Beans (Ejote Frances) . Thus some mismanagement in the cultivation had occurred in spite of proper instruction given by the Project. The details should be referred to in the Annex.

- Timing of harvest period of crops: It is from January to March, in general, that the market price of crops for the international market becomes the highest. Actually, however, the cultivation in Xeatzan Bajo started in April because of the construction schedule and harvest was obliged to be done from June to September, which is the lowest marketing price period
- Bonus from a market company: The net benefit was calculated based on the actual payment which a market company, named OPCION, had made to the beneficiaries. However OPCION does not pay all the value of the products at once when OPCION received the products from farmers. OPCION will pay the remaining at the end of their fiscal year, in June 2003.

Taking into consideration the above reasons, analysis and several simulations for net benefit are made and shown in Table 3.2.2 (1).

(d) Collection rate of the water charge

Because of the low profits in this cultivation, the committee decided to postpone collecting the full amount of the water charge. The beneficiaries had paid 11% of the water charge, which was paid to the community as a fund for communal welfare. All the beneficiaries paid those fees and no delinquency occurred.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
There was a possibility of creating a problem for the municipality's potable water supply which uses the same spring because of the implementation of the mini-irrigation project.	A governor of Chimaltenango province, the Xeatzán Bajo community, the Patzun municipality, MAGA-Chimaltenango, and the Study Team had a meeting on December 18, 2001. In the meeting it was confirmed that the project would not have a bad effect on the municipality water supply.	No problem has been seen so far.
All the administrative works of the farmers' association were concentrated on particular persons, the committee members.	[Countermeasure to be made] <ul style="list-style-type: none"> <li>- It is a solution that the provision of a proper amount of compensation, i.e., payments in cash, should be made for their services from the revenue of the irrigation association.</li> <li>- The administrative works, which had been done by only the committee members should be divided amongst other beneficiaries under a small-group administration system.</li> </ul>	

All farmers in the Model Area wanted to join the irrigating cultivation scheme, but there were some difficulties to realize this goal.	The regulation of the irrigation association includes the following clauses; <ul style="list-style-type: none"> <li>- New associates are given a maximum of two years moratorium on payment of the entrance fee, i.e. Q950.</li> <li>- Maximum cultivation area per person is limited at 0.5 cuerdas (580m<sup>2</sup>) and no extension of irrigated land is allowed so as to maximize the number of beneficiaries in the future.</li> <li>- 11% of the total water charge, i.e. Q0.25/m<sup>3</sup>, should be paid to the community for expenses of communal welfare activities in order to mitigate envy of the non-beneficiaries.</li> </ul>	
[Problems possible in the future] The borders of each irrigation plot are not clear. So unapproved land extension, which will be made without acceptance of the association, might occur in the future.	[Countermeasure to be made] The measurement of irrigated lands and marking the borders with pickets should be done.	
There was unevenness in farmers' net benefit from person to person.	[Countermeasure to be made] Meticulous instruction to the farmers is required for improving unit yield of crops in the next cultivation period.	
Profitability of crops	[Countermeasure to be made] Timing of the harvesting period was the major reason of this low profitability. In the next cultivation, the planing period should be carefully selected in order to obtain a high selling price at the harvest period.	

## (6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Middle	<ul style="list-style-type: none"> <li>- Irrigation system was duly constructed and used by the beneficiaries efficiently.</li> <li>- Timing of the first cultivation, which was started immediately after the construction was not a good period in terms of selling price and profitability.</li> </ul>
<i>Effectiveness</i>	Middle	<ul style="list-style-type: none"> <li>- Not all the beneficiaries gained the benefits from the project in the first cultivation. However the several simulations confirmed the effectiveness of the irrigation.</li> </ul>
<i>Impact</i>	Many positive impact were observed	<ul style="list-style-type: none"> <li>- Farmers were organized for bargaining with middleman over the products.</li> <li>- By the implementation of the irrigation project, the community can earn funds for communal welfare activities.</li> </ul>

<i>Relevance</i>	High	- The coverage of irrigation systems in Guatemala is still low and the advantages of irrigating cultivation is still high.
<i>Sustainability</i>	Middle	- The association is organized well. - The association learned how to maintain the facilities very well. - The committee members have a heavy burden of association activities, and this burden should be alleviated and compensated.

<i>Conclusion</i>	<p>Timing of cultivation, which was started immediately after the construction was not a good period for getting a good selling price of the products. Thus the profitability in the first cultivation was low. Even though the profitability was low because of the low selling price at the harvest season, farmers' interest for the next crop were still high. Based on the simulation with a proper cultivation period, the effectiveness of the irrigation was proved. It is expected that a high income from irrigation would be realized in the next cultivation.</p> <p>The reduction of the burden of the committee members is a key to the project sustainability.</p>
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<i>Recommendation</i> <i>[Responsible agency]</i>	<p>The following items should be monitored with high priority.</p> <ul style="list-style-type: none"> <li>- After 1 year; collection rate of water fee and payment condition of 11% of water fee (fund for communal welfare). <i>[MAGA]</i></li> <li>- After 5 years; condition of facilities (condition of maintenance of pump, pipeline, valves and other facilities) <i>[MAGA]</i></li> </ul>
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### 3.2.3 Water Quality Improvement Plan for the Existing Drinking Water

#### (1) Background

In the Xeatzan Bajo Model Area, there was a communal potable water system, which used spring water for drinking purposes without any treatment. The operation and maintenance of the water supply system was duly managed by the water committee, but it was detected in the result of a water sampling test that the water quality was not suitable for drinking directly. Thus a water treatment facility, i.e., a sterilizer with hypo-chloride sodium, was required.

#### (2) Objectives of the Study

The main objectives of the project were to improve the health condition of the community residents through improvement of drinking water quality by installation of a sterilizer.

#### (3) Components and Schedule



The work components are summarized as follows;

- Installation of the sterilizer (including a protection house): 1 set
- Calibration of the equipment
- Training for using the equipment

Item	2001			2002												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1) Purchase of equipment													■			
2) Installation of sterilizer													■	■		
3) Training														■		
4) Monitoring													▲	▲		

#### (4) Monitoring Results

##### Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data Collection
1) Users of improved water	Every 3 months	Development Committee
2) Operation status of sterilizer	Monthly	Development Committee
3) Number of diarrhea patients	Every 3 months	Development Committee
4) Simple water quality test	Every year	FIS

##### (a) Users of sterilized water

After installation of the equipment, an interview survey has been conducted with some users in the community in order to know the status of using the treated water. As a result, no user stopped using the treated potable water because of a bad taste or smell.

##### (b) Operation status of sterilizer

Before commencement of the water purification, training for the operators and the committee members has been made in order to give skills and knowledge for using and maintaining the sterilizer. It seems that this training has been finished successfully and all the attendants learned all the skills and knowledge. However not much time has passed after commencement of the treatment, thus actual operation and maintenance works could not yet be observed at the site.

##### (c) Number of diarrhea patients

Not much time has passed since commencement of the water treatment, thus the

actual effect could not yet be observed at site. However a certain tendency of decrease of the number of water born disease patients is anticipated based on a sample analysis in the case of a sterilizer installed in Palestina. The details should be referred to in the annex report.

(d) Simple water quality test

Water quality before and after the water treatment was checked. Obvious improvement of water quality had been observed in the test. Details should be referred to in Table 3.2.3 (1).

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Before commencement of the project, the pump in the potable water system was broken down and could not pump up water. The community repaired it finally but it took 9 months.	[Countermeasure to be taken] In the planning stage, the condition of all the water supply facilities should be checked beforehand.	

(6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	High	- Water quality was certainly and immediately improved.
<i>Effectiveness</i>	Will be achieved in the later stage	- Number of patients of water born diseases is expected to be reduced, but it will take certain time for identifying it.
<i>Impact</i>	Negative impact	- Some people noted a strange smell of the treated water. But those people were using the treated water.
<i>Relevance</i>	High	- The treatment of potable water is one of the most important items in terms of rural development of Guatemala.
<i>Sustainability</i>	High	- Assistance of the municipality can be received from now on. - The water committee learned how to maintain the sterilizer system very well.

<i>Conclusion</i>	The water quality was improved immediately after installation of the sterilizer. However the benefit of the project could not be observed quickly and clearly. The municipality started to become involved in the water treatment recently and they have intention to support the project continuously.
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<p><i>Recommendation</i> <i>[Responsible agency]</i></p>	<p>The following items should be monitored with high priority.</p> <ul style="list-style-type: none"> <li>- After 1 year; condition and operation status of the sterilizer. <i>[Municipality]</i></li> <li>- After 1 year; status of municipality's assistance (supply of the chemical materials). <i>[MAGA]</i></li> <li>- After 5 years; condition and operation status of the sterilizer. <i>[Municipality]</i></li> </ul>
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### **3.3 Panyebar Model Area**

#### **3.3.1 Coffee Production Improvement Plan**

##### **(1) Background**

The present prices of coffee in the world market are low, therefore the income of coffee farmers is also low. Many farmers in the project area go out of the village to seek other sources of income, this results in inadequate management of the coffee farms. As a result, the yield of coffee in the project area is lower than the national average yield, 7 qq/cuerda in the project area compared to 15 to 20 qq/cuerda at the national level.

##### **(2) Objectives of the Study**

The main objectives of the project are to introduce vinyl house in order to produce high quality of coffee seedlings in it and to improve the productivity of coffee in the Panyebar Model Area. Proper management of coffee farms must be carried out, including adequate pruning of trees, replacement of old trees, adequate fertilization, clearing obtrusive cover over trees. Especially, the replacement of old coffee trees is an urgent matter because there are many old coffee trees of over 20 years; this is a major cause of low productivity of coffee farms in the project area.

##### **(3) Components and Schedule**

The project components during Phase-I consisted of the following items:

- 1) Organization of project beneficiaries, including preparation of its bylaws and management guidelines.
- 2) Construction of two vinyl houses, one of 420 m<sup>2</sup>, to be used for coffee seedling production, and one of 375 m<sup>2</sup>, to be used for avocado and peach seedling production.
- 3) Construction of two water tanks, with a capacity of 2 m<sup>3</sup> each, for storing water to irrigate the seedlings.
- 4) Procurement and distribution among beneficiaries: a total of 2,500 coffee seedlings , 500 avocado seedlings , and 300 peach seedlings .

- 5) Procurement of equipment and materials for management of green houses, and
- 6) Implementation of training programs for all project beneficiaries.

The project components during Phase-II consisted of providing training in the following technologies:

- 1) Grafting of avocado seedlings;
- 2) Preparation of compost;
- 3) Technology of post-harvest coffee management;
- 4) Marketing of avocado and peach seedlings ;
- 5) General market of citrus fruits.

Item	2001			2002											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1) Provision of greenhouse and input materials			■												
2) Operation									■						
3) Marketing of seedlings (planting season)														■	
4) Training & monitoring technical training Monitoring			◆	◆	◆	◆				◆		◆	◆	◆	◆

#### (4) Monitoring Results

The items to be monitored are indicated in the Table below:

Item	Frequency	Data Collector
1) Number of renewed coffee trees	At the end of rainy season (September)	Coffee growers' Association
2) Number of participants in training program	After training course end	Coffee growers' Association
3) Result of nursery operation	At the end of rainy season (September)	Coffee growers' Association
4) Sale of seedlings	At the end of rainy season (September)	Coffee growers' Association

##### 1) Number of renewed coffee trees:

JICA provided 2,500 coffee seedlings as a grant to the project beneficiaries. The seedlings were planted for renewing old coffee trees when the newly planted seedlings have grown. The monthly survey made by the Study Team indicates that almost all the coffee seedlings were transplanted to the coffee farms and are growing in good conditions.

2) Number of participants in training programs and in construction

Eleven formal training programs were provided by a local contractor to the organized farmer's beneficiaries. Participation rate averages 27%, ranging from 15 to 49%. The total number of participants in each training activity was as follows:

Training Activity	Phase-I						Phase-II				
	1	2	3	4	5	6	1	2	3	4	5
No. Participants	39	23	25	12	29	25	27	14	15	15	15
% of total Beneficiaries	48.8	28.8	31.3	15	36.3	31.3	33.8	17.5	18.8	18.8	18.8

55 of association members attended to the construction of vinyl house voluntarily. Participation rate averages 68%, 175 man-day in total, 3.2 person per day in daily average. The details are shown in Annex E.

3) Result of nursery operation

At the end of Phase-II field work, the condition of operation of the greenhouses was as follows Coffee Seedlings: Among 5,500 young coffee seedlings , about 770 seedlings (14% of the total seedlings) died, mainly because of inadequate watering and/or some farmers using a mixture of soil with a high proportion of relatively fresh manure. At the end of November, there were a total of 4,730 coffee seedlings in the greenhouse; most of the coffee seedlings are growing in good conditions but about 15 % of the seedling have grown deficiently.

Avocado Seedlings: Among 2,220 of seeds planted, 420 seeds (19% of the total) were not germinated. The remainder (1,800) have grown well and were grafted on two different dates; a first group of 1,200 avocado seedlings was grafted on October 10; from the 1,200 seedlings grafted, there are 1,105 seedlings (96.7 %) in good condition. A second group of 600 avocado seedlings was grafted on November 15.

Peach Seedlings: There are about 1,700 peach seedlings in very good condition in the sand bed; these seedlings will be soon transferred to plastic bags.

(d) Selling of coffee, avocado and peach seedlings

The sell of seedlings is postponed until the beginning of the rainy season in year 2003, because present dry conditions do not allow the transplanting of seedlings in the field.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
<p>Before implementation of the project, a landowner verbally offered his land for greenhouses without charge. When, however, the project started, the land owner requested payment for the land.</p>	<p>As a result, the association agreed that the association should pay a land rental charge. Such negotiations postponed construction of the green houses. To avoid this problem, a written contract was prepared.</p>	
<p>The number of participants to the construction works and the training were low.</p>		
<p>Many coffee plants died because of diseases, which are difficult to identify.</p>	<p>The association received technical services from the regional office of ANACAFE.</p>	
<p>The drinking water committee verbally agreed to permit the supply of water for irrigating the seedlings in the greenhouses. But at the moment that water was requested, the water committee refused to comply with the promise.</p>	<p>To solve this problem, the municipal mayor of San Juan la Laguna made an agreement for providing water by sending trucks as it is needed.</p>	
<p>Cold treatment of about 1,000 peach seeds was done in the refrigerator during the period from July 7 to 27. And the peach seeds were directly planted into the plastic bag with soil, in the greenhouse on July 28; but all these seeds did not germinate because of incorrect treatment of the seeds and the low quality of seeds.</p>	<p>After discussion among beneficiaries, a local contractor (REINSA) and the Study Team, the 3 parties decided to share the expenses equally and replant peach seeds. About 4,600 peach seeds were purchased by the 3 parties. Germination was performed by two methods: (1) 2,300 seeds were planted in sand beds without cold treatment and (2) 2,300 seeds were planted in sand beds with cold treatment. The group of seeds in case 1 was planted on October 2 and only a low number of seeds had germinated by November 15. In case 2, 2,300 peach seeds were put into a refrigerator from September 12 until October 26 and those seeds were planted in a sand bed on October 26.</p>	<p>It was estimated that a high percentage (about 75%) of these seeds germinated successfully.</p>

## (6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Medium	- Construction was delayed and could not finish on time.
<i>Effectiveness</i>	-	- Period of selling seedlings will be in next the rainy season, so actual income will be delayed.
<i>Impact</i>	Positive impact and negative impact	- Farmers had more knowledge for diversification of crops through the lectures given by the project. - The landowner requested a fee for land use of the vinyl houses. The committee decided to pay it.
<i>Relevance</i>	Medium	- International marketing prices of coffee were depressed.
<i>Sustainability</i>	Medium	- In terms of fruit cultivation, there is a possibility of further expansion, but coffee is relatively difficult.

<i>Conclusion</i>	<p>Because of the planting season of the seedlings, the coffee seedlings grown in the vinyl house could not be sold until the next rainy season. Thus determination of the actual condition of income increase should be delayed until the next rainy season.</p> <p>In terms of fruit seedling cultivation, there is a relatively high possibility of further expansion and prosperity in future, compared with coffee.</p>
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<i>Recommendation</i> [Responsible agency]	<p>The following items should be monitored with high priority. [MAGA]</p> <ul style="list-style-type: none"> <li>- After a half year; growth condition of plants and results of selling the seedlings.</li> <li>- After 2 years; physical and operational condition of vinyl houses.</li> </ul>
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### 3.3.2 Plan for Reducing Workload in the Mountainous Area through Coffee Processing

#### (1) Background

Most of the land used for agriculture production in the Panyebar Model Area was coffee cultivation on very steep slopes. During the harvest period, coffee farmers and laborers walk up the very steep lands carrying heavy loads (bags of 45 kg) of harvested fresh coffee beans. It is known that 100 kilograms of fresh coffee bean are reduced to 20 kilograms after depulping and drying. Therefore, if coffee beans are depulped and dried nearby the farms, the workload of farmers, especially for the young and the women will be reduced significantly.

#### (2) Objectives of the Study

The objective of the project is to install 4 units for depulping and drying coffee nearby farm sites with the main purpose of reducing the workload of farmers in carrying coffee beans.

#### (3) Components and Schedule

##### (a) Project components

- Procurement and installation of 4 units of coffee pulping machines with

gasoline operated motors.

- Procurement and provision of 80 plastic tanks for fermenting pulped coffee, 4 weight-measuring scales and 600 m<sup>2</sup> of vinyl sheet for drying pulped coffee.
- Procurement and provision of materials for construction of 4 protection houses, one for each pulping machine.
- Construction of protection houses by voluntary labor force from project beneficiaries.
- Establishment of an organization of project beneficiaries, including preparation of its statutes and management guidelines.
- Training to beneficiaries.

Item	2001			2002											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1) Ordering of Machines			■												
2) Installation of facilities				■	■										
3) Training Activity					■									■	
4) Monitoring						▲						▲			

#### (4) Monitoring Results

The items to be monitored are summarized below.

Item	Frequency	Data Collection
1) Construction of pulping house	Weekly	Coffee Growers Association
2) Operation of pulping machines	Weekly	Coffee Growers Association
3) Reduction (80%) from coffee bean (uva) weight to pergami no	Monthly	Coffee Growers Association
4) Price of coffee (10% increase from uva to pergami no)	Monthly	Coffee Growers Association
5) Collection of pulping fee	Monthly	Coffee Growers Association

##### (a) Installation of pulping machines and construction of protection house

The pulping machines were installed on February 7, 2002. The contractor conducted training and gave a demonstration in front of the project beneficiaries with the four pulping machines at the site.

##### (b) Operation of pulping machines

Coffee farmer beneficiaries of the project began the operation of two pulping machines immediately after delivery. Some 17 beneficiaries (or 21% of the total



beneficiaries) used pulping machines and processed about 105 quintals of coffee.

(c) Reduction (80%) from fresh coffee bean (uva) weight to pergamino

In the trial test at site with beneficiaries, it indicated that the ratio between the weight of pulped coffee beans over the weight of fresh coffee beans was 0.6. After drying pulped coffee beans, their weight becomes 20% of that of fresh coffee beans. The capacity of installed pulping machines varies from 13 to 32 quintals per hour.

(d) Price of coffee (10% increase from uva to pergamino)

During the harvest season from November 2001 to February 2002, the price paid to farmers for fresh coffee beans varied from Q35 to Q50 per quintal; and the price of dried pulped coffee beans (pergamino) varied from Q250 to Q350 per quintal. As a result, it was concluded that value of pergamino to be produced from one quintal of uva ranged from 1.4 to 2.9 times of the price of uva, averaging at 1.8 time of the price of uva. (See Annex F)

(e) Collection of pulping fee

The pulping fee was set at Q 1.4/qq, which comprises fuel, lubricants, spare parts, operator's wages and others. Because of the inadequate timing of installation of the pulping machine, only 2 machines had been used and 105 qq of coffee had been depulped during the monitoring period. At those 2 pulping houses, the operators recorded the collection of pulping fees and all the users had paid their charges according to the records.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
During the operation stage, the beneficiaries of the model project reported some difficulty in pulping the coffee beans; this was because part of the pulp came out of the machine mixed with the beans.	The countermeasure taken was to bring the specialist from ANACAFE for providing training on calibration of the pulping machines. The specialist from ANACAFE explained that the problem was mainly caused by the inadequate harvest of coffee beans made by the beneficiary farmers; grains of very poor quality were mixed with good grains, and this caused inadequate functioning of the machines.	

(6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Medium	- Timing of installation of the pulping machine was delayed; The pulping machines were installed after the coffee harvest season , thus the condition of the full operation of the machine could not observed.
<i>Effectiveness</i>	Achieved	- By introduction of the pulping machine, the workload of transportation was dramatically reduced.
<i>Impact</i>	Positive impact	- Separating from the middleman, farmers try to sell coffee by themselves directly, and a business mind is instilled.
<i>Relevance</i>	High	- Coffee transportation is one of the heavy works in harvest season and reduction of workload is necessary.
<i>Sustainability</i>	High	- The committee members learned how to maintain and calibrate the machine. - Pulping charges were duly collected from the beneficiaries.

<i>Conclusion</i>	<p>Workload of transportation was dramatically reduced by the introduction of the pulp machines. This will contribute to improvement of the human life in the rural area.</p> <p>“Efficiency” was evaluated as “middle” because of the inadequate timing of the machine. However the machine will be fully operated in the next harvest season.</p>
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<p><i>Recommendation</i> [Responsible agency]</p>	<p>The following items should be monitored with high priority. [ANACAFE]</p> <ul style="list-style-type: none"> <li>- After 1 year; physical condition and maintenance of the 4 pulping machines.</li> <li>- After 1 year; operational status of the 4 pulping machine.</li> <li>- After 1 year; collection rate of pulping charges.</li> </ul>
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### 3.3.3 Rehabilitation Plan for Drinking Water System

#### (1) Background

The community of Panyebar Area already had two drinking water supply systems. One system was installed by CARE in 1978 and the other was installed by FONAPAZ in 1998. The pipes of the water supply systems had structural problems, such as lack of sufficient support at the crossing of the creeks, and in some locations the pipes are on the ground surface, so falling rocks and trees damaged them. Also the water distribution tank of the system built by CARE lacked capacity to store the volume of water carried by the supply system throughout a night.

#### (2) Objectives of the Study

The objective of the project is to achieve stable, sure, and constant drinking water supply in the community.

#### (3) Components and Schedule

Project work components are summarized below.

- a. River crossing works (aqueducts) 7 units. Length of aqueduct; from 18m-30m, discharge 4 liter/s.
- b. Distribution Pipe rehabilitation 3.0 km for pipe modification and protection, pipe protection works for PVC pipeline
- c. Distribution tank 1 unit, capacity: 50 m<sup>3</sup>, concrete, size: 5.0m x 5.0m x 3m, including connection pipe (PVC, 160psi, 3")
- d Training for maintenance of pipeline On the Job training and several other lectures to users for maintenance work.

Item	2001			2002											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1) Purchase of equipment			■	■											
2) River cross work				■	■	■					■	■	■	■	
3) Protection work for pipeline				■	■	■					■	■	■	■	
4) Distribution tank				■	■	■					■	■	■	■	
5) Supply pipe/ Connection pipe					■	■					■	■	■	■	
6) Monitoring														▲	▲

#### (4) Monitoring Results

##### Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data collector
1) Progress of construction of water supply	Monthly	Water Committee
2) Payment rate of water charge	Every 4 months	Water Committee
3) Status on O&M of facilities	Once half year	Water Committee
4) Status of water use	Monthly	Water Committee

##### (a) Progress of construction works

The construction works in Phase-I started at the end of December 2001. However, because of lack of voluntary labor forces from the community, the progress at the end of phase I period (the end of March 2002), was greatly delayed from the original schedule. Overall schedule and actual progress of the construction works are shown in Figure 3.3.3 (1).

##### (b) Collection rate of water charge

The Study Team offered and tried to introduce a new water collection system to the water committee in order to increase the collection rate of water charge. However, the water committee insisted that the frequency of the water fee collection should be kept as before, once a year. The water committee decided

that a penalty for delinquency, i.e. cutoff of the water supply, would be strictly imposed on those who do not pay the water charge. However the application of the penalty should be delayed until December 2002 when everybody has income from their products.

