Table 4.3.1 (1) Present Condition of Micro-basin (Chimaltenango)

Item	Present Condition
1. General Information	
(1) Province	Chimaltenango
(2) Municipality	Patzun
(3) Community (Aldea/Caserio)	Aldea Xeatzan Bajo
(4) Location	26 km to the west of Chimaltenango
(5) Area (km^2)	9.3 km^2
(6) Population*	1,100 persons
(7) Population density*	118.3 persons / km^2
(8) Number of Household*	212 households
(9) FIS Indicator**	Level C (14.76)
2. Natural Condition	
(1) Climate	Average rainfall 1,000mm, Temparature varies -3 ~ 36C^o
(2) Topography (Elevation, Slope)	Elev. 2,000~2,300 m, Undulaterd to almost flat, Slope 1~10%
(3) Geological condition	Tv, Qp (Terciary volcanic rocks and Pleistonic volcanic rocks)
(4) Soil	Tecpan (TC) and Comancha (Cm); deep (50 cm), Slightly Acidic pH=6.1
(5) Water Resource	River: Pacacquix (3rd tributary of River Madre Vieja) Discharge is estimated at less than 1 lit/sec. Spring: There is a spring with discharge of approx. 20 lit/sec in Xeatzan. Several springs with less than 1 lit/sec also exist in the cuenca.
3. Socio-economicCondition	
(1) Average household size*	5.2 persons / household
(2) Ethnicity	Indigena: 99.7%, Non-indigena: 0.3%
(3) Religion	Catholic
(4) Major Language	Spanish, Kaqchikel
(5) Literacy rate*	57.90%
(6) Major Occupation of residents	Farmer
4. Land & Agriculture	
(1) Land Use	Annual crop, Perennial Crop, Forest
(2) Major crops	Vegetables, Black Berry, Maize
(3) Average Farm Size	0.2 ha (to be confirmed)
(4) Cropping pattern	1) Rainfed: May~July; Aug.~Nov., 2) Irrigated: year round
(5) Irrigation condition	Sprinkler irrigation is partly applied with utillizing portable water.
5. Social Services & Infrastructure	
(1) Infrastructure	
1) Road	11.9 km of unpaved road from Patzun to Xeatzan Bajo
2) Access to portable water*	128 households
3) Electlificaiton*	184 households
(2) Health	
1) Common diseases	To be confirmed
2) Hospital/Health care center	1 health post
3) Health Personnel	1 doctor, 1 auxiliary nurse, 2 midwives
6. Environmental situation	
(1) Forest condition	Not observed.
(2) Soil erosion	Not observed.
(3) Living Environment	Not observed.

*: Data are taken from the INE census 1994. They are subjected to the revision in the further survey.

**: FIS, 1994

Table 4.3.1 (2) Fact Finding in the Model Micro-basin in Chimaltenango

1. Socio-economy

- □ Most of the residents in the community are full-time farmers and produce vegetables and basic grains.
- □ Although some of farmers operate irrigated vegetable production, farm size is still small (estimated at 0.2 ha) and irrigation itself is not sufficient.

2. Agriculture

- □ Irrigation on vegetables and black berry production was observed. However, because of limited water supply, farmers use portable water supply for the irrigation. Based on the interview with the farmers, most of them are strongly interested in the irrigated vegetable/black berry production if the water available.
- □ A spring with discharge of about 20lit/sec exists in the community. Out of this, about 8 lit/sec is used for portable water supply. The ownership of this spring belongs to the village and discharged water is not fully utilized at present. The spring could be a potential water source for irrigation.

3. Infrastructure

- □ Access road to Patzun is unpaved and in relatively poor condition. (approx. 11.9km)
- □ The number of households with access to the portable water has been increased to about 230 households under the project implemented by CARE.
- □ There is an open-air pick-up point for vegetable marketing. Farmers usually bring their produces to this pick-up point and sell to the middle-men.

4. Environment

- □ Forest in the micro-basin is in relatively good condition and no specific issue relating to forest is observed so far. However, since both banks of Pacacquix stream are relatively steep, attention has to be paid to avoid soil erosion.

5. Health

- □ There is a health post with an auxiliary nurse and a doctor. However, stock of medicine is not sufficient and there is no pharmacy in the community.
- □ For complicated cases that cannot be attended at the health post, patients are referred to the health center or hospital in central Patzun.

6. Willingness for Development

- □ Both municipality mayor and heads of the community are willing to have development programs in the community.
- □ Farmers are strongly interested in irrigated vegetable production.

7. Others

- □ Since this micro-basin is geographically located near Panajacel, which is one of the famous tourist town, it has location advantage in terms of marketing of produces. Besides, disseminating effect as a model basin would be expected.

Table 4.3.2 (1) Present Condition of Micro-basin (Solola)

Item	Present Condition
1. General Information	
(1) Province	Solola
(2) Municipality	San Juan La Laguna
(3) Community (Aldea/Caserio)	Aldea Panyevar
(4) Location	17 km to the south-west of Solola
(5) Area (km^2)	5.8 km^2
(6) Population*	1,184 persons
(7) Population density*	204 person /km^2
(8) Number of Household*	206 households
(9) FIS Indicator**	Aldea Panyevar: level C (14.03)
2. Natural Condition	
(1) Climate	Rain fall: 1500 mm ~ 2000 mm, Tempature18 ~ 24 C^o
(2) Topography (Elevation, Slope)	Elev.1,600~2,600 m, Steep slopes15-60%; strongly undulated, high risk of erosion
(3) Geological condition	Tv. Terciary volcanic rocks
(4) Soil	Soil series Chiqo (chi) and suchitepequez (sx); formed from volcanic ash, loamy and silty loam texture, slightly acidic.
(5) Water Resource	River: Rio Yatza and its tributaries Discharge is roughly estimated at 1~5 lit/sec. Spring: A spring exist at the down stream of tributaries of Rio Yatza Discharge is roughly estimated at 1~5 lit/sec. Also springs exist at the skirt of Paquisis in this Aldea Panyevar.
3. Socio-economy	
(1) Average household size*	6.3 persons/household
(2) Ethnicity	Indigena: 99.7%, Non-indigena: 0.3%
(3) Religion	Catholic
(4) Major Language	K'iche', Tz'utujil
(5) Literacy rate*	52.60%
(6) Major Occupation of residents	Farmer
4. Land & Agriculture	
(1) Land Use	Perennial Crop (Coffee), Annual Crop (Maize, Potato), Forest
(2) Major crops	Coffee, Maize, Potato
(3) Average Farm Size	0.1 ~ 0.15 ha (2~3 cuerda)
(4) Cropping pattern	Coffee, Maize: April ~ November
(5) Irrigation condition	Rainfed only
5. Social Service & Infrastructure	
(1) Infrastructure	
1) Road	6 km of unpaved road from the nearest town (Santa Clara La Laguna)
2) Access to portable water*	204 households
3) Electlificaiton*	1 household
(2) Health	
1) Common diseases	ARI, Diarrheal Diseases, Malnutrition
2) Hospital/Health care center	A building for health post was constructed but not used so far.
3) Health Personnel	13 health promoters, 1 facilitator, 2 midwives
6. Environmental situation	
(1) Forest condition	Basically covered by coffee and forest trees. Partly cut for agricultural production.
(2) Soil erosion	Potential erosion area is observed in the left bank of Rio Paquiayacheu.
(3) Living Environment	Domestic waste water is drained without any treatment.

*: Data are taken from the INE census 1994. They are subjected to the revision in the further survey.

**: FIS, 1994

Table 4.3.2 (2) Fact Findings in the Model Micro-basin in Sololá (1/2)

1. Socio-economy

- ✓ Most of the farmers plant coffee and some produce annual crops such as maize, frijol, and potatoes.
- ✓ Farm size per household is too small to cover their family expense. (0.1~0.15 ha/household)
- ✓ Because of heavy work during coffee harvesting season, young generation prefer to work outside of the community such as Guatemala City, Solola, and Quetzaltenango. Once they go out, usually they are not willing to return to the community.
- ✓ Farmers do not have sufficient capital to invest for the improvement of agricultural production.
- ✓ Those who live in highly elevated area cannot plant coffee because of climate. Therefore, income difference would be expected between those in high area and those in low area.

