

Present Situation of the Model Micro-cuenca (Palestina)



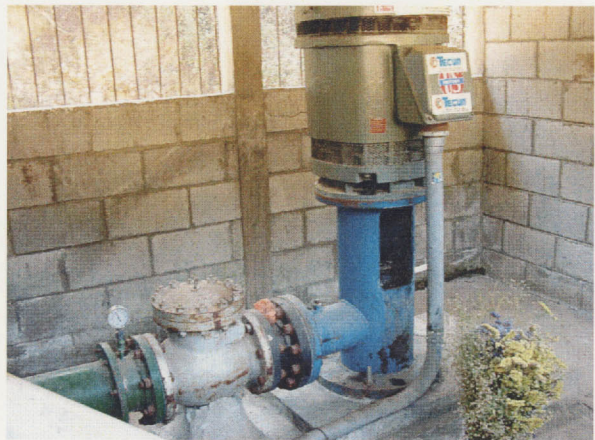
Present condition of farm land in Los Diaz



Potato planting in Sector-I



Traditional sauna bath (Temaskal)



Pump used for water supply (about 900 households in Palestina de Los Altos are supplied with this system)



General public meeting conducted under the participatory survey (Los Diaz)



General public meeting conducted under the participatory survey (Los Cabrera)

SUMMARY

Authority

- 01 This is Draft Final Report prepared by the JICA Study Team in accordance with the Contract for the Study on the Master Plan Study on Sustainable Rural Development for the Reduction of Poverty in the Central Highland Region of the Republic of Guatemala (the Study) agreed upon between the Government of Guatemala, the Ministry of agriculture, Livestock and Food (MAGA) and the Japan International Cooperation Agency (JICA) in July 29 1999.
- 02 The objectives of the Study are (1) to prepare a Master Plan on a sustainable rural development project for the rural areas in the Central Highland Region of Guatemala, and (2) to transfer technology, mainly procedures and methods of plan formulation, to the Guatemalan counterpart personnel through on-the-job training in the course of the Study. The plan is being formulated to reduce poverty in the Study area by integrating a) increase of farmer's income, b) improvement of life quality and c) conservation and effective use of natural resources.
- 03 The Study area covers about 6,000 km² located in the Central Highland Region. It consists of the four provinces of Chimaltenango, Sololá, Totonicapán and Quetzaltenango.

Project Background

- 04 The population of Guatemala is estimated at 10.8 million in 1998. Population growth rate is 2.7 % per annum. About 65 % of the population lives in rural areas. About 20% of the total population or 2.4 million people live in Guatemala City, the capital. Economically, the agricultural sector is the most important in the country. It contributes to 23.3 % of GDP and accounts for 59% of the country's labor force. About 60 % of the country's total export come from agricultural produce
- 05 Since the Guatemala Peace Agreements in December 1996, the Government has focussed on poverty alleviation and human resource development for small-scale farmers in the rural areas in the peace process and maintaining an appropriate macroeconomic framework. Especially the Government has invested in the fields of infrastructure in the rural areas, economic liberalization, basic education and social infrastructure.
- 06 The Study area consists of four provinces in the Central Highland Region and is identified as a poor area. About 70 % of the rural people in the Study area suffer from malnutrition due to a shortage of foodstuff. Moreover, owing to poor access to water supply system and the health services, water borne diseases and respiration infections are more prevalent and mortality is higher compared to other regions. Most of the farmers in the Study area have very small land holdings. Access to the markets, irrigation facilities and extension services for agricultural technology is very poor. Further, there is a shortage of funds for the farmers. As a result, agricultural production is low as are farm incomes. A recent increase in population has brought about the development of steep lands that are not suitable for farming, resulting in the unplanned deforestation, serious soil erosion, decrease of fostering capability of water resources in the river basins, deterioration of water quality of

the river water and groundwater.

- 07 This Study was carried out based on the basic concept of “Agreement on Social and Economic Aspects and the Agrarian Situation, III Agrarian Situation and Rural Development” in the Guatemala Peace Agreements.

General View for the Study Area

Administration and population

- 08 The Study area is about 6,050 km² or 5.6% of the total area of the whole country. Administratively, it is under four provinces (Chimaltenango, Sololá, Totonicapán and Quetzaltenango), 67 municipalities and local traditional authorities. Municipalities have the important function of providing services to the people. Under municipalities, there are local traditional authorities such as aldea and caserio that function their local administration. The total population of the Study area was 1,300,000 in 1994 or 12.3% of the total population of the country. The indigenous people in the Study area are mainly Kaqchikel, K'iche, Tu'zujil and Mam and occupy about 80% of the total population. The total number of households is 240,000. The family size is about 5.5. The population density is about 217 persons per km² and population growth rate is 2.4 % per year.

Health

- 09 The health sector is characterized by the involvement of many institutions, both public and private, non-governmental organizations (NGOs), and a sector of traditional medicines, which plays an important role especially in rural areas with a Mayan tradition. The total coverage of health services in 1999 was 67%.
- 10 Indigenous population including in the Study area has one of the worst health profiles for women and children in Latin America. Principle causes of morbidity and mortality in the country and the Study area are (1) acute respiratory infections and diarrhea, (2) nutritional deficiencies, and (3) other diseases such as Malaria, HIV/AIDs, and diseases among adults.

Rural Infrastructure

- 11 The total length of the roads in the Study area represents 16.6% of the national system's total, of which 67% of the length is not paved. The coverage service rate of potable water supply, latrines and electricity in the Study area is 73.7%, 22.5%, 58.8%, respectively.

Institution for Development

- 12 Many organizations and many channels for rural development exist. In the process of decentralization, social funds have increased considerably and the Ministries themselves have concentrated their duties on formulation of policies and arrangements among relevant authorities concerned and are instituting new alternative systems like SIAS, PRONADE, etc.
- 13 MAGA is made up of three groups of institutions; (1) centralized institutions (MAGA), (2) functional autonomy institutions and (3) special execution units. Under the decentralization policy, the major functions of MAGA are (1) to formulate and administering policies and strategies for agricultural sectors of farming, livestock, forest and hydro-biology and (2) coordination, regulation,

evaluation of actions in the above agricultural sectors.

- 14 There are organizations for supporting fund such as the land fund, FONAGRO, FIS, FONPAS, FSDC, INFOM, FODIGUA, etc. Among them, FIS and FONAPAS have played in an important role in restoration of Guatemala since cease of internal conflicts.
15. In forest and environment organization, there area INAB, Ministry of Environment and CONAP that perform forest management, conservation of natural resources and operation/management of the protected area.
- 16 BANRURAL is the most important organization to provide credit services. It mainly finances agricultural activities such as craftsman ship, and commerce to promote economic and social development of the rural area.
- 17 There are two organizations, ICTA and INTECAP in the training. ICTA is an institution decentralized of MAGA. The responsibility of ICTA is to generate and promote the use of science and agricultural technology with efficiency and sustainability. Also it has basic principal to contribute to increasing productivity and profitability of the agricultural sector. INTECAP is created for (1) development of human resources and increment of productivity, (2) contribution with government development plan in attaining the targets for formation and training of labors and (3) promotion of the collaboration between private and public sectors etc.
- 18 NGOs are one of the most important institutions in the field of socio-economic development at the community level. According to the UNDP's Directory in 1997, the NGOs cover various activities such as agriculture, environmental conservation, health and sanitation, and so on.

Natural and Environmental Condition

- 19 The main characteristic of the Study area is its highly dissected mountain relief, forming land with very steep slopes and very narrow, and deep valleys. There are several volcanoes within the Study area. Exceptions to the mountainous character of the Study area are some areas of relatively large flat valleys in Chimaltenango and Quetzaltenango provinces. Most of the Study area is located in the Guatemalan Central Highlands, at altitude ranging mostly from 1,000 to 3,300 meters. In areas located above 2,000 meters, frosting temperatures occur during the months from December to February. The annual average rainfall also shows correlation to altitude. Areas located at higher altitude are lower values of average rainfall compared to areas located at lower elevation.
- 20 The main characteristics of soils within the Study area are related to their volcanic origin, with the exception of some relatively small areas of alluvial soils. The lands in the Study area are classified into Class I-IV (28.5%) and V-VIII (61.5%) according to the USDA classification system.
- 21 There are main 12 rivers in the Study area consisting of nine rivers in the Pacific Region, one river Caribbean Sea Region and two rivers in Mexican Gulf Region. The groundwater in the Study area is located in volcanic rocks of the Tertiary and Pleistocene Eras. There is limited use of groundwater for irrigation and it must be considered a good future alternative water sources.

- 22 The main environmental problems reported in the Study area are the deterioration of natural resources and contamination problems. The deterioration of natural resources is mainly the result of deforestation leading to a diminution of biodiversity, increases erosion and diminution of water resource quality. The main contamination problem is the contamination of waters due to domestic sewer, solid waste and uncontrolled pesticide use.

Agriculture

- 23 A high percentage (71.5 %) of land in the Study area is classified as non-agricultural land (classes V to VIII). At present such lands are reclaimed for agriculture due to high population pressure. The present land use is as shown below:

Land use	Basic grain	Vegetable	Perennial crops	Forest	Urban, pasture, Other	Total
Area (ha)	93,700	43,500	142,100	289,200	36,700	605,200
(%)	15.5	7.2	23.5	47.8	6.1	100.0

- 24 Basic crops in the Study area are maize and black beans that are the main staples for Guatemala people. The average cultivation area of household is very small and 0.49 ha, half the national average. All small farmers produce maize in a traditional way. The average yields of maize are as low as 1.3 to 2.1 tons/ha. Vegetable production at a commercial scale has been increasing significantly by small-scale farmers under rainfed condition. Chimaltenango is the major vegetable-producing province in Guatemala. Production of potato is the main economic activity in some municipalities of the Study area, mainly in Quetzaltenango and Sololá. Coffee production is a very important agriculture activity. Export of coffee is one of the main export commodities of Guatemala. Coffee production is the major economic activity for several municipalities of Sololá province, and is also very important in some municipalities of Chimaltenango and Quetzaltenango. The majority of coffee farmers have small land areas planted to coffee and its yield is low. In addition, other crops produced are blackberry, strawberry, peach and apple, which are planted in relatively small areas in the Study area.
- 25 Because of the small land area available and low yields, about 90% of maize produced by farmer households is for family self-consumption, and it is estimated that only about 10% is dedicated to the local market. Vegetables produced in the Study area are sold for domestic market and for export to USA and the Central America. A high margin of exporters and middle traders is one of the serious problems. Coffee is marketed through middlemen, pulping owners, dry mill plant owners to domestic and international market.

Present Condition of Chimaltenango Province

Social Conditions

- 26 Demographic and social conditions in Chimaltenango province are shown in the following table.

Items	Value
Area (km ²)	1,979
Total population in 1994 (person)	315,000
Population in the rural area in 1994 (person) Ratio to the whole population	184,000 (58%)
Population in the urban area in 1994(person) Ratio to the whole population	131,000 (42%)
Population density in 1994 (persons/km ²)	159
Total number of household in 1994 (No.)	59,800
Average family size (persons/family)	5.3
% of indigenous people (%)	78
Major indigenous people	Kaqchikel
Literacy rate (%)	63.8
Number of municipality (No.)	16

The capital of the municipality of Chimaltenango lies 55 km from Guatemala City, the capital. Due to this reason, many economic activities have flourished like Maquila industry and Agro-exportation of vegetables, fruits and flowers. Besides, Chimaltenango is transforming into a commuting town for employees of the capital. Because of these changes, farm labor wages have increased.

Land and Agriculture

- 27 About 59,300 ha, or 30 % of total area of Chimaltenango province is classified as land suitable for intensive agriculture production, classes I to IV. About 82,000 ha or 42 % of the total area in this province is presently being used for agricultural production. Almost all (99.7 %) agriculture production is under rainfed condition. In the province, there are three sub-regions geographically. Main crops in the sub-regions are: (1) coffee in the northern sub-region, (2) vegetables for domestic and international market in the central and southern sub-region and (3) coffee in the southwestern sub-region. The main vegetable introduced are snow pea, French bean, lettuce, cabbage, broccoli, cauliflower, carrot, and beet. In addition to vegetables and maize, other important crops produced in the province are coffee, strawberry, blackberry, and small areas of fruit trees such as peach.