(c) Status on O & M facilities

The rate of water charge collection in 2001 was around Q1,300, from 48% of the total beneficiaries. After investigating their account book and usage of the money, all the collected money was duly utilized for proper purposes from January 2002 to now. Major expenses were costs of materials for repairing pipelines and the labor wages for repairing works.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Lack of voluntary labor forces in the construction works	The Study Team held several meetings with all the beneficiaries. However, definitive countermeasures could not be found within the community. Finally the Mayor offered financial support paying daily labor wages.	The labors were obtained smoothly and the progress of construction performed well.

(6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Medium	- Completion of construction works was delayed. - Stable water supply was ensured.
<i>Effectiveness</i>	High	- The beneficiaries could enjoy a stable water supply.
<i>Impact</i>	Positive impact	- The water committee had a strong position and voice in the society because of improvement of their services and provision of the stable water supply.
<i>Relevance</i>	High	- The stable water supply is one of the most important items in rural development.
<i>Sustainability</i>	High	- As long as water reaches houses, people are going to pay the water fee. Then the water fee can be used for maintenance, which secures a stable water supply.

<i>Conclusion</i>	Because of lack of voluntary labor, the schedule of construction was delayed.  Water supply system was improved and reinforced so people can receive stable water supply services. Because of the enhancement of the water committee, they can collect the water fee effectively.
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<i>Recommendation</i> <i>[Responsible agency]</i>	The following items should be monitored with high priority. <i>[MAGA]</i> - After 1 year; collection rate of water fee. - After 1 year; physical condition and maintenance of potable water system. - After 1 year; condition of water supply, stable or not.
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### 3.3.4 Water Quality Improvement Plan for the Existing Drinking Water

#### (1) Background

In the Panyebar Model Area, there was a communal potable water system, which used spring water for drinking without any treatment. The operation and maintenance of the water supply system was duly managed by the water committee, but in the result of a water sampling test it was detected that the water quality was not suitable to drink. Thus a water treatment facility, i.e., a sterilizer with hypo-chloride-sodium, was required.

#### (2) Objectives of the Study

The main objectives of the project are to improve the health condition of the community residents through improvement of drinking water quality by installation of sterilizer.

#### (3) Components and Schedule

The work components are summarized as follows;

- Installation of the sterilizer (including a protection house): 2 sets
- Calibration of the equipment
- Training for using the equipment

Item	2001			2002												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1) Purchase of equipment													■			
2) Installation of sterilizer													■	■		
3) Training														■		
4) Monitoring													▲	▲		

#### (4) Monitoring Results

##### Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data Collection
1) Users of improved water	Every 3 months	Development Committee
2) Operation status of sterilizer	Monthly	Development Committee
3) Number of diarrhea patients	Every 3 months	Development Committee
4) Simple water quality test	Every year	FIS

(a) Users of sterilized water

After installation of the equipment, an interview survey has been conducted with some users in the community in order to know the status of using the treated water. In the results, no user stopped using the treated potable water because of a bad taste or smell.

(b) Operation status of sterilizer

Before commencement of the water purification, training for the operators and the committee members has been given in order to give skills and knowledge for using and maintaining the sterilizer. It seems that this training has been finished successfully and all the attendants learned all the skills and knowledge. However not much time has passed after commencement of the treatment, thus the actual operation and maintenance works could not yet be observed at site.

(c) Number of diarrhea patients

Not much time has passed since commencement of the water treatment, thus the actual effect could not yet be observed at site. However a certain tendency of decrease of the number of water born disease patients is anticipated based on a sample analysis in the case of a sterilizer installed in Palestina. The details should be referred to in the annex report.

(d) Simple water quality test

Water quality before and after the water treatment was checked. Obvious improvement of water quality had been observed in the test. Details should be referred to in Table 3.2.3 (1).

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Because of lack of knowledge about the water treatment, unreasonable rumors, such as a burn in the stomach by the water treated with chloride, were observed in the community.	The Study Team held a meeting for all the village people to explain the effectiveness and harmlessness of the water sterilization.	After the explanation, no any critical opinion against the water treatment was observed.
In the planning stage, the water committee found a landowner that offered his land gratis for a house for water treatment. However when the project actually started, the landowner requested money for the land.	Finally the committee found another free land but precious time passed in vain for several weeks.  Countermeasure: In the planning stage, all the important agreements, especially regarding money and land, should be made in writing.	

## (6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	High	- Water quality was certainly and immediately improved.
<i>Effectiveness</i>	Will be achieved in the later stage	- Number of patients of water born diseases is expected to be reduced, but it will take a certain time for identifying it.
<i>Impact</i>	Negative impact	- Some people noted a strange smell of the treated water. But those people were using the treated water.
<i>Relevance</i>	High	- The treatment of potable water is one of the most important items in terms of rural development of Guatemala.
<i>Sustainability</i>	High	- Assistance of the municipality can be received from now on. - The water committee learned how to maintain the sterilizer system very well.

<i>Conclusion</i>	The water quality was improved immediately after installation of the sterilizer. However the benefit of the project could not be observed quickly and clearly. The municipality started to become involved in the water treatment recently and they have intention to support the project continuously.
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<i>Recommendation</i> [Responsible agency]	The following items should be monitored with high priority. - After 1 year; condition and operation status of the sterilizer. [Municipality] - After 1 year; status of municipality's assistance (supply of the chemical materials). [MAGA] - After 5 years; condition and operation status of the sterilizer. [Municipality]
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### 3.4 Pachum Model Area

#### 3.4.1 Plan of Extension Use of Improved Cooking Stoves and of Sauna Baths "Temascal"

##### (1) Background

According to the household survey, the use of improved stoves in Pachum Model Area was low, only 2 %, and most inhabitants cook meals over an open fire. In the Pachum area, a traditional sauna bath was popularly used, called "Temascal". Those cooking and sauna facilities used a lot of firewood, which was taken from forests in the mountainous area.

##### (2) Objectives of the Study

The purposes of introducing improved stoves and improved sauna baths are summarized below:

- Reduce the daily consumption of firewood in order to conserve the forest in the mountainous area.

- Mitigate heavy work of firewood transportation by the reduction of firewood consumption.
- Improve the villagers' health condition by the introduction of a comfortable and economical type of sauna bath.

### (3) Components and Schedule

The Project provided the following;

- Improved Stoves ... 130 ea.
- Improved Temascal (newly constructed) ... 10 ea.
- Improved Temascal (combustion box installation only) ... 30 ea.
- Training and demonstration
- Several interview surveys

Component	2001			2002										
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1) Designing & demonstration			■	■										
2) Construction works				■	■	■							■	
3) Monitoring & Evaluation					■								■	

### (4) Monitoring Results

#### Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data Collection
1) People's impression on facility use	Before installation & 3 months after the installation	MAGA
2) Firewood consumption before and after the project	Before installation & 3 months after the installation.	MAGA

#### (a) Beneficiaries' opinions on the facility use

According to the interview survey, all the interviewees expressed their high "satisfaction" with their improved facilities as mentioned in the following table.

Questions	Improved Stove (Total answers : 20 persons)	Improved Temascal (Total answer : 19 persons)
What do you think about it?	Very satisfied (20), Satisfied little (0), Not satisfied (0)	Very satisfied (19), Satisfied little (0), Not satisfied (0)

#### (b) Firewood consumption before and after the project

As mentioned the table below, consumption of firewood decreased to around 57% of the previous consumption in the improved stove and less than 45% in the improved Temascal.



### Comparison of Firewood Consumption

	Improved Stove [lb. / family / week]	Improved Temascal [lb. / use]
Before Project : ... (1)	259.2	42.0
After Project : ... (2)	147.9	18.7
Relative consumption Rate : = (2)/(1)	57.1%	44.5%

#### (5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
After installation of the first design of the improved Temascal (hereinafter the old design Temascal), it was revealed that many beneficiaries abandoned use of the old design Temascal immediately.	The design review survey and modification of the design were made. Newly designed Temascals were installed in the houses in the community.	All the beneficiaries accepted the new design Temascal and are using those facilities presently.
The stove and Temascal committee requested people to pay Q25 per person on the condition of receiving the improved facilities. And this caused a friction between the committee and some villagers.	The study team held a meeting with all the villagers and explained not to agree to such a money collection. After long discussion, the committee accepted the terms and returned money to the beneficiaries who had already paid.	No any conflict between beneficiaries and the committee occurred so far.

#### (6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Medium	- The improved saunas were reinstalled after design change. It needed more manpower, time and funding.
<i>Effectiveness</i>	Achieved	- Reduction of firewood consumption was great and it contributed to improved quality of life in the rural area.
<i>Impact</i>	Positive impact	- People had more opportunities because of fewer trips to the mountain. - People increased the frequency of taking saunas, which contributed to improvement of health condition.
<i>Relevance</i>	High	- Forest conservation is one of the most important items in terms of rural development of Guatemala.
<i>Sustainability</i>	High	- Beneficiaries understood and recognized the benefits of the improved facilities very well

<i>Conclusion</i>	The reduction of firewood consumption by the improved facilities was remarkable. It contributed not only to improve the quality of life in the community but also conserve the forest and environment.
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<i>Recommendation</i> <i>[Responsible agency]</i>	The following items should be monitored with high priority. <i>[MAGA]</i> <ul style="list-style-type: none"> <li>- After 1 year; condition of usage of the improved facilities.</li> <li>- After 5 years; condition of operation status of the improved facilities.</li> </ul>
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### 3.5 **Palestina Model Area**

#### 3.5.1 Potato Storage Plan

##### (1) Background

The Palestina area is one of the typical potato production areas in Quetzaltenango province. Annual fluctuation of potato price at markets in Guatemala is very large. In ordinary years, the price lowers to 30 to 40 Q/quintal during harvest season, but it soars to 90 to 120 Q/quintal in off-season. If there were some means of storage, the quantity of potatoes sold in the market would be self-controlled and the price would be more stabilized. If this project could control the market, it would make a way for farmers to increase their income.

##### (2) Objectives of the Study

The main objectives of the project are as follows:

- to search for an effective means of long-term storage of potatoes by simple storage at the farm level
- to ascertain the acceptability of quality of the stored potato in the potato markets

##### (3) Components and Schedule

The project components consisted of the following items.

- Establishment of simple storage facilities at the farmer's level, three types of potato silos, named ICTA type, Japanese Type -I and Japanese type-II. Each type of potato silo was made in two sizes, 10 and 20 quintals; the experiment was made in 2 caserios, Los Cabrerias and Los Diaz
- Monitoring of storage and potato conditions at 15 day intervals
- Technology transfer to potato farmers, both in the field at the time of conducting the project and through lecture with explanation of project results.

The implementation schedule is shown below:



### Los Diaz

Type of Silo	Storage Capacity of Silo	Potato Variety	Amount Discarded before Storing*	Actual Weight of Potato Stored	Weight suitable for consumption after storage	% of Potato damaged during Storage	Appearance of Potato
	(qq)		(qq)	(qq)	(qq)	%	
Japanese I	10	Dia 71	0.0	10.0	9.3	7.0	Good
Japanese II	10	Dia 71	0.3	9.7	8.6	11.3	Good
ICTA	10	Dia 71	0.0	10.0	9.0	10.0	Good
Japanese I	20	Dia 71	0.8	19.2	18.4	4.2	Regular
Japanese II	20	Dia 71	0.0	20.0	10.8	46.0	Bad
ICTA	20	Dia 71	0.5	19.5	19.0	2.6	Good

\* The reasons for discarding some potatoes before storing were due to bacteria and/or insect damages.

### Los Cabrera

Type of Silo	Storage Capacity of Silo	Potato Variety	Amount Discarded before Storing*	Actual Weight of Potato Stored	Weight suitable for consumption after storage	% of Potato damaged during Storage	Appearance of Potato
	(qq)		(qq)	(qq)	(qq)	%	
Japanese I	10	Dia 71	0.0	10.0	9.01	9.92	Good
Japanese II	10	Dia 71	0.0	10.0	8.08	19.20	Bad
ICTA	10	Dia 71	0.0	10.0	9.15	8.5	Good
Japanese I	20	Loman	2.44	17.56	16.61	5.41	Good
Japanese II	20	Loman	0.42	19.58	18.91	3.42	Good
ICTA	20	Loman	0.88	19.2	18.33	4.13	Good

\* The reasons for discarding some potatoes before storing were due to visible bacteria and/or insect damages.

Based on the analysis of data presented above and data on variation of potato selling periods and prices, it could be concluded that potatoes stored inside of simple silos for up to 70 days could maintain good appearance for the local market. Since the presence of the bacteria *Ralstonia solanacearum* and or the insect *Scrobipalopsis solanivora* was the major cause of the large percentage of potato damage during the storage period in all types of silos, especially in the Japanese type -II silo, careful treatment for bacteria and insect contamination will be needed.

#### (b) Cost and profit of storage operation

Cost and profit of the storage operation for each type of silo at Los Diaz and Los Cabrera are summarized below. Details are shown in Table 3.5.1 (1).

Los Cabrera

Type of Silo	Purchase Price of Potato (Q/qq)	Potato Total purchase cost (Q)	Material Cost (Q)	Total Cost Of Material and Potato (Q)	Consumable Amount of Potato (qq)	Selling Price* (Q/qq)	Gross Revenue (Q)	Net Return (Q)	Net return (Q/qq)
	(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)	(7)	(8)=(7)-(4)	(9)
Japanese I	55	550	35.0	585.0	9.3	100	930	345.0	34.5
Japanese II	55	550	86.0	636.0	8.6	100	860	224.0	22.4
ICTA	55	550	90.7	640.7	9.0	100	900	259.3	25.9
Japanese I	55	1,100	70.0	1,170.0	18.4	100	1,840	670.0	33.5
Japanese II	55	1,100	151.0	1,251.0	10.8	100	1,080	-171	-8.5
ICTA	55	1,100	157.5	1,257.5	19.0	100	1,900	642.5	32.1

\* at February 28, 2002

Los Cabrera

Type of Silo	Purchasing Price of Potato (Q/qq)	Potato Total purchase cost (Q)	Material Cost (Q)	Total Cost Of Material and Potato (Q)	Consumable Amount of Potato (qq)	Selling Price* (Q/qq)	Gross Revenue (Q)	Net Return (Q)	Net return (Q/qq)
	(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)	(7)	(8)=(7)-(4)	(9)
Japanese I	55	550	35.0	585.0	9.01	100	901.0	316.0	31.6
Japanese II	55	550	86.0	636.0	8.08	100	808.0	172.0	17.2
ICTA	55	550	90.7	640.7	9.15	100	915.0	274.3	27.4
Japanese I	100	2,000	70.0	2,070.0	16.61	100	1,661.0	- 409.0	-20.5
Japanese II	100	2,000	151.0	2,151.0	18.91	100	1,891.0	- 260.0	-13.0
ICTA	100	2,000	157.5	2,157.5	18.33	100	1,833.0	- 324.5	-16.2

\* at March 11, 2002

Based on the analysis of the data presented above, it could be concluded that potatoes stored inside simple silos for up to 70 days can maintain good appearance for the local market and that farmers can obtain an important increase in benefit from selling their potatoes at the time of better market prices.

The negative returns indicated in the above tables (4 results of negative net return out of 12 storage tests) can not be attributed to the type of silo used, but are due to the quality of stored potatoes and the type of potato variety stored. In the case of potato silos made in caserío Los Díaz, the cause of potato damage during storage was the presence of bacteria in the potatoes. In the case of silos made in caserío Los Cabrerías, the causes of negative return were the presence of bacteria in the potatoes and mainly because potatoes of the Loman variety were bought at a high price and sold at the same price. As potatoes of the Loman variety are brought to the selling point from several places and the supply of this variety of potato is over a longer period, there are less chances to get timing for better prices.

(c) Sugar content

The sugar content (% Brix) of potatoes was measured every 15 days. The results of measurement of sugar content of stored potatoes showed no significant

change in % Brix during the 70 days of storage. There was no significant difference in sugar content between the different types of silos. There was no significant change in specific weight (grams/cm<sup>3</sup>) of potatoes during the 70 days of storage.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
The presence of the bacteria and/or insects was the major cause of the large percentage of potato damage during the storage period in all types of silos, especially in the Japanese type -II silo.	<ul style="list-style-type: none"> <li>- Potatoes should be harvested at ripening time. Do not leave potatoes in the soil longer than normal growing period</li> <li>- Prior to selection of potatoes for storage, elimination of potatoes with visible damages from bacteria and/or insects should be done.</li> <li>- Prior to selection of potatoes for storage, avoiding injury of the potatoes during transportation and storing should be done.</li> <li>- Potatoes for storage and the soils inside the silo should be treated with agricultural chemicals</li> <li>- Site of silo should not be used for potato cultivation.</li> <li>- Site of silo should be selected in a cool area where it is not under direct sunlight for a long time.</li> </ul>	It is expected that the rate of damage of potatoes during storage will be reduced significantly.
The proposed simple storage method at the farmer's level could not sufficiently meet the export quality standards for potatoes for market at La Cumbre.	<ul style="list-style-type: none"> <li>- Introduction of warehouses installed with facilities that store potatoes in low temperature room (3-5<sup>0</sup>C) should be essential.</li> </ul>	It is expected that the quality of potatoes will meet export standards.

(6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	High	<ul style="list-style-type: none"> <li>- The results of the project indicated that the quality of potatoes (Dia variety) that were stored for about 3 months was acceptable for the local potato market.</li> <li>- The results of the project indicated that potatoes (Dia variety) were sold at a higher price than before, but Loman variety not.</li> </ul>
<i>Effectiveness</i>	Partly achieved	<ul style="list-style-type: none"> <li>- The results of the project indicated that the small storage technology for potatoes (Dia variety) at the farmer's level was economically feasible.</li> </ul>
<i>Impact</i>	Positive impact was observed.	<ul style="list-style-type: none"> <li>- It is considered that the project could produce significant impact on increasing income for small-scale potato farmers if small storage at farmer's level is properly managed.</li> <li>- Farmers have not used small storage technology at the farmer's level because they did not know of it. It is important to make efforts to continue demonstrating this small and profitable technology to small potato production farmers.</li> </ul>

		- Actual impact shall be confirmed after several years since it takes more time for the effect to emerge more clearly.
<i>Relevance</i>	High	- Income increase accrued from project implementation is expected to be quite important for the poverty reduction of indigenous people.
<i>Sustainability</i>	Relative high	- Since the potato storage project shows technical soundness and economical viability, it is expected that this project will be sustainable. Expansion of the potato storage project requires continuation of the demonstration of small storage technology.

<i>Conclusion</i>	<p>The results of the potato storage project showed that the technology of simple storage at the farmer's level was technically sound and economically feasible. It is necessary that small storage at the farmer's level be properly managed in terms of control of pests and diseases.</p> <p>It is greatly expected that application of the technology of simple storage at the farmer's level will bring about an increase of farm income and contribute to the reduction of poverty of the small scale potato farmers in the potato production areas.</p> <p>In view of sustainability, it is essential to make every effort to continue demonstrating this small and profitable technology to small potato farmers.</p>
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<i>Recommendation</i> <i>[Responsible agency]</i>	<p>It is recommended that the demonstration of the technology of simple storage at the farmer's level should be continued by the MAGA Quetzaltenango office in cooperation with ICTA. Demonstration of storage should be carried out for about 70 to 90 days from about the middle of November to February for the Dia variety potatoes that will be obtained at the second harvest. MAGA and farmers will share the necessary costs for the demonstration at a rate of 1 to 1. <i>[MAGA]</i></p> <p>It is also recommended that the following monitoring should be performed by the MAGA Quetzaltenango office in cooperation with the farmers and ICTA in Quetzaltenango. <i>[MAGA]</i></p> <ol style="list-style-type: none"> <li>a) Operation period: once a year, for three years</li> <li>b) Demonstration place: 2 places: at Los Cabrera and Los Diaz</li> <li>c) Monitoring items: (1) potato price and storage status, (2) cost and profit of storage operation, (3) the number of farmers who try to carry out storing potatoes by using this simple storage technology.</li> </ol>
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### 3.5.2 Project of Model Farm on Potato Production

#### (1) Background

The Palestina Model Area is one of the important potato production places in Guatemala. However, the present yield of potatoes is low due mainly to use of potatoes infested by various viruses and inadequate farm management. As a result, potato farmers live in very difficult conditions. In addition, much use of agricultural chemicals prevails in the Model Area, which may result in occurrence of negative effects for human health and the environment such as contamination of

groundwater. To solve these problems, the Pilot Project will provide demonstration farms that will be installed with the help of farmers. In the demonstration farms, improved technologies could be demonstrated and transferred to village farmers to contribute to the improvement in potato production.

(2) Objectives of the Study

The main objectives of the project are as follows:

- to demonstrate improved farming of potato cultivation in model farms
- to increase the unit yield of potatoes

(3) Components and Schedule

The project components consist of the following items.

- Establishment of model potato farms with an area of 2 cuerdas, one in each of the five selected communities of Palestina de Los Altos consisting of 5 caserios, Sector-1, Los Diaz, Los Perez, Los Cabrera and Los Morales. The model farm in each community was divided into 4 sections with different crop management (ICTA technology, application of different levels of compost, IPM, and use of virus free seeds)
- Management and monitoring of potato cultivation in the model farms
- Transfer of farming technology to the farmers

The implementation schedule is shown below;

Component	2001		2002											
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Preparatory work and establishment of model farms										■	■			
Management and monitoring											■	■	■	■
Training											■	■	■	■
Field										■	■			■



#### (4) Monitoring Results

Monitoring indicators are shown in the table below.

Item	Frequency	Data Collection
(a) Condition of potato crops	45 days after planting	Contractor (NGO) and beneficiary farmers
(b) Quantity of potatoes harvested	At the harvest time	Contractor (NGO) and beneficiary farmers
(c) Number of participants on training & field days	After each meeting	Contractor (NGO) and beneficiary farmers

##### (a) Conditions of potato crop

The model farm at each caserío was subdivided into four plots of 0.5 cuerda each, for the implementation of different treatments for managing potato crops. The treatments implemented were i) the technology recommended by ICTA, ii) application of 3 different levels of compost, iii) Integrated Pest Management (IPM) and iv) planting potato seed materials free of viruses.

Management of potato farms was made by each farmer with technical guidance and monitoring of model potato farms made by an expert from FUNDIT (contractor/NGO).

Potato seeds were planted at the end of August 2002. All the potatoes were germinated by 19 September.

The climatic conditions, especially the pattern of rainfall and temperature, during development of potato were as shown in the following table.

Month	Number of Rainy Days	Rainfall (mm)	Maximum Temperature (°C)	Minimum Temperature (°C)
August (20 to 31)	5	43.3	23.1	5.7
September (1 to 30)	22	169.2	23.6	5.2
October (1 to 31)	13	108.8	23.5	1.4
November (1 to 19)	7	13.8	23.0	- 0.4

Note: Data of INSIVUMEH for Labor Ovalle meteorological station at Quetzaltenango, about 23 Km from the project area

The incidence of the Late and Early Blights were kept low during the first 45 days of development of potatoes in the model farms. This could be attributed to the management applied, consisting in the application of fungicides and insecticides twice and three times per week.

Also, the number of insects and aphids was low during the first 45 days of crop development. This can be attributed to climatic conditions unfavorable for insect growth because of frequent rains during September and to chemical control applied. The presence of potato plants affected by virus was minimal

until 28 September.

However, the incidence of 'Late Blight' disease seriously occurred from October to November. The main causes are considered to be as follows:

- During the period from September 19 to October (25 days), there were 21 rainy days and a lot of rainfall.
- In addition to the 21 rainy days, high relative humidity, a low number of sunshine hours, low temperature and strong winds with hail occurred in the said period.
- Potatoes in the model farms were seriously affected by 'Late Blight disease' that was easily transported from the nearby potato crops in farms other than the model farms

Potatoes were seriously damaged by 'Late Blight' disease and the yield was decreased.

(b) Quantity of potatoes harvested

Potatoes in each section of the 5 caseríos were harvested at the middle of December 2002. The yield of potatoes in the 5 caseríos is shown below. Details are shown in Table 3.5.2 (1).

