

Japan International Cooperation Agency (JICA)

Ministry of Agriculture, Livestock and Food (MAGA)

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

VOLUME-II : ANNEX-1

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

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CURRENCY EQUIVALENTS

US \$1 = Quetzales 7.70 = Japanese Yen 119.35 (Q.1.0 = Yen 15.50)
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 Protected Area (Consejo Nacional de Areas Protegidas) |
| CONGCOOP | : Coordination for NGO and Cooperatives (Coordinacion de ONG y Cooperativas) |
| CONTIERRA | : Presidential Office for the Resolucion 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 Agicultural Cooperation (Instituto Interamericano de Cooperacion Agricolas) |

| | |
|--------------|--|
| INAB | : National Institute of Forest (Instituto Nacional de Bosques) |
| INCAP | : Institute of Nutrition of Central America and Panama (Instituto de Nutricion de Centoamerica y Panama) |
| INDE | : National Institute of Electrification (Instituto Nacional de Electrificacion) |
| INE | : National Institute of Statistics (Instituto Nacional de Estadistica) |
| INFOM | : Municipal Development Institute (Instituto de Fomento Municipal) |
| INSIVUMEH | : Instituto de Sismologia, Volcanologia, Meteorologia |
| INTA | : National Institute of Agrarian Reform (Instituto Nacional de Transformacion Agraria) |
| INTECAP | : Technical Institute for Capacitation and Productivity (Instituto Tecnico de Capacitacion y Productividad) |
| JICA | : Japan International Cooperation Agency (Agencia de Cooperacion Internacional del Japon) |
| MAGA | : Ministry of Agriculture, Livestock and Food |
| MINUGUA | : Mision de Verificacion 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 Publica y Asistencia Social) |
| MTIV | : Minitry of Transportation and Road (Ministerio de Transporte y Vial) |
| OMS | : Organizacion Mundial de la Salud (WHO) |
| ONG/NGO | : Non-governmental Organization (Organizacion No Gubernamental) |
| ORS | : Oral Rehydration Salt (Sobre de Rehidratacion Oral) |
| PDP | : Small Project Program for the Productive Development of the Resettled Areas (Programa de Pequeños Proyectos para el Desarrollo Productivo de las Areas de Reasentamiento) |
| PEA | : Economic Active Population (Poblacion Economicamente Activa) |
| PINFOR | : Forest Incentive Program (Programa de Incentivos Forestales) |
| PLAMAR | : Action Plan for Modernization and Encouragement of Low Risk Agriculture (Plan de Accion para la Modernizacion y Fomento de la Agricultura Bajo Riego) |
| PNUD/UNDP | : United Nations Development Program (Pragrama 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 Programe (Programa Nacional de Educacion) |
| PROTIERRA | : Institutional Committee for the Development and Strengthening of the Property of Land (Comision Institucional para el Desarrollo y Fortalecimiento de la Tierra) |
| PROZACHI | : Chixoy River Project (Proyecto del Rio 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 Capacitacion para el Fortalecimiento Institucional) |
| S/W | : Scope of Work (Alcances del Trabajo) |
| SEGEPLAN | : Secretary for Planning (Secretaria de Planificacion) |
| SEPAZ | : Secretaria de la Paz |
| SIAS | : Integrated System of Health Care (Sistema Integral de Atencion 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 Programe (Prorama Mundial de Alimentos) |

1. INTRODUCTION

1.1 Authority

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 the Ministry of agriculture, Livestock and Food (MAGA) and the Japan International Cooperation Agency (JICA) in July 29 1999.

1.2 Objectives of the Study and Study Area

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 the 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.

The Study area covers about 6,000 km² located in the Central Highland Region. It consists of the four provinces of Chimaltenango, Solola, Totonicapan and Quezaltenango.

1.3 Performance of the JICA Study Team

The Study was carried out in two phases. The Phase-1 study was carried out for about 9 months from January 1999 to October 2000. In this period, the following study was conducted.

- (1) Assessment for the present conditions and development constraints in the Study area
- (2) Selection of "Model Micro-Basin" in each province
- (3) Formulation of the preliminary rural development plans in each selected model micro-basin prepared based on the farmer's participatory approach methods and
- (4) Selection and examination of pilot projects from the each model area

During the Phase-I period, the JICA Study Team submitted the following reports to the Government of Guatemala. All the results of the Phase-1 were compiled in

the Interim Report.

- (1) Inception Report: February 8, 1999
- (2) Progress Report -1: May 2, 2000
- (3) Interim Report: October 6, 2000

The Phase-2 study was carried out for five months from January 2001 to July 2001. In this period, the following study was conducted.

- (1) Explanation of the contents of the Interim Report
- (2) Preparation of the rural developments in the model micro-basins
- (3) Detail implementation plan of the pilot projects

A JICA expert was attacked by armed robberies February 11, 2001. The attack occurred on the road connecting San Fransisco El Alto with Santa Maria Chiquimula city Totonicapan province. The JICA headquarters in Tokyo ordered that all members of the Study Team stop the field survey and stay in the capital until it is confirmed that four model micro-basins have no problems with security. The Study Team returned to Japan March 23, 2001 and again started the study in Guatemala from May 8, 2001. During this period, the JICA Study Team submitted the following reports to the Government of Guatemala. All the results of the Phase-1 and the Phase-2 were compiled in the Draft Final Report.

- (1) Progress Report-2: March 20, 2001
- (2) Draft Final Report July 2, 2001

In principle, the Study was carried out by the joint efforts of the JICA study team and the counterpart personnel assigned from the Government of Guatemala. The Study Team transferred technical knowledge to the counterpart personnel. Throughout the study course, a series of regular meetings were held once a two weeks and exchanged views on surveys and projects.

The counterpart personnel and the JICA experts who took part in the Study are shown in Table 1.3.1.

2 PROJECT BACKGROUND

2.1 General Economic Conditions in the Country

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 comes from agricultural produce such as coffee, banana, sugar, meat and cardamom. The economic condition of Guatemala has been seriously affected by international market prices for primary products.

A financial crisis occurred in 1990 and the balance of payments deteriorated. Since 1991, the Government has propelled an economic policy for stabilizing an economic conditions to prevent increasing inflation and so forth. Though the situation has improved after 1993, it deteriorated again in 1997.

The Government has endeavored to promote a free trade policy and to expand the scale of trade. In 1996, the value of GDP decreased owing to a decline in international market prices of primary products. Afterward, the economy of Guatemala has been revitalized due to stabilization of the price of primary products, increase of public investments through income produced by privatization, and public investment in peace treaty-areas. Under such situation, the annual growth of GDP has increased and achieved 5.1% in 1998. On the other hand, the Government has serious financial problems due to the shortage of tax income and has attempted to reform the tax system.

The macro economic indicators in recent years are shown in the following table.

| Particulars | 1994 | 1995 | 1996 | 1997 | 1998 |
|--|--------|--------|--------|--------|--------|
| GDP(million US\$) | 12,990 | 14,600 | 15,700 | 17,800 | 18,000 |
| Average growth of GDO per annum (%) | 4.0 | 4.9 | 3.1 | 4.4 | 5.1 |
| GNP/capita (US\$) | 1,190 | 1,340 | 1,470 | 1,462 | 1,485 |
| Consumption Price Index | 12.5 | 8.4 | 11.1 | 9.3 | 7.0 |
| Unemployment (%) | 3.3 | 3.7 | 4.9 | 4.5 | 4.5 |
| Financial Balance of the Government (M-Quetzal) | -939 | -218 | -270 | -1,596 | 1,941 |
| Revenue (M-Quetzal) | 5,787 | 7,267 | 8,658 | 9,828 | 12,893 |
| Expenditure (M-Quetzal) | 6,725 | 7,485 | 8,928 | 11,424 | 10,952 |
| Balance of Payment (M-US\$) | -625 | -572 | -451 | -632 | -1,115 |
| Current Account Balance (M-US\$) | -997 | -877 | -643 | -1,466 | -2,092 |
| Trade Balance (M-US\$) | -997 | -877 | -643 | -1,466 | -2,092 |
| Exports of goods (FOB) (M-US\$) | 1,550 | 2,156 | 2,236 | 2,386 | 2,546 |
| Imports of goods (FOB) (M-US\$) | 2,547 | 3,033 | 2,880 | 3,852 | 4,638 |
| Income from no-trades | -77 | -188 | -329 | -147 | -217 |
| Current transfer balance (M-US\$) | 449 | 493 | 522 | N/A | N/A |
| Balance of capital (M-US\$) | 655 | 556 | 738 | N/A | N/A |
| Errors and omission (M-US\$) | -24 | -136 | -72 | N/A | N/A |
| Reserves excluding gold (M-US\$) | 863 | 702 | 870 | 1,047 | 1,354 |
| External debt (M-US\$) | 3,420 | 3,665 | 3,785 | 4,124 | 4,565 |
| Public/public sector (M-US\$) | 2,729 | 2,835 | 2,766 | N/A | N/A |
| Bilateral (M-US\$) | 1,116 | 1,183 | 1,132 | N/A | N/A |
| International institutions (M-US\$) | 987 | 1,003 | 1,036 | N/A | N/A |
| External debt (M-US\$) | 3,420 | 3,665 | 3,785 | 4,124 | 4,565 |

2.2 National Development Policy

After 35 years of civil war, the Guatemala Government and rebel forces signed Peace Accords 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.

The Government prepared action programs between 1996 and 2000 for the social development and construction of peace in the country. Since then, the Government has promoted the following matters for poverty alleviation and human resource development;

- (1) To reinforce basic infrastructure in the rural areas by improvement and rehabilitation of the rural and main roads, secondary and regional road and privatization for the Government's infrastructures such as ports, power, telecommunications, highways, and the postal services.
- (2) To liberalize the economy and improve the public sector
- (3) To reduce the poverty and inequality by basic education reform, investment in social infrastructure and reconstruction/local developments that contribute to the sustainable self-development of the local population,

mostly indigenous people living in extreme poverty.

The new administration was established in January 2000 and it seemed that the new administration would follow the basic development policy made by the previous government.

At present, SEGEPLAN is formulating the new development plans for the future and gives high priorities to the development of the follows;

People Security, Justice, Demilitarization, and Human Rights

- Increase de Professionalism of Civil Nation Police
- Judicial Investigation
- Prison System
- Reform the Judicial System
- Human Rights

Decentralization, Rural Development and Environment

- Strategic Way of Decentralization
- Structures and Practices of Government Power
- Modernization of the Government Institutions
- Sustainable Agriculture
- Policy for Access to Land
- Management of Natural Resources
- Rational Use of Natural Resources
- Environmental Contamination

Education

- Educational Reform
- Gender
- Inter-Culture
- Quality of Education
- Re-adjustment of Curricula
- Development of Human Resources
- Modernization of Educational Sector

People Participation and Political Reform

- Strengthening of Mechanisms of Participation
- People Representation and Decision Making
- Social Auditing
- People Organization

Integrated Human Development

- Children and Youth

- Women
- Inter-Culture

2.3 Background for the Study

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 having 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 are.

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.

Under these circumstances, the Guatemalan government considered there should be the sustainable rural development for the reduction of poverty in the central highland region with a view to conservation and efficient use of natural resources, increasing farm incomes and improving life quality of the farmers. The Guatemalan government requested the Japanese government on July 1998 to carry out a master plan study in the central highland region. The Government of Japan dispatched a preparatory study team to Guatemala headed by Mr. Kiyoshi Sawada on November 1999 to Guatemala. The team held a series of discussions with the relevant authorities of the Government of Guatemala and both sides agreed on the Scope of Work of the Study on 29 July 1999.

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.

3. PRESENT CONDITIONS IN THE STUDY AREA

3.1 General View for the Study Area

3.1.1 Administration

(1) Demography

Principal demographic characteristics in 1994 is shown below:

| Province | Chimaltenango | Sololá | Totonicapán | Quetzaltenango | Total |
|---|---------------|---------|-------------|----------------|-----------|
| Total population in 1981 | 230,059 | 154,249 | 204,419 | 366,949 | 955,676 |
| Total population in 1994 | 314,813 | 222,094 | 272,094 | 503,857 | 1,312,858 |
| Population growth rate 1981~1994 (% per year) | 2.4 | 2.8 | 2.2 | 2.4 | 2.4 |
| | | | | | |
| Total households | 59,795 | 40,455 | 47,323 | 92,536 | 240,109 |
| | | | | | |
| Total number of indigenous people | 244,624 | 207,927 | 257,123 | 300,115 | 1,009,789 |
| % of indigenous people | 78% | 94% | 94% | 60 % | 77% |
| | | | | | |
| Total urban population | 130,855 | 73,856 | 29,188 | 200,727 | 434,626 |
| Total rural population | 183,958 | 148,238 | 242,906 | 303,130 | 878,232 |
| % of urban population | 41.6% | 33.3% | 10.7% | 39.8% | 33.1% |
| % of rural population | 58.4% | 66.7% | 89.3% | 60.2% | 66.9% |
| | | | | | |
| PEA* in rural area | 56.0% | 65.0% | 89.0% | 56.0% | |
| PEA* for agriculture | 85.1% | 79.4% | 40.8% | 76.1% | |
| | | | | | |
| Total area (km ²) | 1,979 | 1,061 | 1,061 | 1,951 | 6,052 |
| Population density (person/km ²) | 159 | 209 | 257 | 258 | 217 |
| Number of municipality | 16 | 19 | 8 | 24 | 67 |

Source. Census '94 General Characteristics of the Population and Habitat

*: PEA: economically active population

According to the Census of 1994, four provinces of the study area cover 12.3% of the total population of the Republic of Guatemala. The majority of the population is indigenous especially in the province of Totonicapán and Sololá. The average population density is 214.1 km². The majority live in rural areas,

even though this definition of rural area has ambiguity.

According to data from the activities of the Economically Active Population (PEA), rural area shows the agriculture importance, however in Totonicapán more than half of the PEA is engaged in a non-agricultural activity.

The number of municipalities in each province is variable and its size is also different. Some municipalities of the province of Sololá have only 1200 to 1500 inhabitants, on the other hand there are 19 municipalities that have more than 20 thousand. The municipality that has more population is Quetzaltenango, its population rises to 100 thousand.

The main administrative unit is municipality.

(2) Administrative Organizations

(i) Municipality

In Guatemala, the municipality has the most important function to give services to the people. Within the process of the decentralization and the encouragement of participation, more emphasis is given to reinforcement of the organization of municipality.

The important functions of the municipality are the following:

- (a) To choose their own authorities
- (b) To secure and distribute natural resources to people
- (c) To provide the public and local services, to maintain the legislation of their jurisdiction in municipality and to achieve their own aims.

The municipality is made up of a Mayor and some community representatives, and councilors that are chosen depending of the size of the municipalities. Municipal peoples elect these representatives direct.

Municipal revenues are made up of several sources

- (a) Subsidy delivered from the Central Government Budget to Municipalities
 - 1) 10% of ordinary revenue of the Central Government that is stipulated in the Constitution
 - 2) 10% of a value-added tax (V.A.T)
Among this, 3% is distributed in the following way:

- 1% for the municipalities
 - 1% for the development council
 - 1% for peace funds
- 3) Other subsidy from the Central Government to the municipalities
- Tax for the distribution of petroleum and petroleum by-products
 - Tax for the circulation of a vehicle
 - Tax for real estate (Not in function)
- (b) Local tax
- Boleto de Ornato
 - Local tax for products and economic activities
- (c) Non tributary income
- Income of property rent
 - Income of services

The current of the decentralization and reinforcement of the municipality follows its path, however, many financial problems have occurred in most of the municipalities. They have too many limitations for administration and planning and project execution.

(ii) Governor

The Governor is appointed direct by the President of the country acknowledging the proposal from the representatives of non-government organizations that take part in the Provincial Development Councils. The Governor has no authority to exert his power in the municipal administration.

(iii) Local Authorities (Auxiliary Mayors, Alcaldes Auxiliares)

The roll of the Auxiliary Mayors is very important in the communities. The Municipal Code defines that Auxiliary Mayors are representatives of the municipal administration of the small villages, hamlets, and cantons. The municipal mayor will nominate and dismiss the auxiliary mayors of each community. However, it seems that for the members of the community, “Auxiliary Major” actually functions as a representative of the community before the municipality and has the superior authority in the community. And generally communal assembly elects Auxiliary mayors.

Besides the mayor, the mayor’s office is made up of sheriffs (Agnaciles),

FONTANERO and others. It manages the community and solves conflicts and problems.

Also there are various committees in the community for development of project on education, water, roads and others.

Under such situations, the local authorities below municipality have played an important role in the local administration. However, until now, no one has properly appreciated the roll of the local authorities. It is considered that recognition and reinforcement of such traditional local authorities in the indigenous communities are prerequisite to form a democratic nation as described in the Agreement about Identity and Rights of indigenous peoples.

The mentioned agreement “IV. Civil, Political, Social and Economic Rights, B Local indigenous communities and authorities” indicates that;

- i) Recognition is accorded to the importance the Maya and other indigenous communities have had and continue to have in the political, economic, social, cultural and spiritual spheres.
- ii) Bearing in mind the constitutional commitment of the State to recognize, respect and promote these forms of organization which are peculiar to the indigenous communities, recognition is accorded to the role of the community authorities that were constituted in accordance with the customary norms of the communities, in the management of their affairs.
- iii) Recognizing the role of the communities, within the framework of municipal autonomy, in exercising the right of indigenous peoples to determinate their own development priorities, particularly in the fields of education, health, culture and the infrastructure, the Government undertakes to strength the capacity of such communities in this area.
- iv) The Government shall promote a reform to the Municipal Code.

Like the study for the plan of rural development, they must respect this agreement and must seek the way to strengthen the participation of the communities because of the making of the decision for their own development.

(iv) The Provincial Development Council

The Development Councils were created in the time of Vinicio Cerezo’s Presidency, in the year 1988. However it did not function. Now the Agreement about Social-economic Aspects gives a priority to function the Development Councils, both Urban and Rural to secure, promote and guarantee the

participation of the people in the identification of the local priorities, the definition of the projects and public programs. The Agreement suggests that the Development Council law should be reformed.

Provincial Councils have been functioning. The participated members are municipal mayors, governors, the representatives of Social Fund, provincial administrations of the Ministries, ONGs and cooperatives, and others.

3.1.2 Social Aspects

(1) Indigenous People

Guatemala is a multiethnic, multicultural, and multilingual country. There are three major existing indigenous tribes; Maya, Garifuna and Xinca. In the census of '94 the population of the indigenous tribes in total is 41%, however others estimate that there might be more than a half. The Garifuna town is concentrated in the Atlantic coast and some of the Xinca tribes live in the province of Santa Rosa. The Mayan tribe occupies the majority of the indigenous people.

Within the Mayan tribe there are 22 ethnic groups, meaning 22 linguistic communities. The biggest ethnic group is K'iché and the second biggest is Kaqchikel. However, 31% of the self-identified indigenous people do not speak an indigenous language.

In Guatemala the non-indigenous people is called as “Ladinos” who include mestizos, European origin and original indigenous peoples with no self-identification.

In the study area there are 4 different ethnic groups:

| | |
|----------------|-----------------------------|
| Chimaltenango | Kaqchikel |
| Sololá | Kaqchikel, K'iche, Tu'zujil |
| Totonicapán | K'iche |
| Quetzaltenango | K'iche, Mam |

Due to the exclusion of the indigenous people from the Guatemalan State, there have been some negative effects left to the indigenous people. The politic participation of them, especially in the national level, is very few. They are missing an opportunity to receive education and the access to the public services is limited. The Human Development Level shows a lower extent of development for the indigenous people. Data from the literacy and school registration may indicate faults in the exclusive educational system for them. The level of the GDP shows 2 facets; one is the low level of the real income of the natives and the other

is that the Guatemalan State has never been able to capture the reality of the indigenous people's economy in these communities.

For the future many reforms are contemplated based upon the agreement about the identity and rights of the indigenous communities; making the Mayan tongues official, the educational reform, and the acknowledgment of the Customary Rights, the acknowledgement of the local authorities (see Section 3.1.1(2)).

(2) Reorganization Process of the Guatemalan Society

Guatemala is in the process of strengthening of democracy after the 34 years of war. Under this context, to analyze the social-cultural situation, the Peace Treaty must be acknowledged and the progress in the performance of the matters issued in the treaty should be evaluated.

(i) The Uprooted and Resettled.¹

According to the report of the Historical Elucidation Committee, the armed confrontation produced 200,000 deaths and disappeared. People of about 500 thousand to a million displaced in and out the internal and external areas. In Mexico 150 thousand people searched protection.

In June of 1999 the process of return from Mexico concluded and 42,005 people returned. The report of ACNUR (High Committee Member of the United Nation for the Refugees) registers 60 communities like "Communities of the Returned". The Government of Guatemala obtained 35 country properties for the returned and the total of the extension ascends to 58,328 hectares. For the people, the CPR (Communities of Population in Resistance) has bought 11 country properties, approximately 6600 hectares. Besides these country properties, with the internal displaced a negotiation is being arranged for 21 country properties (Two properties have been bought) from the Land Fund and the demobilized also obtained some properties.

Some returned communities that are registered in ACNUR concentrate more in the Transversal Strip of the North (North of Huehuetenango, of Quiché and Alta Verapaz). In the four provinces that cover this study, only 3 returned communities exist in La Guardiania (San Pedro Yepocapa, Chimaltenango), Las Delicias (Palmar, Quetzaltenango) and Magnolia Miramar (Colomba, Quetzaltenango) and one from CPR is in Salvador and Annex (for CPR Sierra,

¹ Accomplishments and Pending Aspects of the Agreement about the resettlement of the banished populations because of the war. Dec. 1999 CTEAR, Guatemala goes back home, ACNUR.

San Miguel Pochuata, and Chimaltenango).

The technical assistance for these communities is in hand of various governmental and none governmental institutions such as CTEAR, PDP, etc. In case of the Productive Development Projects for the returned communities, CTEAR (Technical Commission for the execution of the Agreement about the Resettlement of the Vanished Populations because of the War), and PDP (Small Project Program for the Productive Development of the Resettled Areas Supported by the E.E.U.U.) execute some projects. The demobilized (Ex-Guerrilla) receives support by the Guillermo Toriello Foundation. The report from MINUGUA indicated the consultant necessity and support to the productive projects.² It also mentions the coordination importance.

Besides some returned people say many children brought up in Mexico do not adapt to the life in the distant communities. They have to study for the formation of some cooperative or some micro-company in the cities where they can use their experience, like in the hotel industry in Mexico.

(ii) The Victims of the Internal Conflict and the Compensating Program³

Within the study Area, Chimaltenango was the most affected by the internal conflict. Some communities of San Martín Jilotepeque, San José Poaquil and Comalapa were totally destroyed and the population was obligated to move out of their community.

In other areas of study they didn't suffer as much as the communities previously mentioned. However, there were selected kidnappings, murders of community leaders.

And now SEPAZ and FONAPAZ started a Victim Assistance Program of Violations to the Human Rights (AVIDEH) and are going to start some activities in Chimaltenango. (There are similar programs in Alta Verapaz and Huehuetenango). This program contemplates to carry out activities in 14 communities in the local councils of Chimaltenango (San Martín Jilotepeque, San José Poaquil and Comalapa) in the Mental Health Field, Education, Infrastructure and Productive Projects basing the necessities that the diagnostic picked up.

² MINUGUA Report of the General Secretary of the United Nations about the Verification of the Peace Treat in Guatemala. Nov. 1999

³ It is based on information from SEPAZ and CEH

(iii) The Land Conflict and the Communities of the Indigenous Communities

The land conflicts reflect the complexity that exists in the rural area. There are the story of the plundering of the lands of the indigenous communities, and the unequal distribution of the land, because the conflicts have complicated.

Based on the data of CONTIERRA until the end of December 1999, 553 cases have been registered and 280 cases are in progress. The place where more conflicts (in progress) are concentrated is in Petén (81), Alta Verapaz (58) and Izabal (30).⁴

In the study area, Sololá has 11 registered cases, Quetzaltenango has 10 registered cases, Chimaltenango and Totonicapán have 6 registered cases as shown below.

Type of Conflict over Land Issue in 4 Provinces

| | Quetzaltenango | Totonicapán | Sololá | Chimaltenango |
|--------------------|----------------|-------------|--------|---------------|
| Dispute on right | 1 | 3 | 3 | 2 |
| Access to the Land | 6 | 1 | 1 | 1 |
| Occupation | 1 | 0 | 0 | 0 |
| Regularization | 2 | 1 | 1 | 3 |
| Territorial Limits | 0 | 1 | 1 | 0 |
| Total | 10 | 6 | 6 | 6 |

Source: Data obtained by CONTIERRA; Registered Cases until December 31 of 1999.

There are less cases in four provinces than in Petén and Alta Verapaz. However the root of the conflicts is deep. For example, in some cases in Totonicapán, the land conflict arises around the legitimacy of the historical titles and the rights to the community lands. (Community Forests). Some communities (Partialities) seek control over certain area of the community-municipal forests. And the title belongs to the Municipality, however the real right belongs to the communities of Totonicapán.

Another case arose when a hamlet wanted to elevate to a small village and wanted to divide a part of the community forest that belonged to the hamlet.

Sometimes some projects require a certain legal field, for example the Management Plan and / or the Forest Incentives from INAB, however many communities are not registered, besides the attempt to realize the registration

⁴ Annual report of CONTIERRA (July 98 to June 99) and data obtained in March. (data at the end of December)

may also become a conflict seed.

The Agreement about social and economic aspects and the agrarian situation stated the following.

“Guatemala is in need of reform of the juridical framework of agriculture and institutional development in the rural sector so that an end can be put to the lack of protection and dispossession from which small farmers, and in particular indigenous peoples, have suffered, so as to permit full integration of the rural population into the national economy and regulate land use in an efficient and environmentally sustainable manner in accordance with development needs”.

The Agreement about the identity and rights of the indigenous communities also mentions about the relative rights of the lands like:

- F1. The rights relating to land of the indigenous peoples include both the communal or collective and the individual tenure of land, rights of ownership and possession and other real rights, and the use of natural resources for the benefit of the communities without detriment to their habitat. Legislative and administrative measures must be developed to ensure the recognition, the awarding of title, protection, recovery, restitution and compensation for those rights.
- F9. The Government undertakes to adopt or promote the following measures:
- Develop legal rules recognizing the right of indigenous communities to administer their land in accordance with their customary norms.

The clauses that appear in the agreements must be acknowledged in the future study.

(iv) Migration to the Field and Access to the Land

According to the report from the United Nations “Guatemala: the rural human face of development, 1999”, during the last two decades there have been considerable migratory currents in the interior of the country to the rural zones, unlike from other countries of Latin America. In particular, the country migration to the urban centers, specifically, to the metropolitan area.”

In Guatemala the tendency to expand the agricultural barrier goes on and the high population increase is observed in Petén and Alta Verapaz. The report obtained from the Land Fund also shows the big demand of land in these areas as shown below.

Group from Land Fund

| Number of group | Number of family | Total extension area |
|-----------------|------------------|----------------------|
| 472 | 31,202 | 159,725.59 ha |

SOURCE: List of Applicants for Credit to December 31 1999, Land Fund

This data shows the great demand of land in Alta Verapaz (33.3% of applicant groups) and Petén (11%). In Quetzaltenango 20 groups, Chimaltenango 17 groups and in Sololá 6 groups are looking for country property. However it is not yet investigated the exact origin of the groups.

The Land Fund in 1998 turned over 6,301 hectares to 1,259 families and in 1999 has projected the handing over of 14,332 hectares to 2,128 families⁵. Comparing the range of 14,888 hectares that FONTIERRA reached within the period of 1993 to 1997, much advance is shown, however some concern still exists.

A report from MINUGUA indicates that “it is necessary to raise the availability of properties within the performance of the commitment of recovery of the national lands handed over in an irregular way in the colonization zones”⁶. Another doubt appears near the nonexistent mechanisms, transparent of price establishments and the broken up way to deal with the credit politics.⁷

(v) The Labor Conversion – Dynamic Process of the rural Transformation.

In the Central Highlands of Guatemala they were keeping a rural economy system, where it is based on the farming of corn and other complementary activities. The Mayan rural families did not only depend on agriculture, and also had handmade craft, commerce, etc. However, this modality has changed a lot within the historical process like the introduction of coffee and the increase on the demand of the indigenous hand made articles, and the dispossession of the community lands like the armed confrontation, that formed thousands of refugees and misplaced them, destroying the traditional system in the communities.

In this part the report only covers some recent tendencies.⁸

⁵ Brochure from the Land Fund No.99

⁶ Situation of the commitments about social-economic and Agricultural aspects. MINUGUA. Nov. 1999

⁷ “Rural Development Towards a Minimum Stage” Eugenio Incer, Guatemala News, March 2000

⁸ It is principally based on the report from United Nations, “Guatemala: the rural face of the human

(a) Immigration to Mexico

Mainly, from San Marcos, Huehuetenango and Quetzaltenango 90,000 people immigrate to Mexico per year, basically to Chiapas as farm workers.

(b) Immigration to the United States

In the decade of the 70s, there were already migrants to the United States. Though there are no precise data, it is said that 1,200,000 Guatemalan people live in the United States at present.

It is informed that there are migrants to the United States in the Study area, especially from Quetzaltenango and Totonicapán.

(c) Introduction of vegetable crops and the expansion of the labor market in the highland communities.

Starting from the end of the 70s the non-traditional agricultural exportations emerged. It is estimated that as far as 100,000 small producers are involved with the vegetables.

With the introduction of the farming of vegetables a new market is generated in the communities of the Highlands. At the same time the immigration level is lowered to the south coast property. Women were also involved in the activities related to the vegetables and the participation of the family agriculture in the market.

(d) Work in the factories and the remoteness of the Agriculture

In the areas that there is a possibility to obtain jobs in the factories or in the cities with a professional job, the young people do not want to work in the field. The salary started to rise for farm workers. However, this does not happen because of the salary, it happens because of the agricultural appreciation. It is observed more in Chimaltenango and they can affect the intensive agricultural development like the vegetable.

(3) Health

(i) National Health Policy

Following the strategies agreed in the Peace Agreement between the representatives of the government and the guerrilla, the previous government formed the health policy for the 1996-2000, which incorporate and support the reform to increase national income, control the fiscal deficit and increase spending in the social sectors. One of the important complements for the

reform was the budget allocation to the municipalities. From the allocations made by the central government, which is 8% of the national budget, at least 90% have to be allocated to programs and projects of education, preventive health, infrastructure and public services to improve the quality of life of people. The health policy under the previous government includes the following aspects:

- (a) Institutional development emphasizing on decentralization for increased efficiency and effectiveness
- (b) Strategic development of human resources
- (c) Improved intra and inter-sectorial coordination
- (d) Coordination and optimization of international cooperation
- (e) Increased basic health care services with quality and sustainability
- (f) Improved health sector financing
- (g) Improved basic sanitation and environmental health
- (h) Improved access to essential drugs and improved use of traditional medicines
- (i) Development and strengthening of the sector for integral health of the people

(ii) Organization of the Health Sector

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 Mayan tradition.

The total coverage of health services in mid-1999 was 67%, being distributed as follows: 24% of the population was covered by the Ministry of Public Health and Social Assistance (MSPAS), 18% by SIAS, 17% by the Guatemalan Social Security Institute (IGSS) and 8% by others⁹. In order to increase the coverage an Integrated System of Health Care (SIAS) was designed to provide basic health care services to the population which did not have access to any health services. Under SIAS the MSPAS contracts with local NGOs for provision and/or administration of basic health services to the communities without access to health centers and/or health posts. Contract is made for population of each 10,000 as a unit for the period of one year. In

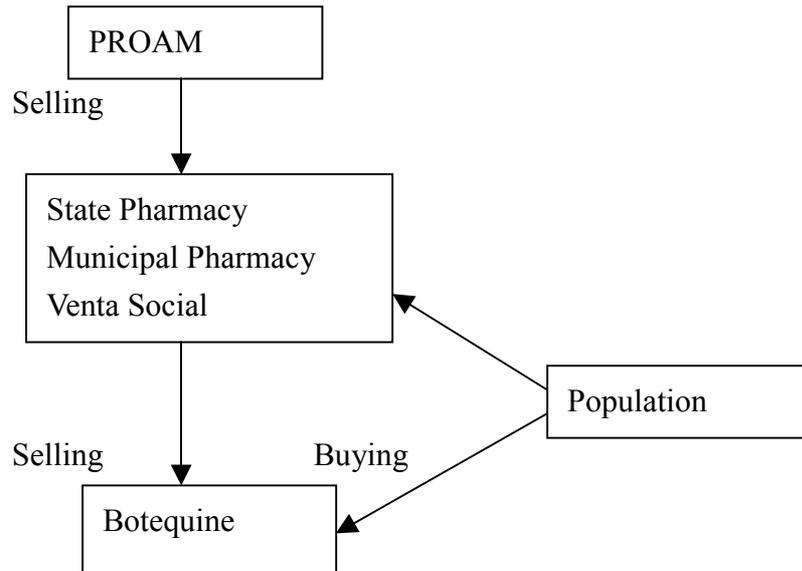
⁹ OPS, La salud en las Americas, edicion de 1998, Volumen II, p.294

communities covered by SIAS the people are taken care by volunteer health promoters (vigilantes or guardines), facilitators who supervise health promoters, and traditional birth attendants (TBAs, or comadronas) supported by a team of a physician and an auxiliary nurse or a technician, which visits each community once a month to provide out-patient care and immunization. According to MSPAS as of 1999 35% of the population is covered by SIAS, 11% still uncovered by any health services.

Quality of Services provided under SIAS by various local NGOs is often worried. There are some donor-funded projects aiming at quality assurance of health services under SIAS, such as USAID-funded Quality Assurance Project.

PROAM (Programa de Accesibilidad de Medicamentos)

It is the Program of Drug Accessibility by Ministry of Public Health and Social Assistance (MSPAS), which was created in order to increase the coverage of quality basic drug with accessible price. It has to meet some criteria for being entitled to buying drugs from PROAM. The criteria include geographical location, sanitary situation and physical facilities. As well, the requirements for the opening of 'Venta Social (Social Sales of Drugs)' or Municipal Pharmacy for PROAM includes a variety of legal document, among which the most important is certificate and diplomas as Auxiliary Pharmacist of those who will be in charge of the pharmacy. More than 150 drugs and supplement vitamins can be obtained through PROAM, which can cure or prevent 95% of diseases in Guatemala. The PROAM drugs can be purchased at State Pharmacy, Municipal Pharmacy, 'Venta Social' and 'Botequine Rurale (Rural first aid Box)'. Disadvantages, which PROAM may have, are (1) PROAM access point is only in Guatemala City, (2) Drugs, which can be obtained from PROAM at one time, may sometimes not be sufficient.



CEGIMED (El Centro Guatemalteco de Informacion de Medicamentos)

CEGIMED was found in 1988 in order to respond the needs for drug related scientific information. It is formed by faculty of chemical and pharmaceutical science of San Carlos University, Ministry of Public Health and Social assistance and OPS (Pan-American Health Organization). CEGIMED is designed with the aim of organizing and training auxiliary pharmacist. Since the beginning, it gave the training in rural areas, while since 1999 it started training course for Auxiliary pharmacist and for those in charge of First Aid Box.