2. Agriculture

- ✓ Farmers have to carry 60~80kg bag of harvested coffee on the steep slope during harvesting season. Because of heavy load, people, especially younger generation, tends to avoid harvesting work.
- ✓ Facility for primary processing of coffee is not available and, therefore, selling price of coffee is low.
- ✓ Because of high elevation of coffee area (1,800~1,900 m), climate is relatively severe for coffee production.
- ✓ In coffee production, the leave disease is commonly observed and it becomes a hindrance for coffee production.
- ✓ Fungus disease is observed in potato production.

3. Infrastructure

- ✓ Access road to the nearest town (Santa Clara La Laguna) is in poor condition and it becomes difficult to access during rainy season.
- ✓ Number of house with electricity has increased compared to the situation in 1994 (census year). Actual number should be confirmed in the later survey.
- ✓ Number of house with access to the water has increased compared to the situation in 1994 (census year). Actual number should be confirmed in the later survey.
- ✓ There is a spring at the left bank of the tributaries of Rio Yatza. Its discharge amount is roughly estimated at 1~5 lit/sec. The community considers this spring as another source for portable water supply. Also there are another five springs at the skirt of Mt.Paquisis, which are expected to be available for portable water and irrigation use.

4. Environment

- ✓ Forest clearing is observed at the left bank of the tributaries of Rio Yatza. It is cleared for the production of annual crops such as maize and potatoes. Because of its strongly steep slope, high risk of soil erosion is expected.
- ✓ Domestic waste water is drained to road and stream after their use without any treatment.

Contamination of water and soil is expected.

5. Health

- ✓ Although health post is installed, it is not well-functioning. In case of emergency, patients have to be carried to the hospital in Solola. Besides, because of non-availability of ambulance, transportation cost has to be paid by the patient's family.
- ✓ Doctor is not permanently stationed. Although a health facilitator provides first-aid care, the service hour is limited (2:00~6:00pm, Monday ~ Friday).
- ✓ People have to endure heavy work load such as coffee harvesting while their nutrition condition is not sufficient.

6. Willingness for Development

- ✓ Both municipality mayor and heads of the community are willing to have development programs in the community.
- ✓ Heads of the community are especially interested in expansion of coffee production area, improvement of coffee production and marketing, because they consider that coffee is most profitable among the crops.

Table 4.3.3 (1) Present Condition of Micro-basin (Totonicapan)

Item	Present Condition
1. General Information	
(1) Province	Totonicapan
(2) Municipality	Santa Maria Chiquimula
(3) Community (Aldea/Caserio)	Caserio Pachum (in Aldea Xesana)
(4) Location	10 km to the north of Totonicapan
(5) Area (km^2)	10.5 km^2
(6) Population*	355 persons
(7) Population density*	33.8 persons / km^2
(8) Number of Household*	68 households
(9) FIS Indicator**	Level C (16.32)
2. Natural Condition	
(1) Climate	Average rainfall: 2,000 mm, Temparature 12 ~ 18 C^o
(2) Topography (Elevation, Slope)	Elev.2,400~2,900 m; Undulated to steeply dissected; slope 5~25%; High risk of erosion
(3) Geological condition	Tv, Terciary volcanic rocks
(4) Soil	Totonicapan; formed by volcanic ash; cemented in some areas, loamy; deep
(5) Water Resource	River: Rio Pachum The discharge is roughly estimated at more than 10 lit/sec. Other: Because of dense forest, it is expected that spring and underground with sufficient discharge are available.
3. Socio-economicCondition	
(1) Average household size*	5.2 persons / households
(2) Ethnicity	Indigena: 98.5%, Non-indigena: 1.5%
(3) Religion	Catholic
(4) Major Language	Spanish, K'iche'
(5) Literacy rate*	19.70%
(6) Major Occupation of residents	Farmer
4. Land & Agriculture	
(1) Land Use	Forest, Annual Crop, Perennial Crop
(2) Major crops	Maize, Fruit trees
(3) Average Farm Size	0.1 ha
(4) Cropping pattern	Maize: April~November
(5) Irrigation condition	None; all rainfed
5. Social Services & Infrastructure	
(1) Infrastructure	
1) Road	4.6 km of unpaved road from the main road (Sn.Fransisco el Alto - Sta.Maria Chiquimula). The road condition is poor and muddy.
2) Access to portable water*	54 households
3) Electlificaiton*	0 household
(2) Health	
1) Common diseases	ARI, Intestinal Parasite, Diarrheal diseases, malnutrition, skin diseases
2) Hospital/Health care center	No health post
3) Health Personnel	3 health promoters, 2 intern health promoters
6. Environmental situation	
(1) Forest condition	The upstream basin of Rio Pachum is covered by dense forests and well-conserved. Deforestation is relatively severe at the down stream of the left bank of Rio Pachum.
(2) Soil erosion	Landslide is partly observed at the left bank of Rio Pachum.
(3) Living Environment	Not specifically observed.

*: Data are taken from the INE census 1994. They are subjected to the revision in the further survey.

**: FIS, 1994

Table 4.3.3 (2) Fact Findings in the Model Micro-Basin in Totonicapán (1/2)

1. Socio-economy

- ✓ Most of the community members are farmers and engaged in maize production.
- ✓ Because of limited capital, technical knowledge and small farm size (estimated at 0.1ha/household), their agricultural activity is still at subsistence level.
- ✓ For the management of forest, a committee is traditionally established and strong regulations are imposed for forest management.

2. Agriculture

- ✓ Most of the area is steeply dissected and, therefore, flat agricultural land is not available in the community. Farmers have no choice but to plant maize at steep area.
- ✓ Considering the observation that farmers use neither high yielding variety seeds nor any fertilizers, the yield of maize is expected to be low.
- ✓ Although the water is available in the river Pachum, it is not utilized yet because of no capital and no technical knowledge for irrigation.
- ✓ Since farmers do not apply any soil conservation technique at steep area, high risk of soil erosion is strongly expected.

3. Infrastructure

- ✓ Access to the main road (San Francisco El Alto - Santa Maria Chiquimula) is approximately 4.6 km with unpaved road. Access to the main road becomes muddy and difficult during rainy season.
- ✓ It is observed that the number of houses with electricity has been improved compared to the situation in 1994 (census year). It is roughly estimated that approximately 20% of households are electrified.[1]

4. Environment

- ✓ Forest in the micro-basin is still well conserved because of traditional regulation among villagers. Dense forest is well kept especially in the upper stream of the Rio Pachum. However, at the down stream near Pachum, deforestation is observed at the left bank and landslide is also observed at several points.
- ✓ Because of well-conserved dense forest in the upper stream, water in Rio Pachum keeps sufficient discharge for irrigation.

5. Health

- ✓ There are no health posts in the community. When medical care is necessary, villagers have to go to the health center or the catholic church's clinic in the center of the Municipality.
- ✓ A physician visits the community every 20 days. There are 3 health promoters and 2 intern health promoters.
- ✓ ARI, intestinal parasite, diarrheal diseases, malnutrition and skin diseases are reported as common diseases.

[1] In order to have electricity in house, consumers have to extend the line by their own expense. This fact might be one of the major reasons for delaying electrification in the community.

Table 4.3.3 (2) Fact Findings in the Model Micro-Basin in Totonicapán (2/2)

6. Willingness for Development

- ✓ Both municipality mayor and heads of the community are willing to have development programs in the community.
- ✓ Community members are interested in vegetable production with using simple irrigation system, preparation of nursery beds for trees, improvement of roads.