Experimental section	Particular	Yield of potatoes (qq/cuerda)				
		Sector-1	Los Diaz	Los Perez	Los Cabrera	Los Morales
T1	Technology recommended by ICTA	6.67	3.78	4.28	11.64	5.28
T2, S1	Application of Compost at rate of 1kg/m <sup>2</sup>	4.42	1.62	3.59	4.38	6.18
T2, S1	Application of Compost at rate of 2kg/m <sup>2</sup>	8.27	3.90	3.87	5.70	6.96
T2, S1	Application of Compost at rate of 3kg/m <sup>2</sup>	8.37	1.81	7.44	9.17	6.78
T3	IPM	4.60	4.9	6.57	4.41	6.16
T4	Planting potato seed materials free of virus	6.00	4.44	6.10	3.15	5.96

The unit yield of potatoes in each section in the model farms was very small and did not exceed the present yield of potatoes in the normal year. It is believed that the main causes of the low yield were difficulty in obtaining the necessary certified potato seeds, which resulted in broken dormancy and difficulty in obtaining the land for the model farms from the farmers. Planting of seeds was delayed by these causes and planting commenced at the end of August, which was an inappropriate planting time. Furthermore, there were 21 consecutive rainy days, which is an abnormally long period and negative climatic conditions.

As a result, (1) Little rain during the process of filling tubers in all the parcels was a serious cause of decrease of the yield. (2) Damage by strong wind with hail occurred. (3) Potato production was seriously affected by late blight (*Phytophthora infestans*) owing to favorable climatic conditions for their development. Detailed analysis of the causes of low yield is shown in Table 3.5.2 (2).

(c) Number of participants on training and field days

There were 5 training sections and 3 field observation days. In addition, twice every week the technician met farmers in their respective farms and discussed conditions of the potato farm and provided recommendations directly to each farmer for care of the potato crop. The themes discussed during the training section were: i) Explanation of treatments implemented in the model farms; ii) Land preparation for potato planting; iii) Importance of use of good quality seeds, free from virus; iv) Important insects and diseases that affect potato crop, and their control; v) Storage of potato seeds.

The number of farmer participants in the training activities varied from 4 to 9. The number of participants in training activities was low, mainly because most training activities coincided with the travel of people from Palestina de Los Altos to the Coastal area for harvesting corn and to take care of the sesame and sorghum crops and pastures. Another cause of low participation in training activities was the lack of a farmers' organization, which makes it difficult to convey invitations to the farmers in Palestina.

The farmers that participated in training activities and field days were very enthusiastic in trying to learn new technology in potato crop management. Some of them expressed interest in becoming producers of certified potato seeds and asked the technician to explain the requirements for becoming certified seed producers.

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
It is very difficult to obtain the necessary potato seeds that are virus free and broken dormancy.	- It is necessary to establish a system of supply of certified potato seeds in ICTA.	It is expected that certified seeds will be easily obtained.

Yield of potatoes was lower than target.	<ul style="list-style-type: none"> <li>- Frequency of field inspections for pests and diseases should be increased and quick treatment against pests and diseases be performed.</li> <li>- It should be designed that harvest be finished by at least the end of October to avoid negative climatic conditions of low temperature, occurrence of hail and low rain fall in November.</li> <li>- More training programs about the improved farming should be undertaken with the farmers.</li> </ul>	<p>Higher yield of potatoes can be expected due to low damage rate by pests and diseases.</p> <p>Higher yield of potato can be expected by avoiding negative natural conditions</p>
The number of farmers participating in the training activities was low.	<ul style="list-style-type: none"> <li>- Training should be performed by visual means such as use of power point.</li> <li>- Training program would be offered under provision of incentives such as lunch.</li> <li>- Training schedule should carefully take into consideration the travel schedule of the people from Palestina de Los Altos to the coastal area.</li> </ul>	Extension work will be smoothly carried out for the farmers.

(6) Evaluation

<i>Criteria</i>	Result	Basis
<i>Efficiency</i>	Very low	<ul style="list-style-type: none"> <li>- The yield of potatoes in the model farms was not over 130% of the present farmer's yield.</li> <li>- Time of chemical application was not reduced.</li> <li>- Disease resistant variety was not available.</li> <li>- Seeding of potato was very late owing to difficulty of obtaining clean seed potato</li> <li>- Participation rate to training is less than 70% of potato farmers.</li> </ul>
<i>Effectiveness</i>	not achieved	<ul style="list-style-type: none"> <li>- No increase of unit yield of potatoes was found</li> <li>- Income level of potato farmers could not improve.</li> <li>- Since participation rate to training is less than 70% of potato farmers, it is essential that expansion of this improved farming method to small-scale farmers should be performed.</li> </ul>
<i>Impact</i>	Positive impact was not observed.	<ul style="list-style-type: none"> <li>- The experimental results of low yield of potato in the model farms could not contribute to the poverty reduction in Palestina or its surrounding areas.</li> <li>-</li> </ul>
<i>Relevance</i>	Low	<ul style="list-style-type: none"> <li>- Poverty reduction in potato farmers would be obtained if clean potato seeds were certainly available and can be planted at proper time.</li> <li>-</li> </ul>
<i>Sustainability</i>	Low	<ul style="list-style-type: none"> <li>- The model potato farm experiment should be performed again at the right time seeding with clean seeds. For the expansion of such improved farming methods to the large areas, it is essential that ICTA should supply certified potato seeds.</li> </ul>

<i>Conclusion</i>	<p>The results of the model potato farm project could not show that the technology of improved farming methods with the use of certified potato seeds was technically sound and economically feasible because seeding with certified seeds could not be done at an appropriate time due to difficulty in obtaining certified seeds and experimental areas of the model farms. Further, there was an abnormally long run of consecutive rainy days, which resulted in a big occurrence of pests and diseases.</p> <p>The experiment of model farm on potato production should be carried out again at the right time.</p>
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<i>Recommendation</i> <i>[Responsible agency]</i>	<p>It is recommended that the demonstration on improved farming technology proposed in the verification study should be done by the MAGA Quetzaltenango office in corporation with ICTA. Improved farming technology consists of four different crop management plan, ICTA standard, application of different levels of compost, IPM and use of virus free potato seeds. Demonstration farms will be constructed at 2 places in Los Cabrera and Los Diaz and operated for 3 years. Cultivation of potatoes will be done twice a year using the Loman variety from April to June and Dia variety from July to September. Training for farmers should be given by ICTA. MAGA and farmers will share the necessary costs for demonstrations at a rate of 1 to 1. <i>[MAGA, in cooperation with ICTA]</i></p> <p>It is also recommended that the following monitoring should be performed by MAGA Quetzaltenango office in corporation with farmers and ICTA in Quetzaltenango. <i>[MAGA, in cooperation with ICTA]</i></p> <ul style="list-style-type: none"> <li>a) monitoring period: twice a year, for three years</li> <li>b) monitoring items: (1) plant status and unit yield of potatoes in each different management plan (2) production cost and profit and (3) the number of farmers who apply the improved farming technology in their farms.</li> </ul>
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### 3.5.3 Mini-irrigation Project

#### (1) Background

In Palestina area, farmers cultivate traditional crops such as maize and potatoes with the rainfed irrigation. Because the land holdings are small, and there exist adverse climatic and topographic limitations, agricultural production cannot sustain their families. To stabilize and increase farmers' income, it is necessary to introduce small-scale irrigation by utilizing the spring water, which is presently not utilized effectively. The objective of the projects was to increase and stabilize farmers' income through 1) increase of the crop productivity with irrigation systems and vinyl houses, 2) crop diversification, and 3) organization of users' associations.

However, the project was canceled in March 2002 because of a request from MAGA. The request was made due to the fact that a group of people was strongly opposed to the project and it might cause disturbances to the project and the study team.

The claims made by this opposing group are as follows.

- 1) The planned water source (Los Molinos spring) is exclusively for potable water supply.
- 2) There are still some communities that do not receive potable water supply and the water source should be kept until they have a potable water supply.
- 3) The said water source produces only 15 lit/sec, which is not enough to provide water for irrigation.
- 4) They are not willing to bear any obligations for installing a water supply system such as hand labor or installation cost since they think it is the obligation of the Municipality.

In response to these claims, MAGA and the JICA study team explained as follows.

- 1) The Molinos water source produces 25 lit/sec, which is sufficient for providing both potable water supply and irrigation water for the proposed farm of 3.0 ha.
- 2) The mini-irrigation project will use only 8% of the total water volume (max. 4 lit/sec for 12hours) from this source and, hence, there will be no effect on the potable water supply.
- 3) MAGA and the JICA study team already obtained permission from the Mayor of Palestina de Los Altos municipality (municipal council) and also obtained official permission from the water committee of the beneficiaries of Molinos water source for the utilization of water from the Molinos spring.
- 4) MAGA will assist the group in order to find funding sources for installation of a potable water supply system.

Although several meetings had been held among the organizations and persons concerned, the opposing group never showed any intention to reach an agreement. Considering this fact, Vice-minister of MAGA decided to request cancellation of the project due to concern about the possibility of a security problem for the study team.

## (2) Detail Background of the Issue

### (a) Potable water system of Palestina de Los Altos:

A potable water supply system is installed in Palestina de Los Altos using water from Los Molinos spring. This system provides water for approximately 1,400 households who reside in and around the project area. To participate in the water supply system, payment of an installation fee (about Q800 to Q1,000 as of March 2002) is necessary. Anyone who pays this fee can be a beneficiary of the water supply system.

(b) Los Molinos water spring:

It is located near the center of the municipality and it belongs to the municipality. According to the survey made by INFOM, the water spring produces 15 lit/sec. On the other hand, the study team also checked the water amount twice in cooperation with the Mayor in 2001 and it turned out to be 23lit/sec. About 33% of the water discharge is used for supplying potable water.

(c) The opposing group

When this system was installed in Palestina de Los Altos, there was a group of people who were reluctant to join the project since they did not want to pay any cost or to offer hand labor for installation. A political leader, who has a long-lasting conflict with present mayor, led these people and started an opposition movement against the mayor of the municipality by saying that he would install a free water supply system for them. Since then, the group has been opposed to the municipal authority.

Some of the people, however, started to leave this opposing group and join the water supply system by paying the necessary cost because the political leader has never provided the free water supply system as he promised.

Presently, the group consists of approximately 20 to 30 people. According to them, they are from the communities of Cruz Verde, Cruz del Mexicano and Buena Vista that are located outside of the project area. There is neither a legal representative nor an authorized representative in the group such as Alcalde Auxiliar except the said political leader.

(d) Discussions between MAGA-JICA study team and the opposing group:

The outline of the discussions between the MAGA-JICA study team and the opposing group is as follows.

A request to cancel the mini-irrigation project was made to MAGA by the opposing group (Nov. 2001)	The major claims of the opposing group are as follows. 1) The water spring is for potable water supply. 2) There is not enough water for irrigation. 3) The irrigation project should not be implemented. 4) JICA study team should implement a water supply project for the group instead of the irrigation project.
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<p>Explanation meeting was held between MAGA-JICA study team and the opposing group.</p> <p>- <i>The group did not accept the explanation made by MAGA-JICA.</i></p> <p>(Nov. 2001)</p>	<p>The team explained following points.</p> <ol style="list-style-type: none"> <li>1) The spring water is sufficient.</li> <li>2) Irrigation project will not affect the potable water supply.</li> <li>3) The team is not supposed to implement a water supply project for the group.</li> </ol>
<p>Background of the opposing group was investigated by an NGO.</p> <p>(Dec., 2001 ~ Jan., 2002)</p>	<p>The Vice-minister of MAGA hired an NGO to investigate the background of the opposing group. Based on the result, MAGA judged the group is not violent and there would be no problem for implementation.</p>
<p>Meeting was held between the MAGA-JICA and the opposing group with the participation of local government, Ministry of Public.</p> <p>- <i>The group did not accept the explanation made by MAGA-JICA.</i></p> <p>(Feb., 2002)</p>	<p>The objectives of the meeting were as follows.</p> <ol style="list-style-type: none"> <li>1) To explain from the technical viewpoints that the irrigation project would not affect the potable water supply at all.</li> <li>2) To find a solution on which both sides can agree.</li> </ol> <p>However, the group had no intention to reach an agreement at all.</p>
<p>Meeting was held with the opposing group at Cruz Verde.</p> <p>- <i>The representatives of MAGA-JICA were forced to sign a document.</i></p> <p>(Feb., 2002)</p>	<p>Based on the request from the group, 2 representatives attended the meeting held at Cruz Verde. About 100 persons were gathered in the meeting and the representatives were forced to sign the minutes without any explanation for it.</p>
<p>Proposal of using an alternative water source for the mini-irrigation project was made to the opposing group.</p> <p>- <i>The proposal was rejected.</i></p> <p>(Feb., 2002)</p>	<p>MAGA considered this issue as a political problem rather than a technical one. MAGA made a proposal of using an alternative source for irrigation and tried to persuade the group. The opposing group, however, did not accept the proposal.</p>
<p>Request to cancel the project was made from MAGA to the study team due to the security reason.</p> <p>(Mar., 2002)</p>	<p>From the attitude of the group, MAGA was concerned that security problems might occur and security of the team could not be guaranteed 100%. Due to this, MAGA requested that the team cancel the project.</p>

### (3) Analysis of the Problem

#### (a) Reasons for the opposing movement

The following two points are considered as the major reasons for opposing the project.

##### (i) Political background

There has been a long-lasting conflict between a political leader and the present mayor. The political leader has been trying to have a negative impact



on the present mayor, and has been disturbing regardless of the type of project. From this background, it is presumed that the political leader agitated the group of people and opposed the mini-irrigation project.

(ii) Water source

The water source was originally used for drinking water and covers both the project area and the non-project area. For this reason, it is easy for water users to worry about the future water availability and to make complaints about the projects. Although the irrigation project will not affect the potable water supply at all, this background on the water source could be a part of the reason for the opposition.

As it is mentioned above, a detail explanation from technical points of view was made several times. Besides, use of an alternative water source was proposed for the irrigation. However, for no reason, the group refused to accept any explanation or proposal. From this fact, the main reason for opposing is simply considered to be a political one.

(b) Reasons for break down of the negotiation

(i) Purpose of the opposing group

The purpose of the political leader is simply to have a negative impact on the present mayor. Therefore, the group had no intention to reach an agreement at all and accepted neither explanation nor proposal. This attitude of the opposing group was the main reason for breaking down the negotiation.

(ii) Limited time and security reason

Negotiation with the opposing group needs sufficient time for continuous explanation and persuasion by proposing various types of alternative solutions. On the other hand, the study period is quite limited and the team needed to avoid any kind of possibility of security problems. For these reasons, continuation of the negotiation was quite difficult and resulted in a break down of the negotiation.

(c) Reasons for unpredictability of the problem

(i) Existence of the opposing group outside of the project area

Basically the study was made inside the project area and less attention was paid to the surrounding area. Therefore existence of the potential opposing group was not identified in advance.

(ii) Doubt for project implementation

People in the rural area have a tendency not to believe in any project until it is

realized. The opposing group was not an exception and seemed to have a doubt about the realization of the irrigation project. Therefore it is considered that the group started opposing when the project implementation become more realistic. Because of this tendency, it is hard to predict the existence of opposing people before the project implementation.

(iii) Reluctance for providing negative information

The people in the rural area are reluctant to provide negative information when a project is going to be implemented in their community, since the negative information might affect implementation of the project. This reluctance could be a cause for difficulty in investigating the existence of potential opposing groups.

(4) Potential Counter Measures for Future Projects

Considering the above analysis, the following potential counter measures would be necessary to avoid problems in implementing similar projects in future.

Measures for investigating existence of potential opposing groups

- 1) The study on the social aspects shall be conducted both inside the project area and through out its surrounding area. This survey would be more important especially if a water source covers a larger area (than project area) or the water source is multipurpose.
- 2) Detailed investigation shall be made for non-participants of the past projects. By interviewing the non-participants about the reasons, background, etc., people's relation inside the community and/or in concerned areas would be ascertained more clearly.
- 3) If a strong leader exists in the community, there is a possibility of the existence of an opposing leader. Therefore, the background of the leader shall be investigated more carefully.

Potential measures when the existence of opposing group is confirmed

- 1) Detailed explanations shall be made regarding the project impact to the people inside the project area and in the surrounding communities in order to promote a clear understanding. It is preferable to have meetings with a small number of people. Meetings with a large number of people are often led and controlled by a few persons and hence, misunderstanding might arise. In case communication among the community people is poor, it is necessary to take sufficient time so that the staff can even visit each house in the communities.
- 2) In the early stage of the project (just before the implementation), detailed explanations shall be made continuously to the opposing group and a

promise that the group will not disturb the project shall be elicited. The promise shall be made in a written document (although it is quite difficult).

- 3) In case that the opposing group is from inside the project area, several projects shall be implemented so that as many people as possible in the community will be benefited by the projects.
- 4) It is also necessary to make a warning, in written document, that legal action will be taken if any violent disturbances occur. This type of warning could be used as preventive measure in relatively extreme cases.

#### 3.5.4 Plan for Migrant People to the Coastal Area

##### (1) Background

In Palestina de Los Altos, the household's land downsizing problem has been pressuring many farmers to migrate to the south in order to search for alternative land to cultivate crops for self-consumption or as alternative sources of income. The majority of the farmers go to Mazatenango and Retalhuleu between April and December very year.

Those who migrate to fincas in Mazatenango and Retalhuleu must live in huts with no safe water sources, toilets or any health services available near by. It is reported that transmigrants suffer from diarrhea, intestinal infections and other water-related illnesses together with pesticide related illnesses and presumably tropical diseases.

The living condition of the migrants should be improved. Access to safe drinking water is the basic need of human beings. The knowledge of appropriate use of pesticides, tropical disease management and better management of simple toilets is also critical for those who migrate in order to protect themselves from any serious health problems. Training on the issues mentioned above can improve the living and health conditions of the emigrants at their destination.

##### (2) Objectives of the Study

The main objectives of the project are as follows:

- to reduce water born illness by introducing the use of water filters.
- to reduce the pesticide use related illness by introducing the appropriate use of pesticides through training
- to reduce malaria and dengue by training on how to prevent illness
- to strengthen the knowledge and training skills of the health center personnel in Palestina de Los Altos on the subjects related to water, pesticides, tropical diseases and simple toilet management

- to strengthen knowledge of primary school teachers on the subjects mentioned above and improvement of teaching materials by providing appropriate materials

### (3) Components and Schedule

The project components consist of the following items.

- Baseline survey for 50 samples
- Training programs for health center personnel/school teachers, community health promoters and migrant people
- Procurement of materials (200 water filters for potable water, 200 simple toilets, 200 sets of mask/gloves/boots/rain coat for agricultural chemicals and 200 sets of seeds of repellent plants) and the provision to the migrant people
- Monitoring survey for 50 samples in terms of condition of water filters, simple toilets, mask/gloves/boots/rain coat, growing condition of repellent plants and effects against malaria and dengue, rate of morbidity, perception of the migrant people and the problems/requirements and the lessons the migrant people learned

The implementation schedule is shown below:

Component	2001			2002										
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Baseline survey				■	■									
Training programs					■	■								
Procurement of materials & provision to the migrant people						■	■							
Monitoring											■		■	

### (4) Monitoring Results

Monitoring indicators are shown in the table below.

Item	Frequency	Data Collection
(a) Condition of water filters and toilets	2 times/15 months	Contractor (NGO)
(b) Condition of equipment & protective materials from intoxication of agro-chemicals	2 times/15 months	Contractor (NGO)
(c) Growing condition of repellent plants	2 times/15 months	Contractor (NGO)
(d) Rate of morbidity	2 times/15 months	Contractor (NGO)

The results of the monitoring survey are shown in Table 3.5.4 (1).

(a) Condition of water filters and toilets

Among 50 samples, only 6 sampled migrants or 12% of the total samples carried water filters to the coastal area while 44 migrants or 88% are using it in their home in Palestina. According to the results of the monitoring survey, the reasons why water filters were not brought to the coastal area are shown below (There were several reasons).

Caserio of origin	Carried	Didn't carry	Reasons						Total
			Small place in trucks	High volume of package	Additional payment for transportation	Too big or too heavy	Short stay on the coast	Fear filter might be broke in travel	
Los Morales	2	13	7	2	2	0	0	2	13
Los Díaz/ Sector-I	1	13	3	4	3	1	0	3	14
Los Cabrera	2	9	1	2	2	1	1	2	9
Los Pérez	1	9	1	0	4	3	0	2	10
Total	6	44	12	8	11	5	1	9	46
%	12%	88%	26%	17%	24%	11%	2%	20%	100%

Water filters have double containers to filter the water. An inside container has sand and gravel for water filtration, and charcoal fills a space between the two containers. Six respondents who carried water filters dismantled a water filter and brought one container for use as water tank in the coastal area and brought it back to Palestina after work in the coastal area. The other is used as a water tank at home in Palestina. Among the 44, the respondents who didn't carry water filter equipment, 39 or 89% are also using dismantled containers as water tanks, and only 5 (11%) (1 from Los Cabrera, 4 from Los Pérez) are using water filters as water filter equipment with double containers in Palestina.

Regarding the condition of the portable toilets, only one sample installed a portable toilet in Champerico (Finca Los Angeles). The number of respondents who did not carry a portable toilet to the coastal area and reasons for not using them are shown in the following table.

Caserío of origin	Carried	No comment	Didn't carry	Reasons			Total
				Small place in trucks	Additional payment for transportation	Prohibition by farm owner	
Los Morales	1	0	14	6	4	4	14
Los Díaz/ Sector-I	0	0	14	6	0	8	14
Los Cabrera	0	2	9	5	2	2	9
Los Pérez	0	0	10	5	1	4	10
Total	1	2	47	22	7	18	47
%	2%	4%	94%	47%	15%	38%	100%

Among the 47 respondents who didn't bring a portable toilet, 12 had installed one in Palestina and 36 are still planning to install one as of 4 November as shown below.

Caserío of origin	Number of samples	Carried to the coastal area	Installed in Palestina	Planned in Palestina	No answer
Los Morales	15	1	1	12	1
Los Díaz/Sector-I	14	0	6	8	0
Los Cabrera	11	0	2	9	0
Los Pérez	10	0	3	7	0
Total	50	1	12	36	1
%	100%	2%	24%	72%	2%

Since the survey was taken, portable toilets have been gradually installed in the homes of the farmers in Palestina. The results of an interview survey indicated that most of portable toilets would be installed in Palestina during November and December when most migrants will come back from the coastal area.

(b) Use of raincoats, masks, boots and gloves to prevent intoxication from agricultural chemicals

Among 50 respondents, 49 answered that they used the protective equipment to apply chemicals during the period of seeding and cultivation of corn. Only 1 (from caserío Los Morales) answered that he didn't use the equipment because he didn't receive any .

(c) Growing condition of repellent plants and effects against malaria and dengue

Forty-five respondents or 90% of the total sampled had planted seeds of repellent plants in Palestina (Basil plants and Marigold seeds were distributed ). 24 respondents succeeded in growing plants and the others failed. 5 respondents planted seeds in the coastal area, however all the seeds did not grow, as shown below;

Caserío of origin	Number Sampled	Coastal Area		Palestina	
		Persons who planted seeds	Number rooting	Persons who planted seeds	Number rooting
Los Morales	21	2	0	19	14
Los Díaz/Sector I	12	1	0	11	4
Los Cabrera	10	2	0	8	3
Los Pérez	7	0	0	7	3
Total	50	5	0	45	24
%	100%	10%	0%	90%	48%

It is considered that some of the important causes of death of plants are attack by ants in Palestina and fumigation in the coastal area.

According to the results of an interview with migrants who didn't carry repellent plants to the coastal area, the reasons they didn't are (1) some respondents didn't believe that seeds can grow in the coastal area because of failures of growing plants in Palestina and (2) the Marigold seeds were used for medicine in the community.