(iii) Health Financing in the Country

During the 1995-1997, the percentage of national spending on health (both public and private) with relation to GDP was around 2.2%. The national health spending during the same period was financed the most by the households (about 33%), followed by IGSS (about 30%), MSPAS (about 28%) and NGOs (about 4%) as shown in the following table. The spending on drugs was 20% of total spending on health. The public spending on health in 1997 and 1998 reached 1%, achieving the goal proposed by the Peace Agreement.

National Health Spending by sector and institution

| | Institutions | 1995 | | 1996 | | 1997 | |
|---------|-------------------|-----------|--------|-----------|--------|-----------|--------|
| | | Million Q | % | Million Q | % | Million Q | % |
| Public | MSPAS | 542 | 28.51 | 544 | 26.58 | 719 | 29.59 |
| | IGSS | 529 | 27.83 | 618 | 30.19 | 742 | 30.53 |
| | Other ministries | 53 | 2.79 | 14 | 0.68 | NA | NA |
| | Social Funds | 3 | 0.16 | 8 | 0.39 | 8 | 0.33 |
| | Sub Total | 1127 | 59.28 | 1184 | 57.84 | 1469 | 60.45 |
| Private | Households | 623 | 32.77 | 690 | 33.71 | 764 | 31.44 |
| | NGOs | 76 | 4.00 | 88 | 4.30 | 101 | 4.16 |
| | Private insurance | 75 | 3.95 | 85 | 4.15 | 96 | 3.95 |
| | Sub Total | 774 | 40.72 | 863 | 42.16 | 961 | 39.55 |
| | Grand Total | 1901 | 100.00 | 2047 | 100.00 | 2430 | 100.00 |

Source: United Nations System

(iv) Population

Based on the 1994 census the total population of Guatemala as of 1999 is estimated to be about 11.0 million. The age distribution shows that it is predominantly young, 44% is younger than 15 years and only 3.4% is older than 65 years of age. About 65% of the population is living in the rural area while 35% living in the urban area. The indigenous population represents 79.5% of the population in the rural area and 20.5% of the population in the urban area.

The population increase rate as of 1998/99 is estimated to be 2.6% at national level, and the total fertility rate (TFR) is 5.0 children per woman of reproductive age (15 – 49 years old). The TFR is higher in the rural area (5.8) than in urban area (4.1), and it is higher among indigenous women (6.2) than among non-indigenous (ladino) women (4.6).¹⁰

(v) Migrant workers

About 800,000 people, or about 12% of the country's total rural population, migrate from the highlands to the large farms along the southern coast of Guatemala in search of work each year. The migration of these people during harvest seasons means that they often do not receive health care in the places of origin, and they also fail to receive it on the farms where they are hired; because they are temporary workers, their employers do not register them with the social security system. Movement of the people also implies transmission of infectious diseases between different places.

¹⁰ INE, MSPAS, USAID, UNICEF, UNFPA, DHS/Macro International Inc. Guatemala Encuesta Nacional de Salud Materno Infantil 1998-1999, July 1999

(vi) Health Conditions in Guatemala

Guatemala's approximately 55% indigenous population has one of the worst health profiles for women and children in Latin America, particularly for the rural Mayan women and children in the highlands.

The following table shows the some of the basic health indicators of Guatemala in comparison with other Central American countries.

Health Indicators of Central American Countries

| Country | IMR (per 1,000 live births) | Life Expectancy at birth | | MMR (per 100,000 live births) | Delivery attended by trained health personnel (%) | Access to safe water (%) |
|-------------|-----------------------------------|-----------------------------|-------|-------------------------------------|---|--------------------------------|
| | | Men | Women | | | |
| Guatemala | 46 | 61.4 | 67.2 | 190 | 35 | 67 |
| Belize | 29 | 73.4 | 76.1 | NA | 79 | NA |
| Costa Rica | 12 | 74.3 | 78.9 | 55 | 97 | 100 |
| El Salvador | 32 | 66.5 | 72.5 | 300 | 87 | 53 |
| Honduras | 35 | 67.5 | 72.3 | 220 | 55 | 77 |
| Mexico | 31 | 69.5 | 75.5 | 110 | 75 | 95 |
| Nicaragua | 43 | 65.8 | 70.6 | 160 | 61 | 62 |
| Panama | 21 | 71.8 | 76.4 | 55 | 84 | 84 |

IMR: Infant Mortality Rate

MMR: Maternal Mortality Rate

Source: UNFPA, The State of World Population 1999

(vii) Principle Causes of Morbidity and Mortality in the Country and the Study Area

(a) Acute respiratory infections and diarrhea

Acute respiratory infections and diarrhea are the leading causes of morbidity and mortality for the country and the study area. Most children suffer an average of five to eight episodes a year, which means that these infections represent a tremendous economic burden for families and for the country. The knowledge and practice of care of diarrhea among mothers has improved during the past 10 years, thanks for the campaigns and other actions to promote the knowledge and use of the oral rehydration salt (ORS).

(b) Nutritional Deficiencies

Nutritional assessment among children under 5 revealed that the prevalence of chronic malnutrition (height-for-age) was 46.4% at national level (DHS 1998/99). In the South-Occident Region, where Sololá, Totonicapán and Quetzaltenango belong to, the prevalence was higher (54.8%) than the national average. Prevalence was higher among indigenous children (67.3%) than among ladino children (34.1%) and also higher among children in rural area (54.4%) than those in urban area (32.4%). The prevalence of

acute malnutrition (weight-for-height) was 2.5% as shown in the following table.

Nutritional Status of Children Under Five 1998/99

| Characteristic | Chronic malnutrition (height-for-age) % | Acute malnutrition (weight-for-height) % | Global malnutrition (weight-for-age) % |
|--------------------|--|---|---|
| Residence | | | |
| Urban | 32.4 | 2.0 | 15.6 |
| Rural | 54.4 | 2.8 | 29.1 |
| Region | | | |
| Metropolitan | 28.6 | 2.3 | 18.9 |
| North | 56.7 | 0.3 | 19.4 |
| North-east | 49.1 | 5.8 | 29.1 |
| South-east | 45.6 | 1.9 | 21.4 |
| Central | 45.5 | 2.5 | 21.7 |
| South-west | 54.8 | 2.7 | 29.4 |
| North-west | 69.2 | 2.5 | 33.4 |
| Peten | 46.2 | 1.7 | 19.8 |
| Ethnic group | | | |
| Indigenous | 67.3 | 2.2 | 33.6 |
| Ladino | 34.1 | 2.7 | 18.6 |
| Mother's education | | | |
| No education | 64.4 | 3.0 | 34.8 |
| Primary | 44.5 | 2.6 | 22.4 |
| Secondary + | 12.7 | 1.1 | 6.5 |
| Total | 46.4 | 2.5 | 24.2 |

Source: DHS, Encuesta Nacional de Salud Materno Infantil 1998-1999

Nutritional assessment of children through the Sentry School Program initiated in 1994 revealed that the prevalence of chronic malnutrition (height-for-age) among children aged 6 – 9 was 83% among female and 85% among male at the national level. Three provinces of the study area with exception of Quetzaltenango showed the higher prevalence of chronic malnutrition. The prevalence of acute malnutrition among children of same age was 9% among female and 10% among male.

Nutritional status of children is good while they are breast-fed (up to about 6 months) and starts when they are given complementary food. The prevalence of malnutrition is associated with access to food, mother's education and birth interval.

In 1995 the prevalence of anemia was 35.4% among women of reproductive age, 39.1% among pregnant women and 26.0% among children aged 1 – 5. The prevalence of vitamin A deficiency among children aged 1 – 5 is

estimated to be 15% at national level. The prevalence of goiter and vitamin A deficiency are said to have decreased by the salt iodination and vitamin A fortification to sugar, but quality control is still worried.

(viii) Other diseases

(a) Malaria

The malaria's area comprises 80% of the country's total surface area and totally or partially encompasses 20 of its 22 provinces with exception of Totonicapán and Sacatepequez. In the highlands of the Study Area, malaria is not a serious health problem thanks for the climate conditions. However, the migration of people living in the highlands during the harvest season to the coastal area, bring in the risk of people getting the infection.

(b) HIV/AIDS

The first case of AIDS was reported in 1984 in Guatemala. Until December 1999 total accumulated number of AIDS cases reported was 3,411, 75.64% men and 24.36% women. 88.48% of the reported cases have been in the 15-49 age group; both sexually and economically active age group. Modes of transmission were: 93.52% sexual contacts, 2.35% blood and blood products and 4.13% prenatal (vertical transmission from mother to child during pregnancy, birth or breastfeeding). In the Study Area the Province of Quetzaltenango has the second largest number of reported cases after Guatemala, the Capital.

(c) Diseases among adults

Although the infectious diseases such as ARI and diarrhea and malnutrition continue to be principal causes of mortality and morbidity, the importance of chronic diseases such as cancer and diseases associated with arterial hypertension is also increasing, indicating epidemiological transmissions taking place.

(ix) Maternal Health

50% of deliveries take place at home attended by traditional birth attendants (comadronas) at national level. In the Study Area more than 80% of deliveries are attended by comadronas with exception of Quetzaltenango. In most rural communities there are about two comadronas. Number of health facilities where deliveries can be attended is quite limited: only hospitals, health centers of type A, and some private clinics. During the past 10 years the MSPAS and many NGOs have been carried out training of comadronas promoting clean and safe delivery at community level and encouraging referral

of pregnant women with risk to the health institutions. However, considering difficult access from rural communities to health facilities capable of providing emergency obstetric care in the Study Area, the maternal care in those areas should be further improved.

Various studies on maternal mortality suggest that there is 42 to 66% of under-recording of maternal deaths.

(4) Rural Infrastructures

(i) Roads

The road infrastructure in Guatemala is divided in four classes: central American, national, provincial and rural roads. The General Management of Roads from the Ministry of Transportation, Infrastructure and Houses in coordination with the respective Committees of Urban and Rural Development are in charge of the construction and maintenance of these roads, with the exception of rural roads.

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 lined, which makes the transiting and transporting of merchandise very difficult in the rainy seasons as shown in the following table.

Road System in the Study Area

| Province | Central American | | National | | Provincial | | Rural | Total |
|----------------------|------------------|-------|----------|-------|------------|-------|-------|--------|
| | Asphalt | Earth | Asphalt | Earth | Asphalt | Earth | Earth | |
| Chimaltenango | 63 | 0 | 42 | 34 | 70 | 179 | 343 | 731 |
| Sololá | 53 | 0 | 86 | 10 | 73 | 89 | 99 | 410 |
| Totonicapán | 61 | 0 | 15 | 42 | 22 | 92 | 353 | 585 |
| Quetzaltenango | 58 | 0 | 122 | 28 | 100 | 142 | 172 | 622 |
| Total of 4 Provinces | 235 | 0 | 265 | 114 | 265 | 502 | 967 | 2,348 |
| Total Guatemala | 2,102 | 44 | 967 | 1,316 | 1,767 | 4,825 | 3,067 | 14,118 |

Source: MTIV Dirección General de Caminos, 1999.

(ii) Electricity, Potable Water and Sanitation

The electricity service is set up and planned by every Committee of Urban and Rural Development in its respective areas. Its construction, operation and maintenance are carried out by INDE. The statistics indicate that the coverage of electricity services is still less than 60% of the population in the year of

1994.

The Ministry of Public Health and Social Assistance (MSPAS), in coordination with INFOM and other state organizations stimulates the policy of access and coverage of potable water service, and every municipality is obligated to supply the respective communities with potable water. The elimination and disposal of excrete and black waters are the MSPAS' duty coordinated with every municipality. The MSPAS is in charge of the quality regulations for the services of potable water, disposal, elimination and discharges of black waters.

The coverage of the electricity, water and latrine services is showed in the following table.

Coverage of Potable Water, Latrines and Electricity

| Province | Total of houses | Potable Water | | Latrines | | Electricity | |
|-------------------|-----------------|---------------|------|----------|------|-------------|------|
| | | houses | % | houses | % | houses | % |
| Chimaltenango | 59,795 | 45,888 | 76.7 | 15,363 | 25.7 | 35,366 | 59.1 |
| Sololá | 40,455 | 34,331 | 84.9 | 5,691 | 14.1 | 21,982 | 54.3 |
| Totonicapán | 47,323 | 33,533 | 70.9 | 4,935 | 10.4 | 26,500 | 56.0 |
| Quetzaltenango | 92,536 | 63,180 | 68.3 | 28,100 | 30.4 | 57,299 | 61.9 |
| Total 4 provinces | 240,109 | 176,932 | 73.7 | 54,089 | 22.5 | 141,147 | 58.8 |
| Total Guatemala | 1,553,708 | 1,055,960 | 68.0 | 491,110 | 31.6 | 864,211 | 55.6 |

3.1.3 Institution for Development

(1) Organizations involved in the development process (Figure 3.1.3(1))

Many organizations and many channels for the rural development exist. In the process of decentralization, Social Funds have much increased and the Ministries themselves have concentrated their duties on formulation of policies and arrangements among relevant authorities concerned and are instituting the new alternative systems like SIAS, PRONADE, etc.

There are certain reasons to manage this course, however many problems have arisen. In the report from the World Bank, "Guatemala Investing for Peace" of 1997, they have recommended that the copy and the fragmentation be eliminated by creating more funds; and that the coordination mechanisms be expanded by means of more specialization of each fund in certain activities with simplified restructured processing.

However, copies are still observed without coordination, because there is lack of

supervision system for the NGO projects and constancy contracted by the State. More about the paternal practices are also mentioned around the Social Funds, etc.¹¹

Other institutions that relate with rural development are Municipalities and Development Councils [See Section 3.1.1(1)]. The municipalities are the basis of decentralization and rural development, however they have administration problems.

In case of MAGA, they have a plan to obtain technicians in the local councils and the Land Fund also has some pilot programs of technical assistance with its own personnel.

(2) Ministry of Agriculture, Livestock and Food (MAGA) and Decentralized Organizations (Land Fund, BANRURAL, etc.)

(i) Organizational Structure of MAGA

The Ministry of Agriculture, Livestock and Food (MAGA) is made up of three groups of institutions (Figure 3.1.3(2))

- (a) Centralized Institutions
- (b) Functional Autonomy Institutions, like the National Forest Institute (INAB), in charge of the forest politics; The Rural Development Bank (BANRURAL) responsible of implementing the credit politics; and the Science and Agricultural Technology Institute (ICTA), responsible of the agricultural investigation; and the Land Fund (FONTIERRAS).
- (c) Special execution units, like the Institutional Committee for the Development and Strengthening of the Property of the Land (PROTIERRA), the Action Plan for the modernization and encouragement of the Low Risk Agriculture (PLAMAR), and the Fruit Farming Development Project (PROFRUTA).

As part of the centralized institution, MAGA has the offices of Provincial Coordination, which function as a link mechanism with the field.

(ii) The MAGA Mission

MAGA defines its functions as: “Consensus and administrate politics, generate norms and regulations, that may simplify the productive sector , the use of public resources and the benefit access of the State, and the supervision and impact evaluation of the investments in the productive development of the

¹¹ P.13 “Situation of the commitments about the Social-economic and Agricultural Aspects, MINUGUA, Nov. 1999

country.” The MAGA Mission is defined like the institution in charge of consensus and administrating politics and strategies that propitiate the sustainable development of the agricultural, forest, and hydro-biological sectors. The reasons previously stated, MAGA is defined as an institution whose functions are not to execute, but to establish norms, regulate, simplify, coordinate and evaluate actions within the Farming and livestock, forest and hydro-biological sectors.

(iii) MAGA Politics

The Agricultural Politics and the Sectorial of the Ministry of Agriculture, Livestock and Food, seeks to provoke a positive change in the actual tendencies of the agriculture and the renewable natural resources, to “Contribute to the bettering of the quality of life of the rural population which depends directly and indirectly of the agriculture and of the natural resources”; throughout a) achieve the sustainability of the agriculture; b) propitiate the competitiveness and rising of the sector; c) stimulate the private and public investment in the sector; e) achieve the food security of the Guatemalan population; f) expand and strengthen the organization and the sectorial management; and g) modernize the institutionality of MAGA.

(iv) Forum for Consulting and Arrangement

- (a) CONADEA (National Council for Agriculture and Livestock Development) was created in 1995 and has recognized as “Principal mechanism of consulting, coordination and social participation in the decision making for rural development.” Representatives of various sectors like Cooperatives, NGO’s, ANACAFE, AGEXPRONT, Farmers Organization gather monthly,
- (b) RADEAS (Network of agents for the Sustainable Agricultural and livestock Development) RADEAS is a space for the participation of the Civil Society at a province level to define and extend strategies and actions for development, and to give priority and act to needs. Now about 10 provinces are functioning with the participation of NGO’s, Cooperatives, Associations etc. However, they don’t have enough resources for their functioning.

(3) Land Fund

The land Fund was founded in June 1999, absorbing “Fideicomisos del Fondo de Tierras Acuerdo de Paz” that had been functioning since May 1997. Before that time, FONATIERRA of INTA was in charge of land distribution.

The Land Fund is a decentralized entity of State, whose objective is to promote the access of rural people to the land. To fulfil this objective, this fund carries

out these functions.

- (i) Impulse a active and transparent land market
- (ii) Facilitate the land acquirement and technical and judicial assistance.

The Land Fund plays an intermediary role between offer makers and demanders of the land. To the beneficiaries, Banks like BANRURAL concede credits with mortgage of the domain.

(4) FONAGRO

FONAGRO (National Fund for the Reactivation and Modernization of the Agriculture and livestock activities) was founded in 1994 as the financial instrument of MAGA to impulse the agricultural sector. Cooperatives, NGO's, Farmers' Association and Rural Women Organization etc., have access to the resources of the Fund. The funds that come from the 2KR program from Japan enter in this Fund.

(5) BANRURAL (Rural Development Bank)

BANRURAL is a banking entity conformed as an incorporated company of mixed capital, which does all kinds of operations as a commercial bank.

The objective of BANRURAL is to promote economic and social development of the rural area, and it is oriented to finance agricultural activity, craftsmanship and commerce etc as shown in the following table.

Destiny of Credits of BANRURAL 1999

| Destiny | Total Quetzals | Number of client | Quetzal par Client | Percentage of client |
|------------------------|----------------|------------------|--------------------|----------------------|
| Agriculture | 371,182,000 | 190,498 | 1948 | 34% |
| Livestock | 53,795,000 | 15,290 | 3518 | 3% |
| Housing | 79,033,900 | 15,791 | 5005 | 3% |
| Micro-medium Company | 167,984,929 | 143,696 | 1169 | 26% |
| Financial Intermediate | 146,000,000 | 107,345 | 1360 | 19% |
| Cooperative credit | 101,380,832 | 80,860 | 1254 | 14% |
| Other destiny | 19,396,741 | 9276 | 2091 | 2% |
| Total | 938,773,402 | 562,756 | 1668 | 100% |

Source : Memoria de labores 1999 , BANRURAL

Another important function of BANRURAL is “ Second level credits”. BANRURAL gives resources to cooperatives and NGO's etc., which provide services in rural areas. Also, BANRURAL accepts non-conventional guarantees such as household goods, machinery and so on. With this change, they make a

broad possibility to grant credits to those who didn't have any access to one without having a registered title of property.

BANRURAL manages resources from several trust funds like Land Fund, Fonagro, Plamar, Prozachi etc.

(6) INAB (National Institute for Forests)

INAB is an autonomous decentralized state entity that was created in 1997. The objective of INAB is to promote and foster the country's forestry development through sustainable forest management, reforestation, forestry industry and handcrafting.

The important activities of INAB are the following:

- (i) Management Plan: For the exploitation of forests, a Plan for the Sustainable Forest Management is required, approved by INAB.
- (ii) Forestry Incentive Program (PINFOR): Grant incentives to landowners (from small to large) of the lands with a forestry vocation, including municipalities who are dedicated to reforestation projects.
- (iii) Forest fire control
- (iv) Control of cutting: In fact it is difficult to control cutting.
- (v) BOSCOM: Municipality's and Communal Forestry reinforcement program is a new project of INAB, which tries to reinforce the technical and administrative capacity of Municipalities and rural communities, to incorporate communal forests into sustainable management, in a way that it will contribute to improve life quality. Now they started to work in 13 provinces. Within this program, they also support the implementation of "Municipal Forestry Offices".

(7) CONAMA (The National Commission for environment)

The CONAMA was created according to the decree No.68-86 "Environmental protection and improvement law", which directly depends on the Presidency. Its function is to advise and coordinate all kinds of actions for the protection and improvement of natural resources. The approval of Environmental impact studies is also one of the activities of CONAMA. According to the UN¹² report, CONAMA only has 49 people in total, especially in the interior of the country where only 12 persons work.

(8) CONAP (National Council for Protected Areas)

CONAP was created according to the Protected Areas Law in 1989 to conserve,

¹² pp. 174-175 Naciones Unidas, 1999 *ibid*.

protect, manage and administrate the protected areas. These areas include Biosphere reservation, private natural reservation, cultural monuments and national and regional parks etc., whose areas reach about 30% of the national territory. CONAP is in charge of 78% of protected areas. (99 areas within 123 protected areas.

CONAP is in charge of most of the province of Sololá, as the Area of Multiple Uses “Lake of Atitlán”, and the Association of Friends of the Lake of Atitlán; as well as other organizations who also presented a “Master Plan for the Management of the Protected Area of Multiple Uses Atitlán” to CONAP in August 1999.

(9) FIS (Social Investment Fund) ¹³

The Social Investment Fund was created in 1993 as a decentralized autonomous state entity with judicial personality and proper patrimony.

This fund has stimulated the investment to overcome the condition of poverty in rural area. During the first years of implementation, they gave more priority to the education sector. Water and Sanitary sector has importance. In the years of 98 and 99 new orientations are taken of investments such as access roads and bridges for vehicles.

The total amount of investments reaches Q388.651 thousand (1998). The provinces, which more investment receives, are Quiché, San Marcos and Alta Verapaz as shown in the following table.

Participation of investment for Sector 1995-1999(%)

| Sector | 1995 | 1996 | 1997 | 1998 | 1999 |
|------------------------|--------|--------|--------|--------|--------|
| Health and Nutrition | 6.6% | 6.8% | 4.5% | 6.1% | 7.6% |
| Water and Sanitary | 8.4% | 9.2% | 12.4% | 12.9% | 22.4% |
| Education | 76.0% | 71.4% | 59.4% | 50.6% | 33.5% |
| Environment | 4.1% | 8.1% | 12.7% | 8.0% | 6.5% |
| Transport | 1.4% | 1.0% | 3.5% | 18.1% | 22.1% |
| Agri and livestock | 3.1% | 3.4% | 3.2% | 3.6% | 7.2% |
| Pre-inverition and POC | 0.4% | 0.1% | 4.3% | 0.7% | 0.7% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Note: Number of 1999 is programmed.

¹³ Description about these fonds is based on the “ informe Global de Fondos Sociales Guatemala 1998”.

Activities in each sector

| | |
|----------------------|--|
| Health and nutrition | Promoter capacitating, School breakfast, Construction and equipment of health post |
| Water and Sanitary | Toilet, Potable water, drainage, |
| Education | School construction and equipment, Literacy, capacitating for teacher etc |
| Environment | firewood saving stove |
| Transport | Bridge and access road construction |
| Agri & Livestock | Irrigation System |

For the carrying out of these extensive activities, FIS makes agreements with governmental, no-governmental organizations such as PRONADE (Ministry of Education), FONAPAZ, INFOM, IICA, WFP, CADISOGUA (NGO's) etc.

(10) FONAPAZ(National fund for the peace)

FONAPAZ was created in 1991, with the purpose of carrying out programs and projects to solve the problems to which the population is affected by armed conflicts confronts, as well as to coordinate and supervise activities of Ministries, NGO's, churches etc., for the benefit of the affected population. The total amount of investment was Q638, 108 thousand (1998) as shown below.

Investment for Sector

| Sector | 1995 | 1996 | 1997 | 1998 | |
|-------------------------|--------|--------|--------|--------|---|
| Health | 2.9% | 1.7% | 0.8% | 10.9% | construction & equipment of health post |
| Water & Sanitary | 6.8% | 7.9% | 6.7% | 1.9% | potable water |
| Environment | 0.0% | 0.0% | 0.1% | 0.0% | waste treatment |
| Education | 19.8% | 17.6% | 16.4% | 3.2% | school construction and equipment |
| Housing | 10.1% | 6.0% | 3.3% | 3.6% | Housing |
| Transport | 9.1% | 13.1% | 37.3% | 42.3% | road and bridge |
| Institutional Reinforce | 18.1% | 13.3% | 14.5% | 5.6% | technical and financial support |
| Peace Process | 28.2% | 43.7% | 13.4% | 30.9% | agricultural material |
| Preinversin study | 1.4% | 0.5% | 0.3% | 0.0% | |
| Production, Employ | 3.6% | ? | 8.8% | 0.6% | |
| Judicial Security | 0.0% | 0.0% | 0.0% | 4.6% | Equipment of National Civil Police |
| Disposable balance | 0.0% | 1.5% | 1.7% | 0.0% | |
| Total | 100.0% | 105.3% | 103.3% | 103.6% | There are same mistake in the source |

Just like FIS, FONAPAZ covers several sectors and has increased the investment for transport these years. With the information acquired, it is not clear which province receives more investment. The province of Guatemala is also assigned certain part (13% in 1998).

FONAPAZ also has several agreements with international, national and,

governmental organizations. Two thirds of the agreements was subscribed with municipalities in 1999, however the difficulty of implementation through municipalities is mentioned.

(11) FSDC (Solidarity Fund for Community Development)

FSDC was created in 1992 with the object to promote and develop communities by respective municipalities. This fund was carried out through Urban y Rural Development Councils, which allows the transference of resources at the request of the population’s needs. This fund only depends on internal resources, and it is under audit of (General Account Controller), because their resources came from The State’s General budget. During 1998, FSDC carried out Q 488.250 thousand as shown below.

Investment for Sector (%)

| Sector | 1995 | 1996 | 1997 | 1998 |
|------------------------------|------|------|------|------|
| Transport | 42% | 26% | 39% | 29% |
| Health and social assistance | 17% | 5% | 3% | 1% |
| Water and sanitary | 2% | 23% | 22% | 25% |
| Education | 9% | 14% | 9% | 10% |
| Electrification | 28% | 28% | 21% | 31% |
| Urban Rural Development | 3% | 4% | 5% | 4% |
| Agriculture and livestock | 0.2% | 0.0% | 0.2% | 0% |

FSDC paid special emphasis of the construction for electric energy and the access roads in 1998.

(12) INFOM (Municipality Foment Institute)

The Municipality Foment Institute (INFOM) was created in 1957, as a state, decentralized, autonomous Institution with a juridical personality and proper patrimony, whose objective is to support the municipalities by providing direct service as well as technical and financial assistance.

In 1997, it was appointed as the institution in charge of “the management of policies and strategies of the Potable Water and Sanitary Sector, as well as the implementation and carrying out of the activities that come out from them”.

The total amount was Q103, 125 thousand (1998) and about 70% were assigned to the Water and Sanitary sector. The destiny of funds changes each year as shown below.

Investment for Sector (%) 1995-1998

| Sector | 1995 | 1996 | 1997 | 1998 | |
|------------------------------|-------|-------|-------|-------|--------------------------------------|
| Urban and Rural Development | 17.3% | 34.6% | 8.5% | 25.6% | markets, mini building, social Salon |
| Transport | 19.0% | 13.1% | 4.0% | 1.7% | bridge and wall |
| Energy | 8.3% | 15.8% | 0.6% | 0.5% | Electrification |
| Health and social assistance | 1.6% | 1.6% | 0.7% | 0.5% | Health Center |
| Water and Sanitary | 44.3% | 27.2% | 84.2% | 69.6% | Drainage |
| Education | 9.5% | 7.7% | 2.0% | 2.1% | School |

Another important activity of INFOM is the financial assistance to local government. In 1998, it conceded Q358,073 thousand to 217 municipalities for Transport, Urban Rural Development etc. But now many municipalities have debt problems.

Within the decentralization process, INFOM plays an important role for the municipal reinforcement. For example, RENICAM (National network of institutions of training for municipal reinforcement) have carried out programs for municipal human resource capacitating. They also give municipal finance advise.

(13) FODIGUA (Guatemalan Fund for Indigenous Development)

This fond was created in 1994, with the object to support and reinforce the process of sustainable and self-manageable human development for the indigenous population. This fund supports and finances projects such as social development; socio-productive, infrastructure, institutional reinforcement and human resource formation. The total amount of investment was Q. 29543 thousand, in 1998, which means less than 8% of the amount of FIS. In addition, 20% of funds came from FONAPAZ. This fond assigns great part of investment to electrification and infrastructure sector that reaches 65.7%. (1998) as shown below.

Investment for sector (%) 1996-1998

| Sector | 1996 | 1997 | 1998 |
|-------------------------|-------|-------|-------|
| Health | 31.6% | 14.3% | 0.5% |
| Education | 31.1% | 9.4% | 7.0% |
| Housing | 2.0% | 2.1% | 8.7% |
| Agriculture & Livestock | 11.8% | 15.3% | 6.1% |
| Infrastructure | 7.8% | 11.1% | 19.0% |
| Energy | 15.5% | 46.6% | 46.7% |
| Socio-productive | 0.0% | 0.0% | 10.3% |
| Industry and Commercial | 0.1% | 1.4% | 0.0% |
| Multi-sectral | 0.0% | 0.0% | 1.8% |

(14) FOGUAMA(Guatemalan fund for the environment)

This fund was created in 1997, attached to the National Commission for Environment (CONAMA). The objective of FOGUAMA is the financing of sustainable environmental development projects like solid waste and sewage treatment, forest fire identification, forest coverage monitoring and institutional reinforcement.

Unlike other funds, the resources are assigned to governmental institutions and municipalities as shown below:

Investment for Institutional Support

| Institution | Amount (Q1,000) | % | Type of finance |
|--|--------------------|-------|-----------------|
| National Commission for Environment | 1048.4 | 24.1 | Grant |
| Authority for sustainable management of basin and Lake Atitlan and their environment | 490 | 11.3 | Grant |
| Ministry of Agriculture, Livestock and Food | 500 | 11.5 | Grant |
| National Institute for Forest | 1,275.0 | 29.3 | Grant |
| Municipality | 1,031.8 | 23.8 | Loan |
| Total | 4,345.2 | 100.0 | |

(15) NGOs

(i) Definition of NGO

NGO is one of the most important institutions in the filed of socio-economic development at community level. However, no specific law or regulation exists under the present legal framework in Guatemala and hence there is no clear definition for NGO.

Considering this unorganized situation, the United Nations Development Program (UNDP) gives a definition for NGO in their publication¹⁴ with the following criteria:

- (a) Private and non profit-making organizations that their activities are in the promotion of human development,
- (b) Promoting the programs for external individuals to the organizations,
- (c) Having a capacity to take responsibility for their programs and actions,

¹⁴ Directorio ONG y entidades de desarrollo y derechos humanos en Guatemala, 1997, UNDP, MINUGUA, FORO

(d) Completely independent from any guiding firms.

(ii) Activities of NGO

According to the UNDP's Directory in 1997, the NGOs cover various activities such as agriculture, environmental conservation, health and sanitary, and so on. Generally, one NGO covers more than one field. The number of NGOs by their activities is shown below.

| Field of Activity | Number of NGOs* |
|---------------------------|-----------------|
| Agriculture | 142 |
| Environment | 159 |
| Promotion of handicraft | 118 |
| Human rights | 180 |
| Education | 241 |
| Production infrastructure | 65 |
| Social Infrastructure | 125 |
| Research | 192 |
| Livestock production | 109 |
| Health and sanitary | 182 |

*: Because of multiple coverage of each NGO, summation of number of NGOs will not be equal to 292.

Source: Directorio ONG y entidades de desarrollo y derechos humanos en Guatemala, 1997, UNDP

(iii) Type of NGO

NGOs can be broadly classified into to 3 types by their function and by their constituent members. The types are classified as Federation NGO, Development NGO, and Community-level Group.

(a) Federation NGO

In the national level, there is one federation named Foro de Coordinaciones de ONGs de Guatemala. Six federations are affiliated under this national federation. They are ASINDES, COPMAG, CONGCOOP, CONDE, FORO Permanente, and TZUK-KIM POP. Major functions of these federations are 1)to provide political protection for member NGOs, 2) to provide training to member NGOs in terms of management and sustainability, 3) to provide fund, and 4) to manage funds provided from external organizations such as FIS, MAGA, and so on.

(b) Development NGO

Under the federation level, there is so-called “development-level NGO”. The function of this NGO is to implement programs for communities in various fields and/or works with community level associations (farmers’ group) for socio-economic development. Some of these NGOs belong to the federation mentioned above, but there are also independent NGOs from those federations. Both international NGO and Local NGO are in operation under this category. International NGO and large scale local NGO cover several provinces, while other local NGOs covers specific area. Because of no specific registration system, total number of this type of NGOs is not clearly grasped by any organizations. However, it is roughly estimated that about 300 organizations are in operation.

(c) Community-level group

Besides above-mentioned organizations, community-level groups are also formed by community members. Farmers’ groups such as community development committee, cooperatives, women’s association are categorized as this type. Because of the unclear registration system, as in the case of the other type of NGO, total number of these groups is not grasped, either.

3.1.4 Natural and Environmental Condition

(1) Land Resources

(i) Climatic conditions in the Study Area

Most of the Study area comprises the provinces of Chimaltenango, Sololá, Totonicapán and Quetzaltenango, with a total area of about 6,050 km². Mayor part of the land in the Study area is located in the Guatemalan central Highlands, at altitude ranging mostly from 1,000 to 3,300 meters above sea level; most of the land in Sololá an Totonicapán provinces are located at altitude above 2,000 m.a.s.l; and small percentage of land in Chimaltenango province is located at altitude below 1,000 m.a.s.l; while a relatively large percentage of land in Quetzaltenango province is located at altitude below 1,000 m.a.s.l. (Table 3.1.4 (1)).

Within the Study area there are different microclimates associated with differences in altitude of the land. Mean values, minimum absolute and maximum absolute temperatures vary largely depending on the altitude of land within the Study area (Table 3.1.4 (2)). In areas located at altitude above 2,000 m.a.s.l, frosting temperatures occur during the moths from December to February. The annual average of rainfall also shows correlation to the altitude

of the zone; areas located at higher altitude register lower values of average rainfall compared to areas located at low zones. (Table 3.1.4 (3) to 3.1.4 (6)). Because of the differences in microclimates and soil conditions, in the Study area there are zones that have significant differences in irrigation requirements.

(ii) Soil and Land Suitability Classification

A general study of Guatemalan soils was made at the reconnaissance level for the entire country by Simmons and collaborators, 1954; that study includes a soil classification map at scale 1:250,000. The main characteristics of soils within the Study area are related to the volcanic origin of the soils, with the exception of relatively small areas of alluvial soils. According to the said study, the soils of Chimaltenango, Sololá, Totonicapán and Quetzaltenango are classified in groups and series; the areas and characteristics occupied by each soil series are summarized in Tables 3.1.4 (7) to 3.1.4 (10), and their geographic distribution is shown in Figs. 3.1.4 (1) to 3.1.4 (4).