Water Resource

- 28 There are main four rivers in the province. These are the Motagua, the Achiquate, the Coyolate and Madre Vieja. Among them, the Coyolate river is the largest. An annual average discharge is 12.9m³/sec at the Coyolate bridge gauging station. Of these basins, the Coyolate River and the Pixcayá River (tributary to Motagua in Chimaltenango), are being used by EMPAGUA as an important source of potable water for the City. That is why any project which involves using water from these rivers, must be coordinated with the company, in order to respect its acquired rights. In the case of the Madre Vieja River, there is no acknowledgement of projects for the use of its water. It is estimated that ground water potential for development is high in the area of municipalities of San Martín Jilotepeque and El Tejar, and medium in San José Poaquil, San Juan Comalapa, Patzún, Patzicia and Zaragoza.

Social Services and Infrastructure

- 29 Principal causes of infant death during 1999 were pneumonia, neonatal sepsis, prematurity, malnutrition and diarrhea. Principal causes of general mortality during the same period were pneumonia, malnutrition, cancer, cirrhosis and diarrhea.

Although infectious diseases such as ARI and diarrhea, and malnutrition continue to be principal causes of mortality and morbidity, the importance of adult diseases such as cancer and diseases associated with arterial hypertension are also increasing.

- 30 Seventy-seven percent of the population in the province has access to health care services from MSPAS and SIAS. Eighty-five percent of delivery care is treated by comadrona. Seventy-seven percent of women received prenatal care at least once during pregnancy. In spite of the campaigns carried out by the MSPAS, NGOs and municipalities, the vaccination coverage for infants (under 1 year old) is still below 90%.
- 31 The service coverage rate of drinkable water, latrines and electricity is 76.7%, 25.7% and 59.1%, respectively, indicating that basic social infrastructure is at a low level especially for sanitation services
- 32 The province of Chimaltenango has one lined Central American road (CA-1) that connects the capital with the provinces of Sololá, Totonicapán, Quetzaltenango and others. It has also two national roads that connect Antigua, Acatenango, Patzicía, Sololá (No. 1) and Yepocapá, Escuintla (No. 10), partially lined, and several provincial roads and highways. The total length of roads is 730km, of which 76% is unpaved.

Present Condition of Sololá Province

Social Conditions

- 33 The demographic and social conditions in Sololá province are summarized in the following table.

Items	Value
Area (km ²)	1,061
Total population in 1994 (person)	222,000
Population in the rural area in 1994 (person)	148,000
Ratio to the whole population	(67%)
Population in the urban area in 1994(person)	74,000
Ratio to the whole population	(33%)
Population density in 1994 (persons/km ²)	209
Total number of household in 1994 (No.)	40,000
Average family size (persons/family)	5.5
% of indigenous people (%)	94
Major indigenous people	Kaqchikel, K'iche, Tz'utujil
Literacy rate (%)	44.3
Number of municipality (No.)	19

Agriculture is the most important activity in this province. Tourism is also an important industry for some communities near the lake, especially Panajachel and Santiago Atitlán.

Land and Agriculture

- 34 About 31,800 ha, or 30 % of total Sololá province land is classified into classes I to IV. An estimated area of about 42,440 ha or 40 % of province area is being used for agricultural production. Agricultural production is almost entirely rainfed. Sololá province may be divided into three sub-regions according to the elevation of the land and kind of main crops: (1) the north and northeast sub-region produces potato,

vegetables and basic grains, (2) the sub-region of the western part of the province produces basic grains, and coffee and (3) the sub-region located at the south of Atitlan lake produces the Atitlán coffee.

Water Resource

- 35 There are main four rivers such as the Nahualate, the Madre Vieja, and the Sis-Icán and the rivers that flow to the lake of Atitlán. The Nahualate is the largest and annual average discharge is 30.2m³/sec at the San Miguel Moca gauging station. With respect to ground water sources, it is estimated that development potential is medium in municipalities of Sololá, Santa Lucía Uatlán, Nahuala and Santa Catarina Ixtahuacán.

Social Services and Infrastructure

- 36 Principal causes of infant death during this period were pneumonia, prematurity, diarrhea diseases and malnutrition. Principal causes of general mortality during 1999 were pneumonia, malnutrition, alcoholic intoxication, and diarrhea diseases. Common diseases include intestinal parasite, anemia, skin diseases and amoebiasis.
- 37 Access to health care services is very good and 98% of the population receive services from MSPAS and SIAS. 86% of delivery care is carried out by comadrona. Ninety percent of women received prenatal care at least once during pregnancy. Vaccination covers BCG, Polio, DPT and measles, and its rate is less than 90%.
- 38 The coverage rates of drinkable water, latrines and electricity services are 84.9%, 14.1% and 54.3%, respectively, indicating that the basic social infrastructure is at a low level, especially for sanitation services.
- 39 The province of Sololá has a lined Central American highway (CA-1) that passes through the north connecting the capital city with the provinces of Totonicapán, Quetzaltenango and others. It has also two national ones that unite Antigua, Acatenango, Patzicía, Patzún, Sololá (no.1) and the routes like Godinez, San Lucas Tolimán, Patulul (no. 11), lined and many provincial roads and highways. The total length of roads is about 410 km, of which 50% is unpaved.

Present Condition of Totonicapán Province

Social Conditions

- 40 The demographic and social conditions in Totonicapán province are shown below.

Items	Value
Area (km ²)	1,061
Total population in 1994 (person)	272,000
Population in the rural area in 1994 (person)	243,000
Ratio to the whole population	(89%)
Population in the urban area in 1994(person)	29,000
Ratio to the whole population	(11%)
Population density in 1994 (persons/km ²)	257
Total number of household in 1994 (No.)	47,300
Average family size (persons/family)	5.7
% of indigenous people (%)	94
Major indigenous people	K'iche
Literacy rate (%)	49.8
Number of municipality (No.)	8

It is characterized that people of this province have more participation in non-agriculture activities like small industry and commerce. The traditional local authority properly manages about 60% of the communal forests.

Land and Agriculture

- 41 About 46,000 ha, or 37 % of total area of Totonicapán province are classified as agricultural suitability classes I to IV. It is estimated that about 41,000 ha or 34.6 % of total land province area is being used for agriculture production. The agricultural production in Totonicapán province is mainly maize and black bean for self-consumption of farmers' household but there are also very small areas of land used for fruit production, such as avocado, apple and peach. The severe climatic condition of high mountains is the main factor that limits agricultural production in Totonicapán province.

Water Resource

- 42 In the province, there are main four rivers such as the Nahualate, the Salamá, the Salinas and the Motagua. The development potential of groundwater is estimated as high in San Andrés Xecul municipality and as medium in Momostenango municipality.

Social Services and Infrastructure

- 43 Principal causes of infant death in 1999 were pneumonia, diarrheal diseases, neonatal sepsis, asphyxia at birth and bronchitis. Principal causes of general mortality during 1999 were pneumonia, diarrheal diseases, malnutrition, and neonatal sepsis. Other common diseases are intestinal parasite, skin diseases, and amoebiasis
- 44 Access to health care services in 1999 was low, indicating that only 68% of the population received services. 95% of delivery care services is provided by comadrona. About 81% of women receive some kind of prenatal care at least once during pregnancy. Vaccination coverage rate (less than 80%) among children under one year old is the lowest among the Study area. It is assumed that the low rate of vaccination results in causes of religion, ethnic traditional behavior and resistance against injection to health children.
- 45 The coverage rates of the services of drinkable water, latrines and electricity are 70.9%, 10.4% and 56.0%, respectively. This indicates that the basic social infrastructure has a low level, especially for sanitation.
- 46 The province of Totonicapán has a Central American surfaced road (CA-1) that connects the capital with the provinces of Sololá and Huehuetenango. It has also two national roads, which connect Los Encuentros, Totonicapán, Quetzaltenango (route no. 1) and San Bartolo, San Carlos Sija, Quetzaltenango (route No. 9N) and several provincial roads and highways. The total length of roads is about 590km, of which 80% is unpaved.

Present Condition of Quetzaltenango Province

Social Conditions

- 47 The demographic and social conditions in Quetzaltenango province are shown

below.

Items	Value
Area (km ²)	1,951
Total population in 1994 (person)	504,000
Population in the rural area in 1994 (person) Ratio to the whole population	303,000 (60%)
Population in the urban area in 1994(person) Ratio to the whole population	201,000 (40%)
Population density in 1994 (persons/km ²)	258
Total number of household in 1994 (No.)	92,500
Average family size (persons/family)	5.4
% of indigenous people (%)	60
Major indigenous people	K'che, Mam
Literacy rate (%)	68
Number of municipality (No.)	24

Because Quetzaltenango province extends from the highlands to the coast, there is a great difference in the land use pattern among municipalities. Also people in the northern are annually migrate to the large-scale farmlands in the coastal lands. They rent lands to cultivate maize for self-sufficiency and/or work as seasonal agricultural labor. Also there is a tendency of migrating to the USA to obtain employment at present.

Land and Agriculture

- 48 About 41,000 ha, or 21 % of the total Quetzaltenango province is classified as agricultural suitability classes I to IV. The area used for agriculture production in this province is estimated at about 124,000 ha or 64 % of total land area of the province. Agriculture production is almost entirely rainfed. Quetzaltenango province has a large variation of micro-climate and soil conditions; considering these variation in climate, the province may be divided into three sub-regions: A large percentage of farmers in Quetzaltenango province produce the basic food crops of maize and black bean. Wheat is also being produced by a small percentage of farmers. Potatoes are produced in several municipalities of the central sub-region, such as Concepción Chiquirichapa, San Martín, San Juan Ostuncalco and La Esperanza, and in the in the northern sub-region Palestina de los Altos. Vegetables and fruit such as peach, are produced at a small scale is several municipalities of the province. In the municipalities of the southern sub-region, such as Colombia, Génova and Coatepeque coffee is the main produced. Sugarcane and African palm are produced in some areas of the southern sub-region of Quetzaltenango province.

Water Resources

- 49 In the province, there are main four rivers: the Ocositos, the Naranjo, Samalá River and Cuilco river. It is estimated that development potential of groundwater is high in municipalities of Olinstepeque, Cajolá, San Martín Sacatepéque, Almolonga, and Colomba, and medium in San Carlos Sijá, Concepcion Chiquilichapa, San Fransisco La Unión, Génova, Flores Costa Cuca, and Palestina de Los Altos.

Social Services and Infrastructure

- 50 Principal causes of infant death during 1999 were pneumonia, diarrhea diseases, prematurity, neonatal sepsis, and malnutrition. Principal causes of general mortality during this period were pneumonia, diarrhea diseases, cancer, and cardiac

insufficiency. Other frequent diseases include intestinal parasite, anemia and urinary infection. In addition, the number of AIDs patients in this province is the second highest in the country.

- 51 Access to health care services is low, indicating that only 67% of the population received services. Sixty-seven percent of delivery care is carried out by comadrona. Ninety-two percent of women received some kind of prenatal care at least once during pregnancy. The coverage rate of vaccination shows about 90%, the highest in the Study area.
- 52 The coverage rates from drinkable water, latrines and electricity services are 68.9%, 30.4% and 61.9%, respectively, indicating that the basic social infrastructure is found at a low level, especially sanitation.
- 53 The province of Quetzaltenango has a Central American surfaced road (CA-2) which connects Escuintla, Mazatenango, Retalhuleu, Coatepeque, and Malacatán. It also has three national roads that connect Los Encuentros, Tonicapán, Quetzaltenango (route No. 1), San Bartolo, San Carlos Sijá, Quetzaltenango (route No. 9N) and Retalhuleu, Coatepeque, El Rodeo (route No. 13). The total length of roads is about 620 km, of which 55% is unpaved.

Selection of “Model Micro-Basin”

Basic Concept of Selection and Procedure

Basic Concept

- 54 As a result of the field survey, it is considered that main causes of poverty of the farmers in the Study area are (1) low agricultural income, (2) devastation of natural resources and (3) poor quality of life of the farmers. The natural and social conditions are the main factors governing the land use pattern and controlling agricultural production in the Study area. It is considered that the present land use pattern seriously affects causes of poverty of (1) and (2). And cause of poverty of (3) is considered to affect appropriately.
- 55 Since the Study area is as large as 6,000 km², selection of the model micro-basins should be done stepwise.
 - (i) First Screening Step: One representative municipality in each province is selected based on the representative land use pattern in the province and the poverty criteria of FIS that considerably reflects the degree of quality of life of farmers.
 - (ii) Second Screening Step: A representative municipality will be divided into micro-basins. One micro-basin will be selected based on 8 evaluation factors.
 - (iii) Third Screening Step: After confirmation of the intention of heads of municipalities and Aldea or Caserio (the local community units) relevant to the micro-basin, one micro-basin will be selected finally from each

province.