(d) Morbidity rates

The results of the interview survey indicate the number of persons suffering from some form of disease in 2001 and 2002 in the coastal area as shown below;

**Morbidity rates, 2001**

(Unit: persons)

Symptom	Los Morales	Los Cabrera	Los Díaz Sector I	Los Pérez	Total	%
Diarrhea	2	1	3	5	11	22.9%
Nausea	1	2	2	0	5	10.4%
Head ache	0	0	0	0	0	0.0%
Fever	7	1	1	0	9	18.8%
Stomach ache	0	1	2	2	5	10.4%
Malaria	0	1	0	0	1	2.1%
Influenza	0	1	1	1	3	6.3%
Injury	0	0	1	1	2	4.2%
Nervous	0	0	0	1	1	2.1%
Vista	0	0	0	1	1	2.1%
No information	7	3	0	0	10	20.8%
Total	17	10	10	11	48	100%

Source: Results of the interview survey that JICA study team conducted in 2001

### Morbidity rates, 2002

(Unit: persons)

Symptom	Los Morales	Los Cabrera	Los Díaz Sector I	Los Pérez	Total	%
Diarrhea	6	0	0	3	9	15.5%
Nausea	0	0	0	0	0	0.0%
Head ache	0	1	1	1	3	5.2%
Fever	0	3	1	4	8	13.8%
Stomach ache	3	3	4	2	12	20.7%
Malaria	1	0	0	0	1	1.7%
Influenza	8	6	5	4	23	39.7%
Hurt	0	0	0	0	0	0.0%
Nervous	0	0	0	0	0	0.0%
Vista	0	0	0	0	0	0.0%
Urinary infection	1	0	0	1	2	3.4%
Total	19	13	11	15	58	100.0%

Source: Results of the interview survey that JICA study team conducted in 2002

There were 58 cases of sickness (about 21%) from 50 individual respondents according to the interview of 272 people (139 men and 133 women) in 2002. The morbidity rate did not decrease suggesting that there was no benefit derived from the water filter equipment, portable toilets or repellent plants. The main sicknesses for adults and children are shown below.

Adults	Children
Head ache	Flu
Flu	Diarrhea
Fever	Stomach ache
Urinary infection	

The results of an interview asking why the respondents did not buy medicine at MPUs are shown below (there were several possible answers).

Caserío of origin	Bought medicine	Reasons						Total
		Didn't expect to be sick	Pharmacy was closed	Far from home	No information on medicine	Not in the habit of buying medicine for trip	Not in the habit of carrying medicine for trip	
Los Morales	4	8	3	0	0	0	0	15
Los Díaz/Sector-I	5	7	2	0	0	0	0	14
Los Cabrera	3	4	2	0	2	1	1	13
Los Pérez	2	0	2	5	0	1	0	10
Total	14	19	9	5	2	2	1	52
%	27%	37%	17%	10%	4%	4%	2%	100%

Fourteen respondents (27%) bought medicine at MPUs in the community and 9 respondents (17%) wanted to buy it but could not because the MPU was closed.



Most respondents felt that use of equipment such as masks/gloves/raincoats was very effective for protection against agricultural chemicals. On the other hand, it seems that materials such as water filter equipment, toilets and seeds of repellent plants were beyond their ability to comprehend.

On the other hand, there were a few comments about materials such as water filter equipment, toilets and repellent plant seeds. Some said that rather than improve hygiene habits and their health condition, it was more important for them to have necessities like water tanks.

#### (5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Though migrants had been living in huts with no safe water, toilets nor any health services in the coastal area, most did not use water filters, portable toilets or repellent plants owing to several reasons. As a result, the morbidity rate was not reduced.	<ul style="list-style-type: none"> <li>- More portable and adequate methods such as direct use of a disinfectant such as sodium hypochlorinate should have been applied instead of water filters.</li> <li>- More portable water filter equipment and toilets should be designed.</li> <li>- More training programs for health will be performed for the migrants.</li> </ul>	Reduction of morbidity as well as better living will be expected.
Some owners of fincas did not accept installation of toilets because livestock could fall down hole of toilet.	<ul style="list-style-type: none"> <li>- A door should be installed in the toilet.</li> <li>- Mayor of Palestina de Los Altos should visit owners of fincas and persuade them to accept installation of toilets</li> </ul>	An increase in portable toilet installations would be expected.
Not all repellent plant seeds grew.	<ul style="list-style-type: none"> <li>- Selection of varieties of repellent plants that are suitable for the climate of the coastal area should be made.</li> </ul>	Increased use of repellent plants against malaria and dengue will be expected.

#### (6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	Low	<ul style="list-style-type: none"> <li>- Almost all of the migrants used material and equipment to protect against contamination from agricultural chemicals.</li> <li>- No reduction of morbidity was observed because over 90% of the migrants did not use water filters, portable toilets or repellent plants, therefore health improvement in the coastal area was not realized.</li> </ul>
<i>Effectiveness</i>	Partly achieved	<ul style="list-style-type: none"> <li>- No morbidity by contamination from agricultural chemicals in the coastal area was observed because of the use of masks, gloves, raincoats and boots</li> <li>- With the exception of a reduced rate of contamination from agricultural chemicals, health and sanitary improvements were not yet achieved because most migrants did not bring water filters, portable toilets or repellent plants seeds to the coastal area.</li> </ul>

<i>Impact</i>	Positive impact was observed.	<ul style="list-style-type: none"> <li>- It is considered that the health improvement regarding protection from contamination by agricultural chemicals contributed to the improvement of the living environment, one of the three aspects of poverty reduction.</li> <li>- There was no reduction of morbidity except for contamination by agricultural chemicals.</li> <li>- Sanitary improvement was found in Palestina de Los Altos.</li> <li>- Use of dismantled water filters that play an important role in convenience of living for the people was observed.</li> </ul>
<i>Relevance</i>	Medium	<ul style="list-style-type: none"> <li>- The demand that the migrant people (indigenous people) escape from contamination by agricultural chemicals is still very high. Provision of training on treatment of agricultural chemicals and distribution of equipment for preventing contamination was quite important for their health improvement.</li> <li>- Use of water filter equipment and portable toilets and repellent plants in the coastal areas for health improvement did not always accord with actual requirements of the migrant people.</li> </ul>
<i>Sustainability</i>	Partly high	<ul style="list-style-type: none"> <li>- Almost all of the migrants used materials/equipment for protection against contamination by agricultural chemicals in the coastal area due to their convenience of transportation and an understanding of the positive effects against contamination.</li> <li>- On the other hand, over 90% of the migrant people did not bring water filters or portable toilets to the coastal area and did not use them.</li> </ul>

<i>Conclusion</i>	<p>Almost all of the migrants used materials and equipment to protect against contamination by agricultural chemicals in the coastal area. On the other hand, over 90% of the people did not use water filters, portable toilets or repellent plants. As a result, no reduction of morbidity was observed except for a reduction in the rate of contamination by agricultural chemicals.</p> <p>Portable toilets and dismantled water filters were used in Palestina de Los Altos but the most immediate requirements of the migrants did not accord with health improvement in the coastal area, as was the original purpose.</p> <p>The desire of the migrants (indigenous people) to escape contamination from agricultural chemicals is still very high. However, the demand for use of safe water and better sanitation appears low. Therefore, only a reduction in morbidity due to contamination by agricultural chemicals will be expected in the future.</p> <p>Based on the results of the above evaluation, the project is assessed to be low to medium in terms of efficiency, effectiveness, and relevance.</p>
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<p style="text-align: center;"><i>Recommendation</i></p> <p style="text-align: center;"><i>[Responsible agency]</i></p>	<p>It is recommended that more portable and adequate alternative designs for water filters and portable toilets should be studied and the selection of varieties of repellent plants should be researched. <i>[MAGA]</i></p> <p>It is also recommended that the following monitoring should be performed to evaluate this project and identify problems. <i>[MAGA]</i></p> <p style="margin-left: 20px;">a) Monitoring period: once a year, for three years</p> <p style="margin-left: 20px;">b) Monitoring items: (1) status of use of water filters, portable toilets and equipment to protect against agricultural chemical contamination in the coastal area and in the Model Areas, (2) the number of farmers who go down to the coastal area and to the U.S.A. and (3) the morbidity rates in the coastal area.</p>
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### 3.5.5 Municipality Community Health activity Plan

#### (1) Background

The following health related problems were found in the Palestina Model Area.

- Lack of health education including prevention of common diseases and family planning
- Dependency on health volunteers that serve without financial incentives, resulting in a high turn over rate and discontinuity of community health activities
- Lack of essential drugs in quantity and variety while the drugs sold by private pharmacies are very expensive
- No easy access to drugs or health services.

#### (2) Objectives of the Study

The main objectives of the project were as follows:

- Better access to cheaper drugs and more varieties of drugs at the municipal pharmacy by introducing PROAM drugs
- Better access to cheaper drugs as well as first aid treatment at the village level by selling PROAM drugs at the Minimal Pharmacy Unit (MPU) located inside the villages
- Offering a sustainable and regular health education program and system by community health promoters in co-operation with the Health Center.

#### (3) Components and Schedule

The project components consisted of the following items.

- Training program-I by the health center for 10 health promoters and health committee members
- Training program-II, Auxiliary pharmacist, for 4 health promoters and 2 officers of the municipal pharmacy

- Procurement of drugs and necessary equipment
- Construction of 2 MPU buildings
- Monitoring survey.

The implementation schedule is shown below:

Component	2001			2002										
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Training program-I and II			■			■								
Procurement of drugs and necessary equipment						■								
Construction of MPU buildings			■	■	■									
Health education				■	■	■	■	■	■					
Operation of MPU							■	■	■	■	■	■	■	■
Monitoring							■	■	■	■	■	■	■	■

#### (4) Monitoring Results

Monitoring indicators are shown in the table below.

Item	Frequency	Data Collection
(a) Sale of drugs	Once a month	Health committee
(b) Financial condition	Once a month	Health committee
(c) Health education	Once a month	Health committee
(d) Participation of health center in education sessions	Once a three month	Municipality

##### (a) Sale of drugs

MPU opening was on March 11, 2002. Both health committees (Los Cabrera and Los Diaz) agreed that each one of the health promoters, separately, had to be in charge of an MPU for a one-month period. The Health Committee has been taking care of the MPU in a serious manner especially in case of the daily sale control and monthly stock record control.

The ten most sold drugs in Los Cabrera MPU are the following:

No.	Drug	Properties
1	Mebendazol 100 mgs/5ml	Anti parasite, pediatric
2	Acetaminofen 500 mg tab.	Analgesic, anti fever.
3	Acetaminofen 80 mg tabs	Analgesic, anti fever, pediatric
4	Tinidazol tabs.	Anti parasite
5	Vitaminas multiples capsula	Multivitamin
6	Albendazol 200 mgs tab.	Anti parasite
7	Amoxicilina 250 mgs/5 ml frasco	Antibiotic pediatric, wide spectrum
8	Metronidazol 125 mg/ml frasco	Anti parasite, anti ameba
9	Guayacolato de glicerilo	Expectorator, pediatric
10	Ranitidina tab.	Anti ulcera

The ten most sold drugs in Los Diaz MPU are the following:

No.	Drug	Properties
1	Acetaminofen 500 mg tab.	Analgesic, anti fever
2	Mebendazol 100 mgs/5ml	Anti parasite, pediatric
3	Salbutamol 2 mgs/5ml frasco	Bronco dilator
4	Metronidazol 125 mg/ml frasco	Anti parasite, anti ameba, etc.
5	Albendazol 200 mgs tab.	Anti parasite
6	Vitaminas múltiples cápsula	Multivitamin
6	Amoxicilina 250 mgs/5 ml frasco	Antibiotic pediatric wide spectrum
7	Tinidazol tab.	Anti parasite
8	Acetaminofén 120 mg./5ml frasco	Analgesic, anti fever, pediatric
9	Amoxicilina 500 mgs. Tab.	Antibiotic wide spectrum
10	Ranitidina tab.	Anti ulcera

The main population attended was from Caserio Los Diaz and Los Cabrera, but people from nearby caserios also went to the MPU's, as shown in the table below.

MPU	Caserios which customers came from
Los Diaz	<b>Los Diaz*</b>
	<b>Los Perez*</b>
	<b>Sector 1*</b>
	El Carmen
	Buena Vista
	Cruz Verde
	Los Miranda
	Los Marroquin
Los Cabrera	<b>Los Cabrera*</b>
	<b>Los Morales*</b>
	Palmira
	El Carmen

\* Caseríos in project area.

(b) Financial condition

Monthly stock controls have been made four times, performed by committee members, two promoters and JICA Study Team in each MPU.

The profit/loss statement of Caserio Los Diaz MPU from March 11 to November 5 is shown in following table.

Los Diaz MPU (Mar. 11 ~ Nov. 5)

(Q)

	Income	Outgo	Balance
Sales	4,904.08		4,904.08
Purchase		1,438.50	3,465.58
Promoter incentive		634.16	2,831.43
Committee fund		634.16	2,197.27

Los Diaz Health Committee Fund (Mar. 11 to Nov. 5)

(Q)

	Income	Outgo	Balance
MPU input	634.16		634.16
APROFAM training		100	534.16
Medical supplies		143.56	390.60
Transportation fees for members		26	364.60
Building repair		55	309.60

The committee renewed the drug stock on June 6. The purchase was made through the Municipal Pharmacy. The amount was Q1,438.5. The Health Committee fund was used for education purposes, support for the medical attention in the MPU, building repair and transportation fees for health committee members. There is no discrepancy between cash holding and balance in the account book. The result of the inventory survey indicates no discrepancy. The treasurer keeps the remaining balance.

The profit/loss statement of Caserio Los Cabrera MPU from March 11 to November 5 is shown in following table.

Los Cabrera MPU (Mar. 11 to Nov. 5)

(Q)

	Income	Outgo	Balance
Sales	4,730.91		4,730.91
Purchase		1,369.90	3,361.01
Promoter incentive		612.03	2,748.98
Committee fund		612.03	2,136.95

Los Cabrera Health Committee Fund (Mar. 11 to Nov. 5)

(Q)

	Income	Outgo	Balance
MPU input	612.03		612.03
APROFAM training		100	512.03
Medical supplies		143.56	378.28
Transportation fees for members		26	363.28

The committee renewed the drug stock on June 6. The purchase was made through the Municipal Pharmacy. The amount was Q1,369.9. The Health Committee fund was used for education programs and support for the medical

attention in the MPU, building repair and transportation fees for health committee members. There is no discrepancy between cash holding and the balance in the account book. The result of the inventory survey indicates no discrepancy. The treasurer keeps the remaining balance.

(c) Educational program for the community:

Due to low attendance to the health educational program, the health education has been given mainly to the school students of each caserio by Health Promoter in charge. In addition, health education has been offered personally to the persons who come to purchase drugs. An educational plan has been coordinated with a main church in the community. Summary of the program is shown in the following table.

Content	Attendees	Month	Attendants	
			Cabrera	Diaz
Diarrhea	All Villagers	March	10	10
Vaccination	Family Parents	April	8	10
Diarrhea	School students	May	25	35
Acute Respiratory Infections	School Teachers	June	6	6
Sexual Transmitted Diseases, HIV, AIDS	Family Parents	July	22	20
Environmental Concerns	School students	August	30	39
Growing Concerns	Family Parents	Sept	19	15
Family Planning	School Teachers	Oct	5	5

(d) Epidemiological surveillance in coordination with health center staff

The Health Promoter who attends the MPU is in charge of surveillance activities in coordination with the Health Center. Summary of these activities is shown below.

Activities
Patient Reference to Health Center
Community Sketch Drawing
Population Census Performance
Contamination Source Detection
Contagious Infection Diseases Detection
Vaccination Campaign
MPU Medical Attention support

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect (expected)
The amount of sales of drugs is small. MPU is managed by a health promoter whose incentive is paid from profits and averages Q70 per month. However, in view of sustainability of this project, it is necessary	- In order to increase the profit from the sale of drugs, several communities out of the Model Area became markets of MPU drugs. For this purpose, the following advertisement was tried: 1) a road sign for MPU was constructed. 2) two communal radio stations broadcast information regarding MPU. 3) Authorities meetings were held in the	It is expected that the amount of sale of drugs will increase and incentive to a health promoter will also soar.

that an incentive of at least Q100 per month should be given to a health promoter	community for informing of the cheap medicine and services of MPU. 4) Information about medicines and services was given to the health promoters in out of the Model Area. - With the assistance of the municipal health center, the MPUs provide a place for medical attendance of the health center in order to facilitate easy access to a doctor. A doctor from the health center goes round each MPU twice a month.	
At the beginning of operation of MPU, March and April 2002, there was discrepancy (about Q100 in each MPU) between cash holding and balance in the account book.	- The health committee discussed the missing money with the health promoters and decided that the health promoters should pay back the missing amount. Then, the health committee decided to audit the account of MPU frequently and strictly.	Afterwards, there was no discrepancy between cash holding and balance in the account book.
Due to lack of interest about the health programs, the number of attendees to the program from the community was low. Especially, April, no attendee participated in the program.	- The health programs were held for the students and teachers in the schools in each caserio, and at the MPUs the persons who had come to buy drugs received health education personally. - In order to gather more participants, visual material such as movies and power point demo's should be introduced.	It is expected that the participation rate will be increased.

(6) Evaluation

<i>Criteria</i>	Result	Basis
<i>Efficiency</i>	High	<ul style="list-style-type: none"> <li>- Drugs as well as first aid were available at cheap prices at the community level.</li> <li>- Drugs at the municipal pharmacy became cheaper by introduction of PROAM.</li> <li>- It was observed that regular health education programs were conducted at community level.</li> <li>- Incentives for health promoters were given through introduction of a revolving drug fund system, but incentives are small.</li> </ul>
<i>Effectiveness</i>	Achieved	<ul style="list-style-type: none"> <li>- Establishment of health committees and a good management system of MPUs was observed.</li> <li>- Reduction of morbidity.</li> </ul>
<i>Impact</i>	Positive impact was observed.	<ul style="list-style-type: none"> <li>- Community people as well as out side people reduced the expense by getting cheaper drugs and saved transportation fees.</li> <li>- From the revenue of the MPU, health committees had their own funds and utilized them for health service activities, support to the medical attention in MPUs, and so forth. In the future, it is expected that such health services activities arranged by the health committee will be increased along with the increase of the sales of MPUs.</li> </ul>



<i>Relevance</i>	High	<ul style="list-style-type: none"> <li>- The demand for cheaper drugs in the communities is still high and provision of cheaper drugs is very important for improvement of rural health service quality.</li> <li>- Sufficient knowledge on health and hygiene is required by the community people.</li> </ul>
<i>Sustainability</i>	Relatively high	<ul style="list-style-type: none"> <li>- Amount of sale of drugs and incentives to health promoters are small.</li> <li>- Burden on health promoters is heavy</li> </ul>

<i>Conclusion</i>	<p>Improvement of the quality of health services in the communities was achieved by good management of an established revolving drug fund system of PROAM that played a role in the supply of cheaper drugs and regular health education.</p> <p>Various impacts such as reduction of medical expenses of the local people and promotion of activities for health service and so forth occurred.</p> <p>Since the amount of sale of drugs and incentives of health promoters are small at present, the burden of the health promoters is very heavy. Therefore, it is necessary to increase the amount of sale of drugs and the incentives of health promoters for project sustainability.</p>
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<i>Recommendations</i> <i>[Responsible agency]</i>	<p>It is recommended that advertisement for sale of drugs of MPUs should be reinforced for the local people outside of the Model Area and migrants in the coastal area for sustainable operation of this project. <i>[Municipality pharmacy]</i></p> <p>It is also recommended that the health development committee should continue doing the following monitoring for proper operation of MPUs. <i>[Health development committee]</i></p> <ul style="list-style-type: none"> <li>a) Monitoring period: monthly basis, for three years</li> <li>b) Monitoring items: (1) stock inventory of MPUs and (2) financial condition of MPUs.</li> </ul>
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### 3.5.6 Water Quality Improvement Plan for the Existing Drinking Water

#### (1) Background

In the Palestina de Los Altos Model Area, there was a communal potable water system, which used spring water for drinking purposes without any treatment. The operation and maintenance of the water supply system was duly managed by the water committee, but it was detected in the results of the water sampling test that the water quality was not suitable to drink directly. Thus a water treatment facility, i.e., a sterilizer with hypo-chloride sodium, was required.

#### (2) Objectives of the Study

The main objectives of the project were to improve the health condition of the community residents through improvement of drinking water quality by installation of a sterilizer.

### (3) Components and Schedule

The work components are summarized as follows;

- Installation of the sterilizer: 3 sets  
(including 3 protection houses and 1 tank)
- Calibration of the equipment
- Training for using the equipment

Item	2001			2002												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1) Purchase of equipment													■	■		
2) Installation of sterilizer													■	■	■	
3) Training														■		
4) Monitoring													▲	▲		

### (4) Monitoring Results

#### Indicators for Evaluation and Monitoring Methods

Item	Frequency	Data Collection
1) Users of improved water	Every 3 months	Development Committee
2) Operational status of sterilizer	Monthly	Development Committee
3) Number of diarrhea patients	Every 3 months	Development Committee
4) Simple water quality test	Every year	FIS

#### (a) Users of sterilized water

After installation of the equipment, an interview survey has been conducted to some users in the community in order to know the status of using the treated water. No user stopped using the treated potable water because of a bad taste or smell.

#### (b) Operation status of the sterilizer

Before commencement of the water purification, training for the operators and the committee members has been conducted in order to give skills and knowledge for using and maintaining the sterilizer. It seems that this training has been finished successfully and all the attendants learned all the skills and knowledge. However not much time has passed after commencement of the treatment, thus actual operation and maintenance works could not yet be observed at the site.

(c) Number of diarrhea patients

Not much time has passed since commencement of the water treatment, thus the actual effect could not yet be observed at the site. However a certain tendency of decrease of the number of water born disease patients is anticipated based on a sample analysis in the case of a sterilizer installed in Palestina. The details should be referred to in the annex report.

(d) Simple water quality test

Water quality before and after the water treatment was checked. Obvious improvement of water quality had been observed in the test. Details should be referred to in Table 3.2.3 (1).

(5) Problems Encountered and Countermeasures

Problems	Countermeasures	Effect
Not observed	-	-

(6) Evaluation

Criteria	Result	Basis
<i>Efficiency</i>	High	- Water quality was certainly and immediately improved.
<i>Effectiveness</i>	Will be achieved in the later stage	- The number of patients of water born diseases is expected to be reduced, but it will take a certain time for identifying it.
<i>Impact</i>	Negative impact	- Some people noted a strange smell of the treated water, but those people were using the treated water.
<i>Relevance</i>	High	- The treatment of potable water is one of the most important items in terms of rural development of Guatemala.
<i>Sustainability</i>	High	- Assistance of the municipality can be received from now on. - The water committee learned how to maintain the sterilizer system very well.

<i>Conclusion</i>	The water quality was improved immediately after installation of the sterilizer. However the benefit of the project could not be observed quickly and clearly. The municipality started to become involved in the water treatment recently and they have an intention to support the project continuously.
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<i>Recommendation</i> [Responsible agency]	The following items should be monitored with high priority. - After 1 year; condition and operation status of the sterilizer. [Municipality] - After 1 year; status of municipality's assistance (supply of the chemical materials). [MAGA] - After 5 years; condition and operation status of the sterilizer. [Municipality]
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## 4. OVERALL EVALUATION AND LESSONS LEARNED

### 4.1 Overall Evaluation

#### 4.1.1 Benchmark and Evaluation Survey

In order to evaluate the impact of the pilot projects, questionnaire surveys were conducted twice, one at the beginning of the pilot projects (benchmark survey) and the other at the end of the pilot projects (evaluation survey). The composition of the surveys is summarized in the table below. Details are explained in the technical specifications attached hereto.

	Benchmark Survey	Evaluation Survey
Objectives	To confirm the situation before the project implementation	To confirm the situation after the project implementation To investigate the impacts of the pilot projects by comparing the results of the surveys
Survey Area*	Xeatzan Bajo (Chimaltenango) Panyebar (Sololá) Palestina (Quetzaltenango)	Xeatzan Bajo (Chimaltenango) Panyebar (Sololá) Palestina (Quetzaltenango)
Period	January to February, 2002	November, 2002
Number of samples	Xeatzan Bajo .....20 Panyebar .....20 Palestina .....20	Xeatzan Bajo .....20 Panyebar .....20 Palestina .....19
Methodology	1. Questionnaire Survey	1. Questionnaire Survey 2. Key informant Interview
Issues of survey	1. Questionnaire Survey 1) General Information 2) Income and Expenditure 3) Housing condition 4) Education (literacy) 5) Health and Nutrition, Medical condition 6) Gender situation 7) Problems and plans	1. Questionnaire Survey 1) General Information 2) Income and Expenditure 3) Housing condition 4) Education (literacy) 5) Health and Nutrition, Medical condition 6) Gender situation 7) Problems and plans 8) Specific questionnaires are added for each project. 2. Key informant interview 1) Income condition of the community 2) Living condition of the community 3) Environmental condition of the community 4) Daily time schedule of community people 5) People's participation and attitude towards community activities 6) Gender issues 7) Other overall matters

\*: Pachum in Totonicapán is excluded from the survey area because of security reasons.