The land suitability classification map of Guatemala was prepared by the national geographic institute (IGN) in 1989, following the classification system of the US Department of Agriculture (USDA). The land suitability classification for the Study area is based on the map of land classification prepared by IGN at scale of 1:500,000. The definitions of land classes according to USDA system are described in Table 3.1.4 (11).

A main characteristic of the Study area is its highly dissected mountain relive, formed mainly by land with very steep slopes, and very narrow and deep valleys. There are several volcanoes within the Study area. As an exception to the mountainous characteristic of the Study area, there are some areas of relatively large flat valleys in Chimaltenango and Quetzaltenango provinces. The land capability classification for the Study area is summarized in the following table, and their geographic distribution is shown in Figs. 3.1.4 (5) to 3.1.4 (8).

| Land Class | Study Area | | Chimaltenango | | Sololá | | Totonicapán | | Quetzaltenango | |
|-------------------------------|------------|------|---------------|------|-----------|------|-------------|------|----------------|------|
| | Area (ha) | % | Area (ha) | % | Area (ha) | % | Area (ha) | % | Area (ha) | % |
| Agri. Land Classes I-IV | 178,080 | 28.5 | 59,310 | 30.0 | 31,830 | 30.0 | 45,940 | 36.6 | 41,000 | 21.0 |
| Non-Agri. Land Classes V-VIII | 446,580 | 71.5 | 138,590 | 70.0 | 74,270* | 70.0 | 79,620 | 63.4 | 154,100 | 79.0 |
| Total | 624,660 | 100 | 197,900 | 100 | 106,100 | 100 | 125,560 | 100 | 195,100 | 100 |

Source: JICA's Study Team, based on data of MAGA, 1998.

Note: *includes the Area of Atitlan lake.

(2) Water Resources

(i) Hydrographic Basins

The Study Area is divided in 12 hydrographic basins (See Figure 3.1.4(9)): There are 9 basins in the Pacific Region (Achiguate river, Coyolate river or Xaya river, Madre Vieja river, Nahualate river, Sis-Icán river, Atitlan lake, Samala river, Ocositos river and Naranjo river), one basin of Caribbean Sea Region (Motagua river) and 2 basin of Mexican Gulf Region (Cuilco river, Salinas river or Chixoy river).

Naranjo river, Ocositos river, Sis-Icán river, born in Quetzaltenango and San Marcos Provinces; Samala river born in Quetzaltenango and Totonicapán Provinces; Nahualate river born in Totonicapán and Sololá Provinces; Madre Vieja river and Coyolate river born in Chimaltenango Province and Achiguate river born in Chimaltenango and Sacatepéquez Provinces. All of rivers in Pacific Region are short run off and their slope is steep, and the flow is very variable between dry and rainy seasons. Only characteristics of the Samala river were studied by INSIVUMEH.

Cuilco River and Salinas River (Chixoy) are originated in the north of Quetzaltenango and south of Totonicapán, respectively, and they have bigger basin areas in Guatemala, but their middle and low flow belongs to Mexico.

Only 4 basin waters have an intensive use actually: Xaya river and Pixcaya river (tributary of Motagua river) is used for water supply by EMPAGUA, the Atitlan lake, for recreational and tourism use, and the Chixoy river is used by INDE for hydroelectric power station. The uses for irrigation in the Study Area

are shown in the following table.

Irrigation Uses of Rivers

| No. | Basin | Private Irrigation | | State Irrigation | | Mini irrigation | | Total | |
|------|---------------|--------------------|-------|------------------|-------|-----------------|-------|-----------|-------|
| | | Area (ha) | Users | Area (ha) | Users | Area (ha) | Users | Area (ha) | Users |
| 1.3 | Naranjo | 150 | 2 | 1,530 | | 324 | 1,527 | 2,004 | 1,529 |
| 1.4 | Ocositos | 4,155 | 23 | 100 | | 6 | 17 | 4,261 | 40 |
| 1.5 | Samalá | 565 | 3 | 0 | 0 | 96 | 724 | 661 | 727 |
| 1.6 | Sis-Icán | 710 | 2 | 0 | 0 | 14 | 13 | 724 | 15 |
| 1.7 | Nahualate | 1,265 | 5 | 0 | 0 | 10 | 74 | 1,275 | 79 |
| 1.8 | Atitlán | 120 | 3 | 85 | 1 | 14 | 124 | 219 | 128 |
| 1.9 | Madder Vienna | 1,325 | 4 | 0 | 0 | 1 | 1 | 1,326 | 5 |
| 1.10 | Coyolate | 4,540 | 12 | 0 | 0 | 54 | 106 | 4,594 | 118 |
| 1.11 | Achiguate | 17,410 | 20 | 0 | 0 | 119 | 146 | 17,529 | 166 |
| 2.2 | Motagua | 8,630 | 11 | 3,172 | 14 | 604 | 1,303 | 12,406 | 1,328 |
| 3.1 | Cuilco | | | 0 | 0 | 243 | 602 | 243 | 602 |
| 3.7 | Salinas | | | 1,615 | 0 | 185 | 1,034 | 1,800 | 1,034 |

Source: Plan Maestro de Riego y Drenaje, MAGA, 1991

The river use projects are shown in the following tables. All the projected uses are for hydroelectric. MAGA only have mini irrigation projects with same hectares each.

Water Uses Projects

| No. | Basin | Name | Org. | Location | River | Volume 1000m ³ |
|-----|---------|------------|------|---------------------------|---------|---------------------------|
| 1.3 | Naranjo | El Quetzal | INDE | Nuevo Progreso/San Marcos | Naranjo | |
| 1.8 | Atitlán | Lago | INDE | Zunilito/Suchitepequez | Varios | 128,000 |
| 2.2 | Motagua | Varios | INDE | Varios | Varios | 17,431,500 |
| 3.1 | Cuilco | Canibal | INDE | Huehuetenango | | 400,000 |
| 3.7 | Salinas | Varios | INDE | Varios | Various | 850,675 |

Source: Plan Maestro de Riego y Drenaje, MAGA, 1991

Therefore, for irrigation development projects from rivers of pacific region, is necessary a good co-ordination of actual uses of waters, specially the uses of sugarcane fincas. For the new uses of Motagua river and Chixoy rivers waters are need a tight coordination with EMPAGUA and INDE.

There are not rivers for uses of potable water in the area, except from EMPAGUA.

(ii) Groundwater

The groundwater in the Study Area is located in volcanic rocks of Tertiary and the Pleistocene Era, and there is groundwater in alluvial sediments in Sololá Province with a high to medium potential. There are limited uses of groundwater for irrigation and in the future must be considered a good alternative of water sources. In the Table 3.1.4(14) are shown type of aquifers and their location are as shown below.

Types of Aquifers and Their Location

| Aquifer Type | Code | Material | Municipality |
|--|-------|--|--|
| Basement Rocks | I | Cretaceous metamorphic rocks, intrusive rocks | Huitán |
| Tertiary Volcanic Rocks | Tv | Tertiary volcanic rocks, latitic to dacitic welded tuff, ryolitic lava flows, andesitic/basaltic lava flows, pyroclastic flows, volcanic mud flows and tuffs | Santa Catalina Palopó, San Antonio Palopó, Santa Catalina Ixtahuacán, San José Poaquil, Momostenango, Palestina de los Altos |
| Combined area of Tertiary and Pleistocene volcanic rocks | Qp | Pumice sediments, pyroclastic flow with clastic beds | El Tejar, San Andrés Xecul, Olinstepeque, Cajolá, San Martín Sacatepéquez, Almalonga |
| | Tv | | San Juan Comalapa, San Martín Jilotepeque, Patzún, Patziciá, Zaragoza, Sololá, Santa Lucia Utatlán, Nahualá, San Andrés Semetabaj, Santa Clara La Laguna, San Francisco El Alto, San Carlos Sijá, Concepción Chiquirichapa, San Francisco La Unión |
| Combined are Tertiary rocks and alluvial deposits | TvQal | | Santa Cruz La Laguna, San Pablo La Laguna, San Marcos La Laguna |
| Holocene volcanic rocks | Qv | | Génova, Flores Costa Cuca, Colomba |

Source: The Study on Groundwater Development in the Central Plateau Area in Guatemala, JICA, 1995

(3) Environments

The main environment problems reported in the Study Area are the deterioration of the natural resources and contamination problems. The cause of deterioration of the natural resources is mainly product of deforestation and a consequence of this deforestation is a diminution of biodiversity, grow of erosion and diminution of water resources recharges. The main problem of contamination is the contamination of waters due to domestic sewer, solid waste and uncontrolled pesticides use.

(i) Forestry

The forest situation was studied in 1992 by Forest Action Plan. Their study shown that mayor coverage of forest in the Study Area is in Totonicapán with 60% of the Province surface with forest coverage, other provinces have less than fourth of surface in forests in the following table.

Forest Coverage in 1988

| Forest Type | Quetzaltenango | | Sololá | | Totonicapán | | Chimaltenango | |
|---------------------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|
| | km ² | % |
| Total | 1,951 | 100.0 | 1,053 | 100.0 | 1,061 | 100.0 | 1,979 | 100.0 |
| Conifers | 25 | 1.3 | 47 | 4.5 | 251 | 23.7 | N/A | N/A |
| Conifers (Open) | 66 | 3.4 | 14 | 1.3 | 263 | 24.8 | N/A | N/A |
| Latifoliadas | 230 | 11.8 | 32 | 3.0 | 40 | 3.8 | N/A | N/A |
| Latifoliadas (Open) | 0 | 0.0 | 9 | 0.9 | 58 | 5.5 | N/A | N/A |
| Mixtures | 72 | 3.7 | 79 | 7.5 | 31 | 2.9 | N/A | N/A |
| Mixtures (Open) | 91 | 4.7 | 17 | 1.6 | 0 | 0.0 | N/A | N/A |
| No Determined | 2 | 0.1 | 46 | 4.4 | 3 | 0.3 | N/A | N/A |
| Total of Forest | 486 | 24.9 | 236 | 22.4 | 646 | 60.9 | N/A | N/A |
| Others | 1,465 | 75.1 | 817 | 77.6 | 415 | 39.1 | N/A | N/A |

Source: Plan de Acción Forestal, 1992
Guatemala Forest Coverage 1987-88, scale 1:500,000

There are only unconfirmed estimation of the loss of forest in the Study Area, some estimation mentions forest loss of 16% in ten years (“Monografía Ambiental de la Región Sur-occidente”, ASIES, 1993). This value must be confirmed by detailed studies in the future.

There are reports of loss of forest in the isolated areas as, San Rafael Pixcayá (Chimaltenango), deforestation due to cutting young trees for consumables and construction materials, in Cabricán and Huitán in Quetzaltenango, the trees is used as firewood in the processing of lime. In San Francisco El Alto and Momostenango (Totonicapán), Nahualá, Sololá (Sololá), the pine weevils attacked the forests.

(ii) Bio diversity

In the Study Area, there are 5 life zones according to the criteria of live zones in Guatemala as follows;

- (a) Warm Sub-tropical, very humid forest (bmh-s(c)), with 23% of the surface.
- (b) Low Mountain humid forests (bh-MB) with 40% of the surface.

- (c) Low Mountain very humid forests (bmh-MB) with 31% of the surface.
- (d) Mountain very humid forest (bmh-M) with 3% of the surface.
- (e) Template Sub-tropical, humid forests (bh-s(t)) with 3% of the surface.

Life zones in the Study area are shown in Table 3.1.4(10) and distribution of zones is shown below.

Life Zone Distribution

| Provinces | Life Zone Distribution (km2) | | | | | |
|----------------|------------------------------|-------|--------|-------|---------|-------|
| | Bmh-s(c) | Bh-MB | bmh-MB | bmh-M | Bh-s(t) | Total |
| Chimaltenango | 358 | 1,079 | 370 | 0 | 172 | 1,979 |
| Sololá | 130 | 374 | 368 | 64 | 0 | 936 |
| Totonicapán | 0 | 577 | 414 | 71 | 0 | 1,061 |
| Quetzaltenango | 890 | 364 | 682 | 15 | 0 | 1,951 |
| Total | 1,378 | 2,394 | 1,834 | 150 | 172 | 5,928 |
| % | 23 | 40 | 31 | 3 | 3 | 100 |

Source:: Monografía Ambiental Región Sur-occidente, Monografía Ambiental Región Central, Asies, 1993

There are not a quantitative dates for diminution of bio diversity. For the protection of biodiversity, the Government of Guatemala established a protected zone system. The protected areas in the Study Area are shown in the following table and Figure 3.1.4 (10).

Protected Areas in the Study Area

| No. | Name | Category of Management Legal Base | | Area (ha) | Administrator |
|------|-------------------------|-----------------------------------|-------------------------------------|-----------|---------------------------------|
| 59 | Los Aposentos | National Park | Ac.Pres.26-05-55 | 15 | CONAP |
| 61 | Iximche | Monument Cultural | Ac. Ministerial Education | 50 | IDAHEH |
| 101a | San Rafael Pixcayá | Area de Protection Especial | Propuesto en dec.4-89 | | |
| 111a | Tecpán | Idem | Idem | | |
| 34 | Cuenca de Atitlán | Area Multi propósito | Ac.05-55,Dec.Ley.4-89,Ac. Gub.64-97 | 62,500 | CONAP |
| 47 | Pachuj | Reserve Natural Prohibit | Resolution CONAP 31-96 | 250 | PACHUJ S.A |
| 28 | Los Altos de San Miguel | Parque Regional | Resolution CONAP 102-97 | 16,404 | Municipalidad de Totonicapán |
| 55 | Risks de Momostenango | Parque National | Ac.Pres.26-05-55 | 240 | CONAP |
| 74 | Volcano Cuxliquel | Definite Game Reserve | Ac.Pres.21-06-56. Dec.Leg.4-89 | 164 | INAB-CONAP |
| 29 | Quetzaltenango, SAQBE | Parque Regional | Resolution CONAP 22-98 | 5,661 | Municipalidad de Quetzaltenango |
| 31 | Zunil | Park Regional | Resolution CONAP 17-96 | 4,325 | Municipality de Zunil |
| 75 | Volcano Chicabal | Definite Game Reserve | Ac.Pres.21-06-56. Dec.Leg.4-89 | 496 | INAB-CONAP |
| 81 | Volcano Lacandon | Definite Game Reserve | Ac.Pres.21-06-56. Dec.Leg.4-89 | 1,916 | INAB-CONAP |

Source: Zones Protected de Guatemala, CONAP, 2000

(iii) Soil Erosion

Same as the deforestation problem, there is not a systematic evaluation of the soil erosion problem. It exists only reports for the specific areas as, erosion problems in Cabricán and Huitán (Quetzaltenango) due a mentioned cutting of trees in the zone. In Atitlán Lake, the expansion of cultivated areas produces erosion. In María Chiquimula, Momostenango and Santa Lucía La Reforma due steep slope and little tickles of soil, the soil erosion is great.

(iv) Contamination of waters

(a) Domestic Waste Waters

There are 152 sewer systems in the Study Area, but there little system with water waste treatment and they discharged directly to the rivers without treatment. The most severe case of contamination is presented in Samala river that receipt waste waters without treatment of 5 cities with 114,534 inhabitants (Totonicapán, Quetzaltenango, San Cristóbal Totonicapán, Cantel and Salcajá cities).

The Atitlan Lake basin, as a semi closed basin need a special control because of the growing of their population in the area and the delicate equilibrium of their environment.

There are a same water quality samples near Quetzaltenango, Totonicapán, Sololá cities as shown below. This Table show that the color, turbidity, iron, total solids, maxim permissible, specially in Quetzaltenango zone.

Water Quality of Rivers

| Parameters of quality | Unit | COGUANOR Permissible maxim value | Sololá | Totonicapán | Quetzaltenango |
|-----------------------|------|--|---------|-------------|----------------|
| Color | Unit | 50 | 55 | 110 | 2250 |
| Turbidity | Unit | 25 | 26 | 50 | 1130 |
| Fluorine | Mg/l | 1,70 | 0.62 | 0.50 | 1.30 |
| Chloride | Mg/l | 600 | 29 | 110 | 420 |
| Nitrate | Mg/l | 45 | 25 | 40 | 12 |
| Nitritis | Mg/l | 0.010 | 0.08 | 0.005 | 0.25 |
| Iron | Mg/l | 1 | 3 | 15 | 2.03 |
| Hardness | Mg/l | 1500 | 175 | 136 | 136 |
| Solids Totals | Mg/l | 1500 | 391 | 431 | 2066 |
| pH | | 6.5-9.2 | 6.2-8.7 | 6.0-8.5 | 5.2-8.4 |

Source: Monograph Ambient de Sur Occident, ASIES 1993

The following table shows the sewer system in the Study Area.

Sewer Systems in the Study Area

Unit: number of communities

| Province | Type A | Type B | Type C | Sin system |
|----------------|--------|--------|--------|------------|
| Chimaltenango | 12 | 3 | 1 | 0 |
| Sololá | 7 | 1 | 0 | 11 |
| Totonicapán | 5 | 1 | 2 | 0 |
| Quetzaltenango | 13 | 5 | 2 | 4 |

Note: Type A, solo efluentes human y domestic

Tipo B, descarga mixta de efluentes humano, domestico y pluvial

Tipo C, Sistema separado

Source: Estudio del Desarrollo del Agua Subterránea en el Altiplano Central de Guatemala, JICA, 1995

(b) Agricultural chemicals

In Guatemala, agricultural chemicals of both imported and domestic ones are used. However, only data about the imported agricultural chemicals are available. This database indicated same tendencies of use of pesticides in Guatemala as shown in the following table. The importation data show a notable diminution of insecticides in seventies, due to a drastic reduction of

cotton production. Recently, The import of herbicide increases due to expansion of its use for sugar cane cultivation, and dosage of fungicides also increase because of expansion of its use for vegetables and fruits.

| Type of Agri chemicals | 1978 | | 1985 | | 1994 | | 1997 | |
|------------------------|--------|-----|-------|-----|-------|-----|-------|-----|
| | Kg. | % | Kg. | % | Kg. | % | Kg. | % |
| Insecticide | 15,655 | 69 | 1,498 | 30 | 659 | 16 | 648 | 16 |
| Herbicide | 1,856 | 8 | 703 | 14 | 1,722 | 42 | 1,536 | 38 |
| Fungicide | 586 | 3 | 2,607 | 51 | 1,501 | 37 | 1,764 | 44 |
| Others | 4,594 | 20 | 267 | 5 | 224 | 5 | 95 | 2 |
| Total | 22,694 | 100 | 5,075 | 100 | 4,106 | 100 | 4,042 | 100 |

Source: Publicación Técnica, Proyecto PLAGSALUD,OPS/OMS en Guatemala,1998

The Bank of Guatemala carried out an investigation of use of pesticides in same selected agricultural products. This study shows a quantity of use of pesticides in Guatemala as shown in the following table. Main use of pesticides is for tomatoes, chrysanthemum, cotton, beans, carnation, celery and banana. The total cost of pesticides used is for machine cropped maize, coffee, frijol, sugar cane and banana (with 90% of total use of pesticides).

Crop area, Cost and Type of Pesticides
(Utilizados en Agricultura. Temporada 1996-1997)

| Crops | Cultivated Area (mz) | Total cost Agricultural chemicals (Q/mz) | Insecticides %Cost | Fungicides %Cost | Herbicides %Cost | Nematoda %Cost |
|-----------------|----------------------|--|--------------------|------------------|------------------|----------------|
| Tomato | 8,000 | 1,716 | 29 | 70 | 1 | 0 |
| | | 1,093 | 28 | 70 | 2 | 0 |
| Chrysanthemum | | 1,691 | 53 | 46 | 1 | 0 |
| Cotton | 2,400 | 1,569 | 96 | 0 | 4 | 0 |
| Snow pea | 4,700 | 1,420 | 24 | 69 | 7 | 0 |
| Carnation | | 1,213 | 28 | 70 | 2 | 0 |
| Celery | | 1,205 | 10 | 90 | 0 | 0 |
| Banana | 19,000 | 1,121 | 26 | 47 | 8 | 19 |
| Broccoli | 4,700 | 915 | 44 | 53 | 3 | 0 |
| | | 649 | 49 | 45 | 6 | 0 |
| Onion | 1,000 | 908 | 30 | 65 | 5 | 0 |
| Col de Brussels | | 879 | 22 | 73 | 5 | 0 |
| Lettuce | | 763 | 38 | 59 | 3 | 0 |
| Melon | 5,100 | 727 | 40 | 56 | 4 | 0 |
| Coffee | 384,400 | 652 | 57 | 35 | 8 | 0 |
| | | 469 | 60 | 16 | 24 | 0 |
| Maize I | | 264 | 100 | 0 | 0 | 0 |
| Frijol | 175,400 | 105 | 45 | 55 | 0 | 0 |
| Rice | 16,900 | 414 | 31 | 54 | 15 | 0 |
| Sugar cane | 220,000 | 395 | 80 | 0 | 20 | 0 |
| | | 114 | | | | |

Source: Banco de Guatemala (1996)

The influence of pesticides in human health was studied in Guatemala, the most notable case is the intoxication of DDT in human milk. In 1971 was detected 12.2 mg/l of DDT (FAO/OMS established maxim limit of 0.05 mg/kg. for cow milks) For this cause Guatemala prohibited DDT in 1974, and since that year the contamination of DDT demitted. MSPAS has a residual pesticides control program for same local comestibles. The control is detailed in organic phosphoric pesticides. In the following table are shown the sampling results of residual pesticides in vegetables.

Organic Phosphoric Pesticides in Vegetables 1995-1996

| Product | Nos. of sample | Name of Residual agricultural chemicals | Sample number of residual Agri-chemicals | Value of residuals (mg/kg) |
|--------------------------|----------------|---|--|----------------------------|
| Tomato | 23 | Profenofos | 3 | 0.02-0.03 |
| | | Metamidofos | 3 | 0.10-0.30 |
| | | Clorpirifos | 1 | 0.02 |
| | | Diazinon | 3 | less than 0.01 |
| Chile Sweet pepper Dulce | 19 | Profenofos | 7 | 0.20-1.6 |
| | | Metamidofos | 6 | 0.33-0.90 |
| | | Metil paration | 1 | 0.10 |
| | | Diazinon | 1 | less than 0.01 |
| Potato | 20 | no | | |
| Green beans | 20 | no | | |
| Carrot | 20 | no | | |
| Lettuce | 19 | no | | |
| Broccoli | 20 | no | | |

Source: LUCAM/MSPAS, 1996

There are same data of intoxication for pesticides in Guatemala. There are more cases about intoxication for farmers of coffee and sugar cane as shown below.

Chronic Intoxication by Pesticides

Only IGSS patient 1994 and 1997

| crops | 1994 | | 1997 | |
|------------|-------|-----|-------|-----|
| | Cases | % | Cases | % |
| Sugar cane | 64 | 45 | 78 | 43 |
| Coffee | 50 | 36 | 50 | 28 |
| Maize | 8 | 6 | 11 | 6 |
| Flowers | 6 | 4 | 11 | 6 |
| Vegetables | 3 | 2 | 5 | 3 |
| Rice | 1 | 0.7 | 8 | 4 |
| Others | 9 | 6 | 19 | 10 |
| Total | 141 | 100 | 182 | 100 |

Source: IGSS

(c) Domestic Solid Waste

The collection service of domestic solid waste is not complete in urban area and is almost not in rural area. More of solid waste is dumped in rivers, contributing to the water contamination of rivers, especially near urban areas as shown below.

Municipalities with Solid Waste Collection System

| Province | Urban | Rural | Total number of municipalities |
|----------------|-------|-------|--------------------------------|
| Chimaltenango | 12 | 0 | 16 |
| Sololá | 5 | 2 | 19 |
| Totonicapán | 4 | 0 | 9 |
| Quetzaltenango | 12 | 0 | 24 |

Source: MSPAS

3.1.5 Agriculture

(1) General

The agricultural sector is the main support for the Guatemalan economy; this sector generates about 23 % of country's GDP and provides employment for about 65 % of the working rural economic active population (EAP). In three out of the four provinces that comprise the Study area, the percentage of rural people depending on agriculture as source of employment is higher than the national average; the percentage of rural EAP that depend on agriculture are about 85 % in Chimaltenango, 79 % in Sololá, and 76 % in Quetzaltenango. On the other hand, in Totonicapán, province characterized mainly as forest land, only 41 % of the rural EAP depends on agriculture as source of employment; Totonicapán is the province that has the lowest dependence in agriculture as source of job in the entire Guatemala (Table 3. 1.5 (1)).

(2) General Land Use

As indicated before, a high percentage (71.5 %) of land in the Study area is classified as none agricultural land (classes V to VIII). Also, the Study area is characterized by its high population density (Chimaltenango about 210 persons/km², Sololá 209 persons/km², Totonicapán 390 persons/km², and Quetzaltenango 260 persons/km²); the large population of the Study area depends almost entirely on the land resources for attaining their incomes, foods, and firewood for cooking. The availability of suitable land is not sufficient to satisfy the needs of the large population. The limited availability of agricultural lands and high population density are exerting high pressure on the lands not suitable for agriculture, which are being used for agriculture production without application of land conservation measures. Also, because of limited availability of land, a large number of farmers of some municipalities of the Study area, mainly in Quetzaltenango province, must migrate temporarily every year in order to get job or rent land in others provinces of the coastal lowland areas.

The present land use pattern for the Study area is summarized, in a general way, in

the table below; the details of land use patterns for each province are presented in Sections 3.2 to 3.5 (Figs. 3.2.2 (1), 3.3.2 (1), 3.4.2 (1), and 3.5.2 (1)).

| Present Land Use | Study Area | | Chimaltenango | | Sololá | | Totonicapán | | Quetzaltenango | |
|-----------------------------------|------------|------|---------------|------------|---------------|-------------|---------------|-------------|----------------|-------------|
| | Area (ha) | % | Area (ha) | % | Area (ha) | % | Area (ha) | % | Area (ha) | % |
| Basic Grains | 93,700 | 15.5 | 17,900 | 9.0 | 19,150 | 18.1 | 16,950 | 16.0 | 47,030 | 24.1 |
| Vegetables | 43,460 | 7.2 | 17,250 | 8.7 | 7,500 | 7.0 | 5,600 | 5.2 | 5,690 | 2.9 |
| Perennial Crop (Mainly Coffee) | 142,140 | 23.5 | 54,760 | 27.7 | 25,800 | 24.3 | 1,500 | 1.4 | 60,080 | 30.8 |
| Forest | 289,200 | 47.8 | 106,850 | 54.0 | 40,190 | 37.9 | 81,200 | 76.5 | 60,670 | 31.1 |
| Urban/Pasture/Others | 36,700 | 6.1 | 1,140 | 0.6 | 13,460* | 12.7 | 850 | 0.9 | 21,630 | 11.1 |
| Total | 605,200 | 100 | 197,900 | 100 | 106,100 | 100 | 106,100 | 100 | 195,100 | 100 |

Source: JICA Study Team, based on Present Land Use Map 1:250,000 of IGN, 1991, data from MAGA, and Field Observation. Note: * Includes the area of Atitlan lake.

The data of the two previous Tables, land capability and present land use, indicate that while only about 28.5 % of the total land of the Study area is classified as agricultural lands, the present land for about 46.2 % of the total land area is for agriculture, while only about 47.8 % of the Study area is covered by forest. The use of lands with very steep slopes for agriculture production of annual crops, mainly maize and black beans (frijol), is a main cause of land degradation because soil conservation measures area not being implemented. The present land use pattern of the Study area is considered not sustainable in the long-term because continuous degradation of land by soil erosion.

(3) Crops and Agricultural Production

The main characteristic of agricultural production within the Study area is that a large percentage of farmers are engaged in the production of basic grains, mainly maize and black bean. These two produces are the main staples for Guatemalan people. The average per capita consumption of those staples is 90 kg/person/year of maize, 10 kg/person/year of black bean, while rice is only 4 kg/person/year (MAGA, 1998). The average area planted to maize and bean by household is very small scale, at subsistence level, and mostly for family self-consumption. The average size of farms dedicated to the production of maize and bean within

the Study area is 0.49 ha, a half of the national average size (Tables 3.1.5 (2) and 3.1.5 (3)).

Maize and bean production in the Study area is done entirely under rainfed condition. These two crops are largely planted in association (Milpa). Normal planting periods within the Study area is from March to May, depending on the micro-climate of different zones and the start of rainfall period every year. The growing period of maize planted in the Study area is between 7 to 8 months. All small farmers produce maize in a traditional way; land preparation is done manually using hoe, planted varieties are traditional ones, without improvement, farmers use seeds that they keep from previous harvest, fertilizer is applied in small quantity. The average yields of maize and bean vary significantly among the four provinces of the Study area; average yield reported for Chimaltenango and Sololá are lower than average yield reported in Totonicapán and Quetzaltenango. Most of the lands used for maize production are of steep slopes (10 to 50 %), but farmers do not apply proper soil conservation measures.

There are two main types of maize produce in the Study area, white and yellow. At national level, the white type of maize is planted in about 82 % of the total area planted to maize. Within the Study area the preferred type of maize varies by province; while in Quetzaltenango and Chimaltenango white maize is planted in about 84 and 51 %, respectively, of total maize area of these provinces, in Sololá and Totonicapán yellow maize is planted in about 82 and 62 %, respectively, of total maize area of these provinces (MAGA, Agriculture National Survey, 1995-96).

The total number of farmers that produce maize within the Study area represent about 26 % of total number of maize farmers in the country; while the total planted area and total production of maize in the Study area represent about 14 % and 17 % respectively, of the national planted area and production. In Guatemala, and the Study area, total area planted to maize and black bean have being decreasing significantly (Table 3.1.5 (4)). The planted areas and production of maize and black bean by provinces are shown Table 3.1.5 (5).

Wheat is also a basic grain planted in the Study area, but the areas planted to this crop have being decreasing significantly during the last 15 years (Table 3.1.5 (4)).

Vegetable production at commercial scale has being increasing significantly within the Study area (Table 3.1.5 (6)). Majority of farm households has small

land areas for planting vegetables. In the Study area, due to its high elevation, there is good climatic condition for vegetable production. Vegetables are produced mainly in rainfed condition, during the rainy months (May to November). Irrigated land in the Study area is very small; only irrigated lands are planted with vegetables only during the dry season (December to April). Chimaltenango is the mayor province in Guatemala (Table 3.1.5 (7)). Main vegetables largely produced are broccoli, snow pea, carrot, beat, cauliflower, lettuce, French bean, cabbage, and tomato. Production of potato is a main economic activity in some municipalities of the Study area, mainly in Quetzaltenango and Sololá.

Coffee production is a very important agriculture activity within the Study area. Export of coffee is one of the main export commodities of Guatemala. Coffee production is the mayor economic activity for several municipalities of Sololá province, and is also very important in some municipalities of Chimaltenango and Quetzaltenango. Majority of coffee farmers have small land areas planted to coffee (0.2 to 0.6 ha). The area planted to coffee in the Study area is indicated in Table 3.1.5 (8) by municipalities; the production of coffee at national level and value of export are shown in Table 3.1.5 (9).

Other crops produced within the Study area are black berry, strawberry, peach and apple, these are planted in relatively small areas.

The main problems affecting development of agriculture production in the Study area are:

- (i) Large majority of farm households has very small agricultural land area, therefore agriculture production is at subsistence scale.
- (ii) Scarcity of water resources for irrigated agriculture development; dependence on rainfall for agriculture production.
- (iii) Lands of very steep slopes are commonly used for agriculture production without soil conservation measures to minimize soil erosion and land degradation.
- (iv) Severe climate with low temperature due to high land altitude.
- (v) Low land use intensity, most farmers can plant only during rainy season.
- (vi) Inadequate management of coffee plants, including pruning the coffee plants, inadequate amount of shading, inadequate fertilization which causes strong acidification of soils.
- (vii) Large percentage of coffee areas is very olds and need replanting.

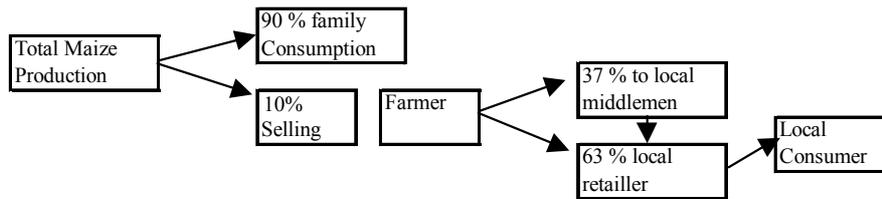
- (viii) High cost for coffee farmers cooperative to attain certification of organic coffee production (US \$ 2,000 to 3,000 per year).
- (xi) Lack or insufficiency of infrastructures for post-harvest management for vegetables, especially cold storage.
- (x) Lack of infrastructures for post-harvest processing of coffee, such as pulping mill, drying floor, storage warehouse, etc. Because of that, farmers can not get added value to their production, and they get low prices for coffee sold at farm gate. Almost all farmers depend on middlemen for selling their coffee production.
- (xi) None or very small coverage of extension service for technical assistance, especially in the proper control of insects and diseases affecting vegetables.
- (xii) Most farmers do not know the correct recommendations for pesticides management, dosages, and timing of application. Because of this, most farmers apply over dosages and too frequent applications of pesticides. Large quantities of vegetables exported to US have being discarded because high level of pesticides. Few years ago this was the cause of losses of several millions of US dollars.
- (xiii) Low average yields obtained by small farmers.
- (xiv) Low incomes of farm households, due to small areas, low yields, and low margin in the marketing of their produce.
- (xv) Very limited access to agricultural credit, and very high interest rates (21 to 30 %).
- (xvi) Lack of a cooperative marketing system which facilitate that small farmers could buy together the necessary inputs and sell together their produces. Majority of small farmers depends on middlemen.
- (xvii) Lack of organization of majority of farmers, or weakness in planning and management capability of existing farmers' organizations.
- (xviii) Very difficult conditions for carrying the harvested coffee from the farm to the selling point near the road. Farmers have to walk through steep slopes carry very heavy loads.
- (xix) Poor conditions of rural roads, which difficult and increases cost of transport of produces to the market.

(4) Marketing

Because the small land area available (average 0.4 ha) and low yields, about 90 % of maize produced by farmer household within the Study area is for family self-consumption, and it is estimated that only about 10 % is dedicated to the local market. For a large percentage of farm households, the production of maize and

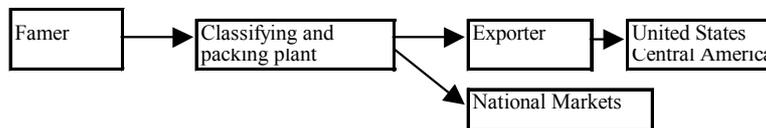
bean is not sufficient to satisfy the requirements of their family. In some municipalities of the Study area, a relatively large percentage of farmers need to migrate temporarily to others provinces in the low land areas, outside of the Study area, in order to get job as farm labors or to rent land for producing maize.

The marketing system for maize in the Study area is explained in the following figure, based on report from Totonicapán province.