Procedure for Selection of Model Micro-basins

First Screening:

- 56 Selection of municipalities having representative land use in each province: As a result, the representative four land use patterns in the Study area were identified and representative land use patterns in each province are as follows;

Number	Representative land use pattern	Name of province
1	Forest	Totonicapán
2	Basic grain (maize, frijol, wheat, etc)	Quetzaltenango
3	Basic grain and vegetables	Chimaltenango
4	Perennial crops such as coffee	Sololá

- 57 Selection of municipalities having class “c” poverty defined by FIS in each province: FIS standardized “poverty” based on the results of INE census. Poverty degree in each municipality and each community in the country was calculated based on the following six evaluation factors and their weighted %, and defined as indicator of unsatisfied basic necessities.

Evaluation factors	Weighted %
1. Number of people per house	5
2. Quality of house	10
3. Access to sewage disposal facilities	25
4. Access to drinking water supply facilities	30
5. Access to education	10
6. Capacity of subsistence	20

- 58 Poverty classes are determined by the value of indicator of unsatisfied basic necessities and consist of five classes from extreme to low poverty as follows:

Class of poverty	Particular	Value of indicator of unsatisfied basic necessities
a	Extreme poverty	Above 30
b	Severe poverty	20-29.99
c	Regular poverty	15-19.99
d	Relative poverty	10-14.99
e	Low poverty	Below 10

It is considered that the indicators of unsatisfied basic necessities and poverty classes prepared by FIS are sound enough to be applied to our selection of micro-basins for the following reasons: (1) Evaluation factors for poverty are very appropriate for evaluating of the degree of quality of life of the farmers, (2) There are no nationwide or province-wide standards to evaluate poverty except FIS criteria. Since FIS evaluated poverty for all the municipalities and all the communities in the country, poverty assessment for the farm households in a huge area like the Study area can be easily practiced on a reliable level, and (3) Everyone can easily use the FIS poverty standard in future projects.

- 59 Based on both the results of evaluation from the viewpoint of representative land use pattern and poverty, selection of one representative municipality was made from each province. In this Study, municipalities classified by “Regular poverty (class c) or medium class poverty” were selected in order to avoid selecting extreme cases.

Second Screening:

- 60 Demarcation of micro-basins in the screened municipality: Micro-basins with an area of about 5 km² are delineated by the use of 1/50,000 topographic maps.

Selection of communities having class “c” poverty defined by FIS: From each representative municipality, communities having class “c” poverty are selected and assessed by the following 8 evaluation factors.

No.	Evaluation factors	Order of assessment	Criteria for community and/or micro-basin
No.1	Number of households in community	1	Should be between 50 and 250 in number
No.2	Area of river basin (micro-basin) (km ²)	2	Should be between 3 and 15 km ² .
No.3	Land use	3	Should be as same as the representative land use pattern for province
No.4	Access (road)	4	Should be within 10 km from the main road.
No.5	Legal uptake of water source	5	Can be used legally
No.6	Overlapped by other projects	6	Not overlapped by other projects that other agencies have conducted and/or are carrying out
No.7	Social problems	7	No serious social problems for implementation of the project
No.8	Overlapping other municipalities	8	Micro-basin does not cover the area of other municipalities

Third Screening:

- 61 Preparation of specific criteria for selection and evaluation: If there are several communities screened in the second screening step, the specific criteria for the communities are determined taking into account hydrological conditions and effectiveness of demonstration and the ripple effect of the project. The communities are assessed by the specific criteria and one micro-basin is selected.
- 62 Confirmation of intention of heads of municipality and/or Aldea/Caserio: The intention of heads of the relevant local authorities of the municipality and/or Aldea/Caserio under the Study area is confirmed and one model micro-basin in each province is finally selected.
- 63 Based on basic concept and selection procedure mentioned above, one micro-basin was selected from each province and the result is shown below:

Province	Municipality	Micro-basin (Communities)
Chimaltenango	Patzún	Xeatzán Bajo
Sololá	San Juan la Laguna	Panyebar
Totonicapán	Santa Maria Chiquimula	Pachum
Qetzaltenango	Palestina de Los Altos	Los Diaz, Sector-I, Los Cabrera, Los Morales, Los Perez

Present Condition of Model Micro-Basins

Present Condition of Xeatzán Bajo Area

Natural Resources

64 The model micro-basin is located near 14° 41' latitude north and 91° 10' longitude west; the elevation varies between 2,150 and 2,500 meters. The topography is undulated with a slope of 1-10%. The lands are classified into Class-I. The soils are moderately deep, up to 1.25 m. The soil texture varies from loam to clay loam. Internal drainage is good. The climate is moderately temperate moderate: Annual mean temperature is about 20°; Monthly mean maximum range, from 25.3° to 29.5° and monthly mean minimum range, from 0° to 9.0°. Average annual rainfall is about 1,000 mm; about 90 % of the annual rainfall occur during the period from May to October; there are about 140 rainy days per year. There are 5 springs and several streams. Pachomochai spring is the largest and has the highest potential for development. Its discharge is estimated to be 12.5 lit/sec of which 30% is used at present.

Socio-economic Conditions

65 Xeatzán Bajo village (Aldea) belongs to the municipality of Patzún, Chimaltenango province. Xeatzán Bajo village has a total population of about 1,950 and 325 household in 2000. Most of the inhabitants are Kaqchikel. It is assumed that 60% are catholic and 40% evangelical. Most of the households are engaged in agriculture. The municipality of Patzún is the smallest authorized administrative unit. Under the municipality, there is a traditional administrative system (auxiliatura) headed by an auxiliary mayor (AA.) who plays the linking role between the municipality and each community (aldea or village). The auxiliatura comprises AA, two adults and 6 constables. The auxiliary mayor is the representative of communities. The auxiliatura is a real administrative unit in communities. AA receives claims and solves problems. Also AA works for the development of the community coordinating with committees. He also negotiates for projects and carries out maintenance of the infrastructure. A.A. is elected by the General Assembly that is the decision-making body of the community.

66 The role of women differs depending on locations. Generally, their main activities are preparation and cooking of food, acquisition of fuels and water, hygiene, weeding in agricultural farming, child care, hand weaving/other hand crafts, sewing, raising livestock and paid agricultural work. More than 50% of women in this village are engaged in the embroidery and/or knitting for the production of traditional Wuipil. The women's political participation is quite limited.

Agricultural Conditions

67 The present land use of the Xeatzán Bajo micro-basin is estimated as follow: 45 % of the land is dedicated to agricultural production; about 30 % is covered by forest;

some 10 % is covered by bush and grass, and 15 % is covered by houses, roads and others. Main crops are vegetables such as broccoli, snow pea, cauliflower, and carrot that are cultivated as cash crops under rainfed condition. All farmers plant corn for family self consumption; others crops planted in small areas are black berry, avocado, and peach. The present cropping pattern of main crops is as indicated below.

Feb.	Mar.	Apr.	May.	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan.	
			Broccoli			Broccoli			Peas			
					Maize							
			Perennials (black berry, avocado, peach)									

Crop yield and agricultural production in the Xeatzan Bajo area are summarized below:

Crop	Average Yield (per manzana)	Harvested Area (manzana)	Production
Broccoli	190 qq	170	64,600 qq (2 harvests)
Snow pea	175 qq	100	17,500 qq
Carrot	13,000 dozens	20	260,000 dozens
Maize	25 qq	200	5,000 qq
Black berry (1)	1,200 flats	20	24,000 flats
Avocado	190,000 units	5	950,000 units

- 68 The vegetable marketing channel is common in the country. But the arrangement of the marketing system is far behind and not well functioning, for both market and channel in this country. Commercial transactions from farmer's field to retailer's shop in consuming area are handled exclusively by middlemen. In such transactions, middlemen's overhead expenses increase all the time and consequently, it presses down producer's selling price and on the other hand, it increases consumer's buying price. Almost all the vegetable production in the Xeatzan Bajo micro-basin is under cultivation contract signed between farmers and the exporting companies, such as ALCOSA, INAPSA, and NETARESA. The farm gate price and retailer's price in Guatemala City of main vegetables are shown below:

Kinds of crops	Unit price (Quetzal/lib)	
	Farmgate price in Xeatzán Bajo	Supermarket price in Guatemala city
Broccoli	0.70	3.00
Carrot	0.40	0.80
Snow pea	1.80	5.00

Health and Sanitation Conditions

- 69 Principal causes of death are neonatal sepsis, malnutrition, chronic alcoholism and pneumonia. Main morbidity causes are common cold, tonsillitis, peptic diseases and etc. Infant mortality rate is 47.8. MMR is 55.7. Malnutrition prevalence of school children reaches 66%. The low coverage rate of vaccination is also one of

the main health problems.

- 70 The main health facilities are a health center and Acuala hospital in Patzún and a health post in Xeatzán Bajo area. One trainee of doctor and one auxiliary nurse are available in a health post and provide general consultation services. The health committee is not functioning well at present. Appropriate drugs are often not available at a health center and a health post although offered by free charge.

Education Service Conditions

- 71 There is only one primary school in Xeatzán Bajo. The number of school children is 297 in total. The dropout of school children increases as grade becomes higher and reaches 40%. The main causes of such high dropout can be summarized: (1) School children can contribute to the household by earning cash income when school children become 14-15 years old, (2) Parents do not see education very important and (3) lack of teachers and classrooms. There is no junior high school. CONALFA gives literacy classes for 90-adults who is from 15 to 55 years old.

Rural Infrastructure

- 72 The condition of rural infrastructure is estimated as follows; All the diffusion rates are over 80% and living environment can be said well. Water quality is not so good according to the result of the water quality test conducted by the Study Team.

Results of Ad-hoc Survey for House Facilities

	Water supply	Electric supply	Drainage	Toilet	Improved stove	Interviewed houses
Diffusion	87%	91%	84%	100%	87%	141 houses

The condition of roads inside the community and access roads to the community is good even in the rainy season.

Environmental Conservation

- 73 Deforestation in Xeatzán Bajo area is caused by expansion of agricultural lands and, firewood consumption by households, without planning reforestation. As a result of introducing non-traditional cultivation to the zone, the agricultural frontier has been expanded to a point in some area of the community. The soils suffer erosion easily, which in the given moment makes the soils unfertile. There are no community forests there, but only private ones. However, a person, who wants to cut one tree of his own forest, needs a permit from his mayor.

Present Condition of Panyebar Area

Natural Resources

- 74 The Panyebar model micro-basin is located near 14° 35' latitude north and 91° 22' longitude west; the elevation varies between 1,600 and 2,600 meters. The topography is very undulated with a slope of 15%-60%. The lands are classified into Class II. The effective soil depth is up to 1.1 m. Soil texture varies from sandy loam to clay loam. Internal drainage is moderate. The climate is moderately template; Annual mean temperature is about 20°, monthly mean maximum range from 27.6° to 29.3° and monthly mean minimum ranges from 6.2° to 12.2°. Average annual rainfall is about 1,500 mm; about 92 % of the annual rainfall occurs during the period from May to October; there are between 140 to 160 rainy days per year.

There are three springs such as Panan, Silberio and Juan of which discharge ranges from 0.01 to 2.7 lit/sec. The present drinking water system depends on water of Panan spring.

Socio-economic Conditions

- 75 Panyebar village belongs to the municipality of San Juan La Laguna, Sololá province. Panyebar is composed of a center and two caserios: Panacal and Chuacanac. Panyebar has about 350 households and a total population of about 1,800 in 2000. All the families are indigenous. Most of the inhabitants are K'iche and there are some Tz'utujil. Sixty percent are catholic and 40% evangelic. Most of the households are engaged in agriculture and its related activities. The municipality of San Juan La Laguna is the smallest authorized administrative unit. Under the municipality, there is a traditional administrative system (auxiliatura) headed by three auxiliary mayors (AA.) who play an important role in the linking between the municipality and each Panyebar (aldea or village). The auxiliatura comprises three AAs, six aguacils and constables. The auxiliary mayor is the representative of communities. The auxiliatura is a real administrative unit in a community. AA receives claims and solves problems. Also AA works for the development of the community coordinating with committees. AA is elected by the General Assembly that is the decision-making body of Panyebar village.
- 76 The main role of women in Panyebar village differs from one another according to the source of income of family. Generally, the main activities are preparation and cooking of food including such activities as going to market, acquisition of fuels and water, hygiene, weeding for farming, child care, hand weaving/other handicrafts, paid agricultural work and raising livestock. The work load of women is very hard. Among these activities, the top five activities in which women spend most time are: 1) preparation of food, 2) cooking, 3) water collection, 4) going to market and 5) laundry (hygiene). The women's political participation is quite limited.