#### 4.1.2 Results of the Surveys

Due to the limited number of samples and premature timing of the evaluation survey, no significant change is observed in terms of quantitative data. On the other hand, the result of the key informant survey showed some observations regarding changes in the community. The result is summarized in the following sections and the result of the questionnaire survey and details of the key informant survey are shown in Annex 2

##### (1) Xeatzan Bajo

<i>Topic</i>	<i>Opinions</i>
1. Income condition	<ul style="list-style-type: none"> <li>- Transportation cost for purchasing thread is reduced.</li> <li>- Cultivation in dry season became possible.</li> <li>- Production cost of huipil is decreased.</li> <li>- The community has an opportunity to negotiate as a group.</li> <li>- Inadequate organization and knowledge lead to loss.</li> </ul>
2. Living conditions	<ul style="list-style-type: none"> <li>- Health condition is expected to improve.</li> <li>- We worry about the cost for maintenance of sterilizer.</li> <li>- Taste of water might be changed due to sterilizer.</li> </ul>
3. Environmental Condition	<ul style="list-style-type: none"> <li>- Same as before. No change is observed.</li> </ul>
4. Daily time schedule	<ul style="list-style-type: none"> <li>- Women can save time required to purchase thread.</li> <li>- Too many meetings were made for the projects.</li> <li>- Not all the community people attended to meetings even if it would be to their benefit.</li> <li>- It seems that the benefit of the project is limited to a small group or the benefit is too low to cover the whole community.</li> </ul>
5. People's attitude to community activities	<ul style="list-style-type: none"> <li>- The community should spend more time in community activities</li> <li>- More people are participating in community activities</li> <li>- The community came to have more committees organized</li> <li>- People become more aware of problems in the community.</li> <li>- It seems that some of the people do not completely agree about the projects in the community.</li> </ul>
6. Gender issues	<ul style="list-style-type: none"> <li>- Women have more chance to participate.</li> <li>- Women have presence in the organized committees in the auxiliatura.</li> <li>- Women can increase the income for the family.</li> <li>- Women's committees can decide on their own.</li> <li>- The traveling to Patzun is decreased.</li> <li>- The women's willingness for working is decreasing because of committee problems.</li> <li>- There is insufficient knowledge for management and lack of trust among the beneficiaries.</li> <li>- Although the community criticizes the committee, people are interested in participation.</li> </ul>
7. Other overall matters	<ul style="list-style-type: none"> <li>- The previous projects affected in a bad way the work in the actual projects.</li> <li>- Lack of capacity for new leaders or lack of leaders.</li> </ul>

(2) Panyebar

<i>Topic</i>	<i>Opinions</i>
1. Income condition	<ul style="list-style-type: none"> <li>- Better quality of plants and products may contribute to income.</li> <li>- Diversification of crops would lead to another income source.</li> <li>- It will take time until we can enjoy the benefit of the coffee projects.</li> <li>- It is expected to have better water without cost.</li> </ul>
2. Living conditions	<ul style="list-style-type: none"> <li>- Availability and quality of water were improved.</li> <li>- Better hygiene and health conditions, especially for the children.</li> <li>- The chloride might be harmful</li> </ul>
3. Environmental Conditions	<ul style="list-style-type: none"> <li>- Better seedling production conditions are established by installation of greenhouses.</li> <li>- Application of agro-chemicals is made only inside the greenhouse, therefore, contamination of soil and water is reduced.</li> <li>- Less contamination of the water.</li> <li>- There would be negative impact if projects were inadequately utilized.</li> </ul>
4. Daily time schedule	<ul style="list-style-type: none"> <li>- People have little time available due to productive activities.</li> <li>- Implementation of projects affected the schedule of daily activities.</li> </ul>
5. People's attitude to community activities	<ul style="list-style-type: none"> <li>- Most people participate actively in the Project.</li> <li>- More cooperation among community people is observed.</li> <li>- A lot of participation was seen only at the beginning.</li> <li>- Not all of the people participated with the same interest.</li> </ul>
6. Gender issues	<ul style="list-style-type: none"> <li>- There is more availability for working.</li> <li>- More participation is observed.</li> <li>- These projects open up more room for women to participate.</li> <li>- Women can give more opinions.</li> <li>- Some of the women are not accustomed to participating.</li> <li>- Little time available due to their home responsibilities.</li> <li>- Insufficient knowledge.</li> <li>- There is no change. It is the same as before.</li> <li>- There wasn't an specific project for women</li> </ul>
7. Other overall matters	-

(3) Palestina

<i>Topic</i>	<i>Opinions</i>
1. Income condition	<ul style="list-style-type: none"> <li>- Inadequate handling of medicine prices</li> <li>- Potatoes can be kept to sell at higher price. If potatoes are not stored well they can perish.</li> <li>- We worry about the cost of the services provided by the implemented projects.</li> </ul>
2. Living conditions	<ul style="list-style-type: none"> <li>- There are medicines in the community now and at lower price.</li> <li>- Better conditions of hygiene and health.</li> <li>- Better control of illnesses.</li> <li>- Insufficient knowledge regarding use of some medicines</li> <li>- The MPUs are closed sometimes.</li> <li>- There are some medicines not available in MPU so there is still a necessity to purchase in private pharmacies.</li> </ul>
3. Environmental Conditions	<ul style="list-style-type: none"> <li>- Quality of water is improved.</li> <li>- Inadequate use of the water.</li> <li>- Less contamination is observed since fewer chemicals are used for potato production.</li> <li>- Improper use of chemicals can contaminate the environment.</li> </ul>
4. Daily time schedule	<ul style="list-style-type: none"> <li>- People can save time because they have medicines in their community.</li> <li>- When the pharmacies are closed, people have to go to the urban area</li> <li>- They participated in activities without any change of normal schedule.</li> <li>- Little time available for people to work in community activities.</li> </ul>

5. People's attitude to community activities	<ul style="list-style-type: none"> <li>- More people participated as the projects proceeded</li> <li>- There is still resistance to participation in community activities.</li> </ul>
6. Gender issues	<ul style="list-style-type: none"> <li>- There is more possibility for women to participate.</li> <li>- Some now have the opportunity to work for their community.</li> <li>- There was no specific project for the women that generates significant direct benefit</li> <li>- They're not sufficiently prepared to participate in this type of projects.</li> <li>- Women have very little time to participate in the additional activities.</li> </ul>
7. Other overall matters	<ul style="list-style-type: none"> <li>- More support should be given in other aspects, for example, commercialization</li> <li>- It is important to have medicines in the community at lower prices.</li> <li>- More medicine should be handled and preparation for it is necessary.</li> </ul>

#### 4.1.3 Overall Evaluation by community

Since the monitoring period of the pilot projects was quite limited, more time will be required to properly evaluate the overall condition of each community. However, impacts of projects observed at this moment may be assessed as follows.

##### (1) Xeatzan Bajo

###### 1) Economic Aspect

It is observed that the basis for income generation is developed both for women and men. However, careful supervision is necessary for attaining improvement of income.

###### 2) Social Aspect

Organization is strengthened by the implementation of project. Positive impact was observed in women's participation in decision making and capacity building. Besides, the existence of the thread shop improved communication both inside the community and with the surrounding communities.

###### 3) Technical Aspect

Due to the high interest of farmers, introduction of new crops was accepted smoothly. On the other hand, it is observed that more basic training was necessary for women (ex. bookkeeping, stock control, etc.) before developing their marketing skills.

###### 4) Overall

In general, sufficient positive impact was observed. Major reasons for this would be existence of strong leaders and organizations, active participation of MAGA, NGO, and a clear decision making system.

## (2) Panyebar

### 1) Economic Aspect

The projects do not reach the stage of providing the economic benefit. Due to the severe condition of the coffee market and the nature of the projects, the projects have not provided immediate benefits.

### 2) Social Aspect

Project implementation could not derive a positive impact in terms of organization strengthening. Major reasons would be the complicated structure of the community, lack of an influential leader and the opportunistic behavior of the community people.

### 3) Technical Aspect

Although the implemented projects are technically acceptable for the community people, significant development was not yet observed. It was analyzed that the weakness of the organization in the area hinders smooth transfer of the technical knowledge. The major reasons for this are also attributed to weak organization and opportunistic behavior of the people.

### 4) Overall

Since the projects have just started, the implementation did not reach the level to see sufficient positive impacts yet. Major reasons for insignificant impact at this moment are considered to be as follows.

- Weak organizational structure
- Lack of a strong leader and a clear decision making system
- Opportunistic behavior of the community people
- Severe economic condition in the coffee market

## (3) Pachum

### 1) Economic Aspect

Introduction of improved stoves and saunas reduced consumption of firewood and indirectly contributed to a positive economic effect.

### 2) Social Aspect

Since the project targeted each household, no significant impact was provided in terms of the organizational or social aspects.



### 3) Technical Aspect

Since the technology of improved stoves is generally known in Guatemala, its introduction to the community was quite acceptable and people also could absorb the knowledge.

### 4) Overall

Although there was only one project in this community, sufficient positive impact was observed. The community has neither a strong organization nor a strong leader. However, the nature of the project is targeting individual household rather than organizations. Therefore, this factor did not affect the results of the project as was feared.

## (4) Palestina

### 1) Economic Aspect

Positive impact was partly observed as for the case of MPU. For the potato-related project, it depends totally on how many of the farmers apply those techniques in the future.

### 2) Social Aspect

There is no organizational structure in the community or in the micro-basin. People usually communicate with the mayor directly. Therefore, from the viewpoint of organizational development, no positive impact was attained. On the other hand, training of an auxiliary pharmacist and operation of the MPU developed the women's capacity, self-confidence and business mind. Besides, communication with surrounding communities was improved by the establishment of the MPU. The political conflict in this area is a big obstacle for development of the community.

### 3) Technical Aspect

Some of the farmers are thinking of applying potato storage and/or use of certified potato seed introduced in the projects. In addition, the health promoter can cope with basic health problems in the community. From these points, it can be said that the projects had positive impacts in the technical aspect.

### 4) Overall

Positive impacts were observed in general. The major reasons are that most of the projects matched with the needs of the communities and were targeted for an unspecified number of people such as the MPU. In addition, since the

communities were strongly coordinated by the mayor, weak organization of the communities was not much of an effect in project implementation except in the case of mini-irrigation.

#### 4.1.4 Observed Impacts

Since the timing of the evaluation survey is premature and the sample number was quite limited, information for investigating multiple effects and secondary effects could not be sufficiently obtained to make qualitative analysis. However, the following points were observed as positive effects of project implementation.

##### (1) Organization strengthening through project implementation

Under the mini-irrigation project in Xeatzan Bajo, it was observed that the beneficiaries' association was strengthened, especially in terms of negotiation power. Before the project, people sold their produce to middlemen and accepted the conditions given by them. After the project, on the other hand, the association obtained more information on various types of contracts and negotiated with contractors regarding selling conditions. And they actually succeeded in setting a minimum price for selling their produce and in obtaining technical assistance on the production of Zucchini and French beans, which was necessary since it was the first time for them to cultivate these crops.

##### (2) Improvement of communication with other communities

It was observed that the municipal community health activity plan in Palestina improved inter-community communication. Because of the large price difference between the usual pharmacy and MPU, people outside of the community also came to buy medicine. So far, people from 5 caserios outside of the project area (El Carmen, Buena Vista, etc.) came to buy medicines at the MPUs. Since people from outside of the community come to the community more often, more communication become possible among the people compared to the previous conservative situation. Besides, the drastically lower price of medicine can contribute not only to the people's health in and around the project area but also to the reduction of their medical expenses.

Also, people come to the thread shop in Xeatzan Bajo to buy threads from outside of the community. Accordingly, the shop becomes a sort of place to exchange information and chatting for women in and around the community. This setting improves communication not only in the community but also among the communities.

### (3) Development of a business mind

In the plan for a revolving fund for hand weaving in Xeaztan Bajo, the committee members started thinking about diversifying the business of their shop, for example, selling snacks, soft drinks, daily goods and so on. In the MPU in Palestina, health promoters became more careful about the amount of sales of their medicines and started paying attention to how much they can earn in each month. In Panyebar, with the introduction of the pulping machine, farmers started to find markets for pulped coffee by themselves by contacting several dealers in addition to the information from the JICA Study Team. These tendencies can be considered as a good sign that the people started thinking about their income more carefully. In other words, a business mind has been developed after implementation of the projects.

### (4) Multiplier effects of the projects

It was observed that people who migrate to the coastal area also buy medicines for their migration. This fact can be analyzed from two factors. One is about people's awareness towards hygiene conditions in the coastal area. This awareness was developed through the series of training programs under the plan for people migrating to the coastal area. Another factor is improved availability of medicines. This was attained by establishment of MPUs and by sale of medicines at drastically lower prices under the Municipal community health activity plan. Improved availability of medicines combined with people's awareness contributed to more effective improvement of the health conditions of the people in Palestina. From these points of view, it can be said that these two projects had multiplier effects or complementary effects on each other.

## 4.2 Lessons Learned

Through the study (the master plan stage to the verification study), various lessons are obtained that would be useful for the future planning and implementation of projects in the central highland region. The lessons learned are summarized as in the following section and details of each lesson learned are explained in Annex 3.

### 4.2.1 Planning Stage

Item / Projects referred to*	Lessons Learned
1) Formation of development concept  <i>Due to overall observation, no specific project is referred to.</i>	- It was observed that the micro-basin does not necessarily match with economically active area in the central highland region. Besides, rural communities do not have sufficient communication each other. Therefore, the concept of a micro-basin shall be flexibly adjusted if there are more than one communities in the basin and they are independent each other.

<i>Due to overall observation, no specific project is referred to.</i>	- Approach to the poverty alleviation from 3 aspects (income generation, improvement of living facilities, and conservation of natural resources) is useful and necessary in terms of project sustainability and mitigation of bias in providing benefits.
2) Selection of project area	
<i>Due to overall observation, no specific project is referred to.</i>	- A project area that consists of only one community will be easier and more manageable in planning projects and their implementation.
<i>Due to overall observation, no specific project is referred to.</i>	- When more than one community will be selected as a project area, an appropriate leader shall be found so that better communication shall be made.
<i>Due to overall observation, no specific project is referred to.</i>	- It is observed that the initial conditions of each community (organization, experience of projects, political factors, etc.) affect the progress and results of the projects (refer to Section 4.2.4). Therefore, sufficient consideration has to be given on these initial conditions during the process of selection of a project area.
3) Participatory survey	
<i>No specific project is referred to.</i>	- The methodology used for the survey is too comprehensive and costly for the counterpart organization to continuously implement in the future. Besides, it imposed many burdens on the community people due to the series of meetings. Therefore, the methodology shall be more simplified so that it can be easily applied by the counterpart organization and also the burden of the community people will be reduced.
<i>No specific project is referred to.</i>	- People focus more on facility-providing projects and their attention tends to be paid more on the problems that they are facing at the time of meeting. This would lead to the selection of projects that do not reflect long-term needs of communities. Hence, sufficient discussion would be necessary to make people aware of long-term needs.
<i>Project #06</i>	- It was observed that projects highly ranked in the meetings might not necessarily reflect the peoples' real needs. Hence, people's real intentions have to be tested by their actions. For example, people have to collect signatures that promise a voluntary labor force or to collect a small amount of money to participate in the project in order to prove their real intentions.
4) Survey by experts	
<i>Project #11</i>	- In visiting each house for interviews or to distribute information about projects, some of the people, especially in the case of women, showed a kind of fear in talking with outsiders due to the influence of the long-lasting internal war. To visit community people individually, it is necessary to always be accompanied by one or two village people. Besides, it would be preferable to include local female staff in the survey team.
<i>Project #11</i>	- In the future, opposition to the projects may occur not only from inside of the project area but also from outside of the area. Therefore, a survey on social aspects shall be conducted for surrounding area also in order to avoid any potential opposition or conflict.

<p>5) Utilization of NGOs</p> <p><i>Due to overall observation, no specific project is referred to.</i></p>	<ul style="list-style-type: none"> <li>- For the survey or implementation of projects, the role of the NGO or local consultant will be quite important. After clarifying the role of the NGO or local consultants under the project framework, appropriate selection shall be made since the ability of the NGO/local consultant varies a lot. Besides, local-based NGOs usually have experience in working together with community people and, hence, have knowledge on their social background. These experiences and knowledge would be useful for social surveys of the community (refer to Section 4.2.5).</li> </ul>
<p>6) Details of project planning</p> <p><i>Project #01, 13</i></p>	<ul style="list-style-type: none"> <li>- In cases like the MPUs or the thread shop, their sales were not as large as expected and it lead to lowered incentive and little profit accumulation. In planning similar types of projects, the scale of the project shall usually be smaller than the demand expected. The scale of the shop can be enlarged as the profit accumulates in the later stages.</li> </ul>
<p><i>Project #02, 11</i></p>	<ul style="list-style-type: none"> <li>- If a water source is originally used for water supply, use of the source for another purpose, such as irrigation, may cause opposing movements or worrying by the beneficiaries of the water supply system. In this case, the project must be designed so as not to affect the water supply and also this point shall be clearly explained to the stakeholders. Then an agreement on use of the water source shall be clearly made with them by a written document in order to avoid future conflict.</li> </ul>
<p><i>Project #02</i></p>	<ul style="list-style-type: none"> <li>- A project that provides benefit to a limited number of people may create internal conflict in the community. When the beneficiaries are limited under a project, a part of the profit of the project shall be utilized for the whole community in some way. In addition, the re-utilization of profit shall be clearly explained to the community so that they can understand that the project is not for a limited number of people but for the whole community.</li> </ul>
<p><i>Project #12, 13</i></p>	<ul style="list-style-type: none"> <li>- Combination of two projects shall be considered in project planning since they might have multiplier or complementary effects. For example, combination of a project that raises people's awareness (ex. Plan for people migrating to the coastal area) and a project that improves the availability of material relating to its awareness (ex. MPU plan) would have complementary effects on each other and efficiently contribute to the people's welfare.</li> </ul>
<p><i>Project #01,13</i></p>	<ul style="list-style-type: none"> <li>- The rural area of Guatemala is still a male-dominated society. Participation of women in projects is low and projects targeted for women are also quite few, which means that women have little chance to receive benefit and to contribute to improvement of their income and their status in the communities. Therefore, it is necessary to include projects that pay attention to the gender issue so that the status and capacity of women and their opportunity will be improved. Considering this social background, i.e. a male dominated situation, it would be necessary to obtain understanding of the men regarding implementation of women-targeted projects.</li> </ul>

\*: The project number means the projects referred to in extracting the lessons. The number mentioned here is the number indicated in Section 3.1.2.

#### 4.2.2 Implementation Stage

Item / Projects referred to*	Lessons Learned
1) Participation of people	
<i>Project #02</i>	<ul style="list-style-type: none"> <li>- People tend to hesitate to participate in a project at the beginning due to doubt or because of the intent to become a <i>free rider</i>. People who did not participate at the beginning may participate after the implementation or when an actual effect is observed. Also, if they cannot be the beneficiaries, conflict with original beneficiaries may occur. Therefore, the project shall be designed in a way that it can expand its capacity and be able to absorb additional participants in the later stages.</li> </ul>
<i>Project #04,06</i>	<ul style="list-style-type: none"> <li>- Implementation of more than one project in the same area within a limited time makes it difficult for people to offer voluntary labor. Besides, in the area where people earn cash income through daily labor work, it would be difficult to offer voluntary labor. Hence, if voluntary labor is a precondition for implementation of a project, detailed analysis of labor availability is necessary and a time schedule sufficient for the construction work shall be considered.</li> </ul> <p>If payment of economic incentive is necessary due to the condition of the community (custom, economic activities of people, etc.), careful consideration should be made regarding the amount of incentive since provision of incentive may change people's mind and they will not work without payment in the future. Amount of payment should be, at most, the opportunity cost of the community people. Otherwise, the payment will hinder indigenous development of the community and change it into an aid-reliant community.</p>
2) Conflict among people	
<i>Project #11</i>	<ul style="list-style-type: none"> <li>- Existence of political conflict will be a big obstacle to project implementation. Besides, when an opposing group exists outside of a project area, detection is difficult. Therefore, it is also necessary to conduct a social survey in the communities surrounding the project area in order to detect any possibility of conflict. In addition, investigation of the existence of political conflict in local administration would be also necessary. In case any conflicts arise, it is necessary to arbitrate by involving a third party from outside the community, such as MAGA, NGO, Department authority or a similar entity.</li> </ul>
<i>Project #04,05</i>	<ul style="list-style-type: none"> <li>- Unclear agreements may cause one-sided claims and, hence, it may cause internal conflict among the community people. It is necessary to prepare written documents for any kind of agreement, especially for cases using land or water sources. Details of the agreement have to be clearly stipulated in the document. In case any conflicts arise, it is necessary to arbitrate by involving a third party from outside the community, such as MAGA, NGO, Municipality/Department authority or a similar entity.</li> </ul>

<p>3) Supporting system</p> <p><i>Due to overall observation, no specific project is referred to.</i></p>	<ul style="list-style-type: none"> <li>- Counterpart organizations have constraints in providing continuous supervision due to frequent personnel change. Lack of continuous supervision at the initial stage of the project may seriously affect the sustainability of the project. There is a necessity to establish a system to provide continuous and close supervision on the projects under the present institutional framework.</li> </ul>
<p>4) Communication</p> <p><i>Due to overall observation, no specific project is referred to.</i></p>	<ul style="list-style-type: none"> <li>- Poor communication among communities/municipalities affects the demonstration effect of the pilot projects. This will be a constraint for any kind of projects that aim at demonstration effect, since very few people will know about the existence of the projects. To tackle this problem, active information distribution has to be made by the governmental side.</li> </ul>
<p>5) Task of committee</p> <p><i>Project #01,02</i></p>	<ul style="list-style-type: none"> <li>- The majority of people in the community did not receive sufficient education and, therefore, management work tends to concentrate on those few in rural areas who have the capacity. Concentration of work may lead to a misunderstanding that the project is for a group of people instead of for the community and it might lead to an internal conflict. Therefore, management work shall be as simple as possible so that more people can take part and, at the same time, continuous education shall be necessary to enhance people's capacity in management work.</li> </ul>
<p>6) Understanding on project facility</p> <p><i>Project #01,13</i></p>	<ul style="list-style-type: none"> <li>- When community people, especially the principal member of a project, receive any facilities, they tend to think that those facilities belong to them rather than to the whole community. If the people think that equipment or facilities belong to them, they do not use them carefully or misappropriate the facilities for their own use. To avoid this problem, it is necessary to continuously educate people, especially principal members of the project, that any project facilities are for the whole community. However, this process would take a long time.</li> </ul>

\*: The project number means the projects referred to in extracting the lessons. The number mentioned here is the number indicated in Section 3.1.2.