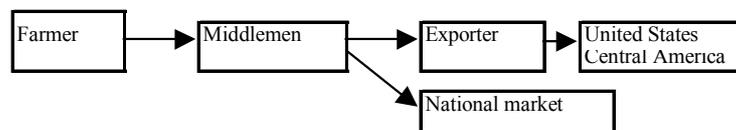
Vegetables produced in the Study area are sold, both, in the country's internal market and for export. The marketing depend on either the farmers are organized or not into cooperative having post-harvesting and cool storage facilities. The common market channels for vegetables are described in the following figures.

1) Farmer organized into cooperatives with infrastructures

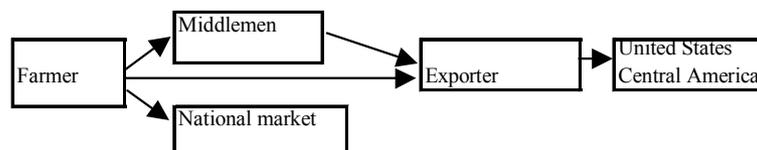


2) Individuals farmers, Not organized in cooperative

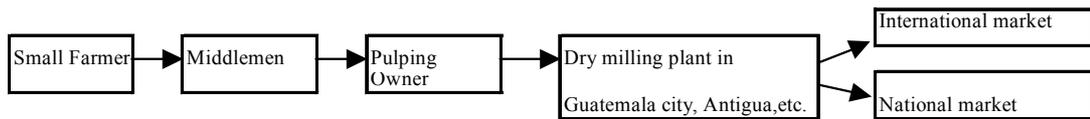
a) Contract growing system (middlemen provide credit)



b) Farmer's self-financing or bank loan



The marketing system for coffee produced by farmer having small land area is summarized as follows:



3.1.6 Legal Aspects

(1) Water Right

The rights on the use of water are based on the dispositions of the Constitution of 1985, where the public control of the waters is defined. On the other side, the Civil Code in force defines private control of the waters (See Table 3.1.6 (1)). These dispositions are apparently contradictory, which is why the State and the municipalities are only regulating the use of waters that haven't been used previously and resolving conflicts in an isolated way and without a clear and stable policy. For these reasons, even though most of the involved parts are interested in the handing over of a general law for waters, that regulate and clarify the rights over waters, until the moment the law has not been possible to hand out for several causes.

With regards to the quality of the water, there also exists the Health Code and the Law of Environment Protection that are detailed in the following paragraph.

(2) Environment

As regards to the environment regulation, there are two fundamental laws that complement themselves and regulate about the environment: the law of Protection and Improvement of the Environment (Decree No. 68-86) and the Health Code (Decree No. 90-97). The first one establishes the basis of the environmental policy and its fundamental mechanisms. As a complement to this fundamental law, there are several laws and regulations like the law of protected areas (Protection of the biological diversity) the law of the State's territorial reserves, forest law, regulation of environmental impact and others. The second one gives the rules of environment control referring to the items that affect the human health, giving special emphasis to everything related to contamination. Details and the circle of the correspondent legislation are shown in Table 3.1.6 (2).

(3) NGOs

Under the present legal framework of Guatemala, no specific law or regulation on NGO is prepared yet and, therefore, there is no clear definition for NGO. Distinction among the so-called NGO (non-profit making organization with objectives for socio-economic development), private firms, and other type of civil

associations is hard to be made. Basically, any group of people can form a non-governmental organization under this legal condition. However, in order for the NGO to have contract with other legal entities, it is necessary for them to have a juridical personality through the registration. For this purpose, Regulation on Registration of Civil Associations (Government Agreement No.512-98) is presently applied. Only with this registration, NGO can work as a juridical person with other legal entities on contract basis. Considering this confusing background, the Sege Plan is now planning to prepare specific legal framework and registration system for NGO.

3.2 Chimaltenango Province

3.2.1 Social Conditions

The Chimaltenango province covers 1,979 km² and has a total population of 314,800 persons. Indigenous population is 78% of the total population, and the Maya-Kaqchikel predominates. Literacy rate of adults is 63.8 %, which occupies the eighth place out of all provinces. In the central city of Chimaltenango their Mayan language is being lost.

The main characteristic of Chimaltenango derives from its location. 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 sleeping town for employees of the capital. Because of these changes, the farm labor wages have been increased. Another tendency that influences the future of agriculture is the indifference of young generation towards agriculture. So now many farm workers come from far away villages.

These situations will affect the future of agriculture in this region and its deep study will be required.

However 87.5 % of the Economic Active Population (EAP) of rural area is still dedicated to agriculture and 20% of EAP stays as non-remunerated work force as shown below. (The figure of EAP always ignores the contribution of women)

Labor Market of Chimaltenango Province

| | | Self-employment | No remunerate family | Employee |
|--------------------------|-------|-----------------|----------------------|----------|
| EAP Rural | 56.0% | 47.6% | 19.4% | 31.8% |
| EAP Rural in agriculture | 85.1% | | | |

Source: La Productividad y el empleo Agrícola y no Agrícola en el Area Rural

These regions have been seriously affected by armed conflicts, especially in the northern municipalities of San José Poaquil, San Martín Jilotepeque and Comalapa. Some communities of Patzún have also been beaten severely.

3.2.2 Land and Agriculture

Main soil series in Chimaltenango province, according to Simmons study, are: series Cauque, Quiché, Tecpán, Yepocapa, Camancha, Balanjuyu, Zacualpa, Poaquil, Alotenango, and series Osuna. The main characteristics and areas covered by each of these soil series are summarized in Table 3.1.4 (7), and their distribution in Chimaltenango province are shown in Fig. 3.1.4 (1).

About 59,300 ha, or 30 % of total area of Chimaltenango province are classified as land suitable for intensive agriculture production, classes I to IV, according to the USDA land suitability classification system. The distribution of land suitability classes in Chimaltenango province is shown in Fig. 3.1.4 (6).

The mayor types of present land use in Chimaltenango province are indicated in Fig. 3.2.2 (1). Some estimates indicate that about 82,000 ha or 42 % of the province total areas are presently being used for agricultural production. Almost all (99.7 %) agriculture production in Chimaltenango province, same for the entire Study area, is under rainfed condition, depending on rainfall; there is only about 240 ha of irrigated land in the entire province. During the dry season some farmers carry water on pickups and irrigate manually small areas of vegetables. The dependence on rainfall for agriculture production is a limiting factor for farmers to make plan of their production; this makes that most farmers' production comes out at the same time, and for that market prices are depressed, reducing profit of farmers.

In the province there are three sub-regions with differences in elevation, topographic conditions, soils and micro-climates. These sub-regions are: 1) northern sub-region which comprises the Motagua river basin, and includes the municipalities of San Martín Jilotepeque, San José Poaquil, Santa Apolonia and Tecpán Guatemala; Coffee is the main crop in this sub-region. 2) The central

and southern sub-region, which includes the municipalities of Chimaltenango, El Tejar, Parramos, San Andrés Itzapa, Zaragoza, Comalapa, Patzún, Patzicia and Santa Cruz Balanya; the main crops in this sub-region are vegetables for export and domestic markets. and 3) The southwestern sub-region, which includes the municipalities of Pochuta, Acatenango and San Pedro Yepocapa; in this sub-region coffee is the main crop.

Chimaltenango is the mayor vegetables producing province in the entire Guatemala (Table 3. 1.5 (7)). The types of vegetables more largely produced are: snow pea, French bean, lettuce, cabbage, broccoli, cauliflower, carrot, and beat. Mayor vegetables producing municipalities are: Tecpán, Patazún, Patzicia, Santa Cruz Balanya, Parramos, Zaragoza, Chimaltenango, and San Andrés Itzapa. In addition to vegetables and maize, other important crops produced in Chimaltenango province are coffee, strawberry, blackberry, and in less area fruit trees such as peach.

A relatively high percentage of farm households grows small numbers of pigs, sheep, and chicken; a smaller percentage of farm households have one or two cattle which they keep around the house and feed with dry leaves of maize. In Chimaltenango there are a few small cooperatives of poultry producers that have achieved good economic success; In Chimaltenango there also very large poultry producers.

3.2.3 Water Resource

The province of Chimaltenango is divided in four hydrological basins: the basin from the Motagua river belonging to the Caribbean Sea's basin, and the basins of the Achiguate river (Guacalate river), the Coyolate river (or Xayá river), Madre Vieja river, which belong to the Pacific Ocean. The characteristics of the basins in the province of Chimaltenango are shown below.

Characteristics of the hydrological basins in Chimaltenango Province

| Basin | Area (km ²) | Flow (m ³ /sec) | | Point of observation | Municipalities |
|------------------------|-------------------------|----------------------------|---------|----------------------|--|
| | | Minimum | Average | | |
| Motagua River | 995.85 | Minimum | | Concua II | Chimaltenango, San Jose Poaquil, San Martín Jilotepeque, Comalapa, Santa Apolonia, Tecpán Guatemala, Patziciá, Santa Cruz Balanyá, Zaragoza, El Tejar. |
| | | Average | | | |
| | | Flow (l/s/ha) | | | |
| Achiguate River | 128.5 | Minimum | 0.49 | Alotenango | Chimaltenango, Yepocapa, San Andrés Itzapa, Párramos, El Tejar |
| | | Average | 1.25 | | |
| | | Flow (l/s/ha) | 0.015 | | |
| Coyolate or Xayá River | 715.35 | Minimum | 5.15 | Coyolate Bridge | Santa Apolonia, Tecpán Guatemala, Patzún, Pochuta, Patziciá, Acatenango, Yepocapa, San Andrés Itzapa. |
| | | Average | 12.88 | | |
| | | Flow (l/s/ha) | 0.103 | | |
| Madre Vieja River | 139.3 | Minimum | 5.95 | Palmira | Tecpán Guatemala, Patzún, Pochuta |
| | | Average | 7.92 | | |
| | | Flow (l/s/ha) | 0.167 | | |
| TOTAL | 1979.0 | | | | |

Source: Plan Maestro de Riego y Drenaje, MAGA, 1991.

Of these basins, the Coyolate River (or Xayá) and the Pixcayá River (tributary to Motagua in Chimaltenango), are being used by the Municipal Company of Water of Guatemala (EMPAGUA) as an important source of water for 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 addition, there are projects for the use of the Motagua River on behalf of EMPAGUA and INDE for the use of potable water and hydroelectricity, which makes a coordination with the entities necessary in case of the promotion of irrigation projects in these rivers. In the case of the Madre Vieja River, there is no acknowledgement of projects for the use of its water.

The potential of groundwater water in the province of Chimaltenango has been partially studied by JICA in 1995. The results demonstrate that the potential of exploding ground water is high in San Martín Jilotepeque and El Tejar and medium potential in San José Poaquil, San Juan Comalapa, Patzún and Patziciá as shown in the following table. In the case that development of an economical explosion of the superficial water in the zones can not be expected, the alternative use of groundwater water must be studied with details.

Development Potential of the Groundwater

| No | Municipality | Geology | Type |
|----|------------------------|---------|------|
| 1 | Chimaltenango | | |
| 2 | San José Poaquil | Tv | B |
| 3 | San Martín Jilotepeque | | A |
| 4 | San Juan Comalapa | TvQp2 | B |
| 5 | Santa Apolonia | | |
| 6 | Tecpán Guatemala | | |
| 7 | Patzún | TvQp2 | B |
| 8 | San Miguel Pochuta | | |
| 9 | Patziciá | TvQp2 | B |
| 10 | Santa Cruz Balanaya | | |
| 11 | Acatenango | | |
| 12 | San Pedro Yepocapá | | |
| 13 | San Andrés Itzapá | | |
| 14 | Párramos | | |
| 15 | Zaragoza | TvQp2 | B |
| 16 | El Tejar | TvQp | A |

Source: Study of the Development of Subterranean Waters in the Central High Plateau of the Republic of Guatemala, JICA, 1995

Notes:

Tv: Volcanic Rocks from Terciary

Qp: Volcanic Rocks from Pleistocen

Qa: Aluvial Sediments

Qv: Volcanic Rocks from holocen

A: High Potential

B: Medium Potential

C: Low Potential

3.2.4 Social Services and Infrastructure

(1) Demography

The population of Chimaltenango as of 1999 is estimated to be 416,965 based on the 1994 census by INE. Percentage of migrant population is relatively low (about 4% of total population). According to MSPAS data both the infant mortality rate (IMR) and the maternal mortality rate in Chimaltenango is lower than any other three provinces as shown in the following table. However, we shouldn't simply compare the available indicators, since there are problems of under-recording of both maternal and newborn deaths. Some of the available indicators at municipality level are shown in the table in Section 3.2.4(5) or information.

Principal Demographic Indicators in 4 Provinces 1999

| Indicators | Chimaltenango | Sololá | Totonicapán | Quetzaltenango |
|-------------------------|---------------|---------|-------------|----------------|
| Total population | 416,965 | 299,005 | 346,787 | 661,807 |
| Migrant population | 15,500 | 6,676 | 125,628 | 91,925 |
| % of migrant population | 3.72 | 2.23 | 36.23 | 13.89 |
| No. of live births | 16,156 | 11,136 | 12,749 | 20,375 |
| Birth rate | 39.00 | 37.24 | 36.04 | 30.79 |
| Fertility rate | 183.00 | 166.95 | 173.72 | 203.65 |
| IMR (per 1,000 LB) | 39.80 | 48.67 | 55.97 | 42.85 |
| MMR (per 100,000 LB) | 55.71 | 170.61 | 101.70 | 132.51 |

Birth rate = (total births 1999/total population 1999)*1,000

Fertility rate = (total births/women of reproductive age)*1,000

Population of women in reproductive age = women aged 15 – 44

LB = live births

Source: MSPAS, Memoria Anual de Vigilancia Epidemiologica

(2) Access to Health Care Services

According to the MSPAS' s office in Chimaltenango, about 55% of the population has access to health services of MSPAS facilities, about 22% covered by SIAS, and 23% without access to any health care services. Percentage of population covered by other institutions (IGSS, private hospitals, etc.) is not known. However, as those institutions are mostly located in urban areas, where services are overlapped with those provided by MSPAS facilities, their service users are likely to be counted within the population covered by the MSPAS facilities as shown below. According to the chief nursing officer in the MSPAS's office in Chimaltenango, IGSS facilities in the province is providing only attentions for injuries and complications caused by accidents, and not providing maternal and child health care.

Coverage of Health Care Services by Institution 1999 (%)

| Institution | Chimaltenango | Sololá | Totonicapán | Quetzaltenango |
|-------------|---------------|--------|-------------|----------------|
| MSPAS | 54.89 | 53.68 | 48.25 | 24.18 |
| SIAS | 22.11 | 39.23 | 20.19 | 17.96 |
| IGSS | - | - | - | 17.23 |
| Others | - | - | - | 8.00 |
| None | 23.00 | 2.30 | 33.56 | 32.64 |

Source: MSPAS, Memoria Anual de Vigilancia Epidemiologica

Names of NGOs working for SIAS under the agreement with MSPAS to provide primary health care services in the communities as of 1999 are shown in following table.

NGOs in SIAS in Chimaltenango 1999

| Name of NGO | Type | Municipality |
|-------------------|---------------|-----------------------------------|
| ADSEIC | Care Provider | Tecpan Guatemala |
| ADSEIC | Administrator | Santa Apolinia & Tecpan Guatemala |
| Uxin Acuala | Administrator | San Jose Poaquil |
| San Juan Comalapa | Administrator | San Juan Comalapa |
| CODESMAJ | Administrator | San Martin Jilotepeque |
| Ru'Cotzijal Maria | Care Provider | San Martin Jilotepeque |

Source: MSPAS

(3) Maternal Care

Among the total deliveries during 1999, about 85% of the deliveries were attended by traditional birth attendants (comadronas), and only about 14% were attended by medical professionals; physicians or nurses. About 77% of women received prenatal care at least once during pregnancy. Percentage of pregnant women who received second dose of tetanus toxoide (to prevent neonatal tetanus during delivery and thus reducing the risk of infant mortality) was only 30%.

Delivery Care Provider in 4 Provinces 1999 (%)

| Delivery care provider | Chimartenango | Sololá | Totonicapán | Quetzaltenango |
|------------------------|---------------|--------|-------------|----------------|
| Medical personnel | 13.94 | 8.24 | 4.99 | 23.12 |
| Comadrona | 84.94 | 85.54 | 94.91 | 67.57 |
| Empirica * | 0.32 | 6.21 | 0.09 | 5.79 |
| Nobody | 0.80 | 0.02 | 0.01 | 3.52 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |

*Empirica includes comadronas who had never received any training, relatives/ friends.

Source: MSPAS, Memoria Anual de Vigilancia Epidemiologica

(4) Immunization

In spite of the campaigns carried out by the MSPAS, NGOs and municipalities, the immunization coverage for infants (under 1 year old) is still below 90%. The main reasons for failure in receiving immunization are said to be migration of some families during the harvest season, traditional beliefs that prevents parents to accept immunization for their children.

Immunization Coverage among Children Under 1 in 4 Provinces 1999 (%)

| Immunization | Chimartenango | Sololá | Totonicapán | Quetzaltenango |
|--------------|---------------|--------|-------------|----------------|
| B.C.G. | 87 | 87 | 83 | 92 |
| Polio | 83 | 83 | 80 | 89 |
| D.P.T. | 82 | 82 | 80 | 89 |
| Measles | 80 | 80 | 72 | 85 |

Source: MSPAS

(5) Principal Causes of Mortality and Morbidity

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

Principal Demographic Indicators by Municipality, Chimaltenango 1999

| Municipality | Population | GMR | IMR | MMR | Birth Rate |
|------------------------|------------|------|-------|--------|------------|
| Chimaltenango | 65,838 | 7.33 | 48.75 | 39.00 | 40.62 |
| El Tejar | 12,696 | 3.05 | 10.30 | 0.00 | 38.98 |
| Tecpan Guatemala | 55,886 | 6.35 | 37.25 | 40.90 | 44.83 |
| Santa Apolonia | 11,781 | 7.61 | 88.80 | 211.40 | 41.36 |
| San Martin Jilotepeque | 56,000 | 5.13 | 29.60 | 0.00 | 43.00 |
| San Juan Comalapa | 37,396 | 4.60 | 26.10 | 0.00 | 35.75 |
| San Jose Poaquil | 21,278 | 6.11 | 62.11 | 124.20 | 38.75 |
| Patzun | 44,171 | 5.50 | 47.13 | 0.00 | 34.00 |
| Patzicia | 20,704 | 6.60 | 33.97 | 0.00 | 36.23 |
| Santa Cruz Balanya | 7,003 | 5.13 | 64.86 | 0.00 | 27.13 |
| Acatenango | 18,844 | 5.73 | 26.73 | 314.50 | 34.40 |
| San Miguel Pochuta | 8,925 | 6.33 | 11.36 | 284.10 | 39.10 |
| San Pedro Yopocapa | 23,662 | 5.10 | 44.71 | 117.60 | 36.64 |
| San Andres Itzapa | 17,939 | 7.16 | 61.44 | 0.00 | 37.00 |
| Parramos | 8,069 | 6.33 | 24.73 | 0.00 | 35.84 |
| Zaragoza | 17,410 | 3.85 | 25.00 | 178.60 | 33.14 |
| Total | 427,602 | 5.85 | 40.00 | 55.70 | 38.75 |

GMR: General Mortality Rate: per 1,000 habitants

IMR: Infant Mortality Rate: per 1,000 live births

MMR: Maternal Mortality Rate: per 100,000 live births

Birth rate: (total births 1999/total population 1999)*1,000

Source: Province of Statistics, Departamento de Area de Salud (DAS)

(6) Electricity, Water Supply and Sanitation

The 5th National Census of Population carried out in 1994 indicates that the service coverage rate of drinkable water, latrines and electricity is of 76.7%, 25.7% and 59.1% respectively. This indicates that the basic social infrastructure has a low level, being very obvious the lack of sanitary services in the provinces.

Situation of Water, Sanitation and Electricity Services

| No | Municipality | Water services | | Sanitation services | | Electricity | | Total houses |
|----|------------------------|----------------|------|---------------------|------|-------------|------|--------------|
| | | houses | % | houses | % | houses | % | |
| 1 | Chimaltenango | 7,476 | 87.7 | 3,758 | 44.1 | 7,321 | 85.8 | 8,528 |
| 2 | San José Poaquil | 2,456 | 87.2 | 489 | 17.4 | 1,327 | 47.1 | 2,815 |
| 3 | San Martín Jilotepeque | 4,507 | 55.0 | 920 | 11.2 | 1,942 | 23.7 | 8,198 |
| 4 | Comalapa | 4,298 | 76.6 | 1,382 | 24.6 | 3,063 | 54.6 | 5,611 |
| 5 | Santa Apolonia | 1,196 | 85.1 | 190 | 13.5 | 719 | 51.1 | 1,406 |
| 6 | Tecpán Guatemala | 5,656 | 76.8 | 1,408 | 19.1 | 3,627 | 49.2 | 7,367 |
| 7 | Patzún | 4,797 | 76.5 | 1,247 | 19.9 | 4,346 | 69.3 | 6,274 |
| 8 | Pochuta | 1,236 | 75.4 | 543 | 33.1 | 623 | 38.0 | 1,639 |
| 9 | Patziciá | 1,821 | 59.5 | 396 | 12.9 | 2,275 | 74.3 | 3,061 |
| 10 | Santa Cruz de Balanyá | 761 | 76.9 | 179 | 18.1 | 761 | 76.9 | 989 |
| 11 | Acatenango | 2,366 | 83.2 | 655 | 23.0 | 1,650 | 58.0 | 2,844 |
| 12 | Yepocapá | 2,694 | 85.0 | 1,213 | 38.3 | 1,731 | 54.6 | 3,170 |
| 13 | San Andrés Itzapá | 2,221 | 81.2 | 1,179 | 43.1 | 2,089 | 76.4 | 2,735 |
| 14 | Párramos | 1,053 | 95.8 | 251 | 22.8 | 828 | 75.3 | 1,099 |
| 15 | Zaragoza | 1,961 | 78.2 | 673 | 26.8 | 1,758 | 70.1 | 2,508 |
| 16 | El Tejar | 1,389 | 89.6 | 880 | 56.7 | 1,306 | 84.2 | 1,551 |
| | TOTAL or Average | 45,888 | 76.7 | 15,363 | 25.7 | 35,366 | 59.1 | 59,795 |

Source: Censo Nacional de Población y Vivienda, 1994, INE

(7) Roads

The province of Chimaltenango has one lined Central American road (CA-1) that connects the capital with provinces of Sololá, Totonicapán, Quetzaltenango and others. It has also two national roads which connect Antigua, Acatenango, Patziciá, Sololá (No. 1) and Yepocapá, Escuintla (No. 10), partially lined, and several provincial roads and highways, whose lengths are shown below.

Road System in Chimaltenango

| Categories of the Roads | Length (km) | |
|-------------------------|-----------------|------------|
| | Asphalt/Surface | Terracería |
| Central American | 63 | |
| National | 42 | 34 |
| Provincial | 70 | 179 |
| Rural | - | 343 |
| TOTAL | | 731 |

Source: Dirección General de Caminos, 1999.

3.3 Sololá Province

3.3.1 Social Conditions

Sololá is one of provinces located at the highland, which is made up of 19 municipalities. It has an area of 1,061 Km² and the lake of Atitlán covers 12 % of its territory. (125.7 km²) The indigenous people forms 93.6 % of total population, that is conformed by 3 ethnic groups; K'iche', Kaqchikel and Tz'utujil. The

K'iche' s live in the municipalities of Nahualá. Santa Catarina Ixtahuacán, Santa Clara la Laguna, Santa María Visitación, Santa Lucía Utatlán and one part of San Juan la Laguna. The Tz'utujiles concentrate in Santiago Atitlán and south of the lake's shore. The kaqchikeles live in the north and east of the province. The literacy rate of adults is very low. (44.3%)

Agriculture is the most important activity in this area. 79.4% of Rural EAP are engaged in agriculture as shown below.

Labor Market of Sololá Province

| | | Self-employment | No remunerate family | Employee |
|--------------------------|-------|-----------------|----------------------|----------|
| EAP rural | 65.0% | 51.6% | 26.8% | 20.3% |
| EAP rural in Agriculture | 79.4% | | | |

Source: La Productividad y el empleo Agrícola y no Agrícola en el Area Rural

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

In the municipality of San Juan La Laguna two ethnic groups exist; the people of the capital city of San Juan la Laguna are Tz'utujil and in the high lands of this municipality the people are K'iche'. Migrants from Totonicapán and other area formed communities of the high lands. Between 1890 and 1900, families from Paquí of Totonicapán and San Cristóbal, which fled from forced labor and commandments founded the Panyevan community. Other communities like Palestina and Pasaquim also have a similar origin. ¹⁵

“Tz'utujil's communities of San Juan la Laguna municipality recognize the municipality's “alcalde” (mayor) as the supreme authority. On the other hand communities of K'iche' rely on “alcalde auxiliar”, who has greater prestige in the communities, at the same time functions as a link with the municipality “Alcalde”¹⁶. Normally the people of the high lands have more relations with the people from Santa Clara.

3.3.2 Land and Agriculture

Soil series most largely extended in Sololá, are series Totonicapán, Quiché, Patzite, Sinache, Camancha, and series Quetzaltenango. The main characteristics and

¹⁵ P.66 Más Allá de la Costumbre : Cosmos, Orden y Equilibrio- El Derecho de Pueblo Maya de Guatemala . Sep. 1999, COPMAGUA . COPMAGUA hizo un estudio en San Juan la Laguna.

¹⁶ P.208 ibid.

areas covered by each of these soil series are summarized in Table 3.1.4 (8), and their distribution is shown in Fig. 3.1.4 (2).

About 31,800 ha, or 30 % of total Sololá province land is classified as classes I to IV, which are considered suitable for intensive agriculture production. The distribution of land classes in Sololá province is shown in Fig. 3.1.4 (6).

The distribution of main types of present land use for Sololá province is shown in Fig. 3.3.2 (1). An estimated area of about 42,440 ha or 40 % of province area is being used for agriculture production. Agriculture production is done almost entirely under rainfed conditions; only about 220 ha are presently provided with irrigation system in Sololá province; some farmers pump water from Atitlan lake for irrigating small area along the lakeshore.

Sololá province may be divided into three sub-regions according to the elevation of the land and kind of main crops.

- (i) The North and Northeast sub-region, which includes de municipalities of Sololá, Concepción, San Andrés Semetabaj, San Antonio Palopo, Santa Cruz la Laguna, San José Chacaya and Santa Lucía Utatlan. These municipalities are located at elevations higher than 2,000 m.a.s.l. The main agricultural productions are potato, vegetables and basic grains.
- (ii) The sub-region of the western part of the province, which includes the municipalities of Nahuala, Santa María Visitación, San Pablo la Laguna, Santa Catarina Ixtahuacán, and Santa Clara la Laguna; the main agriculture production in these municipalities is basic grains, and coffee in the municipalities of Nahuala and Santa Clara la Laguna.
- (iii) The sub-region located at the south of Atitlan lake, which include the municipalities of San Juan la Laguna, San Pedro la Laguna, Santiago Atitlan, and San Lucas Toliman; Coffee is the main crop in this sub-region; In this sub-region is produced the Atitlan coffee, the second most famous gourmet coffee of Guatemala.

Livestock and poultry are grown at very small scale, some families grow few pigs, sheep, and chicken; a small percentage of farm households have one or two cattle that they feed using dry leaves of maize.

3.3.3 Water Resource

The province of Sololá is divided into three hydrographic basins: the one from the Nahualate river, the Madre Vieja river, and the Sis-Icán river and a closed basin in the lake of Atitlán. The characteristics of the basins are shown in the following table.

Because the lake of Atitlán is one of the largest tourist attractions of Guatemala, the state and the local authorities are strengthening the policies about the conservation of the lake and its water. This is why any plan of using the water related to this basin must keep a close attention to the conservation of the quality of the water and of the biosphere of the lake of Atitlán.

Characteristics of the hydrological basins in Sololá

| Basin | Area (km ²) | Flow (m ³ /sec) | | Point of observation | Municipality |
|------------------------------|-------------------------|----------------------------|---------|----------------------|---|
| | | Minimum | Average | | |
| Basin of the Lake of Atitlán | 430.4 | Minimum | | | Sololá, San José Chacaya, Santa Lucía Utatlán, Nahuala, Santa Clara La Laguna, Concepción, San Andrés Semetabaj, Panajachel, Santa Catalina Palopó, San Lucas Tolimán, Santa Cruz La Laguna, San Marcos La Laguna, San Juan La Laguna, San Pedro La Laguna, Santiago Atitlán. |
| | | Average | | | |
| | | Flow (l/s/ha) | | | |
| Nahualate | 531.6 | Minimum | 5.86 | San Miguel Moca | Santa María Visitación, Santa Lucía Atitlán, Nahuala, Santa Catalina Ixtahuacán, Santa Clara La Laguna, Santa Cruz La Laguna, San Juan La Laguna, San Pedro La Laguna, Santiago Atitlán. |
| | | Average | 30.17 | | |
| | | Flow (l/s/ha) | 0.103 | | |
| Sis/ Icán | 43.6 | Minimum | 0.55 | La Maquina | Santa Catarina Ixtahuacán |
| | | Average | 3.94 | | |
| | | Flow (l/s/ha) | 0.036 | | |
| Madre Vieja | 135.8 | Minimum | 5.95 | Palmira | San Andrés Semetabaj |
| | | Average | 7.92 | | |
| | | Flow (l/s/ha) | 0.167 | | |
| | 1141.4 | | | | |

Source: Plan Maestro de Riego y Drenaje, MAGA, 1991

According to the studies done by JICA in 1995, about the potential of groundwater in the province of Sololá, there is a medium potential of groundwater development in Solol, Santa Lucia Utatlan, Nahuala and Santa Catarina Ixtahuacán as shown in the following table. If the possible economical explosion of the superficial water in those zones can not be expected, the alternative use of the ground waters must be studied in details.

Characteristics of the Groundwater

| No. | Municipality | Geology | Type |
|-----|---------------------------|---------|------|
| 1 | Sololá | TvQp2 | B |
| 2 | San José Chacaya | | |
| 3 | Santa María Visitación | | |
| 4 | Santa Lucía Utatlán | TvQp2 | B |
| 5 | Nahuala | TvQp2 | B |
| 6 | Santa Catarina Ixtahuacán | Tv | B |
| 7 | Santa Clara La Laguna | TvQp2 | |
| 8 | Concepción | | |
| 9 | San Andrés Semetabaj | TvQp2 | C |
| 10 | Panajachel | | |
| 11 | Santa Catarina Palopo | Tv | C |
| 12 | San Antonio Palopo | Tv | C |
| 13 | San Lucas Tolimán | | |
| 14 | Santa Cruz La Laguna | | |
| 15 | San Pablo La Laguna | TvAl | |
| 16 | San Marcos La Laguna | TvAl | |
| 17 | San Juan La Laguna | | |
| 18 | San Pedro La Laguna | | |
| 19 | Santiago Atitlán | | |

Source: Study of the Development of the Subterranean Waters in the Central High Plateau of the Republic of Guatemala, JICA, 1995

Notes:

Tv: Volcanic Rocks from Terciary A: High Potential
 Qp: Volcanic Rocks from Pleistocen B: Medium Potential
 Qa: Aluvial Sediments C: Low Potential
 Qv: Volcanic Rocks from holocen

3.3.4 Social Services and Infrastructure

(1) Demography

The population of Sololá as of 1999 is estimated to be 299,005 based on the 1994 census by INE. Percentage of migrant population is lower than any other three provinces (about 2% of total population) in Section 3.2.4 (1).

(2) Access to Health Care Services

According to the MSPAS' s office in Sololá, about 54% of the population has access to health services of MSPAS facilities, about 39% covered by SIAS, and 2.3% without access to any health care services. Percentage of population uncovered by health care services is lowest among the four provinces. However, in mid-1990s 39.2% of the population did not have access to any health care services (UNDP 1998), many of whom are now supposed to be covered by SIAS.

Names of NGOs working for SIAS under the agreement with MSPAS to provide primary health care services in the communities as of 1999 are shown in the following table.

NGOs in SIAS in Sololá 1999

| Name of NGO | Type | Municipality |
|-----------------|------------------|--|
| ASDHI | Service Provider | Santa Maria Ixhuatan |
| RXIIN TNAMET | Service Provider | Sololá, Santa Catarina, Ixtahuacan San Antonio Palopo & Nahuala |
| VIVAMOS MEJOR | Administrator | Panajachel, San Andres Semetabaj Santa Catarina, Santa Catalina Palopo & Santa Cruz la Laguna |
| Parracana | Administrator | Santa Lucia Utatlan, San Jose Chacaya Santa Maria Visitacion & Santa Clara la Laguna |
| Ceibas | Administrator | San Pablo, Santo Domingo Suchitepequez San Lorenzo, Chicacao Cerrito Uno Cuyotenango & Patulul |
| Ixim Achi | Administrator | Sololá |
| Arenis Solidary | Service Provider | Nahuala, Santa Catarina Ixtahuacan & Sololá |

Source: MSPAS

(3) Maternal Care

Among the total deliveries during 1999 about 86% were attended by traditional birth attendants (comadronas), and only about 8% were attended by medical professionals; physicians or nurses. About 6% of deliveries were attended by what they call “empiricas”, which includes comadronas without training and family/relatives (see Section 3.4.4 (1)). About 70% of women received some kind of prenatal care at least once during pregnancy. Percentage of pregnant women who received second dose of tetanus toxide was only 29%.

(4) Immunization

Immunization coverage among children under 1 is shown in Section 3.2.4 (5). Although the coverage for each immunization (B.C.G., polio, D.P.T. and measles) is 80 – 87%, percentage of infants who received all the necessary immunization is thought to be much lower.

(5) Principal Causes of Mortality and Morbidity

Principal causes of infant death during 1999 period were pneumonia, prematurity, diarrheal diseases and malnutrition. Principal causes of general mortality during 1999 were pneumonia, malnutrition, alcoholic intoxication, and diarrheal diseases.

Common diseases include intestinal parasite, anemia, skin diseases and amoebiasis.

(6) Electricity, Water Supply and Sanitation

The V National Census of Population carried on in 1994, indicates that the coverage rates from the drinkable water, latrines and electricity services are 84.9%, 14.1% and 54.3% respectively. This indicates that the basic social infrastructure is at a low level, being very notorious the lack of sanitation services in the Province.