Table 4.3.4 (1) Present Condition of Micro-basin (Quetzaltenango)

Item	Present Condition
1. General Information	
(1) Province	Quetzaltenango
(2) Municipality	Palestina de los Altos
(3) Community (Aldea/Caserio)	Caserio Los Perez Caserio Los Cabrera o Molinos Los Cabrera Caserio San Isidro o Los Diaz
(4) Location	22 km to the north-west of Quetzaltenango
(5) Area (km^2)	3.2 km^2
(6) Population*	1,368 persons
(7) Population density*	427.5 persons / km^2
(8) Number of Household*	222 households
(9) FIS Indicator**	Caserio Los Perez : Level C (18.75) Caserio Los Cabrera o Molinos Los Cabrera : Level C (17.66) Caserio San Isidro o Los Diaz : Level C (15.59)
2. Natural Condition	
(1) Climate	Rainfall: 800~1,000mm, Temperature varies -9 ~ 26 C^o
(2) Topography (Elevation, Slope)	Elev.2,600~2,900 m, Strongly undulated, Slope 10~20%, High risk of erosion
(3) Geological condition	Tv Qp, Terceary Volcanic Rocks and Pleistocenic volcanic rocks
(4) Soil	Ostuncolco; fromed by volcanic ash; Sandy loam texture; Shallow; slightly acidic pH = 6.4
(5) Water Resource	River: Branch of Naranja River Spring: There is a spring with discharge of about 23 lit/sec near Pueblo. This spring is presently utilized for portable water supply for 8 hours/day.
3. Socio-economic Condition	
(1) Average household size*	6.2 persons / household
(2) Ethnicity	Indigena: 94.5%, Non-indigena: 5.5%
(3) Religion	Catholic, Protestant
(4) Major Language	Spanish, Mam
(5) Literacy rate*	22.50%
(6) Major Occupation of residents	Farmer, Migrant farm laborers in the Lower Region
4. Land & Agriculture	
(1) Land Use	Annual crops (maize, frijol, potatoes)
(2) Major crops	Maize, Frijol, Potatoes
(3) Average Farm Size	not available
(4) Cropping pattern	Maize/ Frijol: April ~ Nov., Potato: April ~ June & July ~ Oct.
(5) Irrigation condition	Rainfed only
5. Social Services & Infrastructure	
(1) Infrastructure	
1) Road	National Road #1 runs along northern boundary of the micro-basin. The roads inside the micro-basin are all unpaved and in poor condition.
2) Access to portable water*	52 households
3) Electlificaiton*	19 households
(2) Health	
1) Common diseases	Not confirmed
2) Hospital/Health care center	No health facility is constructed in the community.
3) Health Personnel	A few midwives in the communities
6. Environmental situation	
(1) Forest condition	Majority of forest are cleared for the agricultural land.
(2) Soil erosion	Erosion is observed in steep area because of deforestation.
(3) Living Environment	Waste water from Pueblo is drained w/o treatment into RioTurbala.

*: Data are taken from the INE census 1994. They are subjected to the revision in the further survey.

**: FIS, 1994

Table 4.3.4 (2) Fact Findings in the Model Micro-basin in Quetzaltenango (1/2)

1. Socio-economy

- ✓ Farm size is small and located in high elevated area (2,600~2,900m). Besides, water source is very limited. Therefore, farmers have very limited choice for agricultural production (maize and frijol) and the production of these crops are not sufficient to cover the living expenses.
- ✓ To cover their living expenses, most of the people in community usually go out as migrant farm labor at lower region such as Mazatenango and Retalhuleu.
- ✓ However, landowners in this lowland region tend to refuse migrant workers because of severe soil degradation in their farm land.

2. Agriculture

- ✓ Because of limited water source, high elevation and severe climate, the choice of crops is quite limited.
- ✓ In the southern part of Municipality (Palestina de Los Altos), production of potato is expanding. Those produce are exported to other countries in Central America such as Mexico, Salvador, Honduras and Nicaragua.
- ✓ Municipality is now promoting potato production and its collective marketing through cooperative.
- ✓ There is a spring with about 23 lit/sec of discharge near Pueblo of Palestina de Los Altos. This spring belongs to the municipality and presently being utilized for portable water supply using pumps. However, it is utilized only 8 hours a day and the rest of hours are still unutilized. This spring could be a potential water source for irrigation in the selected micro-basin. In addition to these water sources, potential for groundwater is also expected.

3. Infrastructure

- ✓ Although the northern boundary of the micro-basin is connected to the national road no.1, farm roads in the basin are still unpaved and in poor condition. Hard accessibility during rainy season is expected.
- ✓ It is observed that the number of houses with access to portable water has increased to about 930 houses because of the water supply system using the above mentioned spring. However, there are still a number of households without access to portable water.
- ✓ It is observed that the number of houses with electricity increased compared with the situation in 1994 (census year). Actual number should be confirmed in the later survey.

4. Environment

- ✓ Condition of deforestation is severe. Most of the forest is cleared for agricultural land and for firewood. High risk of erosion is expected.
- ✓ Domestic waste water of the Pueblo is drained into Rio Turbala without any treatment and therefore water contamination of the river is highly expected.

5. Health

- ✓ No health service facility is built in the community.

Table 4.3.4 (2) Fact Findings in the Model Micro-basin in Quetzaltenango (2/2)

- ✓ Only a few midwives are in the community and there are no doctors, health promoters, and facilitators.
- ✓ Because of limited agricultural production, malnutrition is also expected among the community members.

6. Willingness for Development

- ✓ Both municipality mayor and heads of the community are willing to have development programs in the community.
- ✓ The mayor is strongly interested in promoting vegetable (including potato) production for improvement of farmers' income and willing to offer the spring for irrigation use during unutilized hours.

7. Others

- ✓ Since the micro-basin is located along the National Road No.1, it has location advantage in terms of marketing. Through the National Road No.1, it is accessible to Quetzaltenango within 30 minutes to the south-east and to Mexico in 2.5 hours to the north-west. Besides, dissemination effect is highly expected because of its location.

Table 5.1.1 (1) Natural Conditions of 4 Model Micro-Basins

	Xeatzan Bajo	Panyebar	Pachum	Palestina
Number of Families	325	360	160	297
Total Area of Micro-Basin (ha)	930	580	1,050	320
Location: Latitude and Longitude	14° 41' North latitude; 91° 10' West longitude.	14° 35' North latitude; 91° 22' West longitude.	14° 56' North latitude; 91° 25' West longitude.	14° 54' North latitude; 91° 36' West longitude.
Elevation (m.a.s.l)	2,150 to 2,500	1,600 to 2,600	2,300 to 2,600	2,600 to 2,800
Relief	Moderately Undulated to Undulated	Strongly Undulated; Steep	Strongly Undulated; Steep	Undulated
Land Slope (°)	Eastern part (45 to 50); Center (5 to 20); Western part (25 to 35).	Eastern part (50 to 60); Center (10 to 20); Western part (30 to 45).	Eastern part (45 to 50); Center (10 to 25); Western part (25 to 40).	15 to 35 all arround
Soils Classification (Simmons, 1955)	Group I, Volcanic Mountain soils; Camancha series (Cm)	Group II, soils of "Altiplano Central"; Toliman series (Tn)	Group I, Volcanic Mountain soils; Totonicapan series (Tp)	Group I, Volcanic Mountain soils; Ostuncalcos series (Os)
Soil Texture and Depth	Loam to Clay oam; Up to 1.5 m depth.	Sandy loam; Up to 1.10 m depth	Loam with high content of Organic matter, and Clay loam. Up to 1.3 m depth	Loamy Sand;
Average Annual Rainfall (mm/year)	1,000	1,500	1,000	1,300
Rainy Season	6 months; May-October	6 months; May-October	6 months; May-October	6 months; May-October
% of annual rainfall that fall during Rainy Season	90	92	90	91
Rainy Days/Year	100 to 140	140 to 160	140	140
Relative Humid.(%)	80	80; Frequently Fogs	75	80
Average Annual Temperature (°C)	20	20	15	15
Occurrence of Frost	Not every year; about 1 in 3 years	Not every year	Every year	Every year