Agricultural Conditions

- 77 The present land use of the Panyebar micro-basin is estimated as follows: 35 % for agricultural production, about 30 % for forest, some 20 % for bush and grass, and 15 % for houses, roads and others. Coffee and maize are the main crops planted. Maize is seeded at the middle of April and harvested at the middle of December. The harvest of coffee extends for about 2.5 months, the beginning varies from December to February, depending on the start of the rainy season. Crop yield is low. Unit yield of maize and coffee is 22 qq/manzana and 115 qq/manzana, respectively. The causes of low yield of coffee result from use of coffee trees having over economic durability and poor cultivation management. Annual production of coffee and maize is estimated at 17,250 qq (with pulp) and 2,400qq, respectively.
- 78 Ripe cherry harvested by farmers are sold to middlemen such as pulping factory owners in Panyebar village. There is one pulping factory with small processing capacity. International price of coffee fluctuates according to the production trend in major producing countries such as Brazil, Colombia, etc. Accordingly, the price of cherry sold by farmers also fluctuates.

Health and Sanitation Conditions

- 79 Principal causes of death are pneumonia, malnutrition and diarrhea. Main morbidity causes are assumed to be throat infection, pneumonia, dermatomycosis and peptic diseases. Infant mortality rate is 34.6. MMR is 170.6. Malnutrition prevalence rate for school children is very high and ranks 8th among 329 municipalities in the country.
- 80 The main health facility is a community health center (CHC) supervised by Vivamos Mejor (NGO) under SIAS program that provides services of such as general consultations, prenatal care and vaccination. There are a health center at San Pedro la Laguna, and health posts at San Juan de Laguna and Santa Clara la Laguna where is located far from Panyebar area. In CHC appropriate drugs are often not available in kind and volume although offered by free charge.

Education Service Conditions

- 81 The total number of the school children in three schools is 519. The most serious problem of education is a high rate of dropout of school children. The causes of dropout are as same as in Xeatzán Bajo area. There is no junior high school in Panyebar village. CONALFA holds literacy classes for 25-adults who are between 15 and 28 years old.

Rural Infrastructure

- 82 The condition of rural infrastructure is estimated as shown below; Especially the diffusion rate of drainage and toilet is low. It is characterized that the diffusion rate of improved stoves is high in spite that there have been no such programs.

Results of Ad-hoc Survey for House Facility

	Water supply	Electric supply	Drainage	Toilet	Improved stove	Interviewee houses
Diffusion	95%	76%	0%	55%	81%	175 houses

Presently the villagers face water shortage in the systems because of a lack of water source in the *Panan* spring and frequent water stop by physical breakdowns of the conveyance pipeline. The high frequency of the pipe breakdown is also one of the serious shortage of water. With respect to water shortage, the villagers' attention on water wastage and awareness of saving tap water are so low and this is likely the cause of chronic water shortage in the systems. The condition of roads inside the community is good, but the access roads to the community are not sufficient, especially in the rainy season.

Environmental Conservation

- 83 The territory of Panyebar village belongs to the highlands of the volcanic chain, with mountains, hills and volcanic cones. In the village there is a communal forest encompassing an area of 148 ha where some assorted vegetation, such as kinds of epiphytes, orchids and bromelias or gallitos, can be found. This indicates the complexity and special nature of the area. Some farmers have small forest areas within their lands and, periodically collect a quantity of firewood from the forest for cooking in their houses. Farmers, who do not have forest with trees, frequently, collect any kinds of wood for cooking in the area. The collected quantities are so

big. Soil erosion in gently waved to strongly inclined topographically occurs due to cultivation. As a result, washing of the lands occurs and concludes the loss of the fertility.

Present Condition of Pachum Area

Natural Resources

- 84 The Pachum model area is located near 14° 56' latitude north and 91° 25' longitude west; the elevation varies between 2,300 and 2,600 meters. The topography is very undulated with a slope of 5% to 25%. The lands are classified into Class-II. The effective soil depth is up to 1.1 m. The soil texture varies from loam to clay loam. Internal drainage is good. The climate is temperate; Annual mean temperature is about 15°C. There are no available data on monthly maximum and minimum temperatures. Average annual rainfall is about 1,000 mm; about 90 % of the annual rainfall occur during the period from May to October; there are about 140 rainy days per year. Major water sources are three springs of Xecandelaria, Pachum-2 and Pachumu-3, and the Pachum river. The Xecandelaria spring is the largest and its discharge is estimated at 10.3 lit/sec. The Pachum river flows in the lowest of the area and discharge seasonally varies much.

Socio-economic Conditions

- 85 Pachum is a caserío of Xesaná village that belongs to the municipality of Santa María Chiquimula, Totonicapán province. The total number of households and the population in Pachum in 2000 were 150 and 900, respectively. Most people are K'iches. It is assumed that over half of the population are evangelical and the remainder catholic. The municipality of Santa María Chiquimula is the smallest authorized administrative unit. Under the municipality there is a traditional administrative system (auxiliatura) headed by Alcalde Auxiliares (AA) in Xesaná who play an important role of intermediary between the municipality and each community (caserío or aldea). The auxiliaries of Xesaná consist of Auxiliary Mayor, assistants, Forest Keeper, Scholar, Secretary, Treasurer, 4 vocals and etc. The election of AA is carried out in the general assembly that is the decision-making body. Within the Pachum area, there is no authorized that representative. A decision-making system doesn't exist either. To hold a general meeting in Pachum the auxiliaries of Xesaná issue convocation.
- 86 The role of women differs depending on locations. Generally, their main activities are preparation and cooking of food, acquisition of fuels and water, hygiene, weeding in agricultural farming, child care, raising livestock and paid agricultural work. The workload is severe. The women's political participation is quite limited.

Agricultural Conditions

- 87 The present land use of the Pachum area is estimated as follows: 60 % of the land is covered by forest, some 25 % is covered by bush and grass; only about 10 % of the land is dedicated to agricultural production, and 5 % is covered by houses, roads and others. Maize is the main crop. Black beans sometimes are cultivated with maize. Maize is planted in April and harvested in the middle of December. The yield of maize is as low as 20 qq/manzana. The total production of maize in the area is estimated at 1,000 qq of which all are for self-consumption.

Health and Sanitation

- 88 Principal causes of death are pneumonia, bronconeumonia and malnutrition. Maternal mortality rate is 101.7. Malnutrition prevalence of school children ranks 12th among 329 municipalities in the country. Vaccination rate of BCG, Polio, DPT and measles is less than 80%.
- 89 The main health facility is a minimal health unit (MHU). A doctor with a nurse of CDRO attends to MHU once a week and gives general consultation to the people who desires. There is a health center in Santa María Chiquimula, but most people do not use it because of long distance. MHU provides free charge drugs with only children under five years old and pregnant women. Free drugs are available at a health center, but shortage occurs in kind and volume. Private drug stores are located at San Francisco el Alto and Santa María Chiquimula where is very far from Pachum area. A stable supply of drugs is essential in this area.

Education Service Conditions

- 90 There is only one primary school in Pachum area. Problem is a high rate of dropout of school children of which causes are as same as the Panyebar area. There is no junior high school. As informal education, CONAMA holds literacy class and provides educational services with 42 adults.

Rural Infrastructure

- 91 The rural infrastructure in the Pachum area is estimated as below;

Results of Ad-hoc Survey for Housing Facilities

	Water supply	Electric supply	Drainage	Toilet	Improved stove	Interviewee houses
Diffusion	80%	28%	0%	14%	2%	75 houses

Presently the villagers face water shortage in the systems because of shortage of capacity in the conveyance pipeline that delivers spring water from the spring to the storage tank. Low attention about water wastage and low awareness on saving tap water is one of the reasons for the chronic water shortage in the system. The road condition in/around the community is very poor and severely deteriorated in many portions. In the rainy season, the condition is worsted and even a 4WD car can hardly run in mud and rainwater. The roads are also frequently cut by slope sliding in the rainy season. The road traffic is interrupted every year and repair of the damaged section might take more than 1 month in the worst case. Diffusion of the improved stove in the Pachum area is so low and the people cook meals with open fire. The diffusion of Temascal in the area reaches almost 100%. However, both cases require a lot of firewood. Introduction of improved stove and Temascal should be essential to conserve forest environment and reduce heavy workload of the people for collecting firewood.

Environmental Conservation

- 92 The forest is a communal place where most local people come and collect wood products and by-products daily. Forest management has been conducted for approximately for 10 years in the Pachum area with technical assistance under the DIGEBOS - CARE Project. As a consequence of wood and firewood collection

from the communal forest, in parallel with shepherding, some areas are deprived of vegetable cover. To restore carcavas in the area, the use of agroforest and conservation structures is a primordial measure.

Present Condition of Palestina Area

Natural Resources

- 93 The Palestina model micro-basin is located near 14° 54' latitude north and 91° 36' longitude west; the elevation varies between 2,600 and 2,800 meters. The topography is very undulated in the entire area. The slopes of the basin vary in a range between 15° and 45°. The lands are classified into Class-I. The effective soil depth is less than one meter. The soil texture is sandy loam to loam. Internal drainage is fast. The climate is temperate; Annual mean temperature is about 15°C; Monthly mean maximum range from 19.1° to 25.5° and monthly mean minimum range from 0.3° to 10.1°. Average annual rainfall is about 1,300 mm; about 91 % of the annual rainfall occurs during the period from May to October; there are about 140 rainy days per year. There are four springs. The Los Molinos spring is the largest. Its discharge is estimated at 25 lit/sec of which 30% is used at present and has high potential for development.

Socio-economic Condition

- 94 The model micro-basin comprises five caserios: Los Cabrera, Los Morales, Los Perez, Los Dias and Sector I under of the municipality of Palestina de Los Altos. The Palestina area has a total population of about 3,000 and of 325 households in 2000. The population is mostly composed of Mam and Ladinas. It is assumed that 80% of the population is evangelical and the remainder catholic.
- 95 The municipality of Palestina de Los Altos is the smallest authorized administrative unit. Under the municipality, there is a traditional administrative system (auxiliatura) headed by an auxiliary mayor (AA) who is responsible for coordination with the municipality. Within the last 10 years the importance of the AA has been decreasing. There are no authorities that run the community in the model area. The people create "Committees" as an organization with an objective depending on the necessity. The Committees are not elected by the general assembly of the community, but they are formed by among the interested groups. The Committee negotiates with the municipal mayor and competent institutions depending on the necessity.
- 96 Most of the people of this area depend on agriculture, especially potato and maize cultivation for their living. Some people don't have enough land, so they have to go down to the coastal areas from March to December and rent lands for cultivation of maize from large farmers (hacienda) and/or work as seasonal labors to earn money. Usually during their migration they are deprived of the services in health post, informal education, formal education, village midwife, and so forth. Additionally, they have to get their own water source, search for fuel for cooking, cheaper food, and other necessities for daily live in a strange place. The living conditions of these migrants in the coastal area are very severe. Also the migration to the US has increased recently.
- 97 The role of women differs depending on locations. The main roles of women in the Palestina area comprise preparation of food, acquisition of fuel, raising livestock,

weeding for agricultural farming and childcare. The workload of women is very heavy and their average working time is estimated at 16-17 hours a day. The women's political participation is very limited.

Agricultural Conditions

- 98 The present land use of the Palestina model area is estimated as follow: 45 % is for agricultural production, about 30 % is covered by forest; some 10 % is covered by bush and grass, and 15 % is covered by houses, roads and others. Main crops are maize, potato, and bean. Potatoes are harvested twice a year. First is seeded at the end of March and harvested at the beginning of July. Second is planted at the middle of July and harvested at the middle of November. Maize is planted at the end of March and harvested in December. Yield of these crops is as low as 24 qq/manzana for maize and 240 qq/manzana for potato.
- 99 It is said that in Guatemala, there are over 30,000 dealers who are engaged in the marketing of agricultural produce including potatoes. These dealers operate mainly in the collecting centers in producing areas, wholesale market in consuming areas, and are engaged in collection, assorting, packaging, transportation, brokerage and sales. The high margin of these dealers is one of the problems. The retail price of potato in consuming area becomes 5 times of the producer price. While price of potato fluctuates largely and seasonally depending on balance of supply and consumption. The average farm gate prices for the past five years at Conception Chiquirichapa municipality near the Palestina area are as follows

Harvest months	Name of Harvest	Farm gate price (Quetzales/quintal)
Jan. to Apr.	Off season	90-140
Jul. to Aug.	First harvest	45-70
Sep. to Oct.	Mid way	80-90
Oct. to Nov.	Second harvest	60-70

Health and Sanitation

- 100 Principal causes of death are pneumonia, intoxication for pesticide, acute myocardial infarction and diabetes. Infant mortality rate is 39.4. Maternal mortality rate is 133. Malnutrition prevalence for school children ranks 176th among 329 municipalities in the country. The vaccination coverage rate is less than 89%. In addition it seems that the problems of HIV/Aids are not yet recognized as serious health threat. It is reported that Mayan agricultural workers are at increasing risk for contacting HIV/Aids.
- 101 The main health facilities consist of one health center and three health post in municipality city. There are a doctor, a nurse, four auxiliary nurses and a health inspector who provide serves on general consultation, maternal care, vaccination, family planning and health education. There are no facilities in the model area. Though free basic drugs are provided by a health center and a health post, there occurs severe shortage of drugs in kind and volume. Therefore, the people have to purchase drugs with expense price at private and municipality drug stores.