Situation in Water, Sanitation and Electricity Services

| No | Municipality | Water Service | | Sanitation Service | | Electricity | | Total homes |
|----|---------------------------|---------------|------|--------------------|------|-------------|------|-------------|
| | | Homes | % | Homes | % | Homes | % | |
| 1 | Sololá | 5,592 | 87.9 | 1,188 | 18.7 | 4,172 | 65.6 | 6,360 |
| 2 | San José Chacaya | 244 | 94.9 | 16 | 6.2 | 212 | 82.5 | 257 |
| 3 | Santa María Visitación | 234 | 85.4 | 137 | 50.0 | 157 | 57.3 | 274 |
| 4 | Santa Lucía Utatlán | 2,066 | 79.3 | 154 | 5.9 | 1,910 | 73.3 | 2,605 |
| 5 | Nahualá | 6,592 | 92.0 | 627 | 8.7 | 2,900 | 40.5 | 7,167 |
| 6 | Santa Catarina Ixtahuacán | 5,258 | 89.5 | 458 | 7.8 | 653 | 11.1 | 5,872 |
| 7 | Santa Clara La Laguna | 814 | 86.3 | 123 | 13.0 | 242 | 25.7 | 943 |
| 8 | Concepción | 329 | 75.8 | 20 | 4.6 | 205 | 47.2 | 434 |
| 9 | San Andrés Semetabaj | 1,045 | 82.3 | 187 | 14.7 | 797 | 62.8 | 1,270 |
| 10 | Panajachel | 1,360 | 89.4 | 203 | 13.3 | 1,374 | 90.3 | 1,521 |
| 11 | Santa Catalina Palopó | 301 | 92.9 | 15 | 4.6 | 282 | 87.0 | 324 |
| 12 | San Antonio Palopó | 1,203 | 72.5 | 68 | 4.1 | 927 | 55.9 | 1,659 |
| 13 | San Lucas Tolimán | 2,352 | 82.4 | 165 | 5.8 | 2,174 | 76.1 | 2,856 |
| 14 | Santa Cruz La Laguna | 488 | 92.6 | 10 | 1.9 | 143 | 27.1 | 527 |
| 15 | San Pablo La Laguna | 812 | 91.0 | 27 | 3.0 | 562 | 63.0 | 892 |
| 16 | San Marcos La Laguna | 254 | 98.1 | 10 | 3.9 | 120 | 46.3 | 259 |
| 17 | San Juan La Laguna | 1,072 | 94.6 | 124 | 10.9 | 532 | 47.0 | 1,133 |
| 18 | San Pedro La Laguna | 1,398 | 91.9 | 1,075 | 70.7 | 1,325 | 87.1 | 1,521 |
| 19 | Santiago Atitlán | 2,917 | 63.7 | 1,084 | 23.7 | 3,295 | 71.9 | 4,581 |
| | TOTAL | 34,331 | 84.9 | 5,691 | 14.1 | 21,982 | 54.3 | 40,455 |

Source: National Census of Population and Houses, 1994, INE

(7) Roads

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, whose longitudes are shown in following table.

Road System in Sololá

| Categories of the Roads | Length (km) | |
|-------------------------|-------------------|------------|
| | Asphalt / Surface | Terracería |
| Central American | 53 | |
| National | 86 | 10 |
| Provincial | 73 | 89 |
| Rural | | 99 |
| TOTAL | | 410 |

Source: Dirección General de Caminos, 1999.

3.4 Totoncapán Province

3.4.1 Social Conditions

Totoncapán have an area of 1,061k m² and population of 272,094 in 1994. Indigenous population reaches 94.5% of the total population. Ethnic group is K'iche's. Literacy rate of adults is 49.8%.

The unique characteristics are following;

(1) Existence of communal forest in good condition

In Totoncapán several forms of communal forest exist being forests on the community land of “aldea” and/or “caseríos”, on the municipality land, and on the Parcialidades. 60% of Totoncapán's forests are the communal property. The form of control, use and ownership of land is variable, however, forest conservation and presence of local authority are bound.

(2) Presence of solid community organization

Communities rely on the traditional local authority.

(3) Various economic activities

Unlike the other three provinces, people of Totoncapán have more participation in non-agricultural activities like small industry and commerce. Less than half of the rural EAP participate in agriculture. In addition, more participation is observed in the labor market. Non remunerate work force is only 12.9% as shown below.

Labor Market of Totoncapán Province

| | | Self-employed | No remunerate family | Employee |
|----------------------|-------------|---------------|----------------------|----------|
| EAP rural | 89.0% | 48.6% | 12.9% | 37.7% |
| | Agriculture | Industrial | Commercial | Others |
| EAP rural in Sector. | 40.8% | 29.5% | 20.8% | 8.9% |

Source : La Productividad y el empleo Agrícola y no Agrícola en el Area Rural

Each of the 8 municipalities has different activities.¹⁷

| | |
|------------------------------|---|
| Totonicapán: | Craftsmanship (weaving, carpenter, pottery), Commerce, Professionals |
| San Cristóbal Totonicapán: | Commerce, Tailoring (Maquila rural) Migration to USA. |
| San Francisco El Alto: | tailoring, Commerce, Migration to USA. |
| San Andrés Xecul: | Dyeing, Brickwork |
| San Bartolo Aguas Calientes: | Not identified |
| Santa Lucia la Reforma : | Agriculture, commerce , migration to properties |
| Momostenango : | Commerce, Weaving of wool |
| Santa María Chiquimula : | Commerce |

3.4.2 Land and Agriculture

The soil series more extended in Totonicapán province is: Totonicapán series, Quiché, Patzite, Sinache, Camancha, and Quetzaltenango series. The area covered by each soil series and their main characteristics are summarized in Table 3.1.4 (9), and their distribution is shown in Fig. 3.1.4 (3).

About 46,000 ha, or 37 % of total area of Totonicapán province are classified as classes I to IV, which are suitable for intensive agriculture production. The distribution of land classes in Totonicapán province is shown in Fig. 3.1.4 (7).

The distribution of main land use types for Totonicapán province is shown in Fig. 3.4.2 (1). It is estimated that about 41,000 ha or 34.6 % of total land province area is being used for agriculture production. All the agriculture production is done under rainfed condition; there are only about 40 ha under irrigation in Totonicapán province.

The agricultural production in Totonicapán province is mainly maize and black bean for self-consumption of farmers' household; there are 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 agriculture production in Totonicapán province; frost is common during several months a year.

¹⁷ Skarwan, Dagny "Microempresa y Artesanía" 1998 Movimiento Tzuk Kim-Pop y otros documentos.

- About municipalities of Totonicapán FUNCEDE elaborate diagnostic, and Movimiento Tzuk Kim-Pop also has various studies about some municipalities .
- Now the organization NEXUS is making Diagnostic of Municipalities.

The growth of animals such as pigs, sheep, chicken and few cattle are undertaken by a small percentage of households.

3.4.3 Water Resource

The province of Totonicapán is divided in three hydrographic basins from the Pacific: the Nahualate river, Salamá, a basin in the Caribbean: Motagua river and a basin in the Gulf of Mexico: Salinas (Chixoy River). The characteristics of these basins are shown below.

Characteristics of the hydrographic basins

| Basin | Area (km ²) | Flow (m ³ /sec) | | Point of view | Municipalities |
|------------------------|-------------------------|----------------------------|-------|---------------------------|---|
| Motagua River | 82 | Minimum | | Concua II | Totonicapán |
| | | Average | | | |
| | | Flow (l/s/ha) | | | |
| Nahualate River | 82 | Minimum | 0.67 | Santa Catalina Ixtahuacán | Totonicapán |
| | | Average | 1.72 | | |
| | | Flow (l/s/ha) | 0.049 | | |
| Salamá River | 224.2 | Minimum | 0.99 | Cantel | Totonicapán, San Cristobal, Totonicapán, San Francisco El Alto, San Andrés Xecul |
| | | Average | 4.67 | | |
| | | Flow (l/s/ha) | 0.014 | | |
| Salinas River (Chixoy) | 661.8 | Minimum | | | Totonicapán, San Francisco El Alto, Momostenango, Santa María Chiquimula, Santa Lucía la Reforma, San Bartolo |
| | | Average | | | |
| | | Flow (l/s/ha) | | | |
| Total | | | | | |

Of these basins, the stream from the upstream basin of Salinas (Chixoy River) is being used by INDE to generate hydroelectric energy. On the other side, as it is mentioned in the chapter correspondent to Chimaltenango, the Motagua River has projects for its use on behalf of EMPAGUA and INDE, as drinkable water and hydroelectricity.

The study of ground water carried out by JICA in 1995 demonstrates that the zone of San Andrés Xecul is high in potential and Momostenango has a medium potential as shown in the following table. In case of the impossible economical explosion of the superficial water in this zone, the use of subterranean water as an alternative must be studied with details.

Potential of Subterranean Waters

| No. | Municipality | Geology | Type |
|-----|-----------------------------|---------|------|
| 1 | Totonicapán | | |
| 2 | San Cristobal Totonicapán | | |
| 3 | San Francisco El Alto | TvQp2 | C |
| 4 | San Andrés Xecul | TvQp | A |
| 5 | Momostenango | Tv | B |
| 6 | Santa María Chiquimula | Tv | |
| 7 | Santa Lucía La Reforma | | |
| 8 | San Bartolo Aguas Calientes | | |

Source: Study of the Development of Subterranean Water in the Central High Plateau of the Republic of Guatemala, JICA, 1995.

Notes:

Tv: Volcanic Rocks from Terciary A: High Potential

Qp: Volcanic Rocks from Pleistocen B: Medium Potential

Qa: Aluvial Sediments C: Low Potential

Qv: Volcanic Rocks from holocen

3.4.4 Social Services and Infrastructure

(1) Demography

The population of Totonicapán as of 1999 is estimated to be 346,787 based on the 1994 census. Percentage of migrant population in Totonicapán is the highest (36%) among the four Provinces in the Study Area (Table 3.2.4(1)). Percentage of indigenous population is also high (94.5%). Some of the available indicators at municipality level are shown in the table in Section 3.4.4 (5).

(2) Access to Health Care Services

According to the MSPAS' s office in Totonicapán, about 48% of the population has access to health services of MSPAS facilities, about 20% covered by SIAS, and 34% without access to any health care services. Percentage of population without access to any health care services in Totonicapán is highest among the four Provinces in the Study area.

Names of NGOs working for SIAS under the agreement with MSPAS to provide primary health care services in the communities as of 1999 are shown in the following table.

NGOs in SIAS in Totonicapán 1999

| Name of NGO | Type | Municipality |
|-------------------|------------------|---|
| Pies de Occidente | Service Provider | San Andres Xecul |
| CDRO | Service Provider | San Bartolo, Aguas Calientes Momostenango & Santa Maria Chiquimula |

Source: MSPAS

Apart from above mentioned health care services, Catholic Church organization (Pastral Social de Salud) is carrying out clinic services for urban poor and community-based health programs such as health education and basic sanitation in rural areas. CARE is implementing health program with focus on nutrition in 9 municipalities including Santa Maria Chiquimula

(3) Maternal Care

Among the total deliveries during 1999 about 95% were attended by traditional birth attendants (comadronas), and only about 5% were attended by medical professionals; physicians or nurses. About 81% of women received some kind of prenatal care at least once during pregnancy. Percentage of pregnant women who received second dose of tetanus toxoide was only 24%.

(4) Immunization

Immunization coverage among children under 1 in Totonicapán is the lowest among the 4 Provinces. Health Program Officer of CEDRO commented that although the organization provides immunization once a week in the areas it carries out SIAS (usually in areas covered by SIAS immunization is offered only once a month), immunization coverage did not improve a lot, as some parents did not accept their children to be injected when they were not sick.

(5) Principal Causes of Mortality and Morbidity

Principal causes of infant death during the same period were pneumonia, diarrhea diseases, neonatal sepsis, asphyxia of birth and bronchitis. Principal causes of general mortality during 1999 were pneumonia, diarrhea diseases, malnutrition, and neonatal sepsis as shown below. Other common diseases are intestinal parasite, skin diseases, and amoebiasis.

Principal Demographic Indicators by Municipality, Totonicapán 1999

| Municipality | Population | GMR | IMR | MMR | Birth Rate |
|------------------------|------------|------|-------|--------|------------|
| Totonicapán | 101,362 | 7.80 | 73.56 | 169.10 | 35.00 |
| Momostenango | 72,149 | 5.78 | 41.47 | 166.70 | 33.26 |
| San Francisco El Alto | 47,814 | 6.73 | 71.18 | 0.00 | 36.72 |
| Santa María Chiquimula | 39,793 | 6.33 | 48.06 | 0.00 | 42.87 |
| Santa Lucía La Reforma | 12,827 | 6.55 | 18.26 | 0.00 | 55.50 |
| San Bartolo A.C. | 6,167 | 8.27 | 26.88 | 268.80 | 60.30 |
| San Andrés Xecul | 21,305 | 6.52 | 59.02 | 0.00 | 42.15 |
| San Cristóbal Totó | 37,077 | 6.15 | 53.14 | 0.00 | 30.45 |
| San Vicente Buenabaj | 15,222 | 2.56 | 43.85 | 877.20 | 20.30 |
| Total | 353,716 | 6.56 | 55.97 | 101.70 | 36.40 |

GMR: General Mortality Rate: per 1,000 habitants

IMR: Infant Mortality Rate: per 1,000 live births

MMR: Maternal Mortality Rate: per 100,000 live births

Birth rate: (total births 1999/total population 1999)*1,000

Source: Province of Statistics, Departamento de Área de Salud (DAS)

(6) Electricity, Water Supply and Sanitation

The 5th National Census of Population carried out in 1994 indicates that the coverage rates of the services of drinkable water, latrines and electricity 70.9%, 10.4% and 56.0% respectively. This indicates that the basic social infrastructure has a low level, being very notorious the lack of sanitation services in this province as follows.

Situation of Water, Sanitation and Electricity Services

| No | Municipality | Water Service | | Sanitation Service | | Electricity | | Total homes |
|----|---------------------------|---------------|------|--------------------|------|-------------|------|-------------|
| | | Homes | % | Homes | % | Homes | % | |
| 1 | Totonicapán | 12,849 | 87.5 | 2,091 | 14.2 | 11,644 | 79.3 | 14,680 |
| 2 | San Cristóbal Totonicapán | 2,845 | 56.1 | 666 | 13.1 | 2,935 | 57.9 | 5,070 |
| 3 | San Francisco El Alto | 4,112 | 70.2 | 492 | 8.4 | 4,216 | 72.0 | 5,856 |
| 4 | San Andrés Xecul | 1,676 | 58.6 | 622 | 21.7 | 2,220 | 77.6 | 2,861 |
| 5 | Momostenango | 7,449 | 65.1 | 497 | 4.3 | 4,159 | 36.4 | 11,435 |
| 6 | Santa María Chiquimula | 3,483 | 70.6 | 310 | 6.3 | 732 | 14.8 | 4,933 |
| 7 | Santa Lucía La Reforma | 467 | 29.1 | 106 | 6.6 | 169 | 10.5 | 1,604 |
| 8 | San Bartolo | 652 | 73.8 | 151 | 17.1 | 425 | 48.1 | 884 |
| | TOTAL | 33,533 | 70.9 | 4,935 | 10.4 | 26,500 | 56.0 | 47,323 |

Source: National Census of Population and Homes, 1994, INE

(7) Roads

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 nationals, which connects Los Encuentros, Totonicapán, Quetzaltenango (route no. 1) and San Bartolo, San Carlos Sija, Quetzaltenango (route No. 9N) and several provincial roads and highways, whose lengths are shown in below.

Road System in Totonicapán

| Categories of the Roads | Length (km) | |
|-------------------------|----------------|-------|
| | Asphalt/ lined | earth |
| Central American | 61 | |
| National | 15 | 42 |
| Provincial | 22 | 92 |
| Rural | | 353 |
| TOTAL | | 585 |

Source: Dirección General de Caminos, 1999

3.5 Quetzaltenango Province

3.5.1 Social Conditions

The Province of Quetzaltenango has an area of 1951 Km² and is made up of 24 municipalities. The total population is 503,900 and 59.5% is indigenous. In the western part of the province live Mam people and in the eastern part live K'iche' peoples. The literacy rate in adults is 68%.

Because Quetzaltenango province is the second city of Guatemala, rural area EAP remains lower than any other three provinces. Within the rural EAP, agriculture always prevails, however it includes more farm labor as shown below.

Labor Market in Quetzaltenango Province

| | | Self-employment | No remunerate family | Employee |
|---------------------|-------------|-----------------|----------------------|----------|
| EAP rural | 55.9% | 39.2% | 13.5% | 45.8% |
| | Agriculture | Industrial | Others | |
| EAP rural in sector | 76.1% | 8.2% | 15.7% | |

Source: La Productividad y el empleo Agrícola y no Agrícola en el Area Rural

Because Quetzaltenango province extends from the highlands to the coast, there is a great difference of land use patterns among municipalities. Also the people in the northern area are migrating to the coastal area for obtaining cash and auto-consume of maize, and are apt to migrate to the USA. The main characteristics of municipalities are shown below;

- North: Cabricán , Huitan, San Carlos Sija,
Area of migration source with agriculture of auto-consume, and now with the tendency of migrating to the USA. Cabricán exploits and produces lime
- Norwest: Cajolá, Palestina de los Altos, San Juan Ostuncalo(North) ,
(Huitán)
MAM area, in which many people rent land in the pacific coast for the cultivation of maize and sesame.
- Central-East: San Francisco La Unión, Salcajá, Quetzaltenango, San Mateo, Cantel, etc.
Non agricultural activities like commerce, weaving and employees in the city.
- West-Center: Concepción Chiquirichiapa, Ostuncalco, San Martín Sacatepéquez
Potato and vegetable production for local and international market.
Almolonga, Zuñil and one part of San Martín cultivate vegetables.
- South: Colomba, El Palmar, Flores Costa Cuca, Genova, Coatepeque
Area where large properties for the production of coffee, rubber, sugar cane and livestock prevail. Some communities that have been beneficiaries of land distribution exist.

3.5.2 Land and Agriculture

Major soil series in Quetzaltenango province are: series Ixtan, Chuva, Chocola, Retalhuleu, Camancha, Quetzaltenango, Totonicapán, Palin, and Patzite. The areas and main characteristics of these soil series are summarized in Table 3.1.4 (10), and their distribution in the province is shown in Fig. 3.1.4 (5).

About 41,000 ha, or 21 % of total Quetzaltenango province are classified as classes I to IV, which are suitable for intensive agriculture production. The distribution of land classes in Quetzaltenango province is shown in Fig. 3.1.4 (8).

The distribution of main types of land use in Quetzaltenango province is shown in Fig. 3.5.2 (1). 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 done under rainfed conditions, depending on rainfall; only some 350 ha are provided with irrigation system.

Quetzaltenango province has a large variation of micro-climates and soil

conditions; considering these variation in climate, the province may be divided into three sub-regions:

- (i) The north sub-region, which includes the municipalities of San Carlos Sija, Cabricán, Sibilia, Huitán, Palestina de los Altos, Cajolá, San Miguel Sigüila, San Mateo, Olinstepeque, San Francisco la Unión, and La Esperanza; this sub-region is characterized by the high altitude of its lands, varying mostly between 2,000 and 3,000 m.a.s.l. The average annual rainfall varies between 700 to 900 mm; The average temperature is estimated at about 13.5 °C, and very low values (-9 °C) of minimum absolute temperatures are registered during the months from December to February.
- (ii) The sub-region of the central part of Quetzaltenango province, which includes the municipalities of Quetzaltenango, Concepción Chiquirichapa, San Martín Sacatepequez, Ostuncalco, Almolonga, Cantel, and Zunil; this sub-region is characterized because its lands are at altitude in the range between 1,000 and 2,000 m.a.s.l. The average annual rainfall in this sub-region is estimated at about 1,000 mm; the mean temperature is estimated about 15 °C; in this sub-region also occurs low minimum temperatures (-7 °C) during the period between December to February.
- (iii) The south sub-region, which includes the municipalities of Colomba, El Palmar, Flores Costa Cuca, Genova, and Coatepeque; this sub-region is characterized because most of the land is at altitudes of less than 1,000 m.a.s.l. The average annual rainfall varies from 2,000 mm up to 4,470 mm; the mean temperature is estimated at about 18.5 °C.

The variations in soil and climatic characteristics of the three sub-regions of Quetzaltenango make possible a large diversity of agriculture production. A large percentage of farmers in Quetzaltenango province produce the basic grains, maize and black bean; wheat is also being produced by a small percentage of farmers. Potato is produced in several municipalities of the central sub-region, such as Concepción Chiquirichapa, San Martín, San Juan Ostuncalco, La Esperanza, and in the in the northern sub-region Palestina de los Altos. Vegetables and fruit such as peach are produced at small scale in several municipalities of the province. In the municipalities of the southern sub-region, such as colomba, Génova and Coatepeque coffee is the main produce; sugarcane and African palm are produced in some areas of the southern sub-region of Quetzaltenango province.

Many farmers' households have some pigs, sheep, and poultry that they grow in the backyards; some of the families also have few cows that they feed with dry leaves of maize. Some areas, mostly in the southern sub-region are used for pasture.

3.5.3 Water Resource

The province of Quetzaltenango is divided in the three basins from the Pacific: Ocositos River, Naranjo River and Samalá River and a basin in the Gulf of Mexico (Cuilco River). The characteristics of each basin are shown in below.

Characteristics of each basin

| Basin | Flow (m ³ /sec) | | Point of view | Municipalities |
|----------------|----------------------------|-------|----------------|--|
| Ocositos River | Minimum | 0.50 | Caballo Blanco | Coatepeque, Flores Costa Cuca, Génova, Colomba, El Palmar, Concepción Chiquirichapa, San Martín Sacatepequez |
| | Average | 1.58 | | |
| | Flow (l/s/ha) | 0.032 | | |
| Naranjo River | Minimum | | | San Miguel Siguila, Concepción Chiquirichapa, Colomba, San Martín Sacatepequez, San Juan Ostulcalco, Palestina |
| | Average | | | |
| | Flow (l/s/ha) | | | |
| Samalá River | Minimum | 2.57 | Cuilco | San Carlos Sija, Cabricán, Sibilia, Palestina de los Altos |
| | Average | 14.12 | | |
| | Flow (l/s/ha) | 0.022 | | |
| Salinas River | Minimum | | | San Carlos Sija |
| | Average | | | |
| | Flow (l/s/ha) | | | |
| TOTAL | | | | |

According to the study carried on by JICA in 1995, the zones of Olinstepeque, Cajolá, Almolonga and Colomba have a high potential of developing their groundwater. While the zones of San Carlos Sijá, Concepción Chipirichapa, San Francisco La Unión, Flores Costa Cuca and Palestina de los Altos have a medium potential of development. In case there is no possible economical explosion of he superficial waters in these zones, the alternative use of groundwater in these zones must be studied in details.

Potential of Groundwater

| No. | Municipality | Geology | Type |
|-----|--------------------------|---------|------|
| 1 | Quetzaltenango | Qpi | |
| 2 | Salcajá | Qpi | |
| 3 | Olintepeque | TvQp | A |
| 4 | San Carlos Sijá | TvQp2 | B |
| 5 | Sibilia | Tve | |
| 6 | Cabricán | | |
| 7 | Cajolá | TvQp | A |
| 8 | San Miguel Siguilá | Qpi | |
| 9 | San Juan Ostanculco | Qpi | |
| 10 | San Mateo | Qpi | |
| 11 | Concepción Chiquirichapa | TvQp2 | B |
| 12 | San Martín Sacatepéquez | TvQp | A |
| 13 | Almolonga | TvQp | A |
| 14 | Cantel | Qp | |
| 15 | Huitán | Br | C |
| 16 | Zunil | Qa | |
| 17 | Colombá | Qv | A |
| 18 | San Francisco La Unión | TvQp2 | B |
| 19 | El Palmar | | |
| 20 | Coatepeque | | |
| 21 | Génova | Qv | B |
| 22 | Flores Costa Cuca | Qv | B |
| 23 | La Esperanza | Qpi | |
| 24 | Palestina de Los Altos | TvQp2 | B |

Source: Study of the Development of Subterranean Waters in the Central High Plateau of the Republic of Guatemala, JICA, 1995

Hydro-geological study of the basin of Samalá, INSIVUMEH

Notes: Tv: Volcanic Rocks from Terciary A: High Potential

Qp: Volcanic Rocks from Pleistocen B: Medium Potential

Qa: Aluvial Sediments C: Low Potential

Qv: Volcanic Rocks from holocen

3.5.4 Social Services and Infrastructure

(1) Demography

The population of Quetzaltenango province as of 1999 is estimated to be 661,807 based on the 1994 census by INE. Percentage of migrant in Quetzaltenango is about 14% (Table 3.2.4(1)). Percentage of indigenous population is about 60%, lower than Sololá and Totonicapán, and percentage of urban population is about 40%, higher than those two provinces.

(2) Access to Health Care Services

According to the MSPAS' s office in Quetzaltenango, about 24% of the population has access to health services of MSPAS facilities, about 18% covered by SIAS, 17% covered by IGSS, 8% covered by other health institutions such as private hospitals, and 33% without access to any health services.

Names of NGOs working for SIAS under the agreement with MSPAS to provide primary health care services in the communities as of 1999 are shown in the following table.

NGOs in SIAS in Quetzaltenango 1999

| Name of NGO | Type | Municipality |
|-------------------|------------------|--|
| ABC | Service Provider | San Francisco la Union |
| ABC | Administrator | Communities of Quetzaltenango |
| Pies de Occidente | Service Provider | Quetzaltenango |
| ADI | Service Provider | Genova & Flores Costa Cuca |
| CEDEC | Service Provider | San Martin Sacatepequez & Concepcion Chiquirichapa |
| ECOMADI | Service Provider | Cabrican & Huitan |
| ADECO | Service Provider | (information not available) |

Source: MSPAS

(3) Maternal Care

Among the total deliveries during 1999 about 68% were attended by traditional birth attendants (comadronas), and about 23% were attended by health professionals; physicians or nurses. Compared with other 3 provinces Quetzaltenango has the highest percentage of deliveries attended by health professionals in Section 3.2.4 (4) but still lower than the national average (35%). About 92% of women received some kind of prenatal care at least once during pregnancy. Percentage of pregnant women who received second dose of tetanus toxoide was 29%.

(4) Immunization

Immunization coverage among children under 1 in Quetzaltenango is a little higher than in other three provinces in Section 3.2.4 (5). According to the director of the MSPAS office in Quetzaltenango, principal reasons for failing to take immunizations are: a) cultural reasons and b) children of migrant workers often fail to take immunization both in places of origin and destination.

(5) Principal Causes of Mortality and Morbidity

Principal causes of infant death during 1999 were pneumonia, diarrheal diseases, prematurity, neonatal sepsis, and malnutrition. Principal causes of general mortality during 1999 were pneumonia, diarrheal diseases, cancer, and cardiac insufficiency. Other frequent diseases include intestinal parasite, anemia and urinary infection.

As the climate in Quetzaltenango is varied, its common diseases are also varied.

In the lowlands in coastal areas, malaria is often reported. In the big farms located in the lowlands population of about 18,000 are exposed to the risk of oncocercosis.

Number of AIDS patients in the province of Quetzaltenango is second in the country after Guatemala. More AIDS patients are reported among farmers in the case of men, and among housewives in the case of women. It is thought that farmers get infected while they are in the lowlands for work during the harvest season and transmit the infection to their wives back home.

(6) Electricity, Water Supply and Sanitation

The 5th National Census of Population carried out in 1994, indicates that the coverage rates from drinkable water, latrines and electricity services are 68.9%, 30.4% and 61.9%. This means that the basic social infrastructure is found at a low level, being very notorious the lack of sanitation services in this Province.

Situation of Water, Sanitation and Electricity Services

| | Municipality | Water Service | | Sanitation Service | | Electricity | | Total Homes |
|----|--------------------------|---------------|------|--------------------|------|-------------|------|-------------|
| | | Homes | % | Homes | % | Homes | % | |
| 1 | Quetzaltenango | 17,821 | 84.1 | 13,512 | 63.8 | 18,252 | 86.1 | 21,193 |
| 2 | Salcajá | 2,048 | 83.1 | 1,511 | 61.3 | 2,192 | 88.9 | 2,465 |
| 3 | Olintepeque | 2,091 | 69.0 | 343 | 11.7 | 2,116 | 72.3 | 2,926 |
| 4 | San Carlos Sijá | 2,626 | 63.2 | 212 | 5.1 | 2,081 | 50.1 | 4,154 |
| 5 | Sibilia | 1,046 | 76.4 | 184 | 13.4 | 1,034 | 75.5 | 1,370 |
| 6 | Cabricán | 1,638 | 69.6 | 90 | 3.8 | 478 | 20.3 | 2,354 |
| 7 | Cajolá | 610 | 39.2 | 53 | 3.4 | 662 | 42.5 | 1,556 |
| 8 | San Miguel Siguilá | 567 | 75.6 | 9 | 1.2 | 469 | 62.5 | 750 |
| 9 | Ostuncalco | 4,967 | 85.7 | 953 | 16.4 | 3,330 | 57.5 | 5,796 |
| 10 | San Mateo | 446 | 91.6 | 158 | 32.4 | 436 | 89.5 | 487 |
| 11 | Concepción Chiquirichapa | 2,021 | 96.8 | 558 | 26.7 | 1,603 | 76.8 | 2,088 |
| 12 | San Martín Sacatepequez | 2,476 | 85.4 | 329 | 11.4 | 1,136 | 39.2 | 2,898 |
| 13 | Almolonga | 1,714 | 84.6 | 1,373 | 67.7 | 1,816 | 89.6 | 2,027 |
| 14 | Cantel | 3,684 | 83.9 | 731 | 16.6 | 3,215 | 73.2 | 4,393 |
| 15 | Huitán | 1,006 | 86.3 | 45 | 3.9 | 187 | 16.0 | 1,166 |
| 16 | Zunil | 1,861 | 97.5 | 1,086 | 56.9 | 1,473 | 77.2 | 1,909 |
| 17 | Colombá | 3,152 | 46.1 | 1,147 | 16.8 | 3,020 | 44.2 | 6,831 |
| 18 | San Francisco La Unión | 138 | 13.5 | 0 | 0.0 | 548 | 53.4 | 1,026 |
| 19 | El Palmar | 2,597 | 75.8 | 452 | 13.2 | 1,590 | 46.4 | 3,428 |
| 20 | Coatepeque | 7,178 | 54.3 | 4,735 | 35.8 | 7,308 | 55.2 | 13,231 |
| 21 | Génova | 764 | 17.5 | 168 | 3.8 | 723 | 16.5 | 4,371 |
| 22 | Flores Costa Cuca | 802 | 30.4 | 131 | 5.0 | 1,546 | 58.6 | 2,639 |
| 23 | La Esperanza | 1,475 | 92.7 | 236 | 14.8 | 1,406 | 88.3 | 1,592 |
| 24 | Palestina de los Altos | 524 | 27.8 | 84 | 4.5 | 678 | 35.9 | 1,886 |
| | TOTAL | 63,180 | 68.3 | 28,100 | 30.4 | 57,299 | 61.9 | 92,536 |

Source: National Census of Population and Homes, 1994, INE

(7) Roads

The province of Quetzaltenango has a Central American surfaced road (CA-2) which connects Escuintla, Mazatenango, Retalhuleu, Coatepeque, and Malacatán. It also has three nationals that connect Los Encuentros, Totonicapán, Quetzaltenango (route No. 1), San Bartolo, San Carlos Sija, Quetzaltenango (route No. 9N) and Retalhuleu, Coatepeque, El Rodeo (route No. 13), in addition to several provincial roads and highways, whose length is demonstrated below.

Road System in Quetzaltenango Province

| Categories of the Roads | Length (km) | |
|-------------------------|-----------------|------------|
| | Asphalt/Surface | Terracería |
| Central American | 58 | |
| National | 122 | 28 |
| Provincial | 100 | 142 |
| Rural | | 172 |
| TOTAL | | 622 |

Source: Dirección General de Caminos, 1999

4. SELECTION OF “MODEL MICRO-BASIN”

4.1 Basic Concept of Selection and Procedure

(1) Basic Concept

The field survey indicated that poverty of the farmers in the Study area is due to the following three main causes.

- (i) Low agricultural income of the farmers that result in small scale of farmlands, low yield of crops, low crop intensity, low degree of extension services for appropriate agricultural technology, poor access to markets, etc;
- (ii) Devastation of natural resources due to deterioration of lands and soil erosion due to unplanned communal deforestation and environmental contamination by high dosages of agricultural chemicals, and no efficient use of water resources which are less developed and
- (iii) Poor quality of life of farmers because of low health, sanitation and water supply services, low access to education, low capacity of subsistence, low quality of houses, etc.

The natural conditions such as topography, soil, elevation, hydrology, geographical and sociological conditions are the main factors generating the land utilization pattern and controlling agricultural production in the Study area.

From the above survey, it is concluded that the conditions mentioned in (i) and (ii) are attributed to the present land use pattern, and that the poor quality of life of farmers is due mainly to the low level of social infrastructure development in the area.

The Study area, with four provinces and 67 municipalities, has an area of about 6,000 km². Supposing that one micro-basin is 5 km², there are 1,200 micro-basins in the Study area. Since it is very difficult to directly select one model micro-basin from each province, selection of the model micro-basins should be done stepwise.

A model micro-basin from each province is selected based on the following three screening steps.

- (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: One or several micro-basins covering communities in one municipality is or are selected based on the evaluation factors of the scale of the community and the basin area, confirmation of the representative land use pattern, effectiveness of demonstration and the ripple effect of the project, non existence of social problems, legal uptake of water sources, and so forth.
- (iii) Third Screening Step: Final screening of the model micro-basin in each province is made by confirmation of the intention of heads of municipalities and Aldea or Caserio (the local community units) relevant to the micro-basin under the Study. In the case several micro-basins are selected in the second screening step, one micro-basin will be selected based on the specific criteria for selection that reflects the conditions of the municipality containing the micro-basins before confirmation.

(2) Procedure for Selection of Model Micro-basins

The procedure for selection of model micro-basins is illustrated in Figure 4.1.1(1) and consists of the following steps.

(i) First Screening:

Selection of municipalities having representative land use in each province:

The representative land use patterns in the Study area are identified based on the following studies and investigations.

- (a) Interpretation of land use maps (1/250,000) of the four provinces, prepared by IGN in 1991;
- (b) Interpretation of land use maps of Totonicapán province (1/50,000) prepared by EU in 1998;
- (c) Interpretation of the survey results of cultivated area by crop on the municipality level provided by the MAGA provincial offices; and
- (d) Field confirmation survey conducted by the JICA Study Team

As a result, the representative four land use patterns in the Study area were identified and the 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 |

Based on the above studies and investigations, the municipalities in each province that have the representative land use pattern were identified.

Selection of municipalities having class “c” poverty defined by FIS in each province: INE conducted the “10th National Population Census and 5th National Housing Census” in 1994. FIS standardized “poverty” based on the results of those censuses. Poverty degree in each municipality and each community in the country was calculated based on the following six evaluation factors and their weight of %, and defined as indicator of unsatisfied basic necessities (indicador NBI ponderado).

| 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 |

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:

- (a) Evaluation factors for poverty are very appropriate for evaluating of the degree of quality of life of the farmers in the Study area;
- (b) 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 farmer households in a huge area like the Study area, can be easily practiced on a reliable level, and

- (c) Everyone can easily use the FIS poverty standard in future projects.

In this Study, municipalities classified by “Regular poverty (class c) or medium class poverty” were selected in order to avoid selecting extreme cases.

Based on both the results of evaluation from the viewpoint of representative land use pattern and medium class ‘c’ poverty, selection of one representative municipality was made from each province.