Table 5.1.1 (2) List of Water Resources in Xeatzan Bajo in Chimaltenango

Name: Composition: Discharge: Present Usage : Owner: Potentiality: Remarks:	1) *Pachomochai springs* 3 springs 12.5 lit/s Less than 30 % in annual average; Resource of the community portable water supply system through pumping station. Community High Only 6-8 lit/s of spring water out of 12.5 lit/s are diverted to the pump station, and the remains are discharged to the river. At pump station, water tank is always fulfilled and most of inflow water is spilled out from its tank through spillway to river. In addition, although the discharged water from the spring to stream are presently used as a source of drinking water for Patzan municipality through their pump station located about 200m away from the spring. However Patzun municipality does not have regal right for using spring water itself and depends on the surplus water from Xeatzan Bajo area.
Name: Composition: Discharge: Present Usage: Owner: Potentiality: Remarks:	2) *Chuchuka and Xeatzan Alto springs* 2 springs 0.5 lit/s 100% ; Resource of the community portable water supply system through gravity conveyance pipes. Community Low It is located outside of Xeatzan Bajo village
Name: Composition: Discharge: Present Usage: Owner: Potentiality: Remarks	3) *Chuacacquix spring* 1 spring 0.9 lit/s approx. 0 % ; No use Community Medium It is located near *Chitiyah spring*. *Chuacacquix* and *Chitiyah* were purchased by the Community from private owners in 1994 with finance of the Pump Committee in order to utilize them for irrigation in future. (according to the Community Chief)
Name: Composition: Discharge: Present Usage: Owner: Potentiality:	4) *Chitiyah spring* 1 spring 0.5 lit/s approx. 0% ; No use Community Medium
Name: Composition: Discharge: Present Usage: Owner: Potentiality: Remarks:	5) *Pachor spring* 3 Springs 0.3 lit/s 100% ; Resource of the public laundry and drinking tank. Community Low A few families depend on the drinking water at this spring water and many families use laundry facility daily.
Name: Discharge: Present Usage: Owner: Potentiality: Remarks	6) Small Streams (no name) N/A … seasonal flow (no or few flow in dry season) Partially ; Resource of irrigation water by small-scale gravity pipelines. Private Low See the details in the Section 5.1.3 (9) Irrigation Systems.

Table 5.1.2 (1) Seasonal Calendar presented by women in Xeatzan Bajo

This seasonal calendar shows the women's perception of their seasonal environment and problems they face during the year.
This seasonal calender was made by 8 participants in Xeatzan Bajo

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain					●●●●	●●●●● ●●●●● ●●●●● ●●●●● ●	●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●	●●●●● ●●●	●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●	●●●●		
Ag. Work					●●●●● ●●●●● ●●●	●●●●● ●●●●●	●●●●● ●●●●● ●●	●●●●● ●●●●● ●	●●●●● ●●●●●	●●●●● ●●●●●	●●●●● ●●●●● ●●●●● ●●●	●●●●● ●●●●● ●●●●● ●●●●● ●●●
Money	●●●	●●●	●●●	●●●	●●●	●●●●● ●●●●● ●●	●●●●● ●●●●●	●●●●● ●●	●●●●● ●●●●● ●●●●●	●●●●		
Sickness	●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●	●●●●● ●●●●● ●●●●● ●●●●● ●●●●● ●●●●	●●●●	●●●●●	●●●●● ●●●	●●●●● ●●	●●●●● ●	●●●●● ●●●●● ●	●●●●● ●●●	●●●●● ●●●●	●●●●● ●●●●● ●●●	●●●●● ●●●●● ●●●●● ●●●●● ●●
Food					●●●	●●●●● ●●●●● ●●	●●●●● ●●●●	●●●●● ●●	●●●●● ●●●●● ●●●●●	●●●●		

Method: The participants were given about 50 beans and put beans in the month's box for each subject. ● means 1 bean.

Notes: Rain: Water is difficult to obtain between November and April period.
Agricultural Work: Mostly women engage in vegetable harvesting from May to December.
Money: Cash income mostly depends on vegetable harvesting and paid work outside the village between January till they start seeding vegetables.
Sickness: Surprisingly the occurrence of sick in May is far more than the rest of the month. Main illness is diarrhoea.
Food Availability: The food availability coincides with the cash income and Agricultural work.

Table 5.1.3 (1) Present Farming Practices for Main Crops in the Micro-Basins (1/2)

Xeatzan Bajo	Present/Without Project
Crop: Brocoli	All farming activities are done by hand; mechanical machinery are not used.
Variety	Green Beret, Sakata, Green Mountain, Shogun, Manrathon
Planting Density&Planting Materials	24,000 to 27,000 plants per manzana. Seedlings grown at greenhouse are used.
Fertilizer (lib/Manzana)	N=250; P=100; and K= 210
Labor (man-day/Manzana)	paid labor = 30 M-D; family labor = 150 M-D
Irrigation	Mostly raifed; few farmers irragate using aquaduct water
Insects & Diseases Control	The most important insects are at the leaves Pieris brassicae, Prodenia sp, Plutella, Trichoplusiana, Agromyza, Bemisia tabaci, Nezara; Aphids and Trips; at the roots Phyllophaga, Agroti, Diabrotica; and several Nematodes species such as Pratylenchus sp; Ditylenchus and Meloidogine sp. Integrated Pest Management practices validated by ICTA are not applied; Economic threshold criteria is not applied. Control of insects and nematodes is made applying pesticides twice a week.
Crop: Snow pea	All farming activities are done by hand; mechanical machinery are not used.
Variety	Oregon Sugar Pod, Taichung, Melting Sugar
Planting Density&Planting Materials	70,000 plants per manzana, direct seedling.
Fertilizer (lib/Manzana)	N=35; P=75; and K= 85
Labor (man-day/Manzana)	paid labor = 30 M-D; family labor = 60 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	The most important insects are at the leaves Laphygma, Heliotis, Mocis, Brochus, Sitona, Agromyza, Diabrotica; Aphis, Aleurode, etc. At the roots are Melolontha, Phyllophaga, Agroti; and Nematodes; Integrated Pest Management practices validated by ICTA are not applied; Economic threshold criteria is not applied. Control of insects and nematodes is made applying pesticides twice a week.
Crop: French bean	All farming activities are done by hand; mechanical machinery are not used.
Variety	Processor, Strigless Blue Lake
Planting Density&Planting Materials	25,000 plants/manzana; about 100 pounds of seeds per manzana; direct seeding
Fertilizer (lib/Manzana)	N=30; P=70; and K= 85
Labor (man-day/Manzana)	paid labor = 75 M-D; family labor = 110 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	Similar to Snow pea
Crop: Carrot	All farming activities are done by hand; mechanical machinery are not used.
Variety	Chantenay Red Cored, Tahoe, Bonanza, Spartan
Planting Density&Planting Materials	0.5 m row and 0.08 m plants; About 175,000 plants/manzana; about 5 pounds of seeds per manzana; direct seeding
Fertilizer (lib/Manzana)	N=150; P=80; and K=225
Labor (man-day/Manzana)	paid labor = 60 M-D; family labor = 90 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	Most important insects are at the leaves Laphygma, Heliotis, Mocis, Brochus, Estigmena, Diacribia, Agromyza, Diabrotica, Loxa v; Aphis, etc. At the roots are Melolontha, Phyllophaga, Agrotis; and Nematodes. Integrated Pest Management practices validated by ICTA are not applied; Economic threshold criteria is not applied. Control of insects and nematodes is made applying pesticides twice a week.
Crop: Black berry	All farming activities are done by hand; mechanical machinery are not used.
Variety	
Planting Density&Planting Materials	About 3,000 plants per manzana
Fertilizer (lib/Manzana)	N=270; P=270; and K= 270
Labor (man-day/Manzana)	paid labor =70 M-D; family labor = 180 M-D
Irrigation	Irrigation using aquaduct water was done only during the first year after planting the black berries; during last 3 years irrigation is not done because lack of water.
Insects & Diseases Control	
Crop: Maize	All farming activities are done by hand; mechanical machinery are not used.
Variety	Criollo Amarillo, Criollo Blanco
Planting Density&Planting Materials	1 meter between rows and 0.7 m between plants, with 4 to 5 plants per hole, about 8,800 holes per manzana. Almost all farmers use seed material keep corn from their own previous harvest.
Fertilizer (lib/Manzana)	N=110; P=110; and K= 60
Labor (man-day/Manzana)	Only few famers pay some labor, about 20 M-D per manzana; Majority use only family labor, about 65 M-D per manzana.
Irrigation	Only rainfed production
Insects & Diseases Control	Although there are several insects and diseases affecting maize, damages are not significant and control measures are not applied.