Education Service Conditions

- 102 Within the Palestina area, there are three primary schools. The problems is also a

high dropout rate of school children as same as other three model areas. In addition, migration to the south coast is common in the Palestina area. Many families with all members migrate to the south between April and December keeping them children out of education. In the south, the lack of school and the severe likely conditions often prevents the children from attending school. There is no junior high school. CONALFA holds literacy classes for 75 adults.

Rural Infrastructure

103 The rural infrastructure in Palestina area is estimated below:

Results of Ad-hoc Survey on Housing Facilities

	Water supply	Electric supply	Drainage	Toilet	Improved stove	Interviewee houses
Diffusion	60%	73%	22%	73%	70%	112 houses

There are two potable water supply systems in the Palestina area. One is called “Rural Portable Water System” and the other is “Urban Portable Water System”. The Rural System covers all the model area and its surrounding area. The Urban System was mainly constructed in order to supply water to the central settlement area of Palestina municipality and only Los Cabrera and Los Molares communities, which are located beside the central settlement area, have water supply from the Urban System.

Environmental Conservation

104 Most forests are private forest. Agricultural lands are located in steep lands, which are susceptible to soil erosion and soil deterioration is observed. Forests are formed by young trees that prevail aliso and on a small scale, cypress and pine are planted. The people have 2-3 cuerdas but that is not enough for all the firewood they consume. The cultivated land is found inclined or in pending and it does not have any infrastructure of soil conservation, therefore they are easily eroded.

105 In Palestina area, farmers use a lot of agricultural chemicals. It has been reported that the farmers make an inadequate use of the pesticides, specially in the dosage, applying time, handling of leftovers and containers, which results in increased production cost, deficient plague control and risk of contamination and/or poisoning.

Result of the Participatory Survey

Objectives of the Participatory Survey

106 The objectives of the participatory survey are: (1) To analyze the present condition of the community in the selected four micro-basins, (2) To identify problems, needs, and potentials from the farmers’ viewpoints, and (3) To extract potential development approaches from the community members through participatory approach.

Methodology

107 Examination of problems and potential development approaches was made among the community representatives by applying the Project Cycle Management Method (PCM). At the end of these activities, a final public meeting was held for all

community members in order to rank their necessities. The survey was carried out in five steps as follows;

Steps	Activities
1. Explanation of the survey	1) Public Meeting I (Plenary)
2. Study of present situation	1) Key-informants Survey, 2) Questionnaire Survey
3. Extraction of problems and needs	1) Public Meeting II (by Gender) 2) Public Meeting III (by Age-group) 3) Public Meeting IV (Plenary)
4. Investigation of problems, needs and potentials	1) Field Inspection, 2) Representative Meeting I (Problem Analysis)
5. Examination of potential development approaches	1) Representative Meeting II (Objective Analysis) 2) General Public Meeting V (Plenary)

Results of Survey

Xeatzán Bajo Model Area

108 Followings are the major problems raised during the series of survey activities.

Category	Problems
1. Socio-economy	- Small land holding size - Deterioration of housing condition - Lack of capital - Limited area for housing - Secondary school is not available in the community - Lack of market for non-traditional work - No paid work for women.
2. Agriculture	- Low price of agricultural produce - Agricultural chemicals are expensive - Use of agro-chemical has increased. - Delay of payment for agricultural produce - Low quality of agro-chemicals - Intervention of middlemen in the market - Only limited crops are produced.
3. Infrastructure	- Lack of adequate drainage system - Lack of irrigation system - Roads are in poor condition.
4. Health & Sanitation	- There are no permanent medical staff and medicines.
5. Environment	- Deforestation - Contamination of rivers because of chemical use.

109 Based on the problems mentioned during the series of survey activities, a problem tree and an objective tree were prepared and potential approaches were elaborated. Among those approaches, followings are the prioritized potential approaches of the community.

Prioritized Potential Development Approaches for Xeatzan Bajo

1. Installation of mini-irrigation system
 2. Diversification of crop and crop rotation
 3. Formulation of cooperatives
 4. Construction of storage and processing facilities for agricultural produce
 5. Establishment of market for selling textile products
 6. Vocational school for technical orientation on agriculture
 7. Construction of drainage system
 8. Paving road with asphalt
-

Panyebar Model Area

110 Followings are the major problems listed during the series of survey activities.

Category	Problems
1. Socio-economy	<ul style="list-style-type: none"> - Lack of capital for working - Lack of formal and informal education - Lack of job opportunity in the community - There is no job opportunity for women
	<ul style="list-style-type: none"> - Agricultural credit is difficult to access - Lack of technical assistance for coffee and horticulture - Lack of storage, processing, commercialization facilities - Only limited markets are available. - Lack of fertilizer
3. Infrastructure	<ul style="list-style-type: none"> - Shortage of drinking water - Poor condition of road - Lack of drainage - Insufficient number of latrines
4. Health & Sanitation	<ul style="list-style-type: none"> - There is no permanent medical staff and medicines in health post - Lack of ambulance - Lack of health training program.
5. Environment	<ul style="list-style-type: none"> - Deforestation - Contamination of water and decrease of water resource volume - No technical assistance is available on natural resource management - Malnutrition

111 Based on the listed problems from the series of activities, a problem tree and an objective tree were prepared and potential approaches were examined. Followings are the potential approaches prioritized by community members.

Prioritized Potential Development Approaches for Panyebar

1. Installation of water supply system.
 2. Credit assistance for agricultural activities and other productive activities.
 3. Improvement of road from Panyebar to Santa Clara La Laguna.
 4. Improvement of school facilities and utilization of the facility for vocational activity.
 5. Provision of technical assistance on production of coffee, vegetables, and soil conservation.
 6. Disposition of medical staff, medicines and transportation for patients in serious condition.
 7. Establishment of community organization and its strengthening.
 8. Implementation of mini-irrigation system.
 9. Installation of infrastructure relating to environment such as treatment plant, latrine, & drainage
 10. Protection of water source to maintain available water volume.
 11. Implementation of soil conservation program.
 12. Implementation of environmental training program
-

Pachum Model Area

112 Followings are the major problems raised during the series of survey activities.

Category	Problems
1. Socio-economy	<ul style="list-style-type: none"> - Low income - Illiteracy, especially among women - Lack of job opportunity
2. Agriculture	<ul style="list-style-type: none"> - Low price of agricultural produce - Low production of agricultural produce - Lack of technical assistance for agriculture - Inappropriate application of agricultural technique - Lack of credit for agricultural activities and other activities - Low application of fertilizer to soils - Lack of recreation center
3. Infrastructure	<ul style="list-style-type: none"> - Poor road condition - Shortage of potable water supply - Poor condition of housing - Lack of latrines and drainage - Non-availability of improved stove - Households do not have proper place to store water - There is no community salon - School yard becomes muddy when it rains - Cemetery is located too far - There is no marketing place in the community. - Local shops do not have enough supply of goods
4. Health & Sanitation	<ul style="list-style-type: none"> - Malnutrition - High morbidity and mortality of infants - Little access to medical service and lack of medicine - Majority of midwives are not well-trained for medical knowledge - Smoke of firewood affects their health condition
5. Environment	<ul style="list-style-type: none"> - Excessive consumption of firewood - Occurrence of forest fire - Deforestation - Accumulation of inorganic garbage

- 113 Based on the listed problems from the series of activities, a problem tree and an objective tree were prepared and potential approaches were examined. Followings are the potential approaches prioritized by community members.

Prioritized Potential Development Approaches for Pachum

1. Improvement and maintenance of road
 2. Improvement of agriculture and livestock production
 3. Health service program
 4. Vocational training for non-agricultural work.
 5. Improvement of infrastructure (potable water, electricity, improved stoves)
 6. Improvement of amenity facilities (salon, telephone, grocery shop)
 7. Improvement of environmental condition (forest management, treatment of garbage)
-

Palestina Model Area

- 114 Followings are the major problems of the micro-cuenca raised by community members during the series of survey activities.

Category	Problems for 3 groups of communities
1. Socio-economy	<ul style="list-style-type: none"> - Lack of job opportunity - Low income - Emigration to coastal area or U.S.A. - Little access to education

2. Agriculture	<ul style="list-style-type: none"> - Lack of agricultural land - Lack of credit assistance - Lack of technical assistance on agriculture and livestock raising - Low price of agricultural products - Non-existence of market channel - Lack of irrigation - Cultivation is not diversified. - Lack of market for potato production - Drainage is not installed.
3. Infrastructure	<ul style="list-style-type: none"> - Poor road condition - Network of potable water is not sufficient - Electricity supply is not sufficient
4. Health & Sanitation	<ul style="list-style-type: none"> - Lack of health post in the community - Little access to medicines. - Shortage of potable water - Lack of medical service - Lack of health program for training - No assistance in primal health care
5. Environment	<ul style="list-style-type: none"> - Deforestation - Low fertility of soil - Little technical assistance for soil conservation - There is no communal forest. - Few water spring in the community - Inadequate use of agro-chemical

115. Based on the listed problems from the series of activities, a problem tree and an objective tree were prepared and potential approaches were examined. Followings are the potential approaches prioritized by community member.

<i>Prioritized Potential Development Approaches for Palestina</i>		
Los Perez	Los Diaz/Sector I	Los Cabrera/Morales
1. Technical assistance for agriculture	1. Technical assistance for agriculture	1. Technical assistance for agriculture
2. Introduction of improved seeds for production	2. Mini-irrigation system	2. Agricultural credit
3. Agricultural credit	3. Agricultural credit	3. Commercialization of agricultural produce
4. Commercialization of agricultural product	4. Commercialization of agricultural produce	4. Mini irrigation system
5. Rehabilitation of water tank for washing clothes	5. Paving road with asphalt	5. Paving road with asphalt
6. Paving road with asphalt	6. Installation of health post	6. Improvement of school facilities
7. Mini-irrigation	7. Installation of potable water supply system	7. Vocational training for productive activities
8. Installation of health post	8. Provision of medical service	8. Strengthening community organization
9. Health training program	9. Establishment of communal pharmacy	9. Education program
10. Disposition of medical staff and medicine	10. Health education program	10. Installation of health post
11. Strengthening community organization	11. Strengthening community organization	11. Medical assistance
12. Vocational training for productive activities	12. Vocational training for productive activities	12. Establishment of communal pharmacy
13. Education program	13. Education program	13. Training on management of agro-chemicals.
14. Forest management	14. Adequate management of agro-chemicals	14. Soil conservation
15. Soil conservation	15. Soil conservation	15. Adequate forest management
16. Management of agro-chemicals	16. Reforestation	

Sustainable Rural Development Plans for the Reduction of Poverty

Basic Development Concept

- 116 The basic development concept for the selected four micro-basins is to reduce poverty of the people through improvement of income level, upgrading living environment and conservation of natural resources. And it is important for development to combine these three approaches as appropriate package for the upgrading of living standard. Aside from the concept of development approaches, “farmers’ participation” is another important factor for the improvement of living standards, since sustainability will not be attained without farmers’ participation. The basic concept for farmers’ participation consists of following three components. (1) Participation in project implementation, (2) Farmers’ sharing of construction cost and (3) Operation and maintenance of project by farmer themselves.

Needs and Approach to the Development

- 117 Through the series of participatory survey activities, the needs of communities were extracted as summarized in the following table.