#### 4.2.3 Monitoring/Operation Stage

Item / Projects referred to*	Lessons Learned
<p>1) Monitoring</p> <p><i>Project #03,07,14</i></p>	<ul style="list-style-type: none"> <li>- Monitoring is important for people to understand the impact of a project and for sustainability of the projects. In this sense, it is preferable for the beneficiaries themselves to conduct monitoring. On the other hand, community people are not capable of conducting complicated monitoring. Therefore, monitoring indicators shall be as simple as possible. For example, the monitoring indicator for water quality improvement shall be the occurrence of diarrhea rather than the number of coliform in potable water.</li> </ul>

<p><i>Project #01,02,04,13</i></p>	<ul style="list-style-type: none"> <li>- People in rural areas are generally skeptical about the management of committees. In order to clarify the performance of committee members to the community, feedback of monitoring results to the community would be necessary. This will be attained by establishing a reporting system for the results such as informing through a general assembly or displaying a report in a public place.</li> </ul>
<p>2) Transparency in management</p>	
<p><i>Project #01,02,04,13</i></p>	<ul style="list-style-type: none"> <li>- Unclear management easily causes rumors of misappropriation and possibly grows into a conflict. To avoid this, continuous efforts have to be made to explain the project to all the people in the community before it grows into a conflict. Transparency in management of the project would be a solution and it has to be secured by establishing an auditing system by a third party.</li> </ul>
<p>3) Burden of committee and payment of incentives</p>	
<p><i>Project #01,02,13</i></p>	<ul style="list-style-type: none"> <li>- The committee members have to deal with various works without any payment. For women, working as a committee will be a heavy burden since they have to sacrifice their time usually given to domestic work. Therefore, the work of the committee has to be reduced as much as possible if it is voluntary work. Employing a person for management work would be a solution if the project can afford it. If payment of an economic incentive is necessary due to the condition of the community (custom, economic activities of people, etc.), careful consideration would be necessary regarding the amount of incentive since provision of incentive may change people's mind and they will not work without payment in the future. This tendency will hinder indigenous development and change it into an aid-reliant community.</li> </ul>
<p><i>Project #01,02,13</i></p>	<ul style="list-style-type: none"> <li>- In rural communities, people generally think that they are entitled to be paid if he/she worked for the community. If no payment is made, misappropriation could easily occur by paying themselves from the project assets. Besides, unpaid work will reduce their motivation for their work. To combat this tendency, it would be preferable to provide a certain amount of incentive. Employment of staff for a project by the association or committee would be a solution since it would provide incentive for a person to work and at the same time the workload could be reduced.</li> </ul>
<p>4) Regulation of people's organization</p>	
<p><i>Project #02,04,05</i></p>	<ul style="list-style-type: none"> <li>- In the operation stage, various problems which were not predicted in the planning stage might occur. For example, there is a possibility of misuse of the project facility in an unexpected way, or use of excess water for irrigation in a severe dry season. In case these points are not included in the original rules of the association, it is necessary to establish a regulation regarding these points in detail during the implementation stage. The regulation has to be legally effective so that strict supervision shall be made.</li> </ul>



5) Supervision & supporting system	
<i>Due to overall observation, no specific project is referred to.</i>	- Counterpart organizations have constraints due to frequent personnel change. Lack of continuous supervision at the initial stage of the project may seriously affect its sustainability. There is a necessity to establish a system to provide continuous and close supervision on the projects under the present institutional framework.
<i>Due to overall observation, no specific project is referred to.</i>	- It is observed that communication within the governmental and/or administrative side is also insufficient. Due to this, useful programs for rural development such as PROAM, seedling provision program under INAB, etc. are not fully utilized. Therefore, a system to improve information exchange among governmental organizations would be necessary, such as establishment of an information distribution unit.

\*: The project number means the projects referred to in extracting the lessons. The number mentioned here is the number indicated in Section 3.1.2.

#### 4.2.4 Initial Conditions of Communities and Effects on Project Implementation

It is observed that the smoothness of implementation and results of projects were different for each community. It is considered that these differences stem from the difference of initial conditions of each community. The effects of initial conditions on project implementation, which are observed through the implementation of the projects, can be summarized as below (see Table 4.2.4(1)).

##### (1) Structure of the project area (number of communities) and communication

Effect: Large

Insufficient communication among communities and/or inside communities makes it difficult to obtain consensus during project formation. Besides, information regarding the meaning of projects, its effect and its operation will not reach all the communities. It may cause misunderstanding among community people and may cause internal conflict in the future.

##### (2) Organization in the communities

Effect: Very Large

If there is no organizational basis in a community, it is quite difficult to make decisions as a community and to obtain consensus regarding projects. Lack of an organization also affects the process of establishing a new organization for a project. Selection of participants and representatives will be difficult and require a lot of assistance from outside. Besides, if there are several distinct groups inside the community due to the difference of religion, custom or belief, coordination among those groups cannot be made and possibly causes internal conflict.

(3) Experiences with past projects

Effect: Large

Some people have had the experience that they cooperated for surveys or invested some money for projects and the projects were not realized. If people have had this kind of experience before, they become very skeptical about project implementation and their participation becomes very low. In some communities, principal members of a project misappropriated the project assets in the past. In this case also, people become doubtful about the principal member and become very sensitive about the lack of clarity in project management. Once this occurs, extensive support will be necessary until the projects will take off. In addition, it will be quite difficult to obtain voluntary labor if the people experienced paid work in any projects in the past.

(4) Political factors

Effect: Very Large

When political conflicts exist in and around a community, a political leader may agitate the community people and impede project implementation. In this case, the problem cannot be solved technically, because neither the political leader nor the agitated people would accept any logical explanation. For this reason, projects may be suspended or must be implemented by force. Therefore, existence of political conflict will be a big factor that impedes project implementation.

(5) Economic activity of community people

Effect: Small

By adjusting project contents, timing of implementation, etc., it would be possible to avoid any problems. However, if people in the community earn necessary cash income through daily labor work, availability of voluntary labor shall be largely dependent upon people's attitude and their availability.

(6) Natural conditions (Climatic, topographic condition, etc.)

Effect: Small

Since these factors are considered during the process of project formation, most of the problems can be solved technically and, hence, the effects on the project are small. However, it is necessary to pay them sufficient consideration when agriculture-related projects will be implemented in an area with severe climatic conditions. Besides, if the location of the project area is in a remote area, the attitude of people tends to be more conservative and/or irrational. These attitudes of people in remote rural areas may affect the progress of projects.

(7) Others (religion, custom, belief, etc.)

Effect: Different for each case

Differences in religion, customs, or beliefs may form several groups in a community. If the community has a decision-making and coordination function in it, these differences would not greatly affect project implementation. On the other hand, in an area where the above mentioned function does not exist, special attention should be paid, since the differences of religion, customs, or beliefs, etc. may cause internal conflict. In addition, there might be fanatic religious groups or groups that have the same belief in some cases. In this case, special consideration will be necessary.

4.2.5 Evaluation of Non Governmental Organizations (NGO) in the Pilot Projects

In the pilot projects, the study team broadly involved the NGOs in project formulation from the planning stage.

(1) Capability

The study team selected NGOs from a short list of the candidates with the advice of the counterpart, MAGA. Thus the NGOs that were finally selected and involved in the pilot projects had good capabilities for implementing the project. Some of them had experience in participatory community development and management of a public meeting, knowledge of Project Cycle Management along with knowledge and experience in methodology for interview surveys in rural areas. All their works in rural areas were well managed and very skillful. NGOs that worked in the local department had several native Mayan language speakers in order to communicate and obtain more information from indigenous people.

On the other hand, in general, the contents of reports prepared by the NGOs were not good enough to satisfy our requirements. There was a tendency for the larger NGOs with offices in the capital to write better reports than the small NGOs. There were several NGOs that did not have good capability for summarizing and analyzing the results of their surveys.

(2) Contribution to the Implementation of the Projects

In implementation of a rural development project, an NGO is required to be a bridge between the two parties, the government and the beneficiaries. NGOs are always expected to establish good relations with villagers, and in our pilot projects they did this successfully. They took a very important role in the project implementation and contributed well for managing public meetings, collecting information and several other activities in rural areas. It should be noted that there was one exception, an

NGO that could not establish good relations with the rural people and failed to perform their activities in the village.

(3) Lesson and learned

- As mentioned above, NGOs tend to lack some of the basic capabilities for statistical compilation and analysis. When the next questionnaire survey is done in the future, it is recommended that an NGO should only take part in the interviews with the villagers and compilation and analysis should be made by the study team directly in order to have more reliable results.
- On the other hand, local-based NGOs usually have various experience in working together with people in the target areas and have knowledge about its social background. This information is quite useful for social surveys necessary for detecting social problems in the area. For this purpose also, an NGO has to be utilized.
- Regarding payment to NGOs, an NGO that is big in scale and/or has an office in the capital, with high capability for the work, requires a high fee. For interview surveys in rural areas, it is not necessary to hire such an expensive NGO from the capital because local the NGO knows their area well and can communicate with rural people better than the NGO from the capital.
- There are various types of NGOs—those that are good at interview surveys, those that are good at public meetings, and so on. However it is very difficult to identify such characteristics from company papers or instant interviews. The advice of the counterpart or international cooperation agency should be considered to assist with the selection of an NGO.
- In selection of an NGO, the opinion of villagers should be included. An NGO that is not accepted or not trusted by the villagers would not be able to perform their activities in a rural area.

## **5. PROPOSED METHODOLOGY**

### **5.1 Planning of Sustainable Development Plan**

#### **5.1.1 Basic Concept**

The methodology explained here is a proposal for the Master Plan on Sustainable Development for the Reduction of Poverty in the Central Highland Region of the Republic of Guatemala prepared in July, 2001 as the feedback of the results of the verification study.

The methodology aims at providing simple and practical methods of planning for sustainable development in the central region that the government of Guatemala or any other organizations will be able to apply for future development. The basic concept of the proposed methodology consists of the following points.

##### 1) Three pronged approach to poverty alleviation

As it is originally mentioned under the master plan study on sustainable development in the central highland region, poverty alleviation will be approached from three aspects, income increasing, improvement of living conditions and conservation of natural resources.

##### 2) People's participation in planning

In the process of planning, community people will be main actors and participate in the planning process. Participation would be in the form of participation in surveys, public meetings, construction work and so on.

##### 3) Simple and practical methodology

It is expected that the Guatemalan government will promote poverty alleviation utilizing this methodology. Considering the present condition of the Guatemalan government, that is, insufficient budget and frequent change of staff, the methodology has to be simple and less costly. Besides, the central highland region is the area deeply affected by a long-lasting internal war and, therefore, has various problems that are specific to the area. These points are also considered in planning methodology so that it will be more practical in its application.

#### **5.1.2 Procedure**

The planning procedure is summarized below and flow of procedure is shown in Figure 5.1.2 (1). Detail points for each stage are explained in Section 5.1.3.

(1) Selection of areas

Project areas (micro-basins or communities) will be selected from the central highland region. The number of areas would be decided according to availability of funds and capability of executing organizations.

(2) Participatory surveys

For the selected areas, participatory surveys will be conducted to extract problems and needs perceived by the communities.

(3) Survey on present condition of the area

A simple survey shall also be conducted at the same time of the participatory survey regarding potentials and problems for development.

(4) Formulation of a development plan

Based on the result of surveys mentioned above, a development plan for the selected area will be prepared considering the three aspects, income increasing, upgrading living conditions, and conservation of natural resources.

(5) Selection of priority projects

Based on the prepared development plan, priority projects shall be selected according to a set of criteria. The projects selected here would be for implementation.

### 5.1.3 Planning Methodology

(1) Selection of the project area

The project area would basically be a micro-basin of about 5km<sup>2</sup>. In case the basin contains several communities, however, it is necessary to confirm whether these communities are socio-economically related to each other. If they are not related, a community shall be selected as the project area rather than selecting a micro-basin.

The central highland region (or department) will be divided into micro-basins of about 5 km<sup>2</sup> by lining on a topographic map (1/50,000 would be preferable). And communities in the micro-basin will be identified. Poverty class of the communities will be checked based on the poverty criteria defined by FIS. The FIS poverty indicator in 1994 was used for selection under the Master Plan Study. However, if the results of the census that is presently under implementation are available, the indicators should be revised based on the new data and be applied for selection. The FIS indicator classifies the poverty level as follows.

Level	Particular
a	Extreme poverty
b	Severe poverty
c	Regular poverty
d	Relative poverty
e	Low degree of poverty

Note: The Master Plan Study on Sustainable Rural Development for the Reduction of Poverty in the Central Highland Region of the Republic of Guatemala, JICA, 2001

Micro-basins or communities that belong to class “d” and “e” will be excluded from potential project areas. The areas that belong to levels “a” to “c” will be within the range for selection. Then, the potential areas will be evaluated based on the following five factors and final selection will be made.

No.	Evaluation factors	Criteria
01	Number of households	50 ~ 250 households
02	Area	3 ~ 15 km <sup>2</sup>
03	Existence of other projects	There should be no planning or implementation of projects by other agencies.
04	Social problems	There are no serious social problems. (Ex. Serious political conflict, conflict among community people, etc.)
05	Overlapping with other municipalities	Micro-basin should not belong to more than one municipality or administrative body.

Regarding the evaluation factor on social problems, the following 6 items shall be checked.

- Social structure of the project area and communication
- Organization in the communities
- Past experience with projects
- Political background
- Economic activity of community people
- Others (religion, customs, beliefs, influence of the internal war)

In case any factors that may seriously affect project implementation are observed in a potential area, it would be preferable to omit it from the project area.

## (2) Participatory survey

In order to extract problems and needs of the selected communities, simple participatory surveys will be conducted. The methodology proposed here is the simplified one based on the methodology used in the master plan study as explained in the table below.

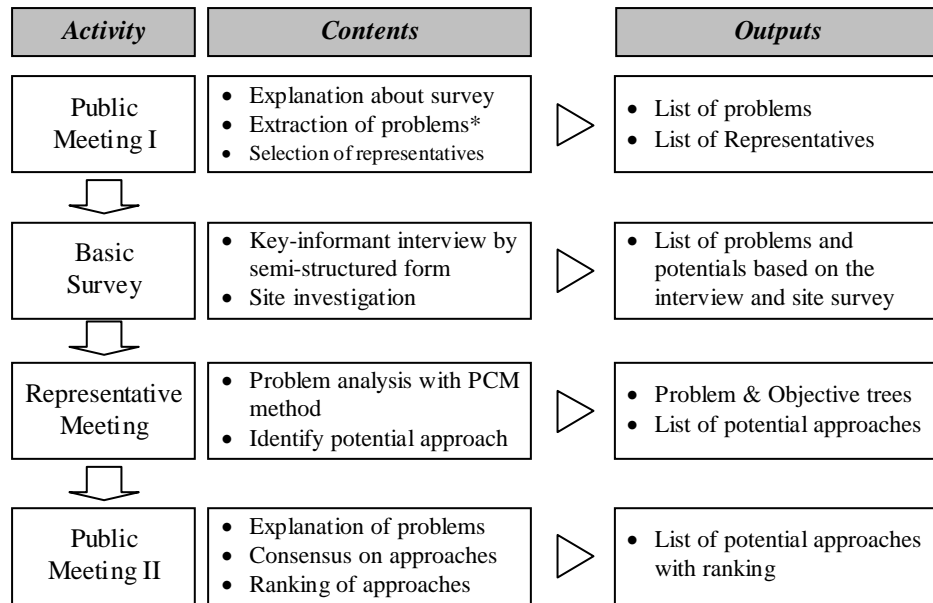
Methodology in M/P Study	Proposed Methodology
1. Public Meeting I - Explanation of survey - Request for cooperation	1. Public Meeting I - Explanation of survey - Request for cooperation - Extraction of problems (by gender) - Selection of representatives
2. Survey on present condition - Questionnaire survey - Key informant survey	2. Survey on present condition - Questionnaire survey - Key informant survey - Field reconnaissance
3. Public Meeting II (by gender)	-
4. Public Meeting III (by age)*1	-
5. Public Meeting IV (by all)*2 - Consensus on problems - Selection of representatives - Ranking of approach	-
5. Field Reconnaissance	-
6. Representative Meeting - Problem analysis - Objective analysis	6. Representative Meeting - Problem analysis - Objective analysis
7. Public Meeting V - Consensus on approach - Ranking of approach	7. Public Meeting II - Consensus on approach - Ranking of approach

\*1: Since no significant change was observed in the needs by age under the M/P study, this meeting is omitted from the survey component.

\*2: This meeting was combined with the final meeting under the proposed methodology, since repetition of ranking is not necessary and extraction of needs could be made at once in the first meeting.

The survey will be made in 3 steps, identification of problems and potentials, problem analysis, and investigation of potential development approaches. To identify problems and potentials, public meetings will be held together with key-informant interviews and site investigations. The identified problems will be analyzed among the community representatives and their cause-effect relations will be clarified. Then, potential development approaches will be elaborated. For this series of activities, the Project Cycle Management (PCM) method shall be applied. After formulating potential development approaches, community people will approve the approaches in a public meeting and decide priority according to the community's needs and urgency. As the final output, a list of potential development approaches with priorities will be prepared. The list will be utilized as the input for formation of a micro-basin development plan. The procedure for the survey is shown below.





\*: For extracting problems, participants shall be divided into groups by gender in order for them to feel free to discuss, especially for women.

### (3) Survey of the Project Area

The needs to be extracted through the participatory survey may have the following weak points.

- People tend to focus only on facility-providing projects
- People pay less attention to long term needs of the communities.

Therefore, a simple survey shall also be conducted at the same time as the participatory survey. The survey may be conducted by the organization staff that is in charge of project formation (governmental staff, local consultant or NGOs) in cooperation with community people. The survey should cover the following items considering the needs in the long term and needs from technical points of view.

Aspect	Items to be surveyed
Income generation	<ul style="list-style-type: none"> <li>• Income source and condition</li> <li>• Present problems in earning cash income</li> <li>• Potential of other additional income sources</li> </ul>
Living Conditions	<ul style="list-style-type: none"> <li>• Infrastructure (roads, water supply, energy, housing)</li> <li>• Health service (health post/center, availability of medicine and staff, toilets, etc)</li> <li>• Nutrition</li> <li>• Education (attendance, facility, human resource)</li> </ul>
Natural Resources	<ul style="list-style-type: none"> <li>• Forest and land use</li> <li>• Soil condition (erosion and degradation)</li> <li>• Water quality and availability (river, spring, well, etc.)</li> <li>• Waste management</li> </ul>

Besides, the following socio-economical surveys are necessary for smooth improvement of the projects or to avoid potential problems in the future.

Organizational aspects	Administration system, Decision making system, Existing people's organization and its function, Operation system of the organizations
Social aspects	Cliques in a community, Existence of political and social conflict, Relationship with other communities, Gender issues, Life pattern of community people
Economic aspects	Income sources, Average daily/monthly earning, etc.
Projects implemented in the past	Project contents, Result or present condition, Problems observed

In conducting the survey, it is always necessary to request community people to accompany the survey team so that neither fear nor suspicion arise against the team. Besides, involvement of local female staff in the survey team will be preferable in conducting the survey especially for talking with rural women.

The result of the survey will be summarized in the form of a counter proposal of potential projects and points to be considered during the implementation stage. Then the result will be crosschecked with that of participatory survey.

#### (4) Formulation of development plan

Based on the result of surveys mentioned above, a development plan for the selected area will be prepared considering the three aspects, income increasing, upgrading living conditions, and conservation of natural resources. The plan would be a list of potential development approaches for each aspect.

#### (5) Selection of priority projects

The list of potential development approaches (projects) prepared will be assessed based on the following three evaluation factors.

Evaluation factor	Grade	Description
Degree of farmers' perception	1	None (No intention is observed in the process of the participatory survey)
	2	Strong (approaches that are less than 6th priority in the participatory survey results)
	3	Very strong (approaches that are in 1st-5th in the participatory survey results)
Degree of contribution to poverty reduction (*1)	1	Small (contribution to poverty reduction is quite small)
	2	Medium (contribution to poverty reduction is indirect and/or partial)
	3	Large (contribution to poverty reduction is direct and large)
Probability of realization	1	Low (no organization at present, considerable time necessary for setting up of organization)
	2	Medium (though there is no organization at present, an early set up of an organization can be expected)
	3	High (There is farmer's organization (s) at preset that can be used for early implementation of projects)

(\*1): The degree of contribution for poverty reduction is graded considering 3 viewpoints, environmental conservation, income increase and improvement of living conditions.

Basically, projects will be implemented according to priority. If there are more than one projects in the same priority, income increasing projects should be first priority, improvement of living conditions would be second and environmental conservation plans would be the last. Then, final selection of the project shall be made based on the following criteria.

No.	Criteria
01	Beneficiaries should agree to share construction costs of the project.
02	Lands necessary for project facilities can be secured.
03	The project is not legally categorized as a private sector project
04	Project cost should be in the range predetermined by the related organizations.
05	O&M of the project should be reliably conducted by community people (ex. development committee).

After the selection, it is necessary to examine the possibility of project realization by taking into account the initial conditions of the project area. The initial conditions to be examined are the 6 aspects that are mentioned in the stage of area selection.

The selected projects will be confirmed with the community people. In order to confirm the actual intentions of the community, an actual action by the community people should be required. For example, collection of signatures for agreeing on voluntary labor or collection of a small amount of money for participation in the project could be a way to confirm their actual intentions. If community people

cannot satisfy the requirement, cooperation of the people may not be expected. Therefore, it is necessary to carefully analyze the reason and a change of project may be considered depending on the analysis.

#### (6) Preparation of project action plans

Before implementation, a project action plan should be prepared regarding the following points.

- Responsible organization for implementation
- Role and responsibility of governmental side and community side
- Burden of beneficiary such as voluntary labor force, land use, and so on.
- Supporting system
- Monitoring indicator and timing, responsible person / organizations
- Incentive for committee members or other major participants, etc.

In addition, an agreement regarding water use, land use, labor force, etc. shall be made with the relevant people by written documents. Reconfirmation regarding existence of political conflict will also be made in the project area and surrounding communities.

## **5.2 Implementation of the Development Projects**

The procedures of project implementation are 1) pre-arrangement for implementation, 2) preparation of specification and award to contractors and 3) implementation. The points to be considered are explained below.

#### (1) Pre-arrangement for implementation

Before the implementation, contact persons or groups shall be selected and they will be tentatively in charge of implementation of the project. Potential persons would be the village chief (Alcalde Auxiliar), members of the development committee, schoolteachers, and so on.

Detailed implementation schedules should be prepared by considering people's seasonal working schedule, labor availability, climatic conditions and other relating factors.

#### (2) Preparation of Specifications and Entrust to Contractors

In case the projects will be entrusted to other organizations (local companies, NGOs, etc.), specifications and contract documents shall be prepared. Specifications should be prepared as detailed as possible. Then, contractors shall be chosen.

Choice of contractors should basically be made through tender. If the tender system is not applicable to the actual situation such as the case of PROAM (organization/personnel are limited), direct nomination could be applied as long as transparency in selection is sustained.

### (3) Implementation

Points to be considered will be different depending on the type of the selected projects as explained below.

#### (a) Organizational development

If establishment of an organization such as a cooperative or association is necessary, the following points must be considered.

- Careful attention shall be paid to selection of principal members since biased selection may lead to complaints from the people who belong to other groups.
- It would be preferable to register the organization as a legal entity such as a cooperative or civil association. Since requirements are much simpler for civil associations, it is recommended to register as a civil association in the beginning.
- Management work should be as simple as possible so that the greatest number of people in the community can take part in the management. Besides, it is also important to reduce the burden of the principal members.
- For a work that needs continuous engagement of staff such as shop operation, employment of permanent staff should be considered.
- If the workload of the principal member (committee member) is too heavy, payment of an incentive shall be considered.
- Continuous supervision would be necessary regarding management of the organization especially at the initial stage.
- Auditing systems and a system of reporting on management condition should be established. It would be better to clarify this system in the articles or operation rules of the organization.

#### (b) Construction

- Even though people promise to offer free labor before the implementation, there is a possibility that sufficient labor cannot be obtained in reality. Therefore, during preparation of the implementation schedule, sufficient time should be allocated to the construction work so that it can be managed by the available labor force.

- The central highland region is a steep area and road conditions are usually poor, especially in rural areas. Due to these conditions, construction work during the rainy season will be quite difficult and dangerous. It would be preferable to avoid construction work during the rainy season.
- In some cases, it is presumed that construction material is misappropriated or stolen. Therefore, careful attention should be paid to management of construction material, for example, by keeping material inside or near the house of a responsible person or by fixing material on the ground with locks so that nobody can move them without borrowing the key from the responsible person.

(c) Training

- In setting the training date, the schedule of the participants should be carefully considered so that as the greatest number of participants can participate. If the training target is women, scheduling will be quite important since women have a lot of things to do and very little time is available for additional activities.
- Using audio-visual equipment during the training courses would be an effective way for obtaining more participation. Advertising through local radio is another way to obtain people's attention. If participation is quite low, this kind of approach should be considered.

(d) Provision of equipment and/or facilities

- In case any equipment and/or facilities are provided to the community, sufficient education on ownership should be conducted in order for people to understand that the equipment and/or facilities are not for their own use but for the community.
- In case any equipment will be provided individually to the participants under a project, attendance to the training course should be a precondition for receiving the equipment.

(e) Mediation of conflict

- In case any conflicts arise, it is necessary to mediate by involving a third party from outside of the community or municipality. The potential third party would be different according to the level of conflict. If it is a conflict inside community, the MAGA departmental office, an NGO or municipal authority could be the one. On the other hand, if the problem were at municipal level, MAGA central, an NGO or Department authority, would be the potential third party. In case it is political, influential persons in a political party or the Public Ministry may also be considered.