Table 5.1.3 (1) Present Farming Practices for Main Crops in the Micro-Basins (2/2)

Panyebar	Present/Without Project
Crop: Coffee	All farming activities are done by hand; mechanical machinery are not used.
Variety	Bourbon, Pache and Typica
Planting Density&Planting Materials	2,800 to 3,500 plants per manzana. Seedlings are grown with poor management condition.
Fertilizer (lib/Manzana)	N=250; P=100; and K= 210, and descomposed forest leves.
Labor (man-day/Manzana)	paid labor = 50 M-D, mostly for harvesting; family labor = 150 M-D
Irrigation	Only raifed.
Insects & Diseases Control	Problems of insects and diseases are not very serious in Panyebar area; Nematodes seems to be the most important problem, but farmers do not know about it. Insects are "Cochinilla" Dismicoccus cryptus, Planococcus citri; Disease present is Pellicularia koleroga. Pesticides are not used for control of insects and diseases
Crop: Maize	All farming activities are done by hand; mechanical machinery are not used.
Variety	Toto Amarillo, Criollo Amarillo, Criollo Blanco
Planting Density&Planting Materials	1 meter between rows and 0.7 m between plants, with 4 to 5 plants per hole, about 10,000 holes per manzana. Almost all farmers use corn kept from their own previous harvest as seed material. Only about 30 % of farmers plant maize and bean in association.
Fertilizer (lib/Manzana)	N=110; P=110; and K= 60
Labor (man-day/Manzana)	Only few famers pay some labor, about 20 M-D per manzana; Majority use only family labor, about 65 M-D per manzana.
Irrigation	Only rainfed production
Insects & Diseases Control	Although there are several insects and diseases affecting maize, damages are not significant and control measures are not applied.
Paletina	
Crop: Potato	All farming activities are done by hand; mechanical machinery are not used.
Variety	Loman (3 months), Diaz (4 months);
Planting Density&Planting Materials	1 meter between rows and 0.25 m between plants, about 2 8,000 plants per manzana; 40 to 50 quintals of seeds per manzana. Almost all farmers use potato kept from their own previous harvest as seed material. Poor quality of seed used is one of the main cause of low yields.
Fertilizer (lib/Manzana)	N=180; P=180; and K=180
Labor (man-day/Manzana)	About 70 % of farmers do not paid labor; the one that pay is about 60 M-D per manzana; family labor = 105 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	Main insects attacking the roots are Phyllophaga, Agrotis, Systena, Epitrix, and several Nematode species; Insects of folliage are Bemisia, Nezara, Spodoptera, Laphygma, Heliotis, Manduca, Trichoplusia, and Agromyza; Aphis and Trips. Most serious disease is Phytophtora; Laman and Diaz varieties are very suceptible to Phytophtora.
Crop: Maize	All farming activities are done by hand; mechanical machinery are not used.
Variety	Toto Amarillo, Criollo Amarillo, Criollo Blanco
Planting Density&Planting Materials	1 meter between rows and 0.7 m between plants, about 10,000 holes per manzana, with 4 to 5 plants per hole. Almost all farmers use corn kept from their own previous harvest as seed material. Only small percentage of farmers plant maize and bean in association.
Fertilizer (lib/Manzana)	N=110; P=110; and K=110
Labor (man-day/Manzana)	About 70 % of farmers do not paid labor; the one that pay labor is about 60 M-D per manzana; family labor = 105 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	Although there are several insects and diseases affecting maize, damages are not significant and control measures are not applied.
Pachum	
Crop: Maize	All farming activities are done by hand; mechanical machinery are not used.
Variety	Toto Amarillo, Salpor, Criollo Amarillo, Criollo Blanco
Planting Density&Planting Materials	1 meter between rows and 0.7 m between plants, about 10,800 holes per manzana, with 4 to 5 plants per hole. Almost all farmers use corn kept from their own previous harvest as seed material. Only small percentage of farmers plant maize and bean in association.
Fertilizer (lib/Manzana)	N=65; P=65; and K=0
Labor (man-day/Manzana)	Almost all farmers do not paid labor; family labor = 160 M-D
Irrigation	Only rainfed production
Insects & Diseases Control	Although there are several insects and diseases affecting maize, damages are not significant and control measures are not applied.

Table 5.1.3 (2) Prices of Vegetables at Different Supermarkets in Guatemala City

Name of Vegetables			Name of Supermarket		
English Name	Spanish Name	Variety	PAIZ	LA TORRE	MULTIMART
			4, July	14, July	30. Aug.
Amaranth	Bledo		0.75/scal		
Asparagus	Esparrago		16.75/lb	14.50/lb	
Basil	Albahaca				1.45/scale
Broccoli	Brocoli	suelto	2.00/lb 2.35/lb 3.51/lb	1.80/lb	2.35/lb
Cabbage	Repollo		1.59/lb	1.30/lb	1.50/lb
Carrot	Zanahoria	meseta minizanahoria	1.45/lb 6.27/tray	10.00/bag	4.75/bag
Cauliflower	Coliflor		2.50-2.85/lb	2.15/lb	2.30/lb
Celery	Apio	ciruelo meseta sisimit	4.2/lb	3.95/lb	 2.50/lb
Champignon	Champiñon		17.9/lb	16.50/lb	
Coriander	Cilantro				1.45/scale
Cucumber	Pepino			1.35/unit	
Eggplant	Berenjena	de 3 unidades	3.60/bunch		1.80/lb
Leek	Puerro	meseta	6.10/scale	5.5/scale	
Lettuce	Lechuga	multiagricole meseta	2.95/lb	 2.75/lb	 2.5/lb
Macoy	Macuy herb				0.90/scale
Onion	Cebolla	big blanka, small	2.15-2.85/lb 5.15/lb		2.85/lb
Parsley	Perejil	liso	1.5/bunch	2.37/bunch	1.35/scale
Pepper	Chile	chile pimento jala peno enbande jado	6.50/lb 6.45/tray 9.75/lb	 5.78/lb	 5.78/lb
Potato	Papa	loman super	1.45-1.70/lb 1.75/lb	1.50/lb 1.80/lb	1.35/lb
Pumpkin	Guicoy			2.9/each	
Snow pea	Arveja china	 pelada	5.50/lb 4.75/lb	5.0/lb	5.0/lb
Soy bean	Soya			2.50/lb	
Straw berry	Fresa			12.0/scale	9.30/scale
Sugar beet	Remolacha	 suelta urias	 1.33/lb	5.7/bag	4.5/bunch
Swiss chard	Acelga			1.50/lb	
Tomato	Tomate	manzano beluga suelto unidad 2-aj beluga prodecon	6.35/lb 7.85/tray 8.57/lb 10.00/tray 2.50/lb		
Watercress	Berro		1.35/bunch	1.00/scale	
Zuchini	Zuchini	 mini	3.75/tray 2.32/tray		
Yucca	Yuka	camelis alvaeo		9.24/bag	