- (ii) Second Screening:

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: The selected municipality consists of the local communities such as Pueblos, Aldeas, Cacerios, Parajes, Fincas, and others that range from “a” to “e” in value of indicator of poverty. Among them, communities having class “c” poverty are screened.

Preparation of criteria with 8 evaluation factors for selection and evaluation: The screened communities in the municipality mentioned above are evaluated based on the following 8 factors and their order of assessment. When all the communities cannot adequately pass the value of the evaluation factors, the range of “c” poverty (15-19.99) should be extended to 13.5 to 22 (plus/minus 10% of the value of “c”) for selection. The same above procedure should be applied to evaluate the communities having these ranges.

| No. of evaluation factors | 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 |

(iii) Third Screening:

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.

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 is confirmed and one model micro-basin in each province is finally selected.

4.2 Selection Procedures

4.2.1 Chimaltenango Province

(1) First Screening

There are 16 municipalities in Chimaltenango province. As shown in Table 4.2.1 (1), six municipalities belong to class “c” poverty: San Martin Jitotepeque, Comalapa, Patzun, Pochuta, Acatenango and Zaragoza. There are 3 municipalities: San Martin Jitotepeque, Pachuta and Acatenango where coffee is grown mainly by coffee. Chimaltenango province plays an important role in the provision of drinking water to Guatemala City. Especially water from the Pixcaya river basin is the most important source. It is considered that adjustment and coordination of drinking water supply to Guatemala city and agricultural

water use in this province are very difficult and the municipalities which cover the Pixcaya river basin should be excluded in the selection of the model micro-basin. As a result, Patzun municipality was selected as shown in Table 4.2.1 (1).

(2) Second screening

The area of Patzun municipality was divided into 30 micro-basins by use of the map on a scale of 1/50,000 as illustrated in Figure 4.2.1 (1) and shown in Table 4.2.1 (2). The number of micro-basins in Patzun is summarized below:

| Name of river | Number of micro-basins |
|--|------------------------|
| 1. Sub-basin of Los Chocoyos (Madre Vieja basin) | 8 |
| 2. Madre Vieja river basin | 5 |
| 3. San Jorge (Madre Vieja basin) | 3 |
| 5. Sub-basin of Nican (Coyolate basin) | 3 |
| 5. Sub-basin of Xaya (Coyolate basin) | 11 |

In Patzun municipality, there are 50 communities. First these communities were assessed by poverty classes. Four communities including Caserios La Trompetilla, El Garabato, Pachut and Popabaj were selected. Second, the micro-basins covering these caserios were assessed based on the proposed 8 evaluation factors. However these communities do not pass the evaluation factor No.1; number of households in the community. So the range of class “c” poverty (15-19.99) was extended to 13.5 to 22 (plus/minus 10% of value of “c”) for selection and 9 communities were retained. The micro-basins including these communities were evaluated by the same procedure mentioned above. Then three micro-basins: Caserio Xetziti, Aldea Xeatzán Bajo and Aldea San Jose Xepatan, adequately passed the 8 evaluation factors and were selected as candidate model micro-basins.

(3) Third Screening

The model micro-basin in this province will be the representative land use for vegetables and basic grains. Since availability of irrigation water is one of the most important factors for rural development and reduction of poverty of the people, water potential in the communities concerned was assessed by field survey as described below.

- (i) Caserio Xetzitzi is located 7.5 km from the capital of Patzun municipality. This caserio is connected to the capital by unlined roads. According to the 1994 census, there were 66 farm households fully engaged in agriculture. In and around this caserio, there are few suitable lands for farming. The

farmers in this caserio grow basic grains and vegetables on reclaimed steep lands. At present several springs in and around this caserio provide less than one lit/sec of water can be obtained from the river reclaimed the steep lands and grow basic grains and vegetables. At present there are several springs in and around this caserio provide less than one lit/sec of water for drinking and washing purposes. The only new water source can be obtained from the river located about 3km far away, but it is necessary to pump up water to a height of 200 m , which suggests a huge investment for construction of irrigation facilities and O&M costs.

- (ii) Aldea Xeatzán Bajo is located 8.2 km from the capital of Patzun municipality. This caserio connected to the capital by unlined roads. According to the 1994 census, there were 212 farm households fully engaged in agriculture. Farmlands in and around this caserio are relatively undulated. The farmers in this caserio grow basic grains and vegetables. There is a spring in this caserio with a discharge of about 20 lit/sec. About half of this discharge is used for drinking by local people in this caserio. The remainder that is discharged to the downstream area at present can be used for irrigation purpose.
- (iii) Aldea San Jose Xepatan is located 5.4 km from the capital of Patzun municipality. This caserio is connected to the capital by unlined roads. According to the 1994 census, there were 169 farm households fully engaged in agriculture. Farmlands in and around this caserio are relatively undulated. The farmers in this caserio grow basic grains and vegetables. Since this aldea is located at an elevation of over 2,300 m and soil moisture is assumed to be supplied by fog that often occurs even in the dry season, culture for vegetables without irrigation is prevailing at present in this aldea. Though there are plenty of water sources from springs in and around this aldea, these water sources are reserved for drinking water supply to Guatemala City. This situation constitutes a limitation for development of water sources for irrigation purpose.

Among the above three communities, the micro-basin covering aldea Xeatzán Bajo was considered the most appropriate as shown in Table 4.2.1 (3).

Needs for development of the Xeatzán Bajo micro-basin were surveyed and identified. It was also confirmed that the heads of the relevant local authorities of Patzun municipality, and Xeatzán Bajo Aldea, and local people of the Xeatzán Bajo micro-basin desire the development of the basin.

As a result, the Xeatzán Bajo micro-basin was selected as the representative one from Chimaltenango province.

4.2.2 Sololá Province

(1) First Screening

There are 19 municipalities in Sololá province. As shown in Table 4.2.2 (1), there

is only one municipality, San Juan La Laguna , with a poverty class “c”. On the other hand, coffee is grown mainly in 11 municipalities including San Juan La Laguna. Therefore, San Juan La Laguna municipality was selected.

(2) Second Screening

The area of San Juan La Laguna municipality was divided into 6 micro-basins as illustrated in Figure 4.2.2 (1) and shown in Table 4.2.2 (2). There is one micro-basin in the Quebrada Seca river basin and five micro-basins in the Yatza river basin.

There are five communities in San Juan La Laguna municipality: Pueblo San Juan La Laguna, Panjevar, Palestina, Pasajquim, and Finca la Dicaha. First these communities were assessed by poverty classes. Pueblo San Juan La Laguna was selected. Second, the micro-basin covering Pueblo San Juan La Laguna was assessed based on the proposed 8 evaluation factors. However this community has 585 total households, which do not pass the evaluation factor No.1: number of households in the community. So the range of class “c” poverty (15-19.99) was extended to 13.5 to 22 (plus/minus 10% of value of “c”) for selection and Panjevar community was thus selected. The micro-basin covering Panjevar (Panjevar, Y-3) was evaluated by the same procedure mentioned above and its appropriateness was confirmed as shown in Table 4.2.2(3).

(3) Third Screening

Needs for development of the Panjevar micro-basin were surveyed and identified. It was also confirmed that the heads of the relevant local authorities of San Juan La Laguna municipality and Panjevar Aldea, and local people of the Panjevar micro-basin desire the development of the basin.

As a result, the Panjevar micro-basin was selected as the representative one from Sololá province.

4.2.3 Totonicapán Province

(1) First Screening

There are 8 municipalities in Totonicapán province. As shown in Table 4.2.3 (1), Four municipalities: San Crisobal Totonicapán, San Andres Xecul, Momostenango, and Santa Maria Chiquimula were selected because they are in class “c” poverty. On the other hand, since Totonicapán province is characterized by forests, the forest coverage rate was used as one of the selection factors in this study. A municipality to be selected should be in class “c” poverty and also have

the highest forest coverage rate among the municipalities. As a result, Santa Maria Chiquimula municipality was selected.

(2) Second Screening

The area of Santa Maria Chiquimula municipality was divided into 40 micro-basins as illustrated in Figure 4.2.3 (1) and shown in Table 4.2.3 (2). The number of micro-basins in the river basins is summarized below:

| Name of River | Number of micro-basins |
|---------------|------------------------|
| Alajsimier | 1 |
| Pacaranat | 4 |
| Tzancorral | 1 |
| Sajcoclaj | 2 |
| Pachac | 10 |
| Sacmequena | 9 |
| Sacbaj | 4 |
| Tzununa | 9 |

There are 66 communities in Santa Maria Chiquimula municipality. First these communities were assessed by poverty class and 13 communities were selected. Second, the micro-basin containing 13 communities was assessed based on the proposed 8 evaluation factors. Three micro-basins covering Chipu, Pachum and Chicaxul communities were retained as shown in Table 4.2.3(3). Other communities were excluded because of their inappropriateness with respect to the evaluation factor No.1: scale of community and/or No.2: (a scale of micro-basin.

(3) Third Screening

Santa Maria Chiquimula municipality is one of the areas where roads are mostly undeveloped. The roads and road network are very poor and inadequate. Most roads are unlined and become muddy in the rainy season. It is considered that the condition of roads to a micro-basin and its location are prerequisites for final selection of a micro-basin for demonstration of the ripple effects of the project, easy access to market, easy implementation of the projects, etc. And also the representative micro-basin should have potential water resources for development, especially agricultural development to increase farm income of local farmers.

The final selection was made from the geographical situation including roads and water potential in the micro-basin covering communities.

The situations of the selected three municipalities are summarized below:

| | Pachum | Chipu | Chicaxul |
|--|---|--|---------------------------------------|
| Conditions of forests | Dense forest | Forest with low density of pine trees | Forest with low density of pine trees |
| Availability of river waters in dry season | Yes | No | No |
| Access to main road connecting municipality capital with Inter American Highway (km) and condition in the rainy season | 4.6 km roads become muddy in the rainy season | 9 km and there is no access road to this community by car. 30 minutes are needed to reach walking from the road connecting with municipality capital | 5.5 km |
| Access to Inter American Highway | 15 km | 33 km | 30 km |

The above table indicates that the Pachum micro-basin has the most advantage from both geographical and water potential viewpoints. Thus the Pachum micro-basin was selected.

Needs for development of the Pachum microcuenca were surveyed and identified. It was also confirmed that the heads of the relevant local authorities of Xesana municipality and Pachum Aldea and local people of the Pachum micro-basin desire the development of the basin.

As a result, the Pachum micro-basin was selected as the representative one from Totonicapán province.

4.2.4 Quetzaltenango Province

(1) First Screening

There are 24 municipalities in Quetzaltenango province. As shown in Table 4.2.4 (1), the three municipalities: San Francisco La Union, Flores Costa Cuca and Palestina De Los Altos, are in class “c” poverty. Though the main land use is cultivation of maize in San Francisco La Uion municipality, there are none community with class “c” of poverty within it. Then, this municipality was eliminated. Flores Costa Cuca municipality is located in the lowland and coffee is dominant in its main land use pattern. This was therefore also eliminated. As a result, Palestina De Los Altos municipality was selected.

(2) Second Screening

The area of Palestina De Los Altos municipality was divided into 10 micro-basins as illustrated in Figure 4.2.4 (1) and shown in Table 4.2.4 (2). The number of micro-basins in the river basins is summarized below:

| Name of River | Number of micro-basins |
|---------------|------------------------|
| Turbala | 6 |
| Palana | 2 |
| Patzacan | 1 |
| Ixchol | 1 |

There are 26 communities in Palestina De Los Altos municipality. First these communities were assessed by poverty class and the following seven communities were selected:

| Number | Administrative Units | Name of community |
|--------|----------------------|-------------------------------------|
| 1 | Caserio | Tojguabil |
| 2 | Caserio | Los Marroquines |
| 3 | Aldea | El Socorro |
| 4 | Caserio | El Carmen |
| 5 | Caserio | Los Cabrera and Molinos Los Cabrera |
| 6 | Caserio | San Isidro and Los Diaz |
| 7 | Caserio | Los Perez |

Second, the micro-basin covering the above seven municipalities were assessed based on the proposed 8 evaluation factors. Among them, the micro-basin with El Carmen was not selected because of its inappropriateness with respect to the evaluation factor No.1: a scale of community. Two micro-basins covering Los Marroquines and El Socorro were eliminated due to the very small scale of an area of their micro-basin (evaluation factor No.2). Since the micro-basin of Tojguabil overlaps the basin of Concepcion Chiquirichapa municipality (evaluation factor NO.8), it was eliminated. The micro-basin Sanisidro, T-3 covering Los Cabrera/Molinos Los Cabrera, SanIsidro/Los Diaz and Los Perez adequately passed all the 8 evaluation factors and was selected as shown in Table 4.2.4 (3).

(3) Third Screening

Needs for development of the micro-basin having three communities were surveyed and identified. It was also confirmed that the heads of the relevant local authorities of Palestina De Los Altos municipality and local people of the micro-basin desire the development of the basin.

As a result, the Sanisidro (T-3) micro-basin was selected as the representative one from Quetzaltenango province.

4.3 General Description of the Selected “Model Micro-basins”

The present conditions of the selected model micro-basins are shown in Table 4.3.1 (1) ~ 4.3.4 (1) for Chimaltenango, Sololá, Totonicapán and Quetzaltenango, respectively. Besides, additional information obtained through field reconnaissance are also summarized in Table 4.3.1 (2) ~ 4.3.4 (2).

5. PRESENT CONDITION OF MODEL MICRO-BASINS

5.1 Xeatzán Bajo Area in Chimaltenango Province

5.1.1 Natural Resources

(1) Location

The Model micro-basin selected in Chimaltenango province, Patzun municipality, Xeatzán Bajo community is located at near 14° 41' latitude north and 91° 10' longitude west; the elevation varies between 2,150 to 2,500 meters above sea level. The location of Xeatzán Bajo Model micro-basin is shown in Fig. 4.2.1 (1).

(2) Topography and Soils

The topography of Xeatzán Bajo Model Micro-basin is undulated; the east side of the basin is a high steep mountain with slopes between 45° to 50;° the center of the basin is slightly undulated with slopes between 10° to 25° and at the west side there is a hill with slopes between 25° to 35.°

According to C. Simmons et.all (1954), the soils of Xeatzán Bajo model micro-basin are classified in the group I, named as soils of Volcanic mountains, series Camanchá (Cm); The parent material is volcanic ash of clear color; The soils are moderately deep, up to 1.25 m; The soil color is dark brown and the texture varies from loam to clay loam. The internal drainage is good. Although the micro-basin is small, within it there are significant differences in soil properties; some small part of the micro-basin present large rocks at the soil surface, and some areas have large percentage of coarse size materials.

(3) Climate

There is not available measurement of climatic data in the nearby of the micro-basin; Referring to temperature and rainfall maps prepared by INSIVUMEH, the average climatic conditions of Xeatzán Bajo micro-basin are indicated in Table 5.1.1 (1). The climate is template 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.° Average annual rainfall is about 1,000 mm; about 90 % of the annual rainfall occurs during the period from May to October; there are about 140 rainy days per year.

(4) Water Resources

There are 5 spring sites, which are owned by the community, and several streams in/near Xeatzán Bajo Community as listed below.

- *Pachomochai* springs
- *Chuchuka and Xeatzán Alto* springs
- *Chuacacquix* spring
- *Chitiyah* spring
- *Pachor* spring
- Small Streams (no name).

Among these water resources, the most prominent water resource in the area, in terms of both its discharge and its potentiality of contribution to the community, is *Pachomochai* spring that is a resource of the present portable water system. According to the field survey, only 30 % of total water volume is utilized and its potentiality as a development water resource is so high.

The detail explanations and the locations of the water resources are shown in Table 5.1.1 (2) and Figure 5.1.1 (1).

5.1.2 Socio-economic Conditions

(1) General Conditions

Xeatzan Bajo is a village that belongs to the Municipality of Patzún, province of Chimaltenango. Now in Patzún there are 12 villages, and Xeatzán Bajo was the first village of this municipality. The population of this area speaks language Kaqchikel and Spanish.

Most of the population of this area is dedicated to the contract-cultivation of vegetable for export. This cultivation generates employment inside of and outside of the community, and the tendency is observed to the permanency of the youths in the community. However the lack of the land inside the community is remarkable and for this reason many families rent land in the near communities. These years they have also lowered profitability of the vegetable cultivation like Broccoli and Arveja China. The women also participate in agriculture and more than half of the women are dedicated to the embroidery and/or knitting for the production of traditional Huipil.

(2) Population and Administrative Structure

The total population of Xeatzán Bajo village is about 1,950 having the total household of 325 in 2000. Most of the households are engaged in agriculture.

The municipality, Patzún is the minimum authorized administrative unit and it has an elect municipal mayor for a universal vote. With the municipal mayor, the Municipality takes charge of local administration.

The auxiliary mayor (AA) plays the linking roll between the municipality and each community (aldeas or villages). The auxiliary mayors are the representatives of each community. A written regulation for election of AA does not exist. However they are usually chosen in the election in the community and the municipality recognizes it. The auxiliatura that is composed of auxiliary mayor and other positions is a real administrative unit in the communities and they receive accusation and they solve problems, they also negotiate for the projects and they carry out maintenance of the infrastructure in the communities for several committees. AA and the municipality have meetings periodically.

According to information of the municipality, 100% of men and 75% of women they have vicinity identification. On the census for the election that bases on this registration, they say that 60% of men and 40% of women are registered.

(3) Communal organization and Mechanism of Decision in Village

Xeatzán Bajo possesses an auxiliary mayor (AA) as community representative, two adults and 6 constable and they work as administrative unit in community. AA of Xeatzán Bajo is chosen every year. They turn a year of position without remuneration. The role of AA is to receive the population's accusation and to solve it. In certain serious cases they send them to the tribunal of peace. A.A also works for the development of the community coordinating with committees. The general assembly convokes it once a month in which about 500 peoples in both men and women participate. The participation of women has increased for 15 years. They carry out the meeting of AA and committees every two weeks.

The election of AA is carried out in the General Assembly. First members of committees, communal advice and salient mayor gather to prepare the list of 3 candidates. In General Assembly they make voting secret for paper basing to select one. The ones entitled to vote must be older than 15 years.

Now in the community there is a Communal Council that was formed in the year 1993 for the representatives of each church. 6 councils are perpetual appointments and they are recognized by their experience and knowledge.

Also in the community several committees that have their own objectives exist.

Now in Xeatzán Bajo there are the Committee of Development, Committee of Pump, School Committee, Health Committee, Women Committee and Sports Committee. The positions of these committees are following; President, Vice-president, Treasurer, Secretary and 5 members, and they are of two years. Assignment of the positions of committees is carried out in the General Assembly and all the committees work with the support of the total community. In these positions they participate from any church.

(4) Ethnicity

All the populations of Xeatzán Bajo they are Kaqchikeles. In the town of Patzún there is non-indigenous population, however little by little the indigenous population is winning politician and economic spaces. In the background there are two main reasons. One is that due to the earthquake of 1976 and the internal war, many populations of non-natives escaped to the capital and they sold big lands that they had. The other is that for the introduction of the vegetable in the indigenous communities cut themselves bonds with the work of the hacienda. The opportunity of the education has also increased for indigenous people, especially for the population of the town, and they get professional works in Patzún. Certain rivalry exists between indigenous and not indigenous population and the cultural activities of the town are carried out separate.

(5) Religion

In Xeatzán Bajo 60% are Catholic and 40% are evangelical. There is a Catholic Church in the center of Xeatzán and there are other two evangelical churches in the community. The Catholics sometimes participate in the mass of Patzún and in Xeatzán Bajo they celebrate mass once a month. The evangelical ones began to penetrate for 30 years. The positions of the community accept them equally. In the time of war the Catholics aims to repress evangelical people and there was a situation where they could not survive without converting.

The habit has diminished from the Father's view in the decade 40-50. Before there were 10-15 Mayan priests and people priested the growth of seeding and harvest etc. Brotherhood also decayed 30 years ago. Now there will only be some families that conserve the habit. 2 sacred places exist; Pacaquix and Nimajuyu.

(6) Land Hold and Tenure

Due to the introduction of vegetable cultivation, the situation of the land holdings has changed. In Xeatzán Bajo 3 holding forms exist. One is to own land in the community, second is to own land outside of community and third is lease,

especially outside of the community. The average of the vegetable cultivation per family is assumed to be about 4 cuerdas. However they are few families that have the whole land inside the community. More or less 75% of the families possess land outside of the community and 75% rents it. 20% of the family also depends on the leased land. When advancing fragmentation of the land for inheritance, the young generation has more dependence to the lease.

Several moments exist for land purchase. 25-30 years ago, in time of wheat boom some families bought land outside of the community. There are also other groups that bought it in 10 years, after the introduction of the vegetable. Also the sale of big properties because of war facilitated land purchase-sale.

The price of the land has increased in some years. 10 years ago the price of the land in the community was Q 1,500 per cuerda. 4-5 years ago it was Q 4,000. And now it costs up to Q 8,000 - Q 10,000, and it reaches up to Q 20,000. It is already very difficult to buy the land inside the community. If one wants to buy a cheap land, he/she has to go to Godinez.

The lease cost is Q300-Q400 per cuerda. In Godinez they charge Q200. There are some cases that, to assure workforce, proprietors lease land in low cost to the workers. Another case is that lessee cultivates two maize cuerda on the other hand of 1 lease rope.

(7) Social Conflict in the Past

(a) APCIL

Conflict around the APCIL (Association from Chimaltenango for the Integral Improvement in Rural Areas). At the end of the 80th decade APCIL was formed in Xeatzán Bajo, and there was a time when 80 people participated. However after the half-filled of '96 internal conflict began with leadership. The location of the training center was one of the confrontation causes for people from other communities like Xepatán in APCIL also participated. Inside the problems, a new directive was chosen. Before this situation, the old directive took the materials and documents etc. This way it made the conflict worse. June of '99, when old directive entered in the community, they were surrounded by community people. Then, the new president was murdered by somebody in Patzún. This conflict is still in process and people don't want to speak of this topic. Some people say; there were few participants (lately around 20 people), it didn't look for everyone's benefit. We don't care for this matter. At least during interviews, people didn't give a lot of attention to this matter.

(b) Conflict against agriculture-exporter>

In the province of Chimaltenango two manifestations occurred against Agriculture-exporter in this year, still in Xeatzán he/she doesn't observe this movement. This has their origin for not canceling payment of products surrendered near one year. In Xeatzán Bajo there were several producers that you/they gave products to these companies and they didn't receive the payment. However the producers were quiet before this situation. The companies before measure of rural organization accepted the payment. This way, if the companies' payment capacity clears up, this type of conflict would increase.

(8) Gender

(a) The Work of Women

The role of women differs from one another according to what the family is earning their income from. However it can be summarized as follows in general.

| | |
|---|---|
| (1) Preparation of food and eating | |
| 1. Grinding maize* | Preparation of corn and grinding corn with grinding machine |
| 2. Cooking* | |
| 3. Washing dishes* | |
| 4. Going to market* | To Patzun on Tuesday, Friday and Sunday, public bus/pickup fee : Q2.5 one way |
| (2) Acquisition of fuels and water | |
| 1. Collecting firewood and buying firewood* | |
| 2. Collecting water* | |
| (3) Hygiene | |
| 1. Cleaning houses* | |
| 2. Laundry* | |
| (4) Gaining cash income | |
| 1. Hand weaving and other handcrafts* | About more than 90% of women are engaged in making Huipil in the village |
| 2. Sewing* | |
| 3. Livestock and poultry raising* | Hens, cocks, cows, pigs and others |
| 4. Paid agricultural work* | |
| (5) Agricultural work | |
| 1. Seeding | |
| 2. Weeding* | |
| 3. Harvesting | |
| (6) Family Care | |
| 1. Child bearing* | 5-10 children on average |
| 2. Child raising* | Especially for girl children, aged 5 years and over |
| 3. Care of the sick and the handicapped* | Between May-July and Nov.-Feb., more sickness |

*: mostly work that women are responsible for

(b) Economic Situation of Women in Xeatzán Bajo

As other area of Guatemala or other countries, women are mainly engaged in

unpaid domestic work in general in Xeatzán Bajo. The limited source of cash income is shown below:

The main source of cash income of women in Xeatzán Bajo

| | Work in charge | | How much/ day or per unit or product | Problems |
|--|------------------------------------|-----------------------|--|---|
| Traditional Women's Blouse "Huipil" making | Hand Weaving and Embroidery | Work with Patron | Setting Thread Q2-3/ huipil/a day Hand Weaving Q5,5/ huipil/a day | To work with a patron means less cash income for their labor. However, They do not own cash to buy their own material. Women with no cash tend to work for patrons. |
| | | Working By themselves | Setting Thread and Hand Weaving Q8-13/ huipil/ a day | There is enough cash at hand of women to buy large quantity of thread in order to make the cost production lower. cf. Men's Hand Weaving in Salcaja : Q17/ a day |
| Livestock/ Poultry | Hens, Cows, Cows etc | | N/A | No appropriate knowledge to grow livestock/ poultry |
| Agricultural work | Harvesting Vegetables Weeding etc. | | N/A | Mainly women work for the family and they do not receive cash. |

Economic situation of women in Xeatzán Bajo is summarized below:

- Women do contribute their household economy. However, they are isolated from good access to paid work and cash income source.
- Women's hand weaving work is undervalued compared with men's hand weaving.
- Women who are cash less or only with small amount of cash earn less than those who do in case of hand weaving business.
- Many women do not know their household income because it is men, mainly household head, who have control over the finance.
- Some women have paid work, however, they have tended to be seasonal, short term, in unskilled or semiskilled categories and substandard working conditions and low wages.

(c) Education

In Chimaltenango, disaggregated data of school children was not available. However, it is clear that there is a significant gap in access to education between female and male. For example, the illiteracy rate in Patzun shows

women's illiteracy rate is 16% higher than that of men as shown below.¹

Illiteracy Rate in Patzun

| | Chimaltenango | Patzun |
|--------|---------------|--------|
| Female | 26% | 43% |
| Male | 12% | 27% |

According to the statistics above, 43% of women are illiterate. Illiterate means lack of access to written information, election, paid work and other scope for skills acquisition in general. Women have also limited chance to attend literacy classes held in the village as they are usually responsible for domestic works and raising children. 70% of participants of literacy classes is male. In Xeatzán Bajo, there are quite limited numbers of women who can speak Spanish. The rate is estimated as 20 % from the result of the two women group meetings.

(d) Social Participation

In Xeatzán Bajo, there is Women's Committee among six committees consisting of development committee, committee of pump, education committee, health committee, sport committee and women's committee. However, there are no women members in other five committees.

Women's Committees are very active in the village.

The Committee usually comprises 8 members as follows.

| |
|------------------|
| 1 President |
| 1 Vice President |
| 1 Secretary |
| 1 Treasurer |
| 4 Vocals |

Every other year, the authority represented by auxiliary major nominates three to five people for the member of committee in the general assembly.

The Main Activities of the Committee is as follows.

¹ Analfabetismo Por Municipio Y Sexo (2000) Comit  Nacional De Alfabetizaci n, Entidad Ejecutora Coordinaci n Departamental Chimaltenango

- Preparation of School Snacks
- Welfare of the Community

(e) Political Participation

The women's political participation is quite limited in Xeatzán Bajo. Usually political candidates are only men and the majority of voters are men.

The estimated rate of women who are registered as constituency, *empadronamiento*, is only 45 per cent. The acquisition of ID card, *cedula*, is estimated as 65%, which is 30 per cent lower than that of men's 95%.

The Rate of Registration of ID and as Constituency in Xeatzán Bajo

| | Female | Male |
|------------------------------|--------|------|
| ID registration | 75% | 100% |
| Registration as constituency | 45% | 60% |

(f) Marriage and Pre-productive Health

In Xeatzán Bajo, the survey on women's reproductive health was not carried out. However, women's experience in marriage, number of children and health problems can be shared among women in the four model areas. Women are generally,

- Marry between 15-18 years old
- Become pregnant 7-9 times on average
- Had no chance to know about their reproductive rights

(g) Observation and Proposal

- Women are deprived of access to cash income source. As proven by many international NGOs, credit schemes are more successful when it is targeted to women. It is strongly suggested that, if credit schemes are taken into the project, the beneficiaries should be women as the rate of repayment becomes higher and the increase of income earned by women directly benefit the household.
- Women have less chance to have any form of education and more that half of women do not speak Spanish. When encouraging women to participate any projects, it is strictly recommended that special attention to this fact should be paid.
- Women in Xeatzán Bajo have an experience of organizational

activities. They have enough capacity to manage a formal credit or cash involved project.

Seasonal calendar presented by women in the area is shown in Table 5.1.2 (1).

5.1.3 Agriculture Conditions

(1) Land Use

The present land use of Xeatzán Bajo micro-basin is estimated as follow. 45 % of the land is dedicated to agriculture production. About 30 % is covered by forest, mostly at the east side of Pakakish river; some 10 % is covered by bush and grass, and 15 % is covered by houses, roads and others.

(2) Cropping Pattern and Farming Practices

Vegetables such as broccoli, snow pea, cauliflower, and carrot are the main cash crop planted in Xeatzán Bajo micro-basin; 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. |
|------|------|---------|--|------|------|---------|------|------|------|------|------|
| | | Brocoli | | | | Brocoli | | | Pea | | |
| | | Maize | | | | | | | | | |
| | | | Perennials (black berry, avocado, peach) | | | | | | | | |

The common farming practices carried out by farmers in Xeatzán Bajo micro-basin are described in Table 5.1.3 (1).

(3) Agriculture Production

Agriculture production in Xeatzán Bajo micro-basin is summarized as below:

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

Lately, farmers are not taking enough care of black berry production. Irrigation was provided only during the first year, but now irrigation is not provided and pruning is not done; therefore yields of black berry have fallen drastically.

(4) Livestock Raising

Livestock production in Xeatzán Bajo micro-basin is very small, mainly due to the limited availability of land for each farmer family. Only a small percentage of families keep some chickens and/or pigs.

(5) Market System

The marketing route of vegetable in Guatemala is as indicated below; Details of marketing system are shown in Figure 5.1.3 (1).

Farmer → collecting center in producing area → transportation → wholesale market in consumer area → retailer → consumer

This vegetable marketing channel is common to any producing countries. But the arrangement of marketing system is far behind and not well functioning, both market and channel in this country. Commercial transactions from farmers' field to retailers' shop in consumer areas are handled exclusively by middlemen in old fashioned manner. 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. In this marketing system, it is inevitable that producer's price of fresh vegetable hangs always around the level of about 1/3 of the consumer's price. It is not rare that the price of vegetables, which is sold in a large quantity in the harvesting season lowers to 1/5.

(6) Prices

In this community, carrot and snow pea, were cultivated on about 800 cuerdas land under contract cultivation, under double cropping during rainy season, during April—November last year. Their sales were as follows. Broccoli was kept low because of the contract cultivation while snow pea brought twice as much income as that of broccoli, although it takes more labor. Surveys of vegetable price were conducted at different sup-markets in Guatemala City as identified below. The results are attached in Table 5.1.3 (2)

| Kind of crops | Farm gate price(Q/lib) | Paiz in Guatemala city (Q/lib) |
|---------------|------------------------|--------------------------------|
| Broccoli | 0.7 | 3.0 |
| Carrot | 0.4 | 0.8 |
| Snow pea | 1.8 | 5.0 |

(7) Crop Budget

Almost all the vegetable production in Xeatzán Bajo micro-basin is under contract growing between farmers and exporter companies, such as ALCOSA, INAPSA, and NETARESA. These companies provide all farming inputs, such as seeds or seedling, fertilizers and pesticides; farmers provide the labor. The costs of the input package provided by exporter companies vary between 4,500 and 6,000 Quetzals per manzana. Farmer must sell the production to the company that provides farming inputs at a fixed price. The crop budget in Xeatzán Bajo micro-basin is summarized below. The detailed financial crop budgets are shown in Table 5.1.3 (3).

| Crop | Cost of Inputs (Q/manzana) | Paid Labor Cost (Q/manzana) | Total Cost (Q/manzana) | Production (qq/manzana) | Selling Price (Q/qq) | Gross Income (Q/manzana) |
|----------|-------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------|-----------------------------|
| Brocoli | 5,800 | 1,200 | 7,000 | 190 | 70 | 13,300 |
| Snow pea | 11,000 | 1,000 | 12,000 | 175 | 180 | 31,500 |
| Carrot | 2,800 | 1,500 | 4,300 | 13,000 dozens | 2.5 dozen | 32,500 |
| Maiz | 1,000 | 0 | 1,000 | 25 | No sale | No sale |

(8) Processing of Agriculture Produce

In Chimaltenango province, 12 major companies are engaged in wholesale and export of vegetables. They operate 50 collecting centers and 12 processing facilities (each employs more than 100 workers).

There are the following collecting and processing centers near project area, Xeatzán Bajo.

1. Flor Patzunera, Sakiya ward, suburb of Patzun city, 11km away from the village, a collecting and processing center (400m²) operated by one of major vegetable export company AGROFRIO. They are operating by ten large trucks and 150 women workers engaged in sorting, processing and packing.
2. FIS/BIRF, Collecting center built by FIS/BIRF, 4 km away from the village. The construction of this center was started in 1997 by FIS as a government's public center. However, only building exists and no operation is carried out presently. Complicated internal problem on marketing seems to exist.
3. A small scale processing center operated by NGO. This facility (40 square meters) was constructed by NGO as a collecting and processing center for vegetable. However, it is not operating at present.

(9) Irrigation Systems

Regarding the irrigation in the area, only several farmers are doing the irrigating cultivation in a small scale with a tiny facility. There are 2 types of irrigation farming styles in Xeatzán Bajo area, as summarized in the following table.

Present Irrigation Condition in Xeatzán Bajo

| | Type-A : Tap water irrigation | Type-B : stream/spring water irrigation |
|--------------------------|--|--|
| - Water resources: | Tap water of the community portable water system | Streams, about 6 or 7, flowing into the community from the north-east mountain |
| -Number of farmers: | Around 2-3 farmers | Around 5-10 |
| - Location | North-west area, near the settlements | North-east area, lower part of the community area |
| - Scale of irrigation | 2-3 cuerdas / farmer | 3-4 cuerdas / farmer |
| - Crops | Carrot, Lettuce, Chinese bean | Broccoli & Maize |
| - Water Charge | About Q600, monthly (based on the interview of a farmer) | Q.50-100, monthly |
| - Purposes of irrigation | Irrigation in dry season | Supplemental water supply for rain season drop |
| - Remarks | There is no any regulation against using tap water as irrigation water. Some farmers tried to use tap water for irrigation purpose in past, but now, most of farmers have negative opinion against the irrigation with tap water because of high water charge and economical balances. | The farmers irrigate their land with water from the streams and <i>Pachomochai</i> springs (one of the community's springs) through private ϕ 0.5" PVC pipes. |

Based on interviews with farmers, the farmers desired to have irrigation facility and cultivate crops in dry season. If economical facilities and farming practices is established, the farmers will easily be involved. The economical verification for irrigating cultivation is most important key in order to introduce it.