### **5.3 Operation/Monitoring of the Projects**

The following points should be considered during the operation/monitoring stage.

### (1) Monitoring

- Monitoring is important for community people to understand the impact of projects. Besides, monitoring data will be important evidence to explain the performance of committee members to the community. This explanation is quite important to avoid any negative rumors about the committee.
- On the other hand, due to the human resource constraints in the governmental side, it is quite difficult for the governmental staff to conduct monitoring. Therefore, the community itself has to be the one to conduct the monitoring. Involvement of the municipal government for assisting with monitoring can be considered if necessary, since the municipal government has fewer personnel changes.
- Considering the fact that the community will be the one to conduct monitoring, complicated indicators that may need special equipment or knowledge should be avoided. Instead, simple monitoring indicators will be applied.

### (2) Operation

The major problems during the operation stage would be 1) workload of committee members, 2) distrust of the committee, and 3) insufficient understanding by the people about the meaning of the project.

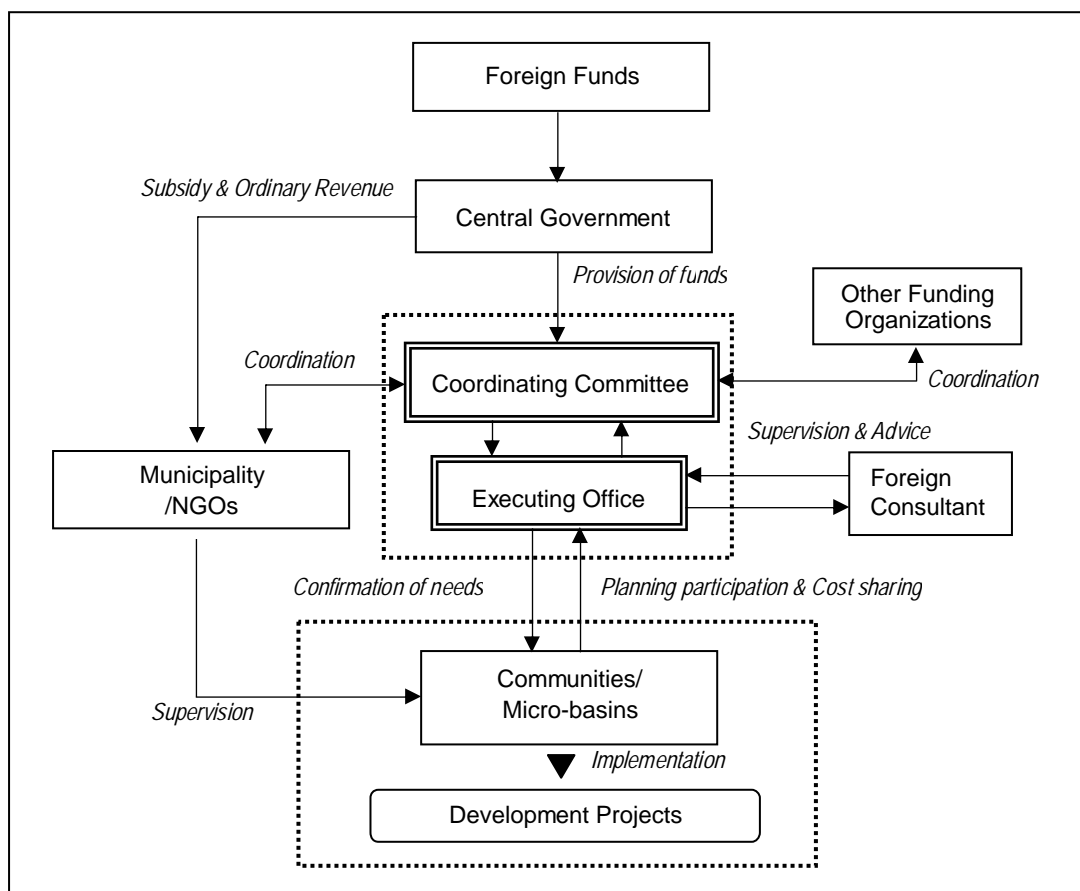
As it was explained, committee members will have many things to do, especially in the initial stages of projects. And those works are usually unpaid voluntary work. This will reduce the motivation of committee members or lead to misappropriation of assets. Therefore, consideration of employment of permanent staff, reduction of obligation, or payment of incentive shall be considered.

To avoid misunderstanding regarding the performance of the committee, management of the organization has to have transparency, especially in cash control. Therefore, establishment of an auditing system by a third party in the same community should be considered. Besides, the audited report has to be disclosed to the community members regularly.

## **5.4 Organization for Implementation**

It is expected that the project implementation in the central highland region will be continued utilizing available foreign funds. For the execution of the poverty alleviation, a coordinating committee for project implementation will be established in Guatemala City. The committee would be headed by MAGA Central and consist of the representatives from relevant organizations and agencies such as SEGEPLAN, MSPAS, Ministry of Environment, Ministry of Public Works, INAB, ICTA, INTECAP, governors of the related provinces and so on. In addition,

representatives of organizations for supporting funds and credit such as FIS, FONAPAZ, etc. should also be involved in the committee whenever it is necessary. Under the coordinating committee, an executing office will be established for supervision, monitoring and evaluation of project implementation. Since the Government of Guatemala is quite unstable due to frequent personnel change, continuous support and supervision by foreign consultants would be necessary for continuation of the project implementation. Foreign consultants will provide services of supervision and advice on project implementation as a third party under the executing office. A proposed organization for future project implementation is shown below:





## 6. CONCLUSIONS AND RECOMMENTATIONS

### Conclusion

- (1) The verification study for the 13 pilot projects out of 18 pilot projects that were prepared in the Master Plan Study was undertaken with a view to assessing the implementation of the pilot projects in terms of technical soundness, organizational aspects and contribution to improvement of the farmer's capacity for solving problems and constraints.

Generally, rural people will usually agree on the implementation of projects during the planning stage. However, they may then show a range of attitudes and responses during the implementation stage. In this study, through implementation of the projects, various responses and problems were observed that are peculiar to the indigenous people of Guatemala. These responses were not obtainable through the planning process only and precious lessons were learned as it is explained in Section 4.2. These lessons will be quite useful for future implementation of poverty alleviation projects in the central highland region. The key words of the lessons are as follows.

Planning stage: formation of a development concept, selection of project area, participatory surveys, survey of experts, practical use of NGOs, project planning

Implementation stage: participation of people, conflict among people, supporting systems, communication, tasks of committees, understanding project facilities

Monitoring/operation stage: monitoring, transparency in management, burden of committee members and payment of incentives, regulation of people's organizations, supervision and supporting systems

Initial conditions and influence on the project

Based on the above lessons learned, the methodology proposed in the Master Plan has been improved in terms of procedure, planning methodology, implementation of the development projects and operation/monitoring of the projects.

- (2) It may be concluded that the improved methodology should be very effective and practical when applied to projects on sustainable rural development for the reduction of poverty.

### Recommendation

- (1) It was observed that for enhancing project sustainability and effectiveness in poverty alleviation, project implementation should pay attention to three aspects, i.e. increasing income, upgrading of living condition, and environmental conservation. However, since this point could not be monitored quantitatively due to its timing, it is proposed to conduct

monitoring on this point after an appropriate period.

- (2) It is recommended that the implementation of the projects on sustainable rural development for the four provinces of Chimaltenango, Solola, Totonicapán and Quetzaltenango in the Central Highland Region should be carried out based the methodology proposed in this report.
- (3) It is recommended that management operations of the 13 pilot projects that had been carried out in the Verification Study should be continued under the full support by the Ministry of Agriculture, Livestock and Food (MAGA) and related organizations concerned.
- (4) It is recommended that the above pilot projects should be monitored by project beneficiaries and MAGA, and evaluation of the pilot projects should be made and the most appropriate methodology should be established for future sustainable development.
- (5) It is observed that communication among governmental organizations is not sufficient and, therefore, useful financial aid programs for rural development are not fully utilized. It is recommended that the information distribution system among governmental organizations be improved.

## ***TABLES***

**Table 1.4 (1) List of Counterpart Personnel and JICA Study Team**

Name	Official Position
<b><u>Counterparts</u></b>	
Lic. Armando Maldonado	MAGA, UPCEF Chief Counterpart, MAGA
Ing. Mario Vela	MAGA, UPCEF, Professional Project Assistant
Ing. Baldemar Portillo	MAGA, U.G.D, Professional Project Assistant
Ing. Bayron Sandval	PLAMAR, Chimaltenango and Sololá
Ing. José Daniel Tistoj Chan	PLAMAR, Quetzaltenango, Totonicapán, San Marcos
Ing. Lester Muñoz	MAGA, U.O.R. Professional Assistant
Ing. Carlos Rolando Santos	MAGA U.O.R. Coordinator, Chimaltenango province
Ing. Walter Reyes Martinez	MAGA, U.O.R. Chimaltenango - Sacatepequez
Ing. Geraldo Garcia	MAGA, U.O.R. Chimaltenango province
Ing. Cristobal Márquez	MAGA, U.O.R. Coordinator, Sololá province
Ing. Carlos Gonzáles	MAGA, U.O.R. Sololá province
Ing. Jorge Guevara Santos	MAGA, U.O.R. Coordinator, Quetzaltenango province
Ing. Carlos E. García Alonzo	MAGA, U.O.R. Quetzaltenango province
Ing. Orlan Rodas de León	MAGA, U.O.R. Coordinator, Totonicapán province
Ing. Josué Moisés Pú cuá	MAGA, U.O.R. Totonicapán province
<b><u>JICA Experts</u></b>	
Kenjiro Onaka	Team leader
Ayako Nishiwaki	WID / Social Development
Koh Watanabe	Rural Society / Organization Development
Luis Rosado	Agriculture / Agro-processing
Fumiaki Murakami	Rural Production Infrastructure
Tokushi Saburi	Rural Living Infrastructure
Ronald Castellanos	Health / Sanitary
Michinori Yoshino	Logistic coordinator (1)
Sumi Hirata	Logistic coordinator (2)

**Table 3.2.1 (1) Inventory of Thread (1/3)**

#	Thread	Unit	Actual Balance <i>Jun.10</i>	Sold	Buy	Expected Balance <i>Jul.5</i>	Actual Balance <i>Jul.5</i>	Difference		Actual Balance <i>Jul.5</i>	Sold	Expected Balance <i>Jul.20</i>	Actual Balance <i>Jul.20</i>	Difference	
								(no.)	(%)					(no.)	(%)
1	2da aleman medio obscuro 5 lbs	Madeja	3,250	801	0	2,449	2,610	161	6.57%	2,610	206	2,404	2,420	16	0.67%
2	2da aleman medio obscuro 4 lbs	Madeja	2,360	80	0	2,280	2,345	65	2.85%	2,345	115	2,230	2,165	-65	2.91%
3	2da aleman obscuro	Madeja	430	242	0	188	355	167	88.83%	355	25	330	315	-15	4.55%
4	2da aleman color	Madeja	4,435	299	0	4,136	4,020	-116	2.80%	4,020	324	3,696	3,756	60	1.62%
5	Articela Iris	Cono	1,571	177	0	1,394	1,642	248	17.79%	1,642	75	1,567	1,564	-3	0.19%
6	Super Articela	Cono	223	50	0	173	169	-4	2.31%	169	63	106	105	-1	0.94%
7	Articela cono pequeño	Cono	328	19	0	309	202	-107	34.63%	202	8	194	291	97	50.00%
8	Mish Oscuro	Madeja	399	51	0	348	364	16	4.52%	364	26	338	355	17	4.95%
9	Mish medio obscuro	Madeja	121	3	0	117	107	-11	9.05%	107	0	107	102	-5	4.46%
10	Cedalina	Cono	4,068	317	680	4,431	4,350	-81	1.83%	4,350	212	4,138	3,926	-212	5.12%
11	Cono Campana Pequeño	Cono	590	30	0	560	560	0	0.00%	560	21	539	536	-3	0.56%
12	Lana	Lbs.	8,740	1,027	2,800	10,513	10,696	183	1.74%	10,696	167	10,529	10,660		0.00%
13	Articela Madeja	Madeja	1,295	142	0	1,153	1,153	0	0.00%	1,153	35	1,118	1,153	35	3.13%
14	Mish Color	Madeja	1,165	193	700	1,672	1,575	-97	5.80%	1,575	158	1,417	1,318	-99	6.99%
15	Mish Primera	Lbs.	50	0	0	50	50	0	0.00%	50	0	50	50	0	0.00%
16	Segunda Aleman Rojo	Madeja	25	1	0	24	24	-0	0.37%	24	0	24	24	0	0.00%
17	Cono Omega	Cono	71	8	0	63	72	9	14.29%	72	4	68	65	-3	4.41%
18	Cedalina Rosa	Cono		8	380	372	372	0	0.00%	372	17	355	355	0	0.00%
19	Cedalana	Lbs.		0	0	0		0		0	0	0		0	
20	Cono Blanco (grande)	Cono		0	0	0		0		0	0	0		0	
21	Cono Chocoy			0	0	0		0		0	0	0		0	
				0	0	0			10.74%		0				5.03%

**Table 3.2.1 (1) Inventory of Thread (2/3)**

#	Thread	Unit	Actual Balance <i>Aug.16</i>	Sold	Expected Balance <i>Aug.26</i>	Actual Balance <i>Aug.26</i>	Difference		Actual Balance <i>Sep.4</i>	Sold	Expected Balance <i>Sep.24</i>	Actual Balance <i>Sep.24</i>	Difference	
							(no.)	(%)					(no.)	(%)
1	2da aleman medio obscuro 5 lbs	Madeja	1,585	55	1,530	1,530	0	0.00%	1,410	10	1,400	1,250	-150	10.71%
2	2da aleman medio obscuro 4 lbs	Madeja	2,050	240	1,810	1,980	170	9.39%	1,980	5	1,975	1,955	-20	1.01%
3	2da aleman obscuro	Madeja	285	0	285	400	115	40.35%	340	0	340	365	25	7.35%
4	2da aleman color	Madeja	3,335	228	3,107	3,185	78	2.51%	3,187	17	3,170	3,100	-70	2.21%
5	Articela Iris	Cono	1,502	96	1,406	1,416	10	0.71%	1,364	36	1,328	1,460	132	9.94%
6	Super Articela	Cono	1,118	60	1,058	1,058	0	0.00%	1,040	22	1,018	1,028	10	0.98%
7	Articela cono pequeño	Cono	287	2	285	283	-2	0.70%	279	1	278	278	0	0.00%
8	Mish Oscuro	Madeja	2,000	250	1,750	1,935	185	10.57%	1,755	0	1,755	1,720	-35	1.99%
9	Mish medio obscuro	Madeja	6,840	90	6,750	6,755	5	0.07%	6,730	90	6,640	6,560	-80	1.20%
10	Cedalina	Cono	6,162	180	5,982	5,963	-19	0.32%	5,841	40	5,801	5,800	-1	0.02%
11	Cono Campana Pequeño	Cono	519	3	516	514	-2	0.39%	513	2	511	510	-1	0.20%
12	Lana	Lbs.	0						0	0				
13	Articela Madeja	Madeja	990	8	982	989	7	0.71%	941	32	1197	1,155	-42	3.51%
14	Mish Color	Madeja	1,145	47	1,098	1,738	640	58.29%	1,116	57	1,059	1,085	26	2.46%
15	Mish Primera	Lbs.	50	0	50	50	0	0.00%	50	0	50		-50	
16	Segunda Aleman Rojo	Madeja	475	0	475	475	0	0.00%	475	0	475	485	10	2.11%
17	Cono Omega	Cono	58	3	55	55	0	0.00%	50	4	46	79	33	71.74%
18	Cedalina Rosa	Cono	340	2	338	338	0	0.00%	332	3	329	329	0	0.00%
19	Cedalana	Lbs.	151	1	150	143	-7	4.83%	136	2	134	132	-2	1.14%
20	Cono Blanco (grande)	Cono	6	1	5	5	0	0.00%	5	1	4	3	-1	25.00%
21	Cono Chocoy		84		84	84	0	0.00%	84		84	84	0	0.00%
								6.44%						7.45%

**Table 3.2.1 (1) Inventory of Thread (3/3)**

#	Thread	Unit	Actual Balance <i>Oct.12</i>	Sold	Expected Balance <i>Oct.28</i>	Actual Balance <i>Oct.28</i>	Difference		Actual Balance <i>Oct.28</i>	Sold	Expected Balance <i>Nov.19</i>	Actual Balance <i>Nov.19</i>	Difference	
							(no.)	(%)					(no.)	(%)
1	2da aleman medio obscuro 5 lbs	Madeja	1,251	30	1,221	1,210	-11	0.90%	1,210	0	1,210	1,204	-6	0.50%
2	2da aleman medio obscuro 4 lbs	Madeja	1,930	0	1,930	1,930	0	0.00%	1,930	0	1,930	1,906	-24	1.24%
3	2da aleman obscuro	Madeja	365	0	365	375	10	2.74%	375	0	375	375	0	0.00%
4	2da aleman color	Madeja	3,073	21	3,052	2,900	-152	4.98%	2,900	15	2,885	2,885	0	0.00%
5	Articela Iris	Cono	1,433	35	1,398	1,407	9	0.64%	1,407	33	1,374	1,374	0	0.00%
6	Super Articela	Cono	1,009	36	973	970	-3	0.31%	970	18	952	956	4	0.42%
7	Articela cono pequeño	Cono	277	4	273	273	0	0.00%	273	16	257	257	0	0.00%
8	Mish Oscuro	Madeja	1,770	20	1,750	1,680	-70	4.00%	1,680	70	1,610	1,610	0	0.00%
9	Mish medio obscuro	Madeja	6,560	30	6,530	6,475	-55	0.84%	6,475	20	6,455	6,475	20	0.31%
10	Cedalina	Cono	5,756	62	5,694	5,727	33	0.58%	5,727	117	5,610	5,610	0	0.00%
11	Cono Campana Pequeño	Cono	506	4	502	502	0	0.00%	502	1	501	501	0	0.00%
12	Lana	Lbs.	69	2	67	69	2	2.99%					0	
13	Articela Madeja	Madeja	1,110	38	1,072	1,072	0	0.00%	1,072	2	1,070	1,070	0	0.00%
14	Mish Color	Madeja	1,063	55	1,008	1,060	52	5.16%	1,060	14	1,046	1,046	0	0.00%
15	Mish Primera	Lbs.	0	0	0	0	0		0	0	0	0	0	
16	Segunda Aleman Rojo	Madeja	485	0	485	485	0	0.00%	485	0	485	485	0	0.00%
17	Cono Omega	Cono	76	4	72	72	0	0.00%	72	2	70	70	0	0.00%
18	Cedalina Rosa	Cono	329	3	326	326	0	0.00%	326	13	313	313	0	0.00%
19	Cedalana	Lbs.	129	1	128	128	0	0.00%	128	1	126	126	0	0.00%
20	Cono Blanco (grande)	Cono	1	0	1	1	0	0.00%	1	0	1	1	0	0.00%
21	Cono Chocoy		84	1	83	83	0	0.00%	83		83	83	0	0.00%
								1.16%						0.13%

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**Table 3.2.1 (2) Financial Statements of the Thread Shop**

**A. Balance Sheet (as of Nov. 19, 2002)**

<i>Debtor</i>	Value	<i>Creditor</i>	Value
Cash	1,053.71	Initial Provision*	86,004.00
Ordinary account	16,220.77		
Check account	1,700.00		
Stock	57,975.18		
Office equipment	181.00		
Assets unaccounted for**	324.17	Net profit	-8,549.17
Total	77,454.83	Total	77,454.83

\*: Office furniture initially provided is not considered.

\*\* : Stock of snack and drink are included.

**B. Profit/Loss Statement (Mar.21 - Nov.29)**

	3/21-8/2	8/2-10/28	10/29-11/19	3/21-11/19	
1. Total sale	33,429.18	12,698.91	3,781.60	49,909.69	
2. Prime cost	31,374.13	11,123.15	3,395.26	45,892.54	
3. Sales profit	2,055.05	1,575.76	386.34	4,017.15	8.0%
4. Operating income					
1) Interest of deposit	0.00	1.78	0.00	1.78	
5. Operating cost					
1) Personel cost	800.00	400.00	400.00	1,600.00	
2) Rental cost	450.00	600.00	150.00	1,200.00	
3) Transp. & communi.	580.00	0	0.00	580.00	
4) Equipment	145.00	36	0.00	181.00	
5) Other	15.00	0	0.00	15.00	
<i>Sub-total</i>	1,990.00	1,036.00	550.00	3,576.00	89.0%
6. Operating profit	65.05	541.54	-163.66	442.93	0.9%
7. Non-operating cost					
1) Stock loss	4,019.03	682.22	-19.10	4,682.15	
2) Unrecovered credit	4,363.80	-153.85	0.00	4,209.95	
3) Loss by counterfeit bill	100.00	0	0.00	100.00	
<i>Sub-total</i>	8,482.83	528.37	-19.10	8,992.10	
8. Net profit	-8,417.78	13.17	-144.56	-8,549.17	

Note:

*Due to the lack of record, the forms are simplified and may not match with the accounting rules.*



**Table 3.2.1 (3) Status of Women's Attendance in Literacy Training**

Month	Week	Number of Registered Women (pesons)	Number of Participants (persons)	Estimated Rate of Participation (%)	Monthly Average (%)
August	2nd	43	18	41.9	43.4
	3rd	43	23	53.5	
	4th	43	15	34.9	
September	1st	67	47	70.1	56.0
	2nd*	67	24	35.8	
	3rd	67	29	43.3	
	4th	67	50	74.6	
October	1st	67	32	47.8	42.4
	2nd	67	28	41.8	
	3rd*	67	18	26.9	
	4th	67	35	52.2	
	5th	67	29	43.3	
November	1st	67	30	44.8	43.3
	2nd	67	33	49.3	
	3rd	67	24	35.8	
Average			29.0	46.4	

\*: Since the trainers had to attend to their capacitation, one class was cancelled.  
Therefore, the attendance rates are low for these two weeks.

**Table 3.2.2 (1) Summary of Simulation of Benefit in Mini-irrigation, Xeatzan Bajo**

**(a) Actual**

No.	Gross Benefit [Q.]			Total Production [lb.]			Freight [Q.] (Q. 0.1/lb-net)	Agri-Input Total (Q)	Water fee (Q2.3/m3)	Net Benefit (Q)
	Total	IVA+ISR	Total-tax	Gross	Rejected	Net				
Max	2720.38	366.69	2353.69	1864.50	462.00	1402.50	140.25	718.99	283.96	1294.22
Min	129.00	17.39	111.61	64.00	21.50	41.50	4.15	265.46	4.40	-390.66
Average	720.00	97.05	622.95	490.01	98.02	391.99	39.20	410.96	129.51	43.28
Sta. Dev	429.47	57.89	371.58	291.36	61.63	236.36	23.64	81.26	52.61	300.82
<b>Total</b>	<b>56,880.21</b>	<b>7,666.95</b>	<b>49,213.26</b>	<b>38,711.00</b>	<b>7,743.50</b>	<b>30,967.50</b>	<b>3,096.75</b>	<b>32,466.00</b>	<b>10,231.16</b>	<b>3,419.35</b>

Maximum, minimum, average, standard deviation, and total of 79 beneficiaries.

**(b) Simulation -1**

No.	Gross Benefit [Q.]		Bonus (Q.0.33/lb.)	Gross + Bonus	Total Product [lb.]			Freight [Q.] (Q. 0.1/lb-net)	Agri-Input Total (Q)	Water fee (Q2.3/m3)	Net Benefit with Bonus
	Total	IVA+ISR			Gross	Rejected	Net				
Max	2720.38	366.69	462.83	2816.52	1864.50	462.00	1402.50	140.25	718.99	283.96	1757.05
Min	129.00	17.39	13.70	163.26	64.00	21.50	41.50	4.15	265.46	4.40	-351.39
Average	720.00	97.05	129.36	752.31	490.01	98.02	391.99	39.20	410.96	129.51	172.64
Sta. Dev	429.47	57.89	78.00	448.38	291.36	61.63	236.36	23.64	81.26	52.61	374.57
<b>Total</b>	<b>56,880.21</b>	<b>7,666.95</b>	<b>10,219.28</b>	<b>59,432.54</b>	<b>38,711.00</b>	<b>7,743.50</b>	<b>30,967.50</b>	<b>3,096.75</b>	<b>32,466.00</b>	<b>10,231.16</b>	<b>13,638.63</b>

Simulation-1: Bonus from a market company

The trade company, OPCION, always keeps a part of the payments temporary in order to avoid the loss by fluctuation of the international agriculture market. So, at the end of the fiscal year, in June, OPCION calculates annual financial balance and pays a part of their benefit to farmers as "a bonus". Thus the beneficiaries in Xeatzan Bajo will receive a bonus in coming June 2003 from OPCION for the products harvested in June – September 2002.