Table 5.1.3 (3) Financial Crop Budget of Vegetable Production Under Present Conditions in Xeatzan Bajo (1/4)

Snow Pea

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	quintal	180	150.0	**27,000**
B) Production Cost				**12,430**
1) Farm Inputs				
- Seeds	pound	75	100	7,500
- Fertilizers				
N	pound	2.00	35	70
P	pound	1.7	75	128
K	pound	1.6	85	136
- Compost	quintal	20	20	400
- Insecticides	lit	95	9	855
- Fungicides	pound	45	4	180
- Hanging rope				500
2) Labor (Paid)	man-day	25	30	750
Labor (Family)	**man-day**	**0**	**60**	**0**
3) Miscellaneous (10%)				1,052
4) Financial cost (21% of Direct Cost)				855
C) Net Income	(Quetzal/Manz.)			**14,570**

French Bean

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	quintal	200	108.0	**21,600**
B) Production Cost				**9,070**
1) Farm Inputs				
- Seeds	pound	**35**	100	3,500
- Fertilizers				
N	pound	2.00	30	60
P	pound	1.7	70	119
K	pound	1.6	85	136
- Compost	quintal	20	20	400
- Insecticides	lit	100	6	600
- Fungicides	pound	45	4	180
- Hanging rope				500
2) Labor (Paid)	man-day	25	75	1,875
Labor (Family)	**man-day**	**0**	**110**	**0**
3) Miscellaneous (10%)				737
4) Financial cost (21% of Direct Cost)				967
C) Net Income	(Quetzal/Manz.)			**12,530**

Table 5.1.3 (3) Financial Crop Budget of Vegetable Production Under Present Conditions in Xeatzan Bajo (2/4)

Brocoli

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	quintal	70	190.0	**13,300**
B) Production Cost				**7,050**
1) Farm Inputs				
- Seeds	seedlings	0.13	25,000	3,250
- Fertilizers				
N	pound	2.00	250	500
P	pound	1.7	100	170
K	pound	1.6	210	336
- Compost	quintal	10	10	100
- Insecticides	lit	95	6	570
- Fungicides	pound	45	3	135
2) Labor (Paid)	man-day	25	30	750
Labor (Family)	**man-day**	**0**	**150**	**0**
3) Miscellaneous (10%)				581
4) Financial cost (21% of Direct Cost)				660
C) Net Income	(Quetzal/Manz.)			**6,250**

Cauliflower

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	quintal	80	270.0	**21,600**
B) Production Cost				**9,160**
1) Farm Inputs				
- Seeds	seedlings	0.15	27,000	4,050
- Fertilizers				
N	pound	2.00	220	440
P	pound	1.7	85	145
K	pound	1.6	260	416
- Compost	quintal	20	25	500
- Insecticides	lit	95	4	380
- Fungicides	pound	45	2	90
2) Labor (Paid)	man-day	25	60	1,500
Labor (Family)	**man-day**	**0**	**145**	**0**
3) Miscellaneous (10%)				752
4) Financial cost (21% of Direct Cost)				887
C) Net Income	(Quetzal/Manz.)			**12,440**

Table 5.1.3 (3) Financial Crop Budget of Vegetable Production Under Present Conditions in Xeatzan Bajo (3/4)

Cabbage

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	heads	1	20,000	**20,000**
B) Production Cost				**8,470**
1) Farm Inputs				
- Seeds	seedlings	0.13	25,000	3,250
- Fertilizers				
N	pound	2.00	275	550
P	pound	1.7	100	170
K	pound	1.6	325	520
- Compost	quintal	10	10	100
- Insecticides	lit	95	9	855
- Fungicides	pound	45	4	180
2) Labor (Paid)	man-day	25	50	1,250
Labor (Family)	**man-day**	**0**	**100**	**0**
3) Miscellaneous (10%)				688
4) Financial cost (21% of Direct Cost)				906
C) Net Income	(Quetzal/Manz.)			**11,530**

Cole of Brussels

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	quintal	80	310.0	**24,800**
B) Production Cost				**8,890**
1) Farm Inputs				
- Seeds	seedlings	0.15	20,000	3,000
- Fertilizers				
N	pound	2.00	220	440
P	pound	1.7	90	153
K	pound	1.6	260	416
- Compost	quintal	20	25	500
- Insecticides	lit	95	8	760
- Fungicides	pound	45	3	135
2) Labor (Paid)	man-day	25	70	1,750
Labor (Family)	**man-day**	**0**	**150**	**0**
3) Miscellaneous (10%)				715
4) Financial cost (21% of Direct Cost)				1,022
C) Net Income	(Quetzal/Manz.)			**15,910**

Table 5.1.3 (3) Financial Crop Budget of Vegetable Production Under Present Conditions in Xeatzan Bajo (4/4)

Carrot

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	docens	3	13,000	**32,500**
B) Production Cost				**5,370**
1) Farm Inputs				
- Seeds	pound	100	5	500
- Fertilizers				
N	pound	2.00	150	300
P	pound	1.7	80	136
K	pound	1.6	225	360
- Compost	quintal	10	25	250
- Insecticides	lit	95	8	760
- Fungicides	pound	45	4	180
2) Labor (Paid)	man-day	25	65	1,625
Labor (Family)	**man-day**	**0**	**90**	**0**
3) Miscellaneous (10%)				411
4) Financial cost (21% of Direct Cost)				845
C) Net Income	(Quetzal/Manz.)			**27,130**

Lettuce

Item	Unit	Unit Price (Quetzal)	Quantity	Amount (Quetzal/Manz.)
A) Gross Income				
Unit Yield	heads	**0.5**	50,000	**25,000**
B) Production Cost				**12,580**
1) Farm Inputs				
- Seeds	seedlings	0.1	70,000	7,000
- Fertilizers				
N	pound	2.00	85	170
P	pound	1.7	40	68
K	pound	1.6	175	280
- Compost	quintal	20	35	700
- Insecticides	lit	95	2	190
- Fungicides	pound	75	2	150
2) Labor (Paid)	man-day	25	80	2,000
Labor (Family)	**man-day**	**0**	**120**	**0**
3) Miscellaneous (10%)				1,056
4) Financial cost (21% of Direct Cost)				969
C) Net Income	(Quetzal/Manz.)			**12,420**

Table 5.1.6 (1) Results of the Household Facility Survey (1/2)

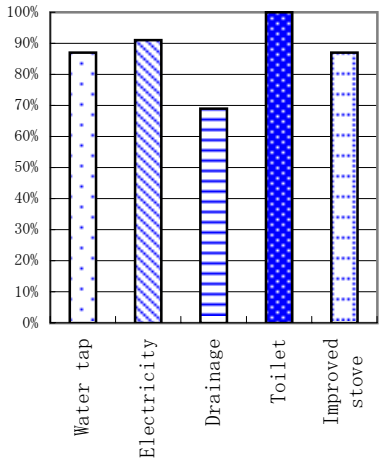
Survey Condition

- Surveyed items :
  1) Portable Water, 2) Electricity, 3) Drainage, 4) Toilet,
  5) Improved stove, 6) No. of family and 7) No. of family member
- Sampling method of house : Random sampling
- Targeting coverage of houses : More than 50% of the houses
- Survey method : Interview at each house, around 5-10 minutes at each house
- Survey period : from end of July to middle of August, 2000
- Interviewer : The member of the Study Team

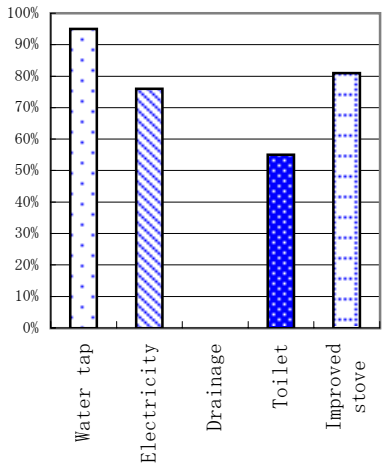
Diffusion of Facilities : Results of the adhoc survey for house facility