Aspect	Needs
Income generation	<p><i>Agriculture</i></p> <ul style="list-style-type: none"> • Technical assistance on farming practice • Mini-irrigation system • Commercialization of produce • Direct marketing • Storage and processing facilities • Establishment of organization or cooperation • Credit assistance <p><i>Non-agriculture</i></p> <ul style="list-style-type: none"> • Vocational training for non-agricultural work such as textile production • Credit assistance
Living condition	<p><i>Education</i></p> <ul style="list-style-type: none"> • Improvement of school facility • Provision of formal and informal education <p><i>Infrastructure</i></p> <ul style="list-style-type: none"> • Improvement of road condition • Installation of potable water supply system • Enhancement of electricity supply system • Construction of drainage • Installation of improved stove <p><i>Health</i></p> <ul style="list-style-type: none"> • Establishment of health unit with staff and sufficient medicines • Betterment of nutrition condition • Promotion of health program • Provision of emergency transportation (ambulance)
Environment	<ul style="list-style-type: none"> • Proper management of forest • Reduction of firewood use • Proper use of agro-chemicals to avoid contamination • Conservation of soil fertility • Proper treatment of inorganic garbage

- 118 From the needs presented here and the behavior of community people during the participatory survey, it is necessary for identification of people’s needs to consider the following points. (1) Shortsighted view: People in the communities are

basically thinking about short-term return, and attention is less paid to long-term effect on living condition; (2) Imperfect understanding of the project: Farmers' focus is concentrated on *getting facilities*, and less attention is paid to the *after-project stage*; (3) Limited perception of the living condition: Since they are already accustomed to their present living condition, sometimes they don't notice what kind of needs they actually have; and (4) Lack of technical knowledge: Farmers do not have technical knowledge for realization of projects. Because of this, farmers cannot come up with concrete idea for development approach.

- 119 Basically, the development plan and community needs must be matched with each other. Based on the needs (approach to the development) of communities and the above four considerations to be taken into account in development, possible alternative approaches to the development of the model areas were prepared as shown in the following table.

No	Alternative approaches (project component)	Name of model areas			
		Chimaltenango	Sololá	Totonicapán	Quezaltenango
		Xeatzan Bajo	Panyebar	Pachum	Palestina
Environmental and Conservation Plan					
a-1	Restoration plan for the collapsed lands	×	×	○	×
a-2	Soil conservation plan for steep farm lands	○	○	○	○
a-3	Reforestation plan	○	○	○	○
a-4	Agro-forestry development plan	○	○	○	○
a-5	Management plan of water quality	○	○	○	○
a-6	Solid wastes treatment plan	○	○	○	○
Plans for Increasing Income Generation					
b-1	Plan for making composts	○	○	○	○
b-2	Plan of model farm on potato production	×	×	×	○
b-3	Potato storage plan	×	×	×	○
b-4	Potato processing plan	×	×	×	○
b-5	Mini-irrigation plan	○	○	○	○
b-6	Layer-chicken raising plan for women's groups	○	○	○	○
b-7	Project for improvement of coffee production	×	○	×	×
b-8	Coffee processing plan	×	○	×	×
b-9	Agro-processing development plan	○	×	×	×
b-10	Plan of direct sale of vegetables	○	×	×	×
b-11	Improvement plan for maize thrashing	○	○	○	○
b-12	Institutional plan for fostering nucleus farmers	○	○	○	○
b-13	Plan of revolving fund for hand weaving thread	○	○	○	○
Improvement plan for living environments					
c-1	Rehabilitation plan of roads in the village	○	○	○	○
c-2	Rehabilitation plan of regional roads	○	○	○	○
c-3	Plan of rural electricity	○	○	○	○
c-4	Rehabilitation plan for drinking water system	○	○	○	○
c-5	Water quality improvement plan for the existing drinking water supply	○	○	○	○
c-6	Plan of extension of improved cooking stoves and sauna bath "Tamascal"	○	○	○	○
c-7	Plan of provision toilette facilities	○	○	○	○
c-8	Plan of night time health education	○	○	○	○
c-9	Plan medicine growing plan	○	○	○	○
c-10	Improvement plan of service quality given to comadronas	○	○	○	○
c-11	Plan for installation of minimal pharmacy unit (MPU)	○	○	○	×
c-12	Municipality community health activity plan	×	×	×	○
c-13	Plan for migrant people to the coastal areas	×	×	×	○
c-14	Plan for reducing workload in the mountain area through coffee processing	×	○	×	×
	Total number of possible alternative approach in the model area	24	25	23	26

Remarks: ○: there is a possible alternative approach ×: there is not possible alternative approach

Development Plan

Criteria for Selection of Project Components

120 In order to formulate the optimum development plans for the model areas, these possible approaches (project components) in each model area were assessed from the three factors; (1) Degree of farmers' desire and perception for implementation of projects; (2) Degree of contribution to reduction of poverty by implementation of projects; and (3) Possibility of materialization of project in view of capability of farmers. The evaluation of project components was made by giving weighted points to each evaluation factor and the selection was made based on the total of weighted points. The evaluation criteria are shown below.

Evaluation Factor	Grade	Description	Point	Weighted point (*)
Degree of farmers' perception	1	No (there is no perception according to the participatory survey results)	1	0.4
	2	Strong (less than 6th rank of prioritized development approaches in the participatory survey results)	2	0.8
	3	Very strong (1st-5th ranks of prioritized development approaches in the participatory survey results)	3	1.2
Degree of contribution to poverty reduction	1	Small (contribution to poverty reduction is small)	1	0.4
	2	Medium (contribution to poverty reduction is indirect and/or partial)	2	0.8
	3	Large (contribution to poverty reduction is direct and large)	3	1.2
Possibility of materialization	1	Low (no organization at present, considerable time necessary for setting up of organization)	1	0.2
	2	Medium (though there is no organization at present, an early setting up organization can be expected due to high capability and intention of farmers)	2	0.4
	3	High (There is farmer's organization (s) at present that can be used for early implementation of projects)	3	0.8

(*): weighted points are calculated based on the following assumption.

Item	Weight (%)
Degree of farmers' perception	40
Degree of contribution to poverty reduction	40
Possibility of materialization	20

121 The total weighted points evaluated by the three evaluation factors assess the possible approaches in each model area. In this study, the possible approaches that have more than 2.0 points were adopted as rural development plans in the model area.

Formulation of Rural Development Plan

122 The rural development plans formulated in four model areas total 59 consisting of 12 environment and conservation plans, 21 plans for increasing income generation and 26 improvement plans for living environments as follows;

Model micro-basin	Number of plans			Total
	Environmental conservation plan	Plan for increasing income generation	Improvement plan for living environments	
Xeatzán Bajo	1	6	4	11
Panyebar	3	5	6	14
Pachum	4	3	9	16
Palestina	4	7	7	18
	12	21	26	59

No	Alternative approaches (project component)	Name of model areas			
		Chimaltenango	Sololá	Totonicapán	Quezaltenango
		Xeatzan Bajo	Panyebar	Pachum	Palestina
Environmental and Conservation Plan					
a-1	Restoration plan for the collapsed lands	-	-	○	-
a-2	Soil conservation plan for steep farm lands	-	○	○	○
a-3	Reforestation plan	○	○	○	○
a-4	Agro-forestry development plan	-	○	○	-
a-5	Management plan of water quality	-	-	-	○
a-6	Solid wastes treatment plan	-	-	-	○
Plans for Increasing Income Generation					
b-1	Plan for making composts	○	○	-	○
b-2	Plan of model farm on potato production	-	-	-	○
b-3	Potato storage plan	-	-	-	○
b-4	Potato processing plan	-	-	-	○
b-5	Mini-irrigation plan	○	-	○	○
b-6	Layer-chicken raising plan for women's groups	-	○	○	○
b-7	Coffee production improvement plan	-	○	-	-
b-8	Coffee processing plan	-	○	-	-
b-9	Agro-processing development plan	○	-	-	-
b-10	Plan of direct sale of vegetables	○	-	-	-
b-11	Improvement plan for maize thrashing	-	-	-	-
b-12	Institutional plan for fostering nucleus farmers	○	○	○	○
b-13	Plan of revolving fund for hand weaving thread	○	-	-	-
Improvement plan for living environments					
c-1	Rehabilitation plan of roads in the village	○	-	○	○
c-2	Rehabilitation plan of regional roads	○	○	○	-
c-3	Plan of rural electricity	-	-	○	-
c-4	Rehabilitation plan for drinking water system	-	○	-	○
c-5	Water quality improvement plan for the existing drinking water supply	○	○	○	○
c-6	Plan of extension of improved cooking stoves and sauna bath "Temascal"	-	-	○	-
c-7	Plan of provision toilette facilities	-	-	○	-
c-8	Plan of night time health education	-	-	○	○
c-9	Plan medicine growing plan	-	○	-	-
c-10	Improvement plan of service quality given to comadronas	-	-	○	○
c-11	Plan for installation of minimal pharmacy unit (MPU)	○	○	○	-
c-12	Municipality community health activity plan	-	-	-	○
c-13	Plan for migrant people to the coastal areas	-	-	-	○
c-14	Plan for reducing workload in the mountain area through coffee processing	-	○	-	-
	Total number of possible alternative approach in the model area	24	25	23	26

Organization and Implementation of Rural Development Plan

Basic Concept

123 Implementation of the project on the sustainable rural development for the reduction of poverty should be performed based on the following six basic concept. (1) The objective areas are an area of four provinces of 6,000 km², (2) Priority for project development should be given to the poor micro-basins that are classified as extreme poverty class *a*, severe poverty class *b* and regular poverty class *c* defined by FIS, (3) It should be planned that types of the project for (a) environmental and conservation, (b) increasing income generation, and (c) improvement for living

conditions that were formulated in this Study, would be applied to the four provinces as much as possible, (4) The sustainable rural development project is not a top-down project but a bottom-up project. In principle, the project should be formulated entirely based on problems and needs of the community and farmers. Also the project should be executed by farmers' participation, (5) The development of the project will be made based on methodology for sustainable development of micro-basins that was created in this study, (6) In order to implement these projects comprehensively and efficiently, it is considered necessary that an institution with the function of coordination should be established, taking into consideration that implementation of rural development projects are in charge of various existing organizations at present administration system. Also under the committee, an executing office will be instituted and consultants will provide services of supervision and advice of project implementation with an executing office.

Organization

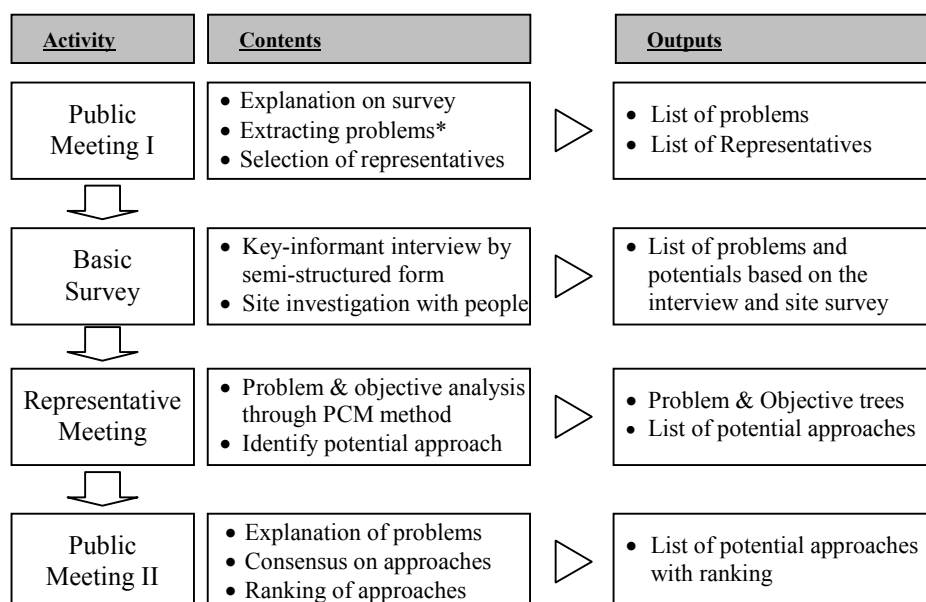
- 124 A new steering committee for project implementation headed by the representative of MAGA headquarters will be established in Guatemala City. It will consist of the members from MAGA, SEGEPLAN, MSPAS, Ministry of Environment, Ministry Public Works, INAB, ICTA, INTECAP, Governors of the related provinces, and other organization if necessary. In addition, representatives of organizations for supporting fund and credit such as FIS, FONAPAZ, FSDC, INFOM, FODIGUA, FOGUAMA, and BANRURAL should become the members of the committee. Under a Steering Committee of Project Implementation, an Executing Office that supervises, monitors and evaluates projects will be instituted. Consultants will provide services of supervision and advice to implementation of projects with an Executing Office.