5.1.4 Health and Sanitation Conditions

(1) Major health problems

Most common diseases in this community are URI and Diarrhea. Newborn mortality is the problem. Higher acute respiratory infection and diarrhea rate are found in Patzun than regional average. Sickness occurs most frequently in December and January while they have more intestinal problems during the rainy season.

| | |
|---|---|
| Morbidity Causes in Xeatzán Bajo | 1. Common Cold 2. Tonsillitis 3. Peptic diseases 4. Arthritis 5. Diarrhea |
| Infant Mortality Rate and Causes at municipality | 47.8 (per 1,000 live births) 1. Neonatal Sepsis, 2. Dehydration |
| Mortality Causes in Xeatzán Bajo | 1. Neonatal sepsis 2. Malnutrition 3. Chronic alcoholism 4. Pneumonia |
| MMR and the causes (region) | 55.7 (per 100,000) 1. Eclampsia 2. Uterine Atony |
| Vaccination Coverage for children under 1 years old in Xeatzán Bajo | BCG 48%, Polio 62%, DPT 60%, Measles 58% TT for pregnant women 8.2% in Xeatzán |
| Malnutrition prevalence at municipality | Chronic malnutrition among school children 66% |
| Delivery attended by municipality | Comadronas 89.63%, Doctor 10.29%, Empiricist 0.06% |

Source: Brief Description, Aldea Xeatzán Bajo Municipios Clasificados Segun Prevalencia de Desnutricion Cronica en Escolares de Guatemala, OPS/INCAP
Memoria Annual de Vigilancia Epidemiologica, Patzun, 1999, MSPAS
Memoria Annual de Vigilancia Epidemiologica, Chimaltenango, 1999, MSPAS

(2) Health related facilities, personnel and drug availability

| | |
|---|---|
| Health Facilities and health personnel, | Health Post in Xeatzán Bajo Health Center, private clinics and Acuala hospital in Patzun |
| Average number of patients a day at HP | 8 to 25 patients a day (In May they have the large number of patients during the first half of year 2000) |
| Referral point | Hospital in Chimaltenango or Health Center and Acuala hospital in Patzun |
| Distance and transportation to the Health Facilities | • Three days a week, direct transportation to Patzun(2.50Q) • There are buses everyday from a near-by village to Patzun • 150Q for hiring the vehicle to the hospital in Chimaltenango. |
| Drug availability | Essential free drugs available at HP and HC, Private pharmacies in Patzun |
| Traditional and Plant Medicine | Appropriate drugs are often not available at HP and HC although offered by free of charge. Private pharmacies in Patzun |
| Health Guard | None |
| Health promoters | 20(10 men and 10women) among whom 10 were trained by HC while the others by CARE |
| Comadronas | 2 comadronas in Xeatzán Bajo, 1 in Xeatzán Alto |
| Health Committee | 9 members(all men), not functioning well |
| Basic Health Infrastructure ² (Water, latrines). | Latrines for all the household Potable water for 87% of the household |

² Household Facility Survey conducted by JICA study team

(a) Health Post

There is a health post in Xeatzán Bajo, which also serves for Xeatzán Alto, Chichoy Paraiso, Chichoy Alto and Chichoy Bajo. It is attended only by a auxiliary nurse, although currently there are one trainee of doctors for six months.

The number of patients who came to HP between January to June, 2000 is follows:

| Number of patient at HP | Jan. | Feb. | March | Apr | May | Jun |
|-------------------------|------|------|-------|-----|-----|-----|
| First consult | 32 | 65 | 231 | 79 | 102 | 149 |
| Re-consult | | 4 | 12 | | 9 | 9 |
| Emergency | | | 2 | | | |
| Total | 32 | 69 | 245 | 79 | 111 | 157 |

Prenatal care, vaccination and growth monitoring are also available every day at HP while hospitalization and attendance for the delivery is available neither at HP nor HC.

(b) Health Promoters

20 promoters (10 men and 10 women) exist, half of which trained by HC and the rest by CARE for its water project. Those trained by HC have not yet conducted any activities. As well those trained by CARE terminated their activities since CARE finished its project and currently they have no motivation or incentives.

(c) Comadronas

There are two comadronas in this community, the one with 25 years and the other with 7 years experiences. The latter was newly chosen by village people and trained by Health Center since only one comadronas was not sufficient for the community.

Materials they have include scissors, balance, bulb syringe and steel tray all of which were given by HC, while soap and sterile tie were brought by themselves. The tie cost 1Q for 4 piece at HC. They think they need a mask and a flashlight.

There are regular (once a month) training for comadronas in Patzun since long time. Several NGOs in collaboration with Health Center organize it. NGO pays 15Q a day for comadronas participated and serves lunch for every participant,

The nurse at Health Post perceives that owing to training for comadronas, maternal mortality and newborn mortality has decreased. They attend delivery 1 to 6 times a month. They are paid 75Q or 100Q for each delivery attendance.

(d) Health Committee

Health committee consists of 9 members, no women included. Their duty is of requesting support to external entities. However, the committee is not well organized and the members do not know what is their responsibility.

(e) Other organizations implementing health activities in Xeatzán Bajo

Cosuder has been implementing nutrition supplement program since 5 years every month for mothers with children from 0 to 36 months. Program facilitators are chosen and trained. The training includes administration and accounting, growth monitoring and giving health education to the community. Requirement for receiving the products is vaccination of the children and participation to preventive education chat. The facilitators are paid from the benefit of selling the product.

Care used to have food distribution program in coordination with health post, which has already terminated. **World Vision** used to distribute drugs for parasite and growth monitoring. **Acuala Hospital** offers various health services including dental services and delivery attendance with cheaper charges.

(f) Referral Point and transportation

Comadronas send the women, in case of mal position, bleeding and fever, directly to the hospital or sometimes to Acuala hospital in Patzun. Referral cases occurred approximately 6 times a year. According to HP, there are around 3 to 5 persons every month referred to HC in Patzun or Hospital in Chimaltenango.

(g) Availability of Drugs

Appropriate drugs are often not available either at Health Center or Health Post. Therefore, people are obliged to buy expensive drugs at private pharmacies in Patzun.

HP is supplied with drugs through HC every month according to their needs in

principle, but also it depends on drug availability at HC level.

(3) Health seeking behavior of the population

People usually go to Health Post at first, where they often can not find appropriate drugs. Then they go to private clinics in Patzun(20Q for consultation, 35Q for injection) or Health Center which also is in lack of drugs frequently. Because of the lack of drugs in public health facilities, people seem to prefer going to private ones although the charge is expensive.

(4) Family Planing, Reproductive Health and Vaccination

(a) Family Planning

Although contraceptives are available at health center and health post, the majority of the people do not accept FP mainly due to religious reason. HP gives FP education and methods only for those who want. It seems acceptability is approximately 10% according to the nurse at Health Post.

(b) Vaccination

Vaccination is available at Health Post every day. In spite of good access to vaccination services, refusal of vaccination due to cultural and religious reason exists.

(c) Reproductive Health (RH)

According to comadronas, pregnant women often have health problems such as anemia and malnutrition. In principle, every woman has to receive prenatal care in HP, and if there is no health problem, the delivery can be attended by comadronas. Many women do not like to take iron or vitamin pills that are given by HP at prenatal care service.

| | Jan | Feb | Mar | Apr | May | Jun |
|---|-----|-----|-----|-----|-----|-----|
| Attendance for Prenatal care in HP ³ | 6 | 8 | 12 | 6 | 5 | 8 |

Prenatal care is also available at Health Center and by comadronas

Most of the delivery is attended by comadronas except in case of complication.

(5) Identification of problem and needs

(a) Health personnel in Area Headquarter of Health of Chimaltenango

³ Health Post at Xeatzan Bajo

- Lack of health personnel particularly nurse and transportation is the biggest problem.
- Lack of budget: For example, for year 2000 they asked 31,080,915Q for their budget and authorized only 14,014,899Q⁴ among which 44.4% is for personnel cost while 24.3% is for SIAS program.
- Health problem caused by pesticide is serious issue: Lack of education for how to use and prevent pesticide caused illness.

| | 1997 | 1998 | 1999 |
|--|------|------|------|
| Number of death caused by pesticide | 12 | 14 | 1 |
| Number of patients caused by pesticide | 134 | 42 | 19 |

Source: Area Headquarter of Health of Chimaltenango

- Health education for the population is difficult because people are not usually at home during the day.

(b) Health personnel at Health Post

- Lack of drugs: they can prescribe only those they have, which are not always the appropriate ones. Particular drugs that are shortage at HP are vitamins for children and pregnant women, Anti-inflammatory drugs such as Ibuprofen, Anbroxol for pulmonary diseases, specific and stronger anti-biotic, Acetaminophen for fever, anti-phosphis, antibiotics for eyes, drugs for diabetes and high pressure.
- Lack of health promoters: lack of incentive discourage the people to become a promoter.

(c) Comadronas

- Women sometimes do not pay the charge.
- They would like to increase the charge (make it 150Q), but not accepted.
- Refusal of FP due to Machismo.

(d) NGO working in the region

- Lack of health volunteers as they are not paid
- Lack of interest and time of the population for health education
- Refusal of nutrition supplement program due to religious belief (Evangelico)

⁴ Area Headquarter of Health of Chimaltenango (Jefatura de Area de Salud de Chimaltenango)

(e) Problems and needs seen by village people

- They need permanent doctor
- Easy access to appropriate drugs

(f) Other problems found through the study

- Lack of health related information
- Insufficient utility of public health services and lack of confidence in it.

5.1.5 Education Service Conditions

(1) Profile of the Education Services

(a) Primary School

Conditions on primary school are summarized below:

| | |
|-------------------------------|---|
| Name | Escuela Oficial Rural Mixta Xeatzán Bajo |
| Type | Official |
| Director | Jornada Matutina |
| Foundation | Year 1997 |
| Transportation | 5-20 minutes' walking distance for school children |
| Number of Teachers | 10 (6 female and 4 male): All Bilingual |
| Number of Classrooms | 10 in good condition |
| Number of School Children | 112 |
| Available facilities | 5 toilets and 5 are all not in hygienic condition |
| Area the school covers | Xeatzán Bajo |
| Committee Members | 7 male committee members |
| Grade of Significant Dropouts | Between grade 4 and 5 |
| Main Reasons of Dropouts | 1. Opportunity Cost : Agricultural Work, Housekeeping etc 2. No incentive for parents to send children, as there is no other job but Agriculture after school. |

(b) Junior High School

There is no junior high school in Xeatzán Bajo. The closest junior high schools are in Chipiaqul and Chicioi Paradiso. When there are students to go to junior high school, mostly they go to Chicioi Paradiso, which was founded by local committee of school in 1996. It is about 30 minutes to travel and there is no particular problem on the way.

Number of Children who went to Junior High School from Xeatzán Bajo was shown as follows:

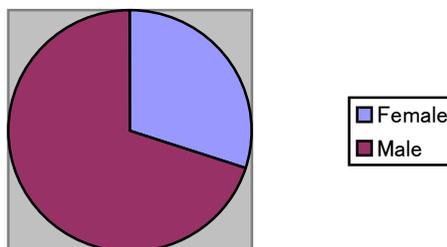
| | | |
|---|------|------|
| | 1998 | 1999 |
| Number of Children who went to Junior High School from Xeatzán Bajo | 2 | 3 |

(c) Adult Education/ Informal Education

As other areas of Guatemala, CONALFA (*Comite Nacional De Alfabetizacion*, National Committee for Literacy) gives literacy classes for adults in Xeatzán Bajo. There are three classes in the village and 90 people are registered as follows. Adult Literacy Classes in Xeatzán Bajo Year 2000 is shown below:

| Organization in charge | NGO(ASODISMA) | | |
|------------------------|-------------------------|-------------------------|----------------------|
| Day | Saturday | Monday/ Thursday | Friday/ Saturday |
| Time | 8:00-12:30 | 15:00-19:00 | 14:00-18:00 |
| Grade | First | Second | N/A |
| Number of participants | Female 10 Male 20 | Female 7 Male 23 | Female 10 Male 20 |
| Teacher | Maria Isabel Canu Xocoy | Maria Isabel Canu Xocoy | Alfonso Xiquita |

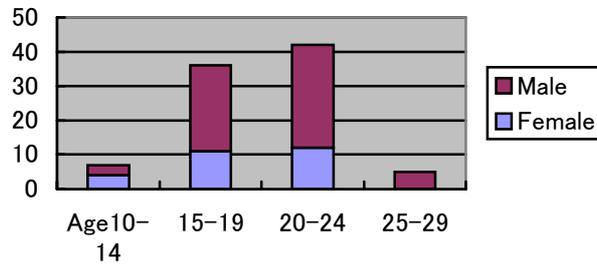
Participants of Literacy Class in Xeatzan Bajo Year 2000



The majority of participants are male in Xeatzán Bajo as shown above. Only 30 per cent of participants are female although the illiteracy rate of women is 16 % higher than that of male. The reason why the rate of women participants is low can be

- (i) Women's domestic work and raising children at home makes more difficult for women to access Education
- (ii) Some women do not understand the importance of literacy
- (iii) Some women do believe that the education is for men but not for themselves.

Age and Number of Literacy Class Students
in Pachum



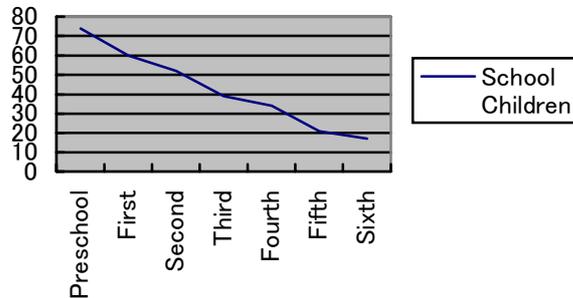
The age of literacy class is between 15 and 55 as shown above. The majority of students are between 20 and 24 of age. Some of the students chose CONALFA rather than official primary school as they have to work.

(2) Primary School

There is only one primary school in Xeatzán Bajo. The number of school children is shown in the following table.

| Grade in Spanish (Grade in English) | Number of Student |
|--|-------------------|
| Preprimaria (Primary School) | 74 |
| Primero (First) | 60 |
| Segundo (Second) | 52 |
| Tercero (Third) | 39 |
| Cuarto (Fourth) | 34 |
| Quinto (Fifth) | 21 |
| Sexto (Sixth) | 17 |
| Totals | 297 |

Number of School Children by Grades



The number of school children in Xeatzán Bajo decrease as the grades become higher as shown above. The biggest dropout is between grade 4 and 5 where almost 40 per cent of school children dropout.

(3) Problems of Primary Education - Dropouts and High Illiteracy Rate -

In Xeatzán Bajo, it is repeatedly said that most children in the village go to school by villagers themselves and also by teachers. However, according to the data shown previously, this information deviates from the fact as only less than a third of students remain at school when they reach the 6th grades. Probably it can be interpreted that most students go to school at least once in their lifetime. For example, it is estimated that 98% of children who are expected to register for the preschool year 2001 are registered already.

The reason why children dropout from school can be summarized as follows.

- 1) Opportunity Cost: At the age of 14- 15, school children can contribute to household economy by earning cash income. e.g. Boys in Agricultural Work, Girls as domestic workers in city.
- 2) Parents cannot see education very important: There is no good work opportunity anyway even if their children graduate primary school.
- 3) The school cannot provide children with good quality of education: Lack of teacher and lack of classrooms.

5.1.6 Rural Infrastructure

In order to grasp general features of the rural infrastructure, such as water supply,

electric supply etc., and the household facilities in Xeatzán Bajo, the ad-hoc survey of diffusion of the infrastructures was made at site. The interview survey was conducted at 141 houses in the area and its results obtained through the interview are shown in the following table. The survey results mention that all the diffusion rates are over 80% and the living standard at Xeatzán Bajo community reaches a certain extent level. The conditions of the survey and the details of the survey results are summarized in Table 5.1.6 (1).

Results of the ad-hoc survey for house facility

| | Water supply | Electric supply | Drainage | Toilet | Improved stove | Interviewee houses |
|-----------|--------------|-----------------|----------|--------|----------------|--------------------|
| Diffusion | 87% | 91% | 84% | 100% | 87% | 141 houses |

The followings show the summaries of the present condition to be underlined, which observed through the site investigation, and all the detailed descriptions are given in Table 5.1.6 (2).

- **Drinking Water Supply System**

The drinking water system was introduced by NGO 5 years ago and operated by the community. The system is operated and maintained well by the Pump Committee presently and the monthly water charge is also duly collected.

The average daily water consumption is not so high, approximately 20-50 liters / person, but they said no any problem in volume. In the other hand, in terms of facility for water quality, there is no any water treatment facility in the system and the spring water is directly delivered to the houses without treatment. The water quality is not so good according to the result of the water quality test by the Study Team.

- **Sanitary System**

Sanitary facilities, i.e. toilet and drainage system (so-called “sumidero”) were installed by NGO at the same time of installation of water supply system. As mentioned in the former table, the toilet system is spread among the community and contributes improvement of house sanitary condition. The fact that they purchased it with their finance shows its necessity, effectiveness and sustainability in the community.

- **Electricity Supply System**

It was recognized that only 13 houses did not have the electric supply according to

the ad hoc survey covering 141 houses. In this context, it is estimated about 90 % of the houses have electric. Main purpose of the electricity is for lights, radio and TV. They paid about Q.15-25/month at the rate of Q.0.99/kW

- Roads and Bridges

Road condition inside the community and access to the community are good condition even in rainy season. No any problem regarding the road was found during the site investigation.

- Improved Stove

Effects of improved stove are: a) to reduce fire wood consumption, b) to avoid diseases caused by its smoke and c) to prevent accidents by children around cooking fire. Through interviews, the villagers recognized these effects and its effectiveness.

5.1.7 Environmental Conservation Sector

(1) Soil Erosion and Collapse

Deforestation on the area of Xeatzán Bajo is caused by the growth of the agricultural frontier, as well as by firewood consumption for households, without planning reforestation projects. For the introduction of non-traditional cultivation to the zone, the agricultural frontier has been expanded, until the point in which in areas of the community. Due to the type of implemented agriculture and the topography of the place, the soils are highly erodible, in some instances the horizon has disappeared, which in the given moment make the soils unfertile.

The village mayor interviewed said that there existed only one farmland in Xeatzán Bajo, which had ever been eroded. As maize did not grow there, the landowner wants to protect his land against erosion by planting trees. There are no community forests there, but private ones. However, a person, who wants to cut one tree of his own, needs a permit from a mayor.

(2) Contamination for Water

Water for domestic use was investigated. Five samples of the water of fountains, wells and a tap were taken at the site (Figure 5.1.7(1)). Each water quality was tested using a water test kit. The number of items of water quality is 12, namely, pH, Electric Conductivity, Coliform group, Bacteria, COD, Total hardness, Ammonium, NO₂, NO₃, Copper, Ferrum and Zinc. Most samples show that the water is unfit to drink unboiled because of detection of coliform and bacteria. Gothic type shows that its value exceeds Japanese standards for potable water.

Nitrate was detected from all the water samples.

Summary of the result of investigation is shown below, and its detail in Table 5.1.7 (1) and Table 5.1.7 (2).

| | | | |
|-------------------------|---|---|---|
| Place | fountain | well | well |
| Evaluation for drinking | NO | NO | NO |
| Conditions of water use | Seven families, which have no running water use all the time. | All the time. No affordability to have running water yet. | All the time. No affordability to have running water yet. |
| Place | fountain | tap water | |
| Evaluation for drinking | YES | NO | |
| Conditions of water use | One family uses all the time. When water supply is cut off, 15 families use | All the time. | |

It is said that here the contamination may occur the main problem due to use of the pesticide.

They do not use the adequate equipment to handle the pesticide. Also the lack of knowledge contributes to make contamination bigger. Implementation of handling techniques will avoid the great amount of pesticides they use. Use of natural organic fertilizer is one of the most important measures to prevent contamination of pesticide from water.

They count on a sink for the treatment of the black waters in households and in the streets, however they are aware of lack of drainage to avoid pollution.

As described above, coliform, bacteria and nitrate were detected from most water samples. This means that human waste seeps into the soil. Pesticides must be detected, though not tested this time.

5.1.8 Existing Development Projects in and around the Micro-basin

(1) Agricultural Sector

Agricultural support project in Xeatzán Bajo micro-basin is limited to provision of fertilizer at low cost through the 2KR program; In the nearby of the micro-basin there are some project activities, but related mainly to post-harvesting handling, such as cold storage in Patzun.

(2) Social Infrastructure Sector

In the infrastructure sector, there was a project focusing on improvement of water supply and sanitary condition by CARE Guatemala. And a improvement project for cooking stove was executed by CONSEDER. The summaries of these projects are mentioned above and the detail information is described in Table 5.1.8 (1).

(a) Water Supply Project by CARE Guatemala

With 212 beneficiary houses, the water supply project was executed with the technical and financial assistance of CARE Guatemala. CARE provided the materials and design/plan of the system, and the beneficiaries paid small amount of cash and provided a voluntary service for the construction works. The system was completed 5 years ago and distributes water to almost 87% of the houses in Xeatzán Bajo presently.

(b) Sanitary Project by CARE Guatemala

In the community, it is noticed that each house have a toilet equipped with concrete toilet seat and a screen tent mostly. Most of these sanitary facilities were installed by a project of CARE Guatemala in 1995. The drainage system with dug pit, so called *sumidero*, had also installed by CARE at the same time of toilet system.

(c) Improved Stove Project by CONSEDER

The improved stoves were installed in the community. After the accomplishment of the project, villagers purchased it of their own accord and the improved stove is spread among the peoples.

(3) Environmental Conservation Sector

To constitute the link to strengthen the economic, technical, administrative and social capacity of the rural communities, in such way that the sustainable improvement of the forests contributes to improve the life level of themselves, without degrading the involved natural resources, MAGA and PAFG implemented "the Forest Management on Communal Lands Program". Existing projects around the study area is shown in the following table.

| Denomination | Location | Extension area (Ha) | Remarks |
|--|---------------|---------------------|---------------------------|
| Tecpán's Municipal Shipyard | Chimaltenango | 1500 | Inventories |
| San Andrés Iztapa's Municipal Shipyard | Chimaltenango | 450 | Inventory, Plan, Interest |

According to "MUNICIPAL FOREST ADMINISTRATION POLICY " of Tecpan Municipality:

- To organize the technical assistance of the INAB-BOSCOM through the implementation of the Forest management Municipal Unit.
- The solution against deforestation is legal, it's necessary to delimit and record the shipyard area so that the people respects it by the execution of the forest laws and let the proper management come.
- The communities need a technical adviser to proceed to the organization of small nurseries and to promote the utilization of improved stoves, and with it, to reduce the fire wood consumption and to improve the familiar improvement.
- To reforest around the water springs and the ravines, train the rural population on conservation practices of soil conservation and to establish forest resources areas.
- To avoid that the people who causes forest fires expect to make fire wood out of the burnt forests, these people should the Municipal Mayor's office control to keep an order on the future work.
- Massive reforestation previous identification of the water sources and proceed to protection and to compromise the social organizations every forest management and production projects is sustainable with.
- Institutional and social actors are INAB and the organized people, Tecpan, Guatemala's municipality, Municipal Unit's technical staff, Village's farmers organizations.

CONAMA receives complaints about pollution filed by residents. In the rural area, complaints were about water pollution and dumped trash. The cause of water pollution is a discharge of domestic wastewater. At this moment, there are no complaints from Patzun.

There exist some environmental projects, which are carried out mainly by the following NGOs.

(a) Maya Ecological Group

Group made up from native organizations of the Guatemalan high plateau. It carries out advise workshops, in which religious and politic leaders take part, appearing as a result; documents about the things the native people can provide for the biological conservation.

(b) Complete Program of Agriculture Environment Protection –PIPPA-

This program works principally in the southwestern region of the country, where the most quantity of traditional products is produced. PIPPA provides training for the proper use of pesticides and gives out information about the plant quarantine regulations and food control. Its main objectives are coordinating technical assistance and training about the use and proper management of the pesticides.

(c) Friends of the Country Association

It has a project of basic education for grownups called Complete Program of Basic Education (PEBI). The program makes up environment educational modules, and they are aimed at people between 15 and 45 years old.

5.2 Panyebar Area in Sololá Province

5.2.1 Natural Resources

(1) Location

The Model micro-basin selected in Sololá province, San Juan la Laguna municipality, Panyebar community is located near 14° 35` latitude north and 91° 22` longitude west; the elevation varies between 1,600 to 2,600 meters above sea level. The location of Panyebar Model micro-basin is shown in Fig. 4.2.2 (1).

(2) Topography and Soils

The topography of Panyebar Model micro-basin is strongly undulated; the east side of the basin is a high steep mountain with slopes between 50° to 60;° the center of the basin is vary from undulated to slightly undulated with slopes between 10° to 20° and at the west side is very steep with slopes between 30° to 45.°

According to C. Simmons et.all (1954), the soils of Panyebar Model micro-basin are classified in the group II, named as soils of the “Altiplano Central”, series Toliman (Tn); The parent material is volcanic ash of clear color; The soils are moderately deep, up to 1.10 m; The soil color is dark brown and the texture varies from sandy loam to clay loam. The internal drainage is moderate.

(3) Climate

There is not available measurement of climatic data in the nearby of the micro-basin; Referring to temperature and rainfall maps prepared by INSIVUMEH, the average climatic conditions of Panyebar micro-basin are indicated in Table 5.1.1 (1). The climate is temperate moderate; Annual mean temperature is about 20;° Monthly mean maximum range from 27.6° to 29.3° and monthly mean minimum range 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.

(4) Water Resources

There are three major springs in Panyebar, which is/will be very important to the villagers' living activities are as listed below.

- *Panan* springs

- *Silverio's* springs

- *Juan's* springs

Panan spring is the biggest water springs in the area. However most of this spring water are utilized at present and no big rooms to be developed for the community water resources. The other springs are located far below from the settlements and it needs a mechanical pumping up system, approximately 100-200m high, if it will be utilized.

The detail explanations and the locations of the water resources are shown in Table 5.2.1 (1) and Figure 5.2.1 (1).

5.2.2 Socio-economic Conditions

(1) General Conditions

Panyebar is a village that belongs to the municipality of San Juan La Laguna, province of Sololá. A village (capital) and three aldeas: Palestina, Panyebar and Pasajquim constitute this municipality. Panyebar is made up by a center and two caseríos that are Panacal and Chuacanac. The population from the village of San Juan La Laguna, which is located at the shores of the lake, speak Tz'utujil. However three aldeas that are on the other side of the hills surrounding, including the model area, belong to the linguistic area of K'iche. The three aldeas in the highland of San Juan were founded by the people who ran away from compulsory work about one hundred years ago from Totonicapán province. Panyebar's population is related with the village of San Juan la Laguna in the administrative

case, however it is more linked with San Pedro la Laguna regarding work. And for some daily trading activity people in Panyebar go to Santa Clara where K'iche is spoken.

Most of the population in this area depends on the daily wage in the coffee fields at the lake's shores, located in San Pedro la Laguna and San Juan. La Laguna.. At the same time they are dedicated to growing maize for their own consumption and they have small coffee crops. Before extending the coffee crops to the lake's shores, most of the families depended on the work in the big estates in the Coast. During the past thirty years growing coffee at the lake's shore has been expanded and peoples in Panyebar have changed the working patterns. The dependency upon a day's wage obstructs the investment on workforce in their own crops, this becomes one of the causes of low yield in the coffee and maize for the small producers.

(2) Population and Administrative Structure

The total household of Panyebar is about **350** households having the total population of about **1,800** in 2000. Most of the households are engaged in agriculture and its activities.

The municipality, San Juan La Laguna is the minimum authorized administrative unit and has a chief (alcalde Municipal) elected by a universal suffrage. The Municipality, with the municipal chief, are in charge of the local administration. The Auxiliary Auxiliar (A. A) are the ones that play a linking role between municipalities and communities (caseríos or aldeas). The A.As are representatives in Panyebar. However their role is not only to join communities. The auxiliara, which is composed by the A.A and other charges, are a real administrative unit in the communities. The selection of the A. A. is under the responsibility of the Aldea and the municipality only recognizes the community's proposal. The A. A. and the municipality don't have a periodically meeting, they meet whenever it is necessary.

The people visit the municipality only when they have to have paperwork done or advising about the management of projects.

Regarding registers, the municipality says 95% of men and 65% of women have a identity card. However, by the information obtained in Panyebar, women who have identity cards is only about a 10%. Based on the registers, most women do not get their registration on the electoral roll, this is why many women don't

participate in the elections.

(3) Community Organization and Mechanism of Decision in Village

Panyebar has three auxiliary chiefs (AA.) as a community representative and Aguacils (auxiliary assistant), that function as an administrative unit in the community. There are three AA in Panyebar and they are chosen each year. Each chief has two assistants. Each one of them works by weekly turns and fulfills one year of service without any payments. A. A. 's role is to receive the population's complaints and solve them. In some serious cases they are sent to the Justice of the Peace. Also a General Meeting is convoked 10-20 a year when necessary. Fifty to two hundred people participate in these meetings depending on the subject. However, most of the participants are men. The assistant's job is to send messages make appointments, etc.

The A. A. election is made in the General Meeting of September. Usually the principals and the ones that are in charge make a list of candidates and present it in the General Meeting. During this meeting people approve the candidates. Sometimes peoples reject to become the candidate because of economical reasons etc. but most of the time they approve them. The Principals are not elected, instead people recognize them as so, because of their age being above 50 years old, the knowledge and experience of fulfilling several positions.

In the community there are several committees that have their own objectives. Nowadays in Panyebar there is a Social Development Committee, Pro-improvement Committee, Electrical Energy Committee, an Elementary Institute Committee, a Parent Committee and a Health Committee. These committees are made up by a president, a vice-president, a treasurer and a secretary, etc. and has three years and a half in force. The position's assignation is done at the General Meeting and all the committees work should be with the community's total support. There is no relation between these positions and religious positions.

(4) Ethnicity

Most of Panyebar's population is K'iche, however there are some families with origins from Tz'utujiles that came from the lake's shore. However in Panyebar K'iche⁵ is spoken. There are no conflicts observed between these two groups. They say there is a big mixture of vocabulary. However there are people who

⁵ They say they speak Tz'utujil, when they go to the village.

distinguish K'iche and Tz'utujil and identify their language. In the community all the families are indigenous, and there is no conflicts among groups.

(5) Religion

By the results of several interviews, it is assumed that 60% are catholic and 40% are evangelic. There is a Catholic Church in the center of Panyebar and other 9 evangelic churches in the community. The Catholics sometimes participate in mass at Santa Clara or San Pedro⁶ and in Panyebar mass is celebrated every two weeks. Panyebar belongs to the parish from Santa Maria Visitación.

The evangelic started to increase 35 years ago. They are not active enough for this study and don't want to participate. However, we can't say they don't participate in social activities, there are evangelic persons who have positions in the community.

(6) Land Holding and Tenure

In the area of Panyebar, there are relatively big landowners of Pasajquim and of the villages of San Pedro and San Juan. The division by inheritance is advancing, there will be 50 families that have around 50 cuerdas. They rent their land to Panyebar's population to harvest maize at 30 quetzales per cuerda.

Among Panyebar's population there are around 2 or 3 relatively big property owners, yet most of the population has less then 10 cuerdas.

They say most of the families have a Public Deed of their land. There are some cases where they have a legal register. They got it many years ago, and are transferring it for inheritance or for sale. So the land they had registered is already in the hands of several families.

The purchasing of properties has advanced, specially in areas suitable for coffee fields. This is why there are not many purchases in the high regions. The people from Panyebar started purchasing land twenty years ago.

(7) Social Conflicts in the Past

(a) Land Movement and its process.

In San Juan La Laguna there were farmer's movement for the acquisition of land in 1996. Eighty persons from the village and forty from Panyebar

⁶ Many workers receive their payment in San Pedro on Sunday, this is why they go to mass there.

participated in the movement in February 1998 and they obtained usufruct of one part of the community land.

Where they had given usufruct, tree cutting had continued by some families from Pasajquim (Family P). In this land every family obtained 10 cuerdas and planted coffee. With a program from PINFOR and INAB, and the support from NGO's they planted trees. Still and all a problem sprang forward between families P, and afterwards the Cholotío families, which have great influence in the San Juan village, reclaimed their property right. In April 1999 there was a confrontation with the population and capturing was done. This matter is still in the judicial process and around 30 persons are under provisional liberty. The future of this process is not clear, yet the people are still cultivating on the land they obtained.

The cholotios also reclaimed their rights over the land provided by Christian Children.

(b) The Installment of Potable Water

At the beginning of the '80, when they tried to install a new system of potable water, the people from Pasajquim (family P) asked for the payment for the pipe installment, even though Panyebar's population understood it as community land. The people asked for the document but "the owner" could not present his document about the land. After Panyebar gave the facility to the people from Pasajquim and they left the demand..

(8) Gender

(a) The Work of Women

The role of women differs from one another according to what the family is earning their income from. However it can be summarized as follows in general.

| | |
|---|---|
| (1) Preparation of food and eating | |
| 1. Grinding of corn* | Preparation of corn, grinding corn with machine |
| 2. Cooking* | |
| 3. Washing dishes* | |
| 4. Going to market* | To Santa Clara La Laguna, Tus. & Sat. Public bus fee 3Q/one way, On foot: 1.5-2hrs/one way |
| (2) Acquisition of fuels and water | |
| 1. Collecting firewood and buying firewood* | 1-2 hrs to collect for every other day |
| 2. Collecting water* | 15-30 minutes/once, 4-10 times a day on average |
| (3) Hygiene | |
| 1. Cleaning houses* | |
| 2. Laundry* | |
| (4) Gaining cash income | |
| 1. Hand weaving, other handcraft* | About 30% of women are engaged in handcraft |
| 2. Sewing* | |
| 3. Livestocks/poultry* | Hens, cooks, cows, pigs and others |
| 4. Paid agricultural work* | At San Pedro/San Juan, 15Q/day at harvesting coffee Nov.-Feb. |
| (5) Agricultural work | |
| 1. Seeding | |
| 2. Weeding* | Corn, black beans and coffee |
| 3. Harvesting | |
| (6) Family care | |
| 1. Child bearing* | 5-10 children on average per woman in a lifetime |
| 2. Child raising* | Especially for girl children, aged 5 years and over |
| 3. Care of the sick and handicapped* | Between May-Jul & Nov.-Feb. more sickness |

(b) Time and Energy Consumption Analysis of Women's Work in Panyebar

The following table shows the result of time-consuming work and energy consuming work made by the women in Panyebar.

The result of the score was as follows.

| Rank | Time Consuming Work | Energy Consuming Work |
|--------|---------------------|-----------------------|
| First | Grinding corn | Laundry |
| Second | Cooking | Going to Market |
| Third | Water Collection | Water Collection |
| Fourth | Going to Market | Washing Dishes |
| Fifth | Laundry | Hand Weaving/ Sewing |

The result shows that the women have to spend more time on preparing food than any other else, however, the energy they consume is not large quantity. On the contrary, Laundry and going to market consume more energy rather than other work

The reason why women have to spend time on these five works will be summarized as follows.

- 1) Women do not have water/ enough water
- 2) Women have to walk to markets, as they have not enough money to spend on the transportation of Q6 return.
- 3) Big numbers of children to feed/raise.