	Water tap	Electricity	Drainage	Toilet	Improved stove	Interviewee houses
Xeatan Bajo	87%	91%	69%	100%	87%	141
Panyevar	95%	76%	0%	55%	81%	175
Pachum	80%	28%	0%	14%	2%	75
Palestina	60%	73%	22%	73%	70%	112

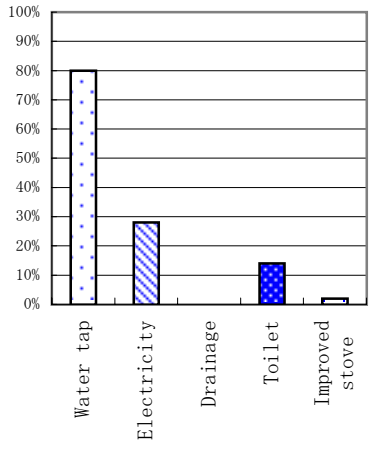
Xeatan Bajo



Panyevar



Pachum



Palestina

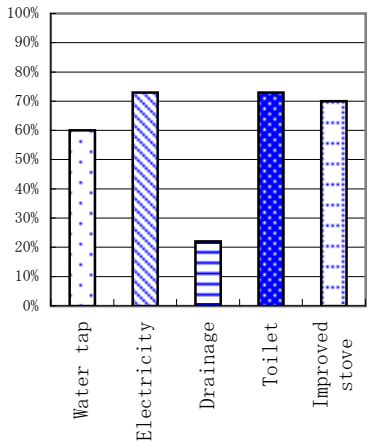


Table 5.1.6 (1) Results of the Household Facility Survey (2/2)

1) Xeatan Baio

House	Family	Family member	Water	
			○	×
141	164	856	123	18
			87%	13%

Electric		Drinage [sumidero]			Toilet			Improved Stove		
○	×	○p	×nf	×	○p	○np	×	○p	○np	×
128	13	97	22	22	118	23	0	107	16	18
91%	9%	69%	16%	16%	84%	16%	0%	76%	11%	13%

a) 1 house has 6.07 family members in average. b) 1 house has 1.16 families in average. c) 1 family has 5.22 family members in average.

2) Panyevar

House	Family	Family member	Water *1				Electric		Drinage [sumidero]			Toilet			Improved Stove		
			○_Care	○_Fonapaz	○_C+F	×	○	×	○p	×nf	×	○p	○np	×	○p	○np	×
175	209	1208	3	58	106	9	133	42	0	0	175	2	94	78	40	103	33
			2%	33%	60%	5%	76%	24%	0%	0%	100%	1%	54%	45%	23%	59%	19%

a) 1 house has 6.90 family members in average. b) 1 house has 1.19 families in average. c) 1 family has 5.78 family members in average.

3) Pachum

House	Family	Family member	Water *2			Electric		Drinage [sumidero]			Toilet			Improved Stove		
			○_P1	○_P2	×	○	×	○p	×nf	×	○p	○np	×	○p	○np	×
75	83	426	49	16	16	23	60	0	0	77	2	9	65	0	2	92
			60%	20%	20%	28%	72%	0%	0%	100%	3%	12%	86%	0%	2%	98%

a) 1 house has 5.68 family members in average. b) 1 house has 1.11 families in average. c) 1 family has 5.13 family members in average.

4) Palestina

House	Family	Family member	Water *3			Electric		Drinage [sumidero]			Toilet			Improved Stove		
			○_Rural	○_Urban	×	○	×	○p	×nf	×	○p	○np	×	○p	○np	×
112	152	755	47	25	48	87	32	25	4	85	25	55	30	26	52	34
			39%	21%	40%	73%	27%	22%	4%	75%	23%	50%	27%	23%	46%	30%

a) 1 house has 6.74 family members in average. b) 1 house has 1.36 families in average. c) 1 family has 4.97 family members in average.

- Note,
*1: "○_Care" = Water system installed by CARE Guatemala, "○_FONAPAZ" = Water system installed by FONAPAZ, "○_C+F" = Both of CARE system and FONAPAZ
*2: "○_P1" = Pachum 1 Water Supply System, "○_P2" = Pachum 2 Water Supply System,
*3: "○_Rural" = Rural Portable Water System, "○_Urban" = Urban Portable Water System

○ : Yes, they have] ○p: constructed by project
×: No, they don't have ○np : constructed by money of villager, not project
×nf : constructed by project, but it is not functioning presently

Table 5.1.6 (2) Rural Infrastructure in Xeatzan Bajo (1/3)

1. Community Drinking Water Supply

(1) Number of beneficiaries and % of beneficiaries in the total houses	[Number of Beneficiary] -Initial stage : 212 houses -Present : 243 houses (according to the registry book of the Pump Committee) [% of Beneficiary] 87 % of the total houses in the community (based on the results of the ad hoc survey for rural infrastructure, which covers 141 houses for 164 families, conducted by the Study Team)
(2) Management organization and its regulations	The Pump Committee manages all the matters regarding the community water supply system. The committee consists of 9 members, and their activities are offered as voluntary services for the community. For daily operation, one personnel, he is not a committee member, is assigned as the operator on the payroll. The committee members will be changed every 2 years. There is no any written regulation in terms of the committee operation.
(3) Water consumption and operation	There is no reliable operation record of the pump station. However, based on the records of water charge for each household, total amount of consumed water and operational hours in a month can be calculated. [consumed water] The amount of water consumption by the system is estimated around 1,000 – 2,300m^3/month or 0.4 – 0.9 lit/s in monthly average, which varies depend on the season. Generally speaking, it observed the water consumption in dry season is much higher than that in rainy season. Provided that one family has 6 family members, the daily water consumption per person is 23-53 litters/day/person. [operational hour of pump] 0-80 hours per month
(4) Facilities	[Type of system] pumping-up system [Pump station] - Location : about 300 m downstream of the water resource, *Pachomochai springs*. - Diversion pipe : 2 pipes supply the spring water to the pump house for 24 hours. - Pump: 1 no. of 35HP, diesel engine type, its average pumping rate at the system is around 3.2 lit/s. - Collection tank capacity: 22.4 m^3 (W4.0*L3.5*H1.6m) [Conducting/distribution system] - Tank capacity: 80.2 m^3 (W9.1 *L4.1*H2.15m) - Pipe length: 2,314 m of conduction pipe and 4,117 m of distribution pipe.
(5) Rule of operation and distribution of drinking water to each family	On every morning the pump operator checks the remaining amount of water in the disributary tank. If the amount in the tank is not enough, water shall be supplied through the pumping station. There is no any limitation of usage water and each house can use water as much as they want, even for irrigation purposes. Water shortage in the system is seems to be hardly happen presently.

Table 5.1.6 (2) Rural Infrastructure in Xeatzan Bajo (2/3)

(6) Water charge price, how to collect water charge, outstanding status, and means against delinquent	[Water charge rate] Water charge is Q. 2.1 per 1,000 liters for every beneficiary. There is no any monthly basic charge but minimum monthly charge at Q 2.1 which grants up to 1,000 litters, thus amount of payment is charged only based on the amount of monthly water usage. [Collection of water charge] At end of month, staffs of Pump Committee check the water counter at each beneficiaries, and claim with notes for payment. Beneficiaries pay around Q10-40 per month. If payment of water charge is suspended 3 month, the committee cut the water supply to the house. At this moment (July '00) only 1 beneficiary is suspended the water supply. The monthly revenue from water supply system is around Q. 2000-3000 and the consumption is around Q.1000-2000 per month. The Pump Committee saves around Q.500-600 per month. This finance will be used only for the maintenance cost of the system, which is anticipated in future.