Procedure and Selection of Projects

- 125 To select micro-basins for an area of four provinces: Micro-basins in an area of four provinces (6,000 km²) are delineated with about 5 km² by use of 1/50,000 topographic maps. And community or communities in the micro-basin will be identified. Poverty class of the communities is checked based on the poverty criteria defined by FIS. Micro-basins that do not belong to class poverty "a", "b", and "c" in FIS criteria will be excluded from candidate micro-basins for the project based on the FIS data.
- 126 To make potential surveys for micro-basins and selection of micro-basins: The screened micro-basins mentioned above are evaluated based on the following five factors: For evaluation, potential survey of all evaluation items except No.2 will be carried out by an executing office.

No.	Evaluation factors	Criteria for community and/or micro-basin
No.1	Number of households in community	Should be between 50 and 250 in number
No.2	Area of river basin (micro-basin)	Should be 3 between 15 km ²
No.3	Overlapped by other projects	Not overlapped by other projects that other agencies have conducted and/or are carrying out
No 4	Social problems	No serious social problems for implementation of the project
No 5	Overlapping other municipality	Micro-basin does not cover the area of other municipality

127 In order to extract problems and needs of the selected communities from the community people mentioned above, simple participatory survey shall be conducted. The survey itself could be conducted by NGOs or local consultants considering human-resource constraints of governmental organizations. Procedure of the survey is shown below:



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

Selection of the Project

128 The potential development approaches (projects) with ranking obtained from participatory survey will be assessed based on the following three evaluation factors and weighted points as shown in item 120 and 121. Projects are listed in order. In principle, implementation of projects will be performed based on priority order. If the projects are in the level of the same rank, project for increasing income generation should be in first priority, improvement plan for living environments in secondary priority and environment and conservation plan in third priority. Final selection of the project should be made based on the following evaluation factors.

No. of evaluation factors	Criteria
1	Beneficiaries should agree to share construction costs of the project.
2	Lands necessary for project facilities are not private.
3	The project is not legally categorized as private sector's project
4	Project cost should be in the range predetermined by the related organizations.
5	O&M of the project should be surely conducted by a development committee.

Implementation of Projects

129 According to FIS data, it is estimated that there are about 210 communities in four provinces that belong to class poverty 'a', 'b', and 'c', and evaluation factor No.1 (the number of households in community: 50 to 250) that mentioned in selection criteria of micro-basins. Regardless, it is expected that a lot of micro-basins will be

selected for project implementation. Implementation of the projects would be performed stepwise and the same numbers of micro-basins selected by each province would be executed provincial-wise.

Monitoring and Evaluation of Projects

- 130 Evaluation for monitoring will be done to grasp (1) progress of the activities, (2) status of attainment of the work and (3) target of the project. Monitoring will be carried out stepwise: Before the implementation of the project and after the implement of the project. The monitoring indicators to be used should be easy for monitoring work. Evaluation of these items should be carried out by the third party including the representative farmers to participate in assessment of the projects.

Pilot Projects

Purpose

- 131 The Pilot Projects aim at (1) monitoring and assessment of technical soundness of the project, (2) monitoring and assessment of organization for implementation and support system for the projects and its management (operation and maintenance) and (3) monitoring and assessment of improvement for the farmers' capability in solving problems and constraints. Countermeasures for problems and constraints that are identified through the implementation of the pilot projects will be proposed for finalization of the procedure of survey and formulation of project development in this Study.

Selection of Pilot Projects

Selection Criteria and Selection of Pilot Project

- 132 Selection criteria of the Pilot Project comprises five evaluation factors and weighted points to each evaluation factor as shown below. Selection was made based on the total weighted point. The project component of which total weighted point is above 2.5 was selected as Pilot Project.

Evaluation factor	Grade	Description	Point	Weighted point (*)
(1) Degree of farmers' perception	1	No (there is no perception according to the participatory survey results)	1	0.1
	2	Strong (less than 6th rank of prioritized development approaches in the participatory survey results)	2	0.2
	3	Very strong (1st-5th ranks of prioritized development approaches in the participatory survey results)	3	0.3
(2) Economic efficiency	1	Low economic viability	1	0.2
	2	Medium economic viability	2	0.4
	3	High economic viability	3	0.6
(3) Possibility of materialization	1	The project component is planned and/or constructed at present by other organization(s)	1	0.3
	2	There is a plan that other organization will implement in near future.	2	0.6
	3	There is no plan that other organization will execute in near future.	3	0.9
(4) Duration necessary for setting up organization	1	Long time necessary for setting up organization	1	0.2
	2	Short to medium time necessary for setup organization	2	0.4
	3	At present there is an organization or implementation can be performed by simple setup organization.	3	0.6
(5) Demonstration and ripple effects	1	The ripple effects of the project to other areas can not be expected.	1	0.2
	2	The ripple effects of the project to other areas can be expected.	2	0.4
	3	The ripple effects of the project to other areas can be highly expected.	3	0.6

* Weighted point is calculated multiplying point by weight % based on the following assumption.

Item	Weight (%)
1. Degree of farmers' perception	10
2. Economic efficiency	20
3. Possibility of materialization	30
4. Duration necessary for setting up organization	20
5. Demonstration and ripple effects	20

Selected Pilot Projects

133 Based on the selection criteria, all the rural development plans (59) in the 4 model areas were evaluated. As a result, 18 pilot projects were selected as follows;

Name of model area	No. of project	Categories of plan*	Name of projects
Xeatzan Bajo	b-5	B	Mini-irrigation Plan
	b-13	B	Plan of Revolving Fund for Hand Weaving Thread
	c-5	C	Water quality Improvement Plan for the existing Drinking Water Supply
Panyebar	b-7	B	Coffee Production Improvement Plan
	c-4	C	Rehabilitation Plan for Drinking Water System
	c-5	C	Water Quality Improvement Plan for the existing Drinking Water Supply
	c-14	C	Plan for Reducing Workload in the Mountainous Area through Coffee Processing
Pachum	a-3	A	Reforestation Plan
	b-6	B	Layer-Chicken Raising Plan for Women's Group
	c-5	C	Water Quality Improvement Plan for the existing Drinking Water Supply
	c-6	C	Plan of Extension Use of Improved cooking Stove and of Sauna Bath "Temascal"
	c-11	C	Plan for Installation of Minimal Pharmacy Unit
Palestina	b-2	B	Project of Model Farm on Potato Production
	b-3	B	Potato Storage Improvement Project
	b-5	B	Mini-irrigation Plan
	c-5	C	Water Quality Improvement Plan for the existing Drinking Water Supply
	c-12	C	Municipality Community Health Service Plan
	c-13	C	Plan for Migrant People to the Coastal Area

* A: Environmental conservation Plan, B: Plan for Increasing Income Generation and C: Improvement plan for living environments

Plans of Pilot Projects

134 The project features and project costs of 18 Pilot Projects are summarized in the following summary table.

Summary of Pilot Projects

Name of Pilot Projects	Beneficiary	O&M Organization	Project Contents	Expected Benefit	Cost (Q 10 ³)	Cost for Beneficiary
Xeatzan Bajo						
1	Mini-irrigation Project	80 hh	Irrigation Committee	Installation of irrigation facility Introduction of vegetable production	Improvement of farmers' income	Q 906 Initial inputs labor & land for facility
2	Plan of Revolving Fund for Hand Weaving Thread	200 pers.	Producers' Association	Formation of association and training Joint purchase of material thread Establishment of revolving system	Increase of income Capacitation of association members'	Q 262 O&M cost
3	Water Quality Improvement Plan	240 hh	Development Committee	Installation of sterilizer Education on water quality improvement	Improvement of health condition	Q 19 O&M cost
Panyebar						
4	Coffee production improvement plan	72 hh	Producers' Association	Nursery construction & operation Training on coffee production Introduction of fruit tree production	Improvement of productivity Increase of income	Q 129 Hand labor (Q9,700)
5	Rehabilitation Plan for Drinking Water System	298 hh	Water Committee	Rehabilitation of water system Strengthening of fee collection Education on O&M	Stabilization of water supply from the system	Q 609 O&M cost Hand labor
6	Water Quality Improvement Plan	298 hh	Water Committee	Installation of sterilizer Education on water quality improvement	Improvement of health condition	Q 36 O&M cost
7	Coffee Processing Plan for Workload Reduction	80 hh	Development Committee	Introduction of manual pulping machine Training on pulping	Reduction of workload Income increase by sale of dried beans	Q 75 O&M cost
Pachum						
8	Reforestation Plan	Communal 150 hh Private 48 hh	Forest Committee	Nursery construction & operation Production of seedlings Technical training of forestation Environ. education and study tour	Conservation of forest and soil Income increase from fruit tree and agro-forestry	Q 141 O&M cost Hand labor
9	Layer-chicken Raising Plan by Women's Group	40 pers.	Women's Group	Formation of women's group Technical assistance Joint purchase and selling	Increase of cash income Improvement of women's capacity and social status	Q 74 O&M cost Hand labor
10	Water Quality Improvement Plan	121 hh	Water Committee	Installation of sterilizer Education on water quality improvement	Improvement of health condition	Q 231 O&M cost Hand labor
11	Extension Plan of Improved Stoves and Sauna	Stove 130 hh Sauna 40 hh	Beneficiaries	Installation of facilities - Improved stove (130 units) - Improved sauna (40 units)	Reduction of firewood consumption Improvement of health condition	Q 166 O&M cost Hand labor
12	Plan for Installation of Minimal Pharmacy Unit	150 hh	Health Committee and CDRO	Training of health promoter Installation of MPU Provision of medicines and establishment of revolving system	Securing easily available medicines Improvement of health condition	Q 51 Hand labor Provision of land for MPU
Palestina						
13	Plan for model farm on potato production	210 hh	Development Committee & advanced farmers	Installation of model farm Training on farming practices	Improvement of productivity Increase of income	Q 13 Cultivation cost: Q3,900 Provision of land
14	Potato storage plan	210 hh	Development Committee	Installation of simple storing system and cold storage, and storing test of the facilities	Improvement of selling price Increase of income	Q 656 Labor Land area by Municipality
15	Mini-irrigation Project	Initial 75 hh Target 150 hh	Development Committee	Installation of irrigation facility Irrigation practice with vinyl house Introduction of vegetable production	Increase of producers' income	Q 1,228 Initial farm inputs labor & land for facilities
16	Water Quality Improvement Plan	106 hh	Water Committee	Installation of sterilizer Education on water quality improvement	Improvement of health condition	Q 151 O&M cost
17	Municipality Community Health Activity Plan	325 hh	Health Committee & Municipality	Purchase medicines from PROAM and sale at reasonable price Installation of 2 MPU's Training of promoter & pharmacist	Securing easily available medicines Improvement of health condition	Q 92 Hand labor Land for MPU
18	Plan for Migrant People to the Coastal Areas	200 hh	-	Base-line survey Training on health management Provision of simple equipment	Improvement of migrants' health condition through preventive-care	Q 394 -
					Q 5,233	-

Implementation of Pilot Projects

- 135 The JICA Study Team will be responsible for overall management of implementation of Pilot Projects in corporation with MAGA. Since the formulated 18 Pilot Projects cover various fields of development and work components, it is proposed to establish a steering coordination committee of representatives from relevant organizations. The committee will be headed by a representative of MAGA. The member of the committee will consist of representatives from SEGEPLAN, MSPAS, ICTA, FIS, INTECAP, JICA/JOCV office, governors of the four related provinces, mayors of four relevant municipalities and JICA Study Team. Provincial offices of the organizations that participate in a steering committee will make supervision of project implementation and monitoring for Pilot Projects in principle. The overall supervision and monitoring will be undertaken by the JICA Study Team.
- 136 In principle construction and implementation of soft service activity will be carried out by general contractors, suppliers, NGOs, local consultants and universities. While a development committee for each pilot project will be organized in the farmer's side. Farmer's participation is essential and the following three basic concept should be applied to the implementation of the pilot project and its O&M: (1) Participation in project implementation (2) Farmers' sharing of construction cost and (3) Operation and maintenance of project by farmers themselves
- 137 Implementation schedule of 18 pilot projects is shown below. The total period of implementation and monitoring of Pilot Projects will be 15 months. After 15 months, it is expected that monitoring work of each Pilot Project should be also continued