**(c) Simulation -2**

No.	Gross Benefit [Q.]			Total Product [lb.]			Freight [Q.] (Q. 0.1/lb-net)	Agri-Input Total (Q)	Water fee (Q2.3/m3)	Net Benefit (Q)
	Total	IVA+ISR	Total-tax	Gross	Rejected	Net				
Max	8849.03	1192.78	7656.25	1864.50	462.00	1402.50	140.25	718.99	1369.40	5805.07
Min	419.62	56.56	363.06	64.00	21.50	41.50	4.15	265.46	21.22	-685.18
Average	2342.07	315.69	2026.38	490.01	98.02	391.99	39.20	410.96	624.56	951.66
Sta. Dev	1397.02	188.31	1208.72	291.36	61.63	236.36	23.64	81.26	253.73	1102.06
<b>Total</b>	<b>185,023.74</b>	<b>24,939.72</b>	<b>160,084.02</b>	<b>38,711.00</b>	<b>7,743.50</b>	<b>30,967.50</b>	<b>3,096.75</b>	<b>32,466.00</b>	<b>49,339.85</b>	<b>75,181.43</b>

Simulation-2: Unit Price Change

In general, the market prices of the exported vegetable crops, is the highest during the period of January to March. In order to obtain the most profitable incomes, harvest season of these crops should be accorded with the highest season of the market price. However the actual cultivation in Xeatzan Bajo was obliged to start in April because of the construction schedule. Thus the beneficiaries had to sell products at June to September, the lowest market price season and profit from products was low. Providing that cultivation started in December, a profit would be high.

**Table 3.2.3 (1) Result of Bacteriologic Water Quality Test**

**Xeatzan Bajo (Sampling location: a faucet of elementary school)**

	Unit	Result		Standard	
		before PJT	after PJT	AML <sup>*1)</sup>	PML <sup>*2)</sup>
Colon bacillus fecal	ufc <sup>*3)</sup> /100ml	11	<2	ND	ND
Colon bacillus total	ufc/100ml	17	<2	<2	ND
Contain aerobic total	ufc/ml	8	0	ND	ND

**Panyebar (Sampling location: a faucet of private house)**

	Unit	Result		Standard	
		before PJT	after PJT	AML	PML
Colon bacillus fecal	ufc/100ml	0	<2	ND	ND
Colon bacillus total	ufc/100ml	140	<2	<2	ND
Contain aerobic total	ufc/ml	56	0	ND	ND

**Palestina (Sampling location: a faucet of elementary school)**

	Unit	Result		Standard	
		before PJT	after PJT	AML	PML
Colon bacillus fecal	ufc/100ml	2	<2	ND	ND
Colon bacillus total	ufc/100ml	140	<2	<2	ND
Contain aerobic total	ufc/ml	20	74	ND	ND

\*1: AML = Acceptable Maximum Limit (regulation of COGUANOR for portable water NGO 29001)

\*2: PML = Permissible Maximum Limit (ditto)

\*3: ufc = units of formation of colony

Table 3.5.1 (1) Economic Analysis of Results on Model Project of Rustic Storage Potatoes

**A) Caserio Los Díaz**

1) Investment Cost for Each Type of Silo

Units: Quetzales

Type of Silo	Capacity of Silo (qq)	Potato Variety	Labor	Materials				Estimated Material Cost Per Each Use*	Potato Cost	Total Cost (Q)
				Straw	Wood	Vynil	Chimney			
JICA I	10	Dia 71	15	20	0	0	0	35.0	550	585.0
JICA II	10	Dia 71	30	20	360	0	0	86.0	550	636.0
ICTA	10	Dia 71	30	20	360	30	17.3	90.7	550	640.7
JICA I	20	Dia 7	30	40	0	0	0	70.0	1100	1,170.0
JICA II	20	Dia 71	60	40	510	0	0	151.0	1100	1,251.0
ICTA	20	Dia 71	60	40	510	30	34.6	157.5	1100	1,257.5

\* Assuming that Wood, Vynil and Chimney can be used 10 times, therefore cost of these components was divided by 10

2) Economic Result from Potato Storage in Caserio Los Díaz

Type of Silo	Capacity of Silo (qq)	Potato Variety	Total Cost	Amount of Potato Suitable for Sell (qq.)	Selling Price (Q/qq.)	Gross Sell (Q)	Net Income (Q)
JICA I	10	Dia 71	585.0	9.3	100	930.00	345.00
JICA II	10	Dia 71	636.0	8.6	100	860.00	224.00
ICTA	10	Dia 71	640.7	9.0	100	900.00	259.27
JICA I	20	Dia 71	1,170.0	18.4	100	1,840.0	670.00
JICA II	20	Dia 71	1,251.0	10.8	100	1,080.0	-171.00
ICTA	20	Dia 71	1,257.5	19.0	100	1,900.0	642.54

**B) Caserio Los Cabrerias**

1) Investment Cost for Each Type of Silo

Type of Silo	Capacity of Silo (qq)	Potato Variety	Labor	Materials				Estimated Material Cost Per Each Use*	Potato Cost	Total Cost (Q)
				Straw	Wood	Vynil	Chimney			
JICA I	10	Dia 71	15	20	0	0	0	35.0	550	585.0
JICA II	10	Dia 71	30	20	360	0	0	86.0	550	636.0
ICTA	10	Dia 71	30	20	360	30	17.3	90.7	550	640.7
JICA I	20	Loman	30	40	0	0	0	70.0	2,000	2,070.0
JICA II	20	Loman	60	40	510	0	0	151.0	2,000	2,151.0
ICTA	20	Loman	60	40	510	30	34.6	157.5	2,000	2,157.5

\* Assuming that Wood, Vynil and Chimney can be used 10 times, therefore cost of these components was divided by 10

2) Economic Result from Potato Storage in Caserio Los Cabrerias

Type of Silo	Capacity of Silo (qq)	Potato Variety	Total Cost	Amount of Potato Suitable for Sell (qq.)	Selling Price (Q/qq.)	Gross Sell (Q)	Net Income (Q)
JICA I	10	Dia 71	585.0	9.01	100	901.00	316.00
JICA II	10	Dia 71	636.0	8.08	100	808.00	172.00
ICTA	10	Dia 71	640.7	9.15	100	915.00	274.27
JICA I	20	Loman	2,070.0	16.61	100	1,661.0	-409.00
JICA II	20	Loman	2,151.0	18.91	100	1,891.0	-260.00
ICTA	20	Loman	2,157.5	18.33	100	1,833.0	-324.46

Note: The actual buying price of potato variety Dia 71 at local market was Q 55 per quintal, while variety Loman was Q 100 per quintal, The selling price after storage was same for the two varieties of potato, at Q 100 per quintal

Table 3.5.2 (1) Input Used and Cost per Each Treatment of Potato Model Farm (1/2)

Item	Unit	Unit Price (Quetzal)	Treatment 1 (IC1A)		Total (Quetzal/Farm)
			Quantity per Cuerda	Quantity Used (0.5 Cuerda)	
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>558.3</b>
<b>1) Inputs</b>					<b>558.3</b>
- Seeds	qq.	224	3	1.5	336.0
<b>- Fertilizers</b>					<b>126.0</b>
15-15-15	qq.	103	0.72	0.36	37.0
Urea	qq.	95	0.12	0.06	6.0
Gallinaza Deshidratada	qq.	33	5	2.5	83.0
Foliar	lit.				0.0
<b>- Insecticides</b>					<b>14.2</b>
Vydate	lit.				0.0
Sistemin	lit.	96	0.1	0.05	4.8
Monarca	lit.	188	0.1	0.05	9.4
<b>- Fungicides</b>					<b>82.1</b>
Curzate	kg	192	0.5	0.25	48.0
Antracol	kg	64	0.4	0.2	12.8
Trimiltox Forte	kg	70	0.046	0.023	1.6
Miragefe 75 WP	gr.	1.095	36	18	19.7
SUBSOL	lit.				0.0
<b>- Insects Traps</b>					<b>0.0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	8.1	4.05	142.0

Item	Unit	Unit Price (Quetzal)	Treatment 4 (Virus Free Potato Seed Materials)		Total (Quetzal/Farm)
			Quantity per Cuerda	Quantity Used (0.5 Cuerda)	
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>557.6</b>
<b>1) Inputs</b>					<b>557.6</b>
- Seeds	qq.	224	3	1.5	336.0
<b>- Fertilizers</b>					<b>125.3</b>
15-15-15	qq.	103	0.72	0.36	37.1
Urea	lib.	95	0.12	0.06	5.7
Compost	qq.	33	5	2.5	82.5
Folliar	lit.				0
<b>- Insecticides</b>					<b>14.2</b>
Vydate	lit.				0
Sistemin	lit.	96	0.1	0.05	4.8
Monarca	lit.	188	0.1	0.05	9.4
<b>- Fungicides</b>					<b>82.1</b>
Curzate	kg	192	0.5	0.25	48.0
Antracol	kg	64	0.4	0.2	12.8
Trimiltox Forte	kg	70	0.046	0.023	1.6
Miragefe 75 WP	gr.	1.095	36	18	19.7
SUBSOL	lit.				0
<b>- Insects Traps</b>					<b>0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	8.1	4.05	142

Item	Unit	Unit Price (Quetzal)	Treatment 3, (Insects Traps and Fungicide SUBSOL)		Total (Quetzal/Farm)
			Quantity per Cuerda	Quantity Used (0.5 Cuerda)	
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>717.9</b>
<b>1) Inputs</b>					<b>717.9</b>
- Seeds	qq.	224	3	1.5	336.0
<b>- Fertilizers</b>					<b>121.3</b>
15-15-15	qq.	103	0.58	0.29	29.9
Urea	qq.	95	0.188	0.094	8.9
Compost	qq.	33	5	2.5	82.5
Folliar	lit.				0.0
<b>- Insecticides</b>					<b>14.2</b>
Vydate	lit.				0.0
Sistemin	lit.	96	0.1	0.05	4.8
Monarca	lit.	188	0.1	0.05	9.4
<b>- Fungicides</b>					<b>86.4</b>
Curzate	kg	192	0.5	0.25	48.0
Antracol	kg	64	0.4	0.2	12.8
Trimiltox Forte	kg	70	0.046	0.023	1.6
Miragefe 75 WP	gr.				0.0
SUBSOL	lit.	80	0.6	0.3	24.0
<b>- Insects Traps</b>					<b>160.0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	8.1	4.05	142.0

Table 3.5.2 (1) Input Used and Cost per Each Treatment of Potato Model Farm (2/2)

Treatment 2, S1. (1 kg Compost per m <sup>2</sup> )					
Item	Unit	Unit Price (Quetzal)	Quantity per Cuerda	Quantity Used (0.17 Cuerda)	Total (Quetzal/Farm)
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>210.0</b>
<b>1) Inputs</b>					<b>210.0</b>
- Seeds	qq.	224	3	0.5	112.0
<b>- Fertilizers</b>					<b>66</b>
15-15-15	qq.	103	0.582	0.097	10.0
Urea	qq.	95	0.132	0.022	2.1
Compost	qq.	33	9.78	1.63	53.8
Folliar	lit.			0	0
<b>- Insecticides</b>					<b>4.7</b>
Vydate	lit.			0	0
Sistemin	lit.	96	0.1	0.0167	1.6
Monarca	lit.	188	0.1	0.0167	3.1
<b>- Fungicides</b>					<b>27</b>
Curzate	kg	192	0.5	0.0833	16.0
Antracol	kg	64	0.4	0.0667	4.3
Trimiltox Forte	kg	70	0.046	0.0077	0.5
Miragefe 75 WP	gr.	1.095	36	6.0000	6.6
<b>SUBSOL</b>					<b>0</b>
<b>- Insects Traps</b>					<b>0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	8.1	1.35	47.3

Treatment 2, S2. (2 kg Compost per m <sup>2</sup> )					
Item	Unit	Unit Price (Quetzal)	Quantity per Cuerda	Quantity Used (0.17 Cuerda)	Total (Quetzal/Farm)
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>255.2</b>
<b>1) Inputs</b>					<b>255.2</b>
- Seeds	qq.	224	3	0.5	112.0
<b>- Fertilizers</b>					<b>116.6</b>
15-15-15	qq.	103	0.432	0.072	7.4
Urea	qq.	95	0.102	0.017	1.6
Compost	qq.	33	19.56	3.26	107.6
Folliar	lit.				0.0
<b>- Insecticides</b>					<b>4.7</b>
Vydate	lit.				0.0
Sistemin	lit.	96	0.1	0.0167	1.6
Monarca	lit.	188	0.1	0.0167	3.1
<b>- Fungicides</b>					<b>21.9</b>
Curzate	kg	192	0.5	0.0833	16.0
Antracol	kg	64	0.4	0.0667	4.3
Trimiltox Forte	kg	70	0.046	0.0077	0.5
Miragefe 75 WP	gr.	1.095	6	1.0000	1.1
<b>SUBSOL</b>					<b>0.0</b>
<b>- Insects Traps</b>					<b>0.0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	8.5	1.4	49.0

Treatment 2, S3. (3 kg Compost per m <sup>2</sup> )					
Item	Unit	Unit Price (Quetzal)	Quantity per Cuerda	Quantity Used (0.17 Cuerda)	Total (Quetzal/Farm)
<b>Production Cost (Only Inputs Provided by JICA)</b>					<b>311.8</b>
<b>1) Inputs</b>					<b>311.8</b>
- Seeds	qq.	224	3	0.5	112.0
<b>- Fertilizers</b>					<b>167.7</b>
15-15-15	qq.	103	0.288	0.048	4.9
Urea	qq.	95	0.072	0.012	1.1
Compost	qq.	33	29.4	4.9	161.7
Folliar	lit.				0.0
<b>- Insecticides</b>					<b>4.7</b>
Vydate	lit.				0.0
Sistemin	lit.	96	0.1	0.0167	1.6
Monarca	lit.	188	0.1	0.0167	3.1
<b>- Fungicides</b>					<b>27.4</b>
Curzate	kg	192	0.5	0.0833	16.0
Antracol	kg	64	0.4	0.0667	4.3
Trimiltox Forte	kg	70	0.046	0.0077	0.5
Miragefe 75 WP	gr.	1.095	36	6.0000	6.6
<b>SUBSOL</b>					<b>0.0</b>
<b>- Insects Traps</b>					<b>0.0</b>
<b>2) Total Labor (Provided by Farmers)</b>	Man-day	35	9	1.5	52.5

**Table 3.5.2 (2) Reasons of Low Yield of Potatoes in Each Section in the Model Farms (1/3)**

No	Reason	Seleccion	LOS PEREZ (Miguel Perez)				LOS MORALES (Maria Monterroso(T1) y Ernesto									
			T1	T2		T3	T4	T1	T2		T3	T4				
				s1	s2	s3	s1	s2			s1	s2	s3	s1	s2	
1	Soil for potato cultivation	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	2	2	2	2	3	2	3	3	2	2	2	2	2	3
2	Location for sunshine	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	2	2	2	2	2	2	3	4	4	4	4	3	3	3
3	Cooperation by land owner	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	Potato seed	(1)Good (2)Medium (3)Bad	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	Damage by disease 1 (Tizon)	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	2	2	2	2	2	2	2	2	4	4	4	3	3	3
6	Damage by disease	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	1	1	1	1	1	1	1	2	1	1	1	2	2	2
7	Insect/pest	(1)No damaged(below 5%) (2)Damaged (6-25%) (3)Mediumdamaged (26-49%) (4)Severely damaged (above 50%)	1	1	1	1	1	1	2	2	2	1	3	1	1	1
8	Rainfall/humid	(1)Much rain (causa daño) (2)Sufficient rain (bueno humedo papa) (3)Small rain (causa poco daño) (4)No rain (causa daño grande)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
9	Other reason: Wind with hail	(1)very hard wind (severe damage) (2)hard wind (strong damage) (3)soft wind (light damage) (4) no wind (no damage)	4	4	4	4	4	4	4	3	1	1	1	2	2	3

Comments:

Basically the potato seed had high quality, but sprout of total potatoes is negatively affected because dormancy of potatoes was broken by not careful medical treatment. Few rain during the process of filling of tubers in all the parcels is considered to become serious causes of decrease of the yield.

**Table 3.5.2 (2) Reasons of Low Yield of Potatoes in Each Section in the Model Farms (2/3)**

No	Reason	Seleccion	LOS DIAZ (Santos (T1-T3, s2 y T4) y (Jacinto Díaz						SECTOR I (Obispo Escobar T1, Juan Díaz T2,s1,s2,s3								
			T1	T2			T3		T4	T1	T2			T3		T4	
				s1	s2	s3	s1	s2			s1	s2	s3	s1	s2		
1	Soil for potato cultivation	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	3	4	4	4	4	3	3	3	3	1	1	1	3	4	1
2	Location for sunshine	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	4	2	2	2	3	4	4	2	2	2	3	3	3	3	3
3	Cooperation by land owner	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	1	3	3	3	3	1	1	1	1	1	1	1	5	2	2
4	Potato seed	(1)Good (2)Medium (3)Bad	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	Damage by disease 1 (Tizon)	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	2	3	3	3	3	2	2	2	2	2	2	2	4	2	2
6	Damage by disease	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1
7	Insect/pest	(1)No damaged(below 5%) (2)Damaged (6-25%) (3)Mediumdamaged (26-49%) (4)Severely damaged (above 50%)	1	2	2	2	2	1	1	2	4	3	4	2	4	4	4
8	Rainfall/humid	(1)Much rain (causa daño) (2)Sufficient rain (bieno humedo papa) (3)Small rain (causa poco daño) (4)No rain (causa daño grande)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
9	Other reason: Wind with hail		3	1	1	3	3	4	4	3	2	2	2	3	4	2	2

Comments:

Basically the potato seed had high quality, but sprout of total potatoes is negatively affected because dormancy of potatoes was broken by not careful medical treatment.  
Few rain during the process of filling of tubers in all the parcels is considered to become serious causes of decrease of the yield.



**Table 3.5.2 (2) Reasons of Low Yield of Potatoes in Each Section in the Model Farms (3/3)**

No	Reason	Seleccion	LOS CABRERA (Emilio Cabrera T1 y T4, Hipolita T2 y						
			T1	T2			T3		T4
				s1	s2	s3	s1	s2	
1	Soil for potato cultivation	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	2	3	3	3	2	2	2
2	Location for sunshine	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	2	3	3	3	3	3	4
3	Cooperation by land owner	(1)Good soil (2)Relatively good soil (3)Medium (4)Bad (5)Very bad	1	1	1	1	1	1	1
4	Potato seed	(1)Good (2)Medium (3)Bad	2	2	2	2	2	2	2
5	Damage by disease 1 (Tizon)	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	2	2	2	2	2	2	2
6	Damage by disease	(1)Not damaged (2)damaged (3)50% damaged (4)Very damaged	2	1	1	1	2	2	2
7	Insect/pest	(1)No damaged(below 5%) (2)Damaged (6-25%) (3)Mediumdamaged (26-49%) (4)Severely damaged (above 50%)	3	2	2	2	2	2	3
8	Rainfall/humid	(1)Much rain (causa daño) (2)Sufficient rain (bieno humedo papa) (3)Small rain (causa poco daño) (4)No rain (causa daño grande)	3	3	3	3	3	3	3
9	Other reason: Wind with hail	(1)very hard wind (severe damage) (2)hard wind (strong damage) (3)soft wind (light damage) (4) no wind (no damage)	4	3	3	3	4	4	3

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Comments:

Basically the potato seed had high quality, but sprout of total potatoes is negatively affected because dormancy of potatoes was broken by not careful medical treatment. Few rain during the process of filling of tubers in all the parcels is considered to become serious causes of decrease of the yield.

Table 3.5.4 (1) Result of Interview (1/2)

No.	Farm of the coastal area	Date of stay in farm	Cultivation				Insect repellent plants				Use of protection equipment	Retune equipment from the coastal area
			Maize	Sesame	Pasture	Sorgo	Seed in the coastal area	Growing	Seed in Palestina	Growing		
Los Morales												
1	Los Angeles, Champerico	May, August, November	●	●					●		●	●
2	Ixtan, Champerico.	May, August, November	●	●					●	●	●	●
3	Ixtan, Champerico.	May, August, November	●	●					●	●	●	●
4	San Rafael, Retalhuleu	Mayo, agosto, octubre.	●		●				●	●	●	●
5	Los Angeles, Champerico.	May, August, November	●	●					●		●	●
6	La Unión, Champerico	May, August, November	●	●					●	●	●	●
7	Los Angeles, Champerico.	May, August, November	●	●					●	●	●	●
8	Los Angeles, Champerico.	May, August, November	●	●					●		●	●
9	Ixtan, Champerico	May, August, November	●	●					●	●	●	●
10	Ixtan, Champerico.	May, August, November	●	●					●	●	●	●
11	Los Angeles, Champerico.	May, August, November	●	●					●		●	●
12	La Unión, Champerico.	May, August, November	●	●					●	●	●	●
13	El Porvenir, Retalhuleu.	May, August, November	●			●			●	●	●	●
14	La Unión, Champerico.	May, August, November	●	●					●	●	●	●
15	San Rafael, Retalhuleu.	May, August, October	●		●				●	●	●	●
16	San Rafael, Retalhuleu	May, August, October	●		●		●				●	●
17	Ixtan, Champerico.	May, August, November	●	●					●	●	●	●
18	Ixtan, champerico	May, August, November	●	●					●			
19	El Porvenir, Retalhuleu.	May, August, November	●			●	●				●	●
20	San Rafael, Retalhuleu.	May, August, October	●		●				●	●	●	●
21	San Rafael, Retalhuleu.	May, August, October	●		●				●	●	●	●
Sub-total			21	14	5	2	2	0	19	14	20	20
Los Diaz												
1	Guatalón, Retalhuleu.	May, August, November	●	●			●				●	●
2	San Marcos Nisa, Mazatenango.	May, August, November	●	●					●	●	●	●
3	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
4	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
5	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
6	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
7	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
8	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
9	San Marcos Nisa, Mazatenango.	May, August, November	●	●					●	●	●	●
10	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
11	San Marcos Nisa, Mazatenango.	May, August, November	●	●					●	●	●	●
12	Guatalón, Retalhuleu.	May, August, November	●	●					●	●	●	●
Sub-total			12	12	0	0	1	0	11	4	12	12
Los Cabrera												
1	San Rafael, Retalhuleu.	May, August, October	●		●				●	●	●	●
2	La Unión, Champerico.	May, August, November	●	●					●		●	●
3	San Rafael, Retalhuleu.	May, August, October	●		●				●	●	●	●
4	La Unión, Champerico.	May, August, November	●	●					●	●	●	●
5	La Unión, Champerico.	May, August, November	●	●					●		●	●
6	La Agrícola, Champerico.	May, August, October	●			●	●				●	●
7	La Unión, Champerico.	May, August, November	●	●					●		●	●
8	La Agrícola, Champerico.	May, August, October	●			●	●				●	●
9	La Unión, Champerico.	May, August, November	●	●					●		●	●
10	La Unión, Champerico.	May, August, November	●	●					●		●	●
Sub-total			10	6	2	2	2	0	8	3	10	10
Los Pérez												
1	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
2	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
3	Guatalón, Retalhuleu.	May, August, November	●	●					●	●	●	●
4	Guatalón, Retalhuleu.	May, August, November	●	●					●	●	●	●
5	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
6	Guatalón, Retalhuleu.	May, August, November	●	●					●		●	●
7	Guatalón, Retalhuleu.	May, August, November	●	●					●	●	●	●
Sub-total			7	7	0	0	0	0	7	3	7	7
Total			50	39	7	4	5	0	45	24	49	49