2. Sanitary System

(1) Number, diffusion % of the total household	[Toilet] 100 % of diffusion. : Most of these sanitary facilities were installed by a project of CARE Guatemala in 1995. According to the ad hoc survey, 84 % of the houses have such facilities made by the CARE project, and the others (mostly these were constructed after the CARE project) made it by their own money. [Drainage] The drainage system with dug pit, so called *sumidero,* had been installed by CARE at the same time of toilet system introduction. 212 houses were given the drainage system but, at present, a quarter of such facilities are not functioning because of getting full in a pit. Present beneficiary is estimated around 70 %.
(2) Features	[Toilet] Toilet is furnished with a concrete seat on the top of a dug hole, about 5-8m in depth, and covered with cloth or plastic screen. [Drainage] Dug pit, 10m in depth, and concrete top cover [1m*1m] Dug pit collects sewerage water from house and water infiltrates ground.
(3) Remarks	[Toilet] As mentioned above, the toilet system is spread among the community and contributes improvement of house sanitary condition. The fact that they install it with their finance shows its necessity, effectiveness and sustainability in the community. [Necessity of improvement for drainage system] Low; The villagers said that they scarcely install such drainage pit in their newly constructed house and also do not repair the stuck pit. In the ad hoc survey, even one facility made by their money could not be found. In the technical point of view, sewage water will not stagnate in the house because of its geographical feature, so serious problems caused by sewage water might not be occurred and effectiveness of the sumidero is not so high in this area.

Table 5.1.6 (2) Rural Infrastructure in Xeatzan Bajo (3/3)

3. Electricity Supply

(1) Number of beneficiaries for power supply and diffusion % of the total houses in the community	It was recognized that 13 houses did not have the community electric supply system in the ad hoc survey covering 141 houses. In this context, it is estimated about 90 % of the houses have electric. Main purpose of the electricity is for lights, radio and TV. They paid about Q.15-25/month at the rate of Q.0.99/kW
(2) Construction / installation cost	The electric system was installed on a commercial basis to each house. Newly installation cost is around Q.450-500/house. (registration: Q60, counter box: Q257, cable: Q2/m, booth: Q3.5/nos, wire: Q1.3/m)

4. Roads and Bridges

(1) Road in the community	[Pavement] gravel pavement [Present conditions of road] Good [Maintenance] By the community, but no special committee for the road maintenance exists. [Remarks] Many tracks of vegetable traders enter the community easily.
(2) Bridge	No bridge in the community

5. Improved Stove

(1) Number, diffusion % of the total houses in community.	Around 87 % of the houses in the community have the improved stove, and 10 % of the houses made new stove after the project without any financial assistance. (by the ad hoc survey) Construction cost of the improved stove is about Q300-500/nos.
(2) Remarks	Effects of improved stove are : a) to prevent accidents by children around cooking fire, b) to avoid diseases caused by its smoke and c) to reduce fire wood consumption. Through interviews the villagers recognized these effects and its effectiveness, and which is verified by the fact that many houses purchased it with their finance.

Table 5.1.7(1) Results of Potable Water Test in Xeatzan Bajo

Date of sampling		25/08/2000	25/08/2000	25/08/2000	25/08/2000	25/08/2000	
Item	Unit	C-1	C-2	C-3	C-4	C-5	Standards
pH	-	7.1	7.2	7.1	7.4	7.1	5.8-8.6
EC	μ S/cm	191	250	179	200	181	-
Coliform group	cfu/ml	**55**	**40**	**15**	ND	**5**	ND
Bacteria	cfu/ml	15	14	17	10	3	100
COD	mg/l	5	5	5	5	**10**	10
TH	mg/l	50	50	20	50	50	300
NH_4^+	mg/l	ND	ND	ND	ND	ND	-
NH_4^+-N	mg/l	ND	ND	ND	ND	ND	-
NO_2^-	mg/l	ND	ND	ND	ND	ND	-
NO_2^--N	mg/l	ND	ND	ND	ND	ND	10
NO_3^-	mg/l	5	10	5	2	5	-
NO_3^--N	mg/l	1.15	2.3	1.15	0.46	1.15	10
Cu	mg/l	ND	ND	ND	ND	ND	1.0
Fe	mg/l	ND	ND	ND	ND	ND	0.3
Zn	mg/l	ND	ND	ND	ND	ND	1.0

Remarks: fountain:C-1,C-4
well:C-2,C-3
tap water:C-5

Table 5.1.7(2) Water Use in Xeatzan Bajo

	C-1	C-2	C-3	C-4	C-5
Community	Xeatzan Bajo	Xeatzan Bajo	Xeatzan Bajo	Xeatzan Bajo (outside of study area)	Xeatzan Bajo
Owner	Community	Private	Private	Private	primary school
Place	fountain	well	well	fountain	tap water
Size	through a pipe	1mX1mX22m (to water surface)	1mX1mX10m (to water surface)	through a pipe	-
When to use the water	Seven families, which have no running water, use all the time.	All the time. No affordability to have running water yet.	All the time. No affordability to have running water yet.	One family uses all the time. When water supply is cut off, 15 families use	all the time

Table 5.1.8 (1) Existing Development Projects in Infrastructure Sector in Xeatzan Bajo (1/2)

(a) Water Supply Project by CARE Guatemala

(1) Number of beneficiaries and % of beneficiaries in the total households	[Number of Beneficiary] -Initial stage : 212 households -Present : 243 households (according to the registry book of the Pump Committee) [% of Beneficiary] 87 % of the total houses in the community (based on the results of the ad hoc survey for rural infrastructure, which covers 141 houses for 164 families, conducted by the Study Team)
(2) Executed body, Construction year, total construction costs and financial sources	[Executed body] CARE Guatemala [Construction year] -Commencement : April 1994 -Completed : Feb. 1995. [Construction cost] Approximately Q500,000 (according to villager) for materials, and the plan/design of the system was financed and executed by CARE Guatemala. [Financial and physical contribution of beneficiaries] Beneficiaries shouldered the part of the construction cost in the amount of Q750 per each beneficiary and in voluntary services as labors for the construction works. Most of the structures were done by the hands of beneficiaries. (except water tank and pump).
(3) Facilities	[Type of system] pumping-up system [Pump station] Pump station is located at about 300 m downstream of the water resource, *Pachomochai springs*. Two diversion pipes supply the spring water to the pump house for 24 hours. - Pump: 1 no. of 35HP, diesel engine type, its average pumping rate at the system is around 3.2 lit/s. - Collection tank capacity: 22.4 m^3 (W4.0*L3.5*H1.6m) [Conducting/distribution system] - Tank capacity: 80.2 m^3 (W9.1 *L4.1*H2.15m) - Pipe length: 2,314 m of conduction pipe and 4,117 m of distribution pipe.

Table 5.1.8 (1) Existing Development Projects in Infrastructure Sector in Xeatzan Bajo (2/2)

(b) Sanitary Project by CARE Guatemala

(1) Number, % of beneficiary of the total houses	[Toilet] 212 houses got it. (84 % of the houses based on the ad hoc survey) [Drainage] 212 houses got it (However a quarter of such facilities are not functioning because of getting full in a pit presently. Present beneficiary is estimated around 70 %.)
(2) Executed body, Project year and its Features	[Executed Body] CARE Guatemala [Project year] 1995 [Feature : Toilet] Each house in the community has a toilet equipped with concrete toilet seat and a screen tent. [Feature : Drainage] The drainage system with dug pit, so called *sumidero* in Spanish [size: 1*1*10m], had installed by CARE at the same time of toilet system.

(c) Improved Stove Project by CONSUDER

(1) Installation / construction	The improved stoves are installed and used in many houses presently. Most of these improved stoves were installed under a project of CONSUDER. The project offered the stove at Q15 each and totally 175 stoves were installed in the community.
(2) Number, % of beneficiary in the total household in village.	[Beneficiary %] Around 76 % of the present houses in the community