Implementation Schedule of the Pilot Projects

Pilot Projects	Work Item	2001					2002											
		08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
1. Mini-irrigation Project Project Area: Xeatzan Bajo Category: b-5	1) Construction																	
	2) Technical training																	
	3) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
2. Plan of Revolving Fund for Hand Weaving Thread Project Area: Xeatzan Bajo Category: b-15	1) NGO selection and Establishment of association																	
	2) Training																	
	3) Provision of thread							△										
	4) Monitoring																	
3. Water Quality Improvement Plan Project Area: Xeatzan Bajo Category: c-5	1) Installation of equipment																	
	2) Education of Beneficialies																	
	3) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
4. Coffee production improvement plan Project Area: Panyebar Category: b-7	1) Instillation of Nursery																	
	2) Operation of Nursery																	
	3) Cultivation training																	
	4) Monitoring																	
5. Rehabilitation Plan for Drinking Water System Project Area: Panyebar Category:c-4	1) Transportation of materials																	
	2) Rehabilitation works																	
	3) Improvement of water tank																	
	4) Monitoring																	
6. Water Quality Improvement Plan Project Area: Panyebar Category:c-5	1) Installation of equipment																	
	2) Education of beneficialies																	
	3) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
7. Coffee Processing Plan for Workload Reduction Project Area: Panyebar Category:c-14	1) Installation of equipment																	
	2) Training																	
	3) Monitoring																	
8. Reforestation Plan Project Area: Pachum Category:c-3	1) Purchase inputs and production of seedlings																	
	2) Plantation																	
	3) Training																	
	4) Monitoring																	
9. Layer-chicken Raising Plan by Women's Group Project Area: Pachum Category:b-6	1) Construction of chicken house																	
	2) Raising and selling																	
	3) Monitoring																	
10. Water Quality Improvement Plan Project Area: Pachum Category:c-5	1) Installation of equipment																	
	2) Education of Beneficialies																	
	3) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
11. Extension Plan of Improved Stoves and Sauna Project Area: Pachum Category:c-6	1) Designing & Demonstration																	
	2) Installation works																	
	3) Monitoring																	
12. Plan for Installation of Minimal Pharmacy Unit Project Area: Pachum Category:c-11	1) Training																	
	2) Construction of MPU																	
	3) Provision of Medicines																	
	4) Monitoring																	
13. Plan for model farm on potato production Project Area: Palestina Category:b-2	1) Input purchase																	
	2) Operation of model farm																	
	3) Training																	
	4) Monitoring																	
14. Potato storage plan Project Area: Palestina Category:b-3	1) Construction																	
	2) Storing and training																	
	3) Monitoring																	
15. Mini-irrigation Project Project Area: Palestina Category:b-5	1) Construction																	
	2) Training																	
	3) Cultivation																	
	4) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
16. Water Quality Improvement Plan Project Area: Palestina Category:c-5	1) Installation of equipment																	
	2) Education of Beneficialies																	
	3) Monitoring			△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
17. Municipality Community Health Activity Plan Project Area: Palestina Category:c-12	1) Training																	
	2) Construction of MPU																	
	3) Registration for PROAM																	
	4) Health education service																	
	5) Monitoring																	
18. Plan for Migrant People to the Coastal Areas Project Area: Palestina Category:c-13	1) Base-line survey																	
	2) Training																	
	3) Provision of equipment																	
	4) Monitoring																	

Conclusions and Recommendations

138 It may be concluded that the peoples in the Central Highland Region of Guatemala seriously suffer from poverty from the view points of low income, poor quality of living environments and devastation of natural resources.

139 It may be concluded that the methodology of the participatory survey approach introduced into this Study is very effective in extracting the problems, needs and potentials from the farmers' viewpoints and motivating community people, that are critical factors for the formulation of sustainable bottom-up rural development

plans.

- 140 It is recommended that 18 Pilot Projects selected in this Study should be implemented as soon as possible. Through the implementation of the Pilot Projects, countermeasures for problems and constraints should be identified and the methodology of surveys and formulation of project development in this Study should be improved.
- 141 It is proposed that a steering coordination committee headed by MAGA should be established before commencement of the Pilot Projects for their smooth implementation and effective monitoring.
- 142 It is recommended that the implementation of the projects on the sustainable rural development should be carried out for four provinces of Chimaltenango, Sololá, Totonicapán and Quetzaltenango based on the above improved methodology.

**THE MASTER PLAN STUDY
ON
SUSTAINABLE RURAL DEVELOPMENT FOR THE REDUCTION OF POVERTY
IN
THE CENTRAL HIGHLAND REGION
OF
THE REPUBLIC OF GUATEMALA**

VOLUME-I : MAIN REPORT

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ATTACHMENTS

- ATTACHMENT-1 : PROJECT DESIGN MATRIX
- ATTACHMENT-2 : SCOPE OF WORKS
- ATTACHMENT-3 : MINUTES OF MEETINGS

CURRENCY EQUIVALENTS

US \$1 =Quetzales 7.70 = Japanese Yen 119.35 (Q.1 = Yen15.50)
as of June 2001

UNITS

Area :

1 manzana = 0.7 ha

1 cuerda (Chimaltenango) = 1/6 manzana = 0.117 ha

1 cuerda (Sololá) = 1/9.7 manzana = 0.072 ha

1 cuerda (Quetzaltenango & Totonicapán) = 1/16 manzana = 0.0438 ha

Weight :

1 quintal (qq.)= 100 lb. = 45.36 kg

ABBREVIATION

ACNUR	: United Nations High Commissioner for Refugees (UNHCR) (Alto Comisionado de las Naciones Unidas para los Refugiados)
AGEXPRONT	: Asociacion Grimal de Exportadores de Productos No Tradicionales
AIDS	: Acquired Immune Deficiency Syndrome (Sindrome de Inmuno Deficiencia Adquirida)
ANACAFE	: National Association of Coffee (Asociacion Nacional del Café)
ARI	: Acute Respiratory Infection
ASINDES	: Asociacion de Entidades de Desarrollo y de Servicios No Gubernamentales de Guatemala
AVIDEH	: Victim Assistance Program of Violations to the Human Rights (Asistencia a Victimas de Violaciones a Derechos Humanos)
BANRURAL	: Bank for Rural Development (Banco para el Desarrollo Rural)
BOSCOM	: Municipal and Communal Forestry Reinforcement Program (Proyecto de Fortalecimiento Forestal Municipal)
CADISOGUA	: Association for coordination for Integrated Development in South-east Guatemala (Coordinadora de Asociaciones en Desarrollo Integral del Sur Occidente de Guatemala)
COINDE	: Council of Development Institution (Consejo de Instituciones de Desarrollo)
CONADEA	: National Council for Agriculture and Livestock Development (Consejo Nacional de Desarrollo Agropecuario)
CONAMA	: National Commission for Environment (Comision Nacional de Medio Ambiente)
CONAP	: National Council for Procted Area (Consejo Nacional de Areas Protegidas)
CONGCOOP	: Coordination for NGO and Cooperatives (Coordinacion de ONG y Cooperativas)
CONTIERRA	: Presidential Office for the Resolusion of Land Conflict (Oficina Presidencial para la Resolucion de Conflictos)
COPMAG	: Guatemalan Maya Council (Consejo de Pueblos Mayas de Guatemala)
CPR	: Communities of Population in Resistance (Comunidades de Poblacion en Resistencia)
CTEAR	: Comision Tecnica para la Ejecucion del Acuerdo sobre el Reasentamiento de las Poblaciones Desarraigada por el Enfrentamiento Armado
DHS	: Demographic and Health Survey (Programa de Encuestas de Demografia y Salud)
E.E.U.U.	: Estados Unidos de Norte America (USA)
EMPAGUA	: Municipal Company of Water of Guatemala
FAO	: Food and Agriculturral Organization of United Nations (Organizacion de Naciones Unidas para la Agricultura y Alimentacion)
FIS	: Social Investment Fund (Fondo de Inversion Social)
FODIGUA	: Guatemalan Fund for Indigenous Development (Fondo para el Desarrollo Indigena Guatemalteco)
FOGUAMA	: Guatemalan Fund for the Environment (Fondo Guamatemalteco de Medio Ambiente)
FONAGRO	: National Fund for Reactivation and Modernization of Agriculture and Livestock Activities (Fondo Nacional para la Reactivacion y Modernizacion de las Actividades Agropecuarias)
FONAPAZ	: National Peace Fund (Fondo Nacional para la Paz)
FONTANERO	: Plumber
FONTIERRA	: National Land Fund (Fondo Nacional de Tierra)
Foror Permanente	: Foro Permanente de ONG y Cooperantes
FSDC	: Solidarity Fund for Community Development
FUNCEDE	: Central America Fundation for Development (Fundacion Centroamericana de Desarrollo)
GDP	: Gross Domestic Product
HIV	: Human Immunodeficiency Virus
ICTA	: Institute of Science and Agricultural Technology (Instituto de Ciencias y Tecnologia Agricola)
IGN	: National Geographical Institute (Instituto Geografico Nacional)

IGSS	: Instituto Guatemalteco de Seguridad Social (Guatemalan Social Security Institute)
IICA	: Inter-American Institute of Agricultural Cooperation (Instituto Interamericano de Cooperación Agrícolas)
INAB	: National Institute of Forest (Instituto Nacional de Bosques)
INCAP	: Institute of Nutrition of Central America and Panama (Instituto de Nutrición de Centroamérica y Panamá)
INDE	: National Institute of Electrification (Instituto Nacional de Electrificación)
INE	: National Institute of Statistics (Instituto Nacional de Estadística)
INFOM	: Municipal Development Institute (Instituto de Fomento Municipal)
INSIVUMEH	: Instituto de Sismología, Volcanología, Meteorología
INTA	: National Institute of Agrarian Reform (Instituto Nacional de Transformación Agraria)
INTECAP	: Technical Institute for Capacitation and Productivity (Instituto Técnico de Capacitación y Productividad)
JICA	: Japan International Cooperation Agency (Agencia de Cooperación Internacional del Japón)
MAGA	: Ministry of Agriculture, Livestock and Food
MINUGUA	: Misión de Verificación de las Naciones Unidas en Guatemala
MMR	: Maternal Mortality Rate (Tasa de Mortalidad Materna)
MSPAS	: Ministry of Public Health and Social Assistance (Ministerio de Salud Pública y Asistencia Social)
MTIV	: Ministry of Transportation and Road (Ministerio de Transporte y Vial)
OMS	: Organización Mundial de la Salud (WHO)
ONG/NGO	: Non-governmental Organization (Organización No Gubernamental)
ORS	: Oral Rehydration Salt (Sobre de Rehidratación Oral)
PDP	: Small Project Program for the Productive Development of the Resettled Areas (Programa de Pequeños Proyectos para el Desarrollo Productivo de las Áreas de Reasentamiento)
PEA	: Economic Active Population (Población Económicamente Activa)
PINFOR	: Forest Incentive Program (Programa de Incentivos Forestales)
PLAMAR	: Action Plan for Modernization and Encouragement of Low Risk Agriculture (Plan de Acción para la Modernización y Fomento de la Agricultura Bajo Riego)
PNUD/UNDP	: United Nations Development Program (Programa de las Naciones Unidas para el Desarrollo)
PROAM	: Programa de Facilidad de Acceso a Medicamentos
PROFRUTA	: Fruits Farming Development Project (Proyecto para el Desarrollo de la Fruticultura)
PRONADE	: National Education Programme (Programa Nacional de Educación)
PROTIERRA	: Institutional Committee for the Development and Strengthening of the Property of Land (Comisión Institucional para el Desarrollo y Fortalecimiento de la Tierra)
PROZACHI	: Chixoy River Project (Proyecto del Río Chixoy)
RADEAS	: Network of Agents for Sustainable Agriculture and Livestock Development (Redes de Agentes de Desarrollo Agropecuario Sostenible)
RENICAM	: National Network of Institutions of Training for Municipal Reinforcement (Red Nacional de Instituciones de Capacitación para el Fortalecimiento Institucional)
S/W	: Scope of Work (Alcances del Trabajo)
SEGEPLAN	: Secretary for Planning (Secretaría de Planificación)
SEPAZ	: Secretaría de la Paz
SIAS	: Integrated System of Health Care (Sistema Integral de Atención en Salud)
TBA	: Traditional Birth Attendant (Comadrona)
TFR	: Total Fertility Rate
TZUK-KIM POP	: Movimiento TZUK-KIM POP
UNDP	: United Nations Development Program (Programa de Naciones Unidas para el Desarrollo)
USAID	: US Agency for International Development (Agencia para el Desarrollo Internacional)
USDA	: US Department of Agriculture
WFP (PMA)	: World Food Programme (Programa Mundial de Alimentos)