(c) Economic Situation of Women in Panyebar

As other area of Guatemala or other countries, most women are not engaged in paid work in Panyebar. The main source for women to obtain cash income is as follows.

The main source of cash income of women in Panyebar

| Main work item | Work in charge | How much/ day or per unit or product | Problems |
|----------------------|-----------------------|--------------------------------------|---|
| Coffee Field | Coffee harvesting | 15Q / day | Seasonal Underpaid compared with Men's wage, 20-25Q |
| Livestock/ Poultries | Hens, Cocks, Caws etc | 30 Q/hen | No appropriate knowledge to grow livestock/ poultry |
| Handcraft | Hand Weaving Beads | 15-20 Q (profit only)/ per item | There is no enough money to buy material at once. |

(d) Education

The rate of school children in a official primary school in Panyebar was as follows.

The rate of school children in a official primary school in Panyebar

| | |
|--------|--------|
| Female | 46.8 % |
| Male | 53.2% |

(e) Social Participation

In Panyebar, there are 6 committees consisting of development committee, pro-mejoranmiento, energy/electric committee, basic institutional committee, health committee, and committee and padre de familia. None of the women members are active member of the committees.

(f) Political Participation

The women’s political participation is quite limited in Panyebar as other micro-basins.

The estimated rate of women who are registered as constituency, *empadronamiento*, is only 10 per cent. The acquisition of ID card, *cedula*, is estimated as 65%, which is 30% lower than that of men’s 95%.

The Rate of Registration of ID and as Constituency in Panyebar

| | Female | Male |
|------------------------------|--------|------|
| ID registration | 65% | 95% |
| Registration as constituency | 10% | N/A |

One of the biggest reasons why women do not participate election is that the majority of women in Panyebar are illiterate. For those who are illiterate, the act of vote cannot be given their priority.

(g) Marriage and Reproductive Health

It was not able to obtain collective information about the marriage and reproductive health in Panyebar. However, from some individual interviews, the following points were recognized.

- Majority of women in Panyebar marries at the age of 15-17.
- Majority of women becomes pregnant more between 5-8 times. The maximum number of the pregnancy among those who were interviewed was 14.

(h) Observation and Proposal

- Women in Panyebar can express their opinion much openly than any other places among the chose micro-basins, even in front of men.

- In Panyebar, the opinion gathered in the public meeting was mainly Catholic women in Panyebar. This can be geographically and religiously biased. It is strongly recommended to consider the need and situation of non-Catholic women in Panacal and Choacanac.
- Illiteracy rate is still high in Panyebar. (Illiteracy rate is about 55% in Sololá) When implementing project for women, special attention to be paid to the fact that most women cannot read and lacks arithmetic ability.

5.2.3 Agriculture Conditions

(1) Land Use

The present land use of Panyebar micro-basin is estimated as follow: 35 % of the land is dedicated to agriculture production, about 30 % is covered by forest, mostly at the east side of the micro-basin; some 20 % is covered by bush and grass, and 15 % is covered by houses, roads and others.

(2) Cropping Pattern and Farming Practices

Coffee and maize are the main crops planted in Panyebar micro-basin; The present cropping pattern of main crops is as indicated below. The harvest of coffee extend for about 2.5 months, the beginning varies from December to January, depending with the start of rainy season.

| Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------|------|------|-------|--------|------|------|------|------|------|------|------|
| | | | Maize | | | | | | | | |
| | | | | Coffee | | | | | | | |

The common farming practices carried out by coffee and maize farmers in Panyebar micro-basin are described in Table 5.1.3 (1).

(3) Agriculture Production

Agriculture production in Panyebar micro-basin is summarized as below; average yield of coffee is low because poor management of coffee plant, caused by lack of investment capacity of farmers and low opportunity of technical assistance.

| Crop | Average Yield (per manzana) | Harvested Area (manzana) | Production |
|---------|-----------------------------|--------------------------|-----------------------|
| Coffee | 115 qq | 150 | 17,250 qq (with pulp) |
| Maiz | 22 qq | 110 | 2,400 qq |
| Avocado | 200,000 units | 8 | 1,600,000 units |

(4) Livestock Raising

The majority of families in Panyebar micro-basin are engaged in livestock and chicken production at small scale; most families have 5 to 20 chickens, few pigs, and 1 to 3 cows. Pigs and cows are kept in small spaces in the backyard of the house.

(5) Market System of Coffee

Ripe cherry harvested by farmers are carried to pulping factory within 24 hrs to process into parchment coffee beans and marketed. Small scale pulping in village level had been practiced and marketed until several years ago. However, requirement of big quantity of water for processing stage (100Lts per quintal) was causing a constraint factor for processing coffee bean in the area. Adding to the above, product quality was not uniform and not appreciated in the market. Consequently, almost no pulping process was practiced in rural areas.

(6) Prices

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. Actual conditions of the price fluctuation are as shown in Table 5.2.3 (1).

(7) Crop Budgets

Most farmers in Panyebar micro-basin make very little investment for production of both coffee and maize crops. The crop budget of coffee and maize in Panyebar micro-basin is summarized below. Inputs costs are only for fertilizers; labor cost for coffee is mostly for harvesting.

| Crop | Cost of Inputs (Q/manzana) | Paid Labor Cost (Q/manzana) | Total Cost (Q/manzana) | Production (qq/manzana) | Selling Price (Q/qq) | Gross Income (Q/manzana) |
|--------|-------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------|-----------------------------|
| Coffee | 2,000 | 1,200 | 3,200 | 115 | 100 | 11,500 |
| Maize | 950 | 0 | 950 | 22 | No | No |

(8) Processing of Agricultural Produce (Coffee)

Farmers' income could increase, if they can sell parchment beans after processing themselves, rather than to sell cherry to village middlemen. However, in many producing areas, there are many cases in which improvement plans were abandoned due to high cost of equipment, lack of water source and weak farmer's organization. Consequently business operations have been much influenced by middlemen's intention. Processing system of coffee bean is shown in Figure 5.2.3

(1).

(9) Irrigation Systems

There is no any existing irrigation system in Panyebar.

5.2.4 Health and Sanitation Conditions

(1) Major Health Problems

Major health problems in this community are parasitical diseases, upper respiratory infection, diarrhea and skin problems. The season with most frequent sickness is January and February due to common cold and May due to intestinal infection. Upper respiratory infection can be caused by malnutrition and the delay of bringing the patient to health facilities aggravate the health condition. High maternal mortality is also pointed out as a big health problem. Chronic malnutrition is prevalent among children. It is coupled with economic difficulty.

| | |
|---|--|
| Morbidity Causes at municipality level | 1. Throat Infection 2. Pneumonia 3. Dermatomycosis 4. Peptic Diseases 5. Dysentery |
| Infant Mortality Rate and Causes at municipality level | 34.6% 1. Premature 2. Grave pneumonia |
| Mortality Causes at regional level | 1. Pneumonia 2. Malnutrition 3. Diarrhea 4. Acute Myocardial infraction |
| MMR and the causes at regional level | 170.6 (per 100,000 live births) 1. Postnatal hemorrhage 2. Delivery 3. Pre-eclampsia |
| Vaccination Coverage for children under 1 years old at municipality level | BCG 94.95% Polio 96.33% DPT 96.33% Measles 88.53% |
| Malnutrition prevalence at municipality level | 8 th highest chronic malnutrition prevalence rate for school children among 329 at municipality 5 th highest among municipalities in Sololá |
| Delivery attended at municipality level | Comadronas 99.31% Doctor 0.69% |

Source: Memoria Annual de Vigilancia Epidemiologica, San Juan La Laguna 1999, MAPAS Municipios clasificados Segun Prevalencia de Desnutricion cronica en Escolares de Guatemala

(2) Health related facilities, personnel and drug availability

Currently Panyebar is covered by SIAS programs and health services are supplied by Vivamos Mejor. In San Juan La Laguna, there is no health center but a health post that is not easily accessible from Panyebar. There is another Health Post in SCL. Hospitalization is available at Sololá Hospital or Christian Clinic in SCL.

Ambulance is also available only at Sololá Hospital that is utilized for referring the patients to the bigger hospitals. Summary is shown below.

| | |
|---|---|
| Health Facilities and health personnel, | <ul style="list-style-type: none"> • Community Health Center(CHC) supervised by Vivamos Major in the framework of SIAS • Health Post in San Juan La Laguna(SJL) and Sta. Clara La Laguna(SCL), Health Center in San Pedro La Laguna(SPL), but few people goes to SPL as it takes 2 hours by walk |
| Average number of patients a day at CHC | CHC-10 to 20 patients a day HP in SCL-15 patients from Panyebar on market days(Tuesday and Saturday) |
| Referral point | Hospital in Sololá |
| Distance and transportation to the Health Facilities | <ul style="list-style-type: none"> • CHC is located in Panyebar • Panyebar to SCL-public transportation available on market days which costs 2.5Q, or one and half hour by walk • 300Q for hiring the vehicle to Sololá hospital |
| Drug availability | <ul style="list-style-type: none"> • Limited free drugs available at CHC • Health Post in SJL and SCL, not sufficient but minimal drug needs can be covered • Cheaper drugs available at Clinic of Santa Clara in SCL • Private Pharmacy in SJL and SCL • Health Facilitator also sells drugs at his house |
| Traditional and Plant Medicine | <ul style="list-style-type: none"> • Traditional practitioner in Palestina who cures evil eyes. • Plant medicine available at the market in Santa Clara and Sololá. People often use them • Request from health guards for plant medicine growing |
| Health Facilitator | There is one who attends at CHC |
| Health Guard | 15 health guards(6 women 9 men) |
| Comadronas | Two in Panyebar, Two in Palestina |
| Health Committee | 5 members, all of whom are men and catholic |
| Basic Health Infrastructure ⁷ (Water, latrines). | 95% of the population with potable water 55% with latrines |

(a) Community Health Center and Health Facilitator

Community Health Center was initially constructed by FIS, which has not been utilized for a while due to absence of authorization from MSPAS. It is currently supervised by VM under SIAS program and offering various health services including consultation Monday to Thursday from 14:00 to 18:00 attended by a health facilitator as well as prenatal care and vaccination program every month and growth monitoring for children under 2 years old every two month.

⁷ Result of House Facilities Survey by JICA Study Team

Consultation fee by the facilitator is free while consultation and prenatal care by health personnel of VM cost 1Q and all of the charges go to health committee. Facilitator received one week initial training and regular retraining by VM. He is allowed to give an injection as well as to prescribe general antibiotics. He is paid 375Q per month.

(b) Health Post

There are two health posts accessible from Panyebar in SJL and SCL. Both of them are attended only by auxiliary nurse. HP in SJL also has a rural health technician. All the health services including drugs are free of charge. Prenatal care, vaccination, growth monitoring and FP method are available besides general consultation.

(c) Health Guard

One health guard is chosen from each sector of the community who is in charge of 20 households, giving health education for hygiene and encouraging the use of CHC. They receive training from Vivamos Mejor once a month on various health issues such as prevention of common diseases. Their duty is visiting the household in charge twice a month to give health education. Each guard is offered 50Q when attending the training. Drop out is occurred mainly because of marriage of the women or immigration.

(d) Comadronas

The average number of attendance for the delivery is around 5 per month.

Sololá hospital used to allowed the refereed pregnant women to accompany the comadronas to the hospital because pregnant women are often afraid of going to the Hospital by herself, but now the authorities has changed and it is said that it is not allowed.

VM gives training to comadronas from three communities around Panyebar every month since two years ago. Most of them also offer prenatal care, and if there is any problem, they refer the women to CHC. Most of them have scissors, bulb syringe, sterile tie and soap, which were given by public health facility. They say they need gloves. The price charged is between 25Q to 50Q.

(e) Health Committee

Health Committee with 5 members, all of whom are men and catholic, was founded two years ago, though it started functioning well since January 2000.

Their duty is

- Supply CHC with necessary equipment
- Looking for support from outside institutions such as municipality, FIS, Government and Vivamos Mejor
- Supervise, encourage and support the activities conducted by health guards

(f) Other organizations implementing health activities in Panyebar

Once a month a health personnel from **Rxiin Tnamet** visit the community for prenatal care and constancy, offering cheaper drugs and FP materials. **Clinic of Santa Clara** administrated offers cheaper and better quality health services, which even include X ray, hospitalization, laboratory and HIV/AIDS blood test. There are 412 patient records coming from Panyebar, which shows not a small number of people from Panyebar utilize this clinic. They offer double pricing system, offering cheaper price for poorer without assets and free services to orphans and widows.

(g) Referral Point and transportation

Referral point from Community Health Center is Sololá Hospital. There are on average 2 to 3 patients referred to the hospital from CHC per month. Comadronas send the pregnant women with problems at first to CHC, then Sololá hospital.

(h) Availability of Drugs

Minimal free drugs are available at CHC provided by SIAS through VM although lack of quantity and variety of drugs can be seen. Lack of drugs is observed even at Sololá Hospital. Clinic of Santa Clara offers cheaper drugs than private ones and VM has their own pharmacy in Santa Maria Visitacion that also offers cheaper drugs. Otherwise, people need to buy drugs at private pharmacy in SCL or SJL.

(3) Health seeking behavior of the population

First choice is Community Health Center as it is the nearest health facility. Otherwise people usually go to Health Post in San Juan La Laguna or Clinic of Santa Clara, or less frequently to Health Post in Santa Clara. Some directly go to Sololá Hospital.

(4) Family Planning, Reproductive Health and Vaccination

(a) Family Planning

Family planning activities are conducted by Rexin Tianit every month. In CHC, there is no FP method to be distributed. FP method is available at HP. It seems acceptability is 10 to 20% according to health personnel at HP. Hindrance for FP is religion and culture. According to comadronas, people prefer natural way of FP and do not accept modern methods such as pill.

(b) Vaccination

Health personnel from Vivamos Mejor give vaccination service every month. This program started two years ago. Before that, health personnel from HP in SJL used to come once or twice a year.

Vaccination coverage rate for children under 1 years old of this year by July in Panyebar is, according to VM, BCG 57.44%(27 children), Polio 87%(41 children), DPT 44%(21 children), Measles 27%(13 children)

(c) Reproductive Health(RH)

Prenatal care is given by Vivamos Mejor every month at CHC. It is also available at Health Posts. According to comadronas, major health problem of pregnant women are anemia, hemorrhage and infection of vagina. High maternal mortality rate (170.6) of Sololá region is significant comparing to 132.5 for Quetzaltenango and 55.7 for Chimaltenango.

(5) Problem and Needs Identification

(a) Health personnel in Area Headquarter of Health of Sololá

- i) High Maternal Mortality rate (MMR) mainly due to prenatal hemorrhage. It is said that 50% of maternal death occurred within 30 minutes after the delivery. 75% of maternal death is occurred when attended by comadronas while 40% is for first pregnancy. Reduction of newborn and maternal mortality is among their policy strategy.
- ii) Culture including Machismo and language.

(b) Vivamos Mejor

- i) Lack of drugs and equipment due to SIAS budget constraint
- ii) Refusal of vaccination and health services because of side effect and religious belief

(c) Health Post

- i) Education and prevention is more important than just providing drugs. Too much population need to be covered by one public health

facilities so that they are not able to cover all the population in charge.

- (d) Health facilitator and guards
 - i) Lack of transportation for going and referring to Sololá Hospital
 - ii) Lack of qualified health personnel
 - iii) People's perception that health service must be free
 - iv) Lack of drugs especially antibiotics, acetaminophen, Maalox, Metroniazol(for ameba) and Penicillin. It is difficult for health guard to encourage the people to go to CHC because of lack of drugs there.
 - v) In addition, the drugs are not supplied according to their needs.
 - vi) More education is necessary to change the culture
- (e) Comadronas
 - i) Machismo against FP
 - ii) Women do not like to be referred to the hospital as they do not have confidence in the service offered.
- (f) NGO working in the region
 - i) Nutritional deficiency
 - ii) Access to the health services by population as well as to the villages by health personnel
 - iii) Better access by constructing the road can be more cost effective than starting numbers of community health centers in disperse areas
 - iv) Negative effect of prescribing antibiotic in inappropriate and insufficient way, causing resistance against antibiotic.
- (g) Problems and needs seen by village people
 - i) High transportation fee to be refereed to Sololá Hospital
 - ii) Lack of equipment and drugs
- (h) Other problems found through the study
 - i) Training for commadronas is not conducted in their local language
 - ii) Lack of equipment for comadronas

5.2.5 Education service Conditions

(1) Profile of the Education Services in Panyebar

In Panyebar, there are three primary schools only as formal educational body. As supplement to the formal education, CONALFA, National Literacy Committee is holding literacy class to those who are over 15 years and over.

(a) Brief Outline of Three Primary Schools

Official Primary School Panyebar

| | |
|-------------------------------|---|
| Name | Escuela Oficial Rural Mixta Panyebar |
| Type | Official |
| Director | Alberto Isaias Saloj |
| Foundation | Year 1997 |
| Location | Caserio Panyebar |
| Transportation | 5-15 minutes' walking distance for school children There are no particular obstacles on the way through the year |
| Number of Teachers | 10 (4 female and 6 male) |
| Number of Classrooms | 7 classrooms are usual brick made 3 classes are staying outside the class room. |
| Number of School Children | 308 ⁸ : Female 144(46.8%) Male 164(53.2%) |
| Available facilities | 3 toilets only , A kitchen is not in a condition of use |
| Area the school covers | Panyebar ⁹ |
| Number of Committee Members | 7 from Panyebar |
| Grade of Significant Dropouts | Between grade 2 and 3 |
| Main Reasons of Dropouts | 3. Economic contribution rather than education 4. Marriage 5. Migration to the South Coast |

Pronade Primary School Chuocanac

| | |
|-------------------------------|---|
| Name | Escuela de Atutogestion Comunitaria Chuocanac |
| Type | Pronade |
| Foundation | Year 1997 |
| Location | Caserio Chuocanac |
| Transportation | 15-20 minutes' walk away from home on average |
| Number of Teachers | 5 (1 female and 4 male) |
| Number of Classrooms | 3 classrooms |
| Number of School Children | 143 ¹⁰ : Female 74(51.7%) Male 69(48.3%) |
| Available facilities | 3 toilets only and no kitchen for preparing daily school snacks |
| Area the school covers | Caserio Chuocanac |
| Committee Members | 7 male committee members |
| Grade of Significant Dropouts | Between grade 2 and 3 |
| Main Reasons of Dropouts | 1 Boys: When they engage in paid work Girls: Housekeeping for family or go to the capital city as domestic workers 2. Lack of understanding of importance of education by parents |

⁸ Censo De Poblacion Escolar 2001

⁹ There is an agreement among schools on the areas that each school covers.

¹⁰ Censo De Poblacion Escolar 2001

Pronade Primary School in Panacal

| | |
|-------------------------------|---|
| Name | Escuela de Autogestion Comunitaria de Panacal |
| Type | Pronade |
| Foundation | Year |
| Location | Caserio Panacal |
| Transportation | 5 ~ 8 minutes' walk away from Los Pérez for school children There are no particular obstacles on the way through the year |
| Number of Teachers | 2 (2 female) |
| Number of Classrooms | 2: classrooms |
| Number of School Children | 68 ¹¹ : Female 34(50.0%) Male 34(50.0%) |
| Available facilities | 3 toilets only and no kitchen for preparing daily school snacks |
| Area the school covers | Caserio Panacal, |
| Committee Members | 7 |
| Grade of Significant Dropouts | Between grade1 and 2 |
| Main Reasons of Dropouts | 1. Economic contribution rather than education Boys: Paid work Girls: Marriage, Domestic Unpaid Work for family 2. Lack of understanding of importance of education by parents |

(b) Junior High School

There is not a Junior High School in Panyebar. The children in this village have to go to a junior high school in Aldea Palestina in San Juan la Laguna. The school is about more than one hour's walking distance from the village.

In Panyebar, there is a provisional committee to establish a junior high school in the village by inducing fund of NGO or other available services.

(c) Informal Education

In Panyebar like other villages in Guatemala, CONALFA, National Literacy Committee, is holding literacy classes on every Monday, Wednesday, Friday and Saturday at official school from 17:00 to 19:30. The institution which is entrusted by CONALFA for the actual management of literacy classes are *Comite Pro-amplicacion Inglesia Catolica Aldea Panyebar*.

(2) Primary Education

(a) Number of the School Children in three schools

The total number of the school children in three schools is 519. Number of

¹¹ Censo De Poblacion Escolar 2001,

School children by grade and gender in three primary schools in Panyebar are shown below.

| Grade in Spanish (Grade in English) | Number of Female Student | Number of Male Students | Totals |
|--|-----------------------------|----------------------------|--------|
| Preprimaria (Primary School) | 61 | 65 | 126 |
| Primero(First) | 47 | 66 | 113 |
| Segundo(Second) | 61 | 46 | 107 |
| Tercero(Third) | 26 | 27 | 53 |
| Cuarto (Fourth) | 26 | 19 | 45 |
| Quinto (Fifth) | 21 | 25 | 46 |
| Sexto (Sixth) | 10 | 19 | 29 |
| Totals | 252 | 267 | 519 |

Source: Censo De Poblacion Escolar 2001

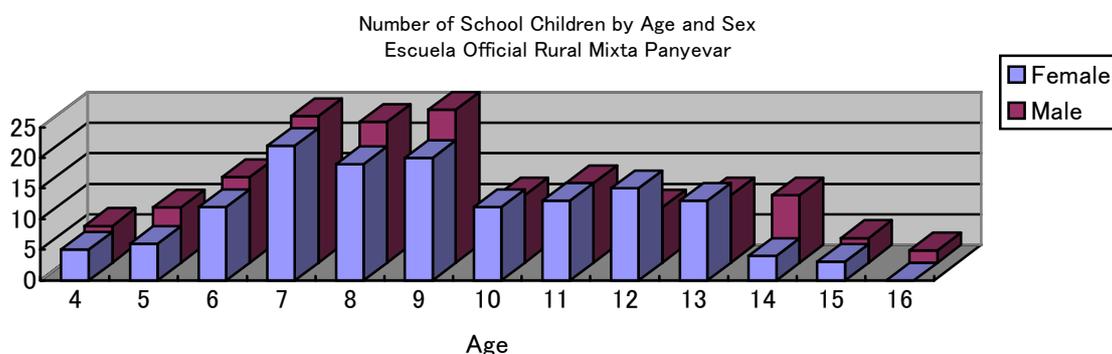
(b) Gender Balance of School Children

The rate of female and male school children who actually attend the school in August 2000 is 48.6 per cent of Female and 51.4 per cent of Male. The rate of female students to male students is 87.8 % of Male students.

| | Guatemala 1999 ¹² | Sololá 1999 ¹³ | Panyebar |
|--------|------------------------------|---------------------------|----------|
| Female | 47.0% | 47.0% | 48.6% |
| Male | 53.0% | 53.0% | 51.4% |

In Panyebar the gender balance does not show any significant difference according to the grades. After the big drop of school children between grade 2 and 3, the rate of female school children still keeps up to 48%.

The following figure shows the number of school children by age in official primary school.



¹² Tasas Educativas 1998 Y 1999; Nivel Primario de Niños (2000) Ministry of Education

¹³ Tasas Educativas 1998 Y 1999; Nivel Primario de Niños (2000) Ministry of Education

From this figure, the following points can be mentioned.

- The rate of female and male students at primary school does not show significant change according to age.
- There are about four stages in terms of age and education.

| Stage | Age | Tendency |
|--------------|-------|--|
| First Stage | 4-6 | Preschool children attend school |
| Second Stage | 7-9 | The majority of the school children are at these age in grade between 1- 2. Parent's expectation is " Basic Comprehension of Spanish". |
| Third Stage | 10-13 | These students are those who did not dropout after the second grade. They are grade 3, 4 and 5. |
| Fourth Stage | 14-16 | Mainly these students are in grade 5 and 6. |

- Although the number of female students are actually smaller than that of male in total, the number between 10 to 13 years old of female students exceed that of male.

(c) Teachers

(i) Number of Teachers

There are 17 teachers in three primary schools in Panyebar. 8 teachers are 4 bilingual and 9 are monolingual. Each school has at least 2 bilingual teachers.

(ii) Role of School Teachers

Teachers are responsible for giving classes for 180 days in a year starting January till the end of October.

(iii) Payment

The amount of salary is solely based on the experience in official school. There is no additional payment for their position nor for transportation. Monthly salary is shown below:

| | Monthly Payment |
|-----------------------------------|---|
| Starting salary in 1999 | Q1,275 monthly |
| After every 5 years of experience | Q1,530 (every 5 years, the salary increase by 20 %) |

Pronade schools have different system from above. In Pronade, the salary is uniformly equal regardless experience of teachers in school.

| | |
|-------------------------------|-----------------|
| | Monthly Payment |
| Salary of teachers in Pronade | Q1,600 |

Teacher does not receive transportation fee nor extra payment for extra work.

(d) School Committee

Each school has an active school committee in the community where the school is located.

(e) School Condition

The following needs are recognized in each schools.

- Lack of class rooms: some classes are in open air
- Lack of teachers: usually a few grades are combined as school do not have enough teachers
- Lack of Materials/ equipment

Since 1999, Vivamos Mejor is financing the community to build extra 3 classrooms for the official school. They are on the construction.

(3) Junior High School

Currently, school teachers of three primary schools are discussing the possibility to apply for grant or aid in order to found a junior high school in the village. The meetings are repeated, and the supervisor of San Juan de La Laguna was also invited due to the following causes.

- The children in this village have to go to a junior high school in Palestina in San Juan de la Laguna. ~~The school is about more than~~ one hour's walking distance from Panyebar. Usually parents cannot afford the transportation fee. Additionally, the road is very bad: it is very hot in summer and can be very dangerous when it rains in winter.
- There were several school children in the year 1999 who had strong wish to continue study. However, the reason above, it was not possible. This year there are 16 children in the 6th grade. There will be several children who wish to continue studying.

(4) Informal Education

(a) CONALFA

In Panyebar, literacy class is constantly held in official school. 25 villagers between age of 15 and 28 attend the class. The majority of the students in the

literacy class are male (68.0%). According to the list of students, female students are only between 15 and 18 of age. The rest of the older students are all male.

(b) Literacy Rate

The Illiteracy rate of San Juan la Laguna is estimated at 55 per cent among villagers at the age of 15 years and over, while the illiteracy rate of Sololá province is 49%.

Although there was no desegregated data was available, it will be no problem to mention that the majority of illiteracy population are women.

(5) Identification of Problems and Needs

- The problem of dropouts cannot be solved only at the community level. Government should spend more budget on schemes for reducing the number of dropouts in rural areas.
- The demand for Junior High School is quite high among parents in the village. However, the provisional committee members are having financial problem in order to prepare salary for the future teacher. Some primary school teachers are negative about founding Junior High School as it will increase their work, but not their salary.
- The majority of women are illiterate. Special attention should be paid to women when any project including women are going to be implemented.

5.2.6 Rural Infrastructure

In order to grasp general features of the rural infrastructure and the household facilities in Panyebar, the survey of diffusion of the infrastructures was made at site. The interview survey was conducted at 175 houses in the area and its results are shown in the following table. The conditions of the survey and the details of the survey results are summarized in Table 5.1.6 (1).

It is noted in the Table 5.1.6 (1) that the diffusion of the toilet and the improved stove are so high even though there was no any project in past in Panyebar. It means the most of the toilets and the improved stoves in the area are made by villager itself with their finances.

Results of the ad-hoc survey for house facility

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

The followings are the summaries of the present conditions of the infrastructures to be underlined, and all the detailed descriptions are given in Table 5.2.6 (1).

- **Drinking Water Supply System**

In the area there are 2 water supply systems made by CARE in 1978 and FONAPAZ in 1998. Most of the houses have 2 taps of 2 systems.

Presently the villagers face water shortage in the systems because of a lack of water resource in *Panan* spring and frequent water stop by the physical breakdowns of the conduction pipeline.

Water charge for the systems is collected by year at a fixed rate, Q 6/year/tap. That is why the villagers' attention of wasting water and awareness of saving tap water are so low and, these causes seem the chronic shortage of water in the systems. Regarding the breakdown in the conduction pipeline, the frequent water stop is closely related to the poor maintenance works by the water committee, such as shortage of manpower for maintenance works and lack of fund for purchasing the materials. However frequency of the pipe breakdown is also extremely high, in every 15 days according to the water committee, the reinforcement of the system is required.

- **Sanitary System**

As mentioned in the above, almost all the toilets are made by themselves and contributes improvement of house sanitary condition. The fact that they purchased it with their finance shows its necessity, effectiveness and sustainability in the community.

- **Roads and Bridges**

Road condition inside the community is good, but the access roads to the community are not sufficient, specially in rainy season.

5.2.7 Environmental Conservation Sector

(1) **Soil Erosion and Collapse**

The territory of the village Panyebar belongs to the high lands of the volcanic

chain, with mountains, hills and volcanic cones.

In the village exists a communal forest, one that encompasses an area of 148 ha in the other, which can be found assorted vegetation from a complex and quite assorted joint of kinds of epiphytes, orchids and bromelias or gallitos, that indicate the complexity and special natural conditions. The lands of the inhabitants of the Panyebar village are used for agriculture (35%), forests (30%), and for other uses (35%). They have in their small land extensions with forest, of those, which periodically extract quantities of firewood to use in their housings to cook their foods. The farmers that do not have forests with trees extract quantities of firewood frequently. Same as, some persons extract meaningful quantities of some wood-able kinds, such extreme of the fact that currently such wood-able kinds no longer exist.

The soils are in Panyebar poor as a rule, in lands that vary in their topography of gently waved to strongly inclined, those which are eroded year by year by clean cultivation. As a result, the wash of the lands occurs and concludes the loss of the fertility of the same.

Carcavas problems here are not a problem as in other areas and what can be done is making compost. The usable soil can be improved.

(2) Contamination for Water

Water for domestic use was investigated. Seven samples of the water of fountains, a tank and a river were taken at the site (Figure 5.2.7(1)). Each water quality was tested using a water test kit. The number of items of water quality is 12, as shown in Table 5.2.7 (1). Most samples in Table 5.2.7 (1) show that the water is not suitable for drinking water without being boiled because of detection of coliform and bacteria. Gothic type shows that its value exceeds Japanese standards for potable water. The pH value 9.5 of the sample S-5 is extraordinary high, which probably results in seepage of detergent into the water tank from a washing place nearby. However the pH of S-6, the source of S-5, shows the value within the standard.

Nitrate was detected from all the water samples.

Summary of the result of investigation is shown below, and its detail in Table 5.2.7 (1) and Table 5.2.7 (2).

| | | | | |
|-------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Place | fountain | fountain | fountain | fountain |
| Evaluation for drinking water | NO | YES | NO | NO |
| Condition of water use | When water supply is cut. |
| Place | water tank | fountain | East river of two ones | |
| Evaluation for drinking water | NO | NO | NO | |
| Condition of water use | When water supply is cut. | All the time. | When water supply is cut. | |

As described above, coliform, bacteria and nitrate were detected from most water samples. This means that human waste seeps into the soil. Pesticides must be detected, though not tested this time.

5.2.8 Existing Development Projects in and around the Micro-basin

(1) Agricultural Sector

Agricultural support project in Panyebar micro-basin is limited to provision of fertilizer at low cost through the 2KR program; In the nearby of the micro-basin there is a project activity, but related mainly to post-harvesting handling, such as coffee pulping at Palestina, Santa Clara la Laguna.

(2) Social Infrastructure Sector

In the infrastructure sector, there were 4 projects in past, such as a) the water projects by CARE Guatemala and FONAPZA, b) the electricity supply project by “*Consejo de Desarrollo Urbano y Rural*” (CODEUR) and c) the improved stove project by FIS. The road project by FONAPAZ and the road improvement project are under construction and preparation to be implemented by the Municipality.

The detailed information of these projects is mentioned in Table 5.2.8 (1).

(3) Environmental Conservation Sector

MAGA and PAFG implemented "the Forest Management on Communal Lands Program". The existing projects around the model areas are shown in the following table.

| Denomination | Location | Extension (Hectares) | Remarks |
|---|----------|----------------------|-----------------------|
| Municipal Forest of San Pedro La Laguna | Sololá | 100 | Interest |
| Nahualá's Communal Forest | Sololá | 200 | Administration exists |

Although Panyebar is not a part of the basin of the Lake Atitlan, their experience about environmental protection in the basin is very helpful to implement our project.

The basin of Lake Atitlan is designated as protected area (62,500ha, GT034AU) by CONAP. To protect the lake, there exist some environmental projects, which are carried out mainly by the following NGOs.

- (a) Authority for the Sustainable Management of the Basin of the Lake of Atitlan and its Ecological Surroundings -AMSCLAE -

The purpose is to keep in good shape the ecology and the quality of the water in the Lake of Atitlan. Article 2 of the Law of the Creation of AMSCLAE specifically establishes that, “the specific goal is to plan, coordinate and run the measures and actions of the public and private sector that are necessary in order to conserve, preserve and protect the ecosystem of the Lake of Atitlan.”

- (b) Friends of the Lake of Atitlan Association –AALA-

Its principal objective is to encourage the supportive development and protect the renewable natural resources of the basin of the Lake of Atitlan. It stimulates environmental education projects aimed to teachers, for it, they use educational manuals and impart seminars to train in their use.

- (c) National Coffee Association –ANACAFE-

It promotes coffee as an environment conservation crops, due to the fact that they have high densities of vegetable coverage and important systems of the different species involved inside the agro-ecosystem.

- (d) Program of Auto-sustained Development in the Basin of the Lake of Atitlan – European Economic Community ALA 88/22-

It has projects like mini-watering, conservation of the grounds and forest nurseries. It seeks the reforestation of an area of 800 ha. It covers an extension of 240 km², which includes a population of 55,000 beneficiaries.

A sewage treatment plant was constructed and completed at the end of 1994 in

the municipality of Sololá, bringing with it a reduction in the levels of pollution in Lake Atitlan.

EU carried out a solid waste project in only Sololá Province of the four provinces to be studied.

CONAMA receives complaints about pollution filed by residents. In the rural area, complaints were about water pollution and dumped trash. The cause of water pollution is a discharge of domestic wastewater. At this moment, there are no complaints from San Juan La Laguna.

5.3 Pachum Area in Totonicapán Province

5.3.1 Natural Resources

(1) Location

The Model micro-basin selected in Totonicapán province, Santa María Chiquimula municipality, Aldea Xesaná, Pachum community is located near 14° 56' latitude north and 91° 25' longitude west; the elevation varies between 2,300 to 2,600 meters above sea level. The location of Pachum Model micro-basin is shown in Fig. 4.2.3 (1).

(2) Topography and Soils

The topography of Pachum Model micro-basin is strongly undulated; the slopes vary in the range between 10° to 50° land of small slopes are located at the center of the micro-basin.

According to C. Simmons et.all (1954), the soils of Pachum model micro-basin are classified in the group I, named as soils of the “Volcanic Mountain soils”, series Totonicapán (Tp); The parent material is volcanic ash and rocks of clear color. The soils are moderately deep, up to 1.10 m. Soil color is dark brown and the texture varies from loam to clay loam. The internal drainage is good. Some areas at the north side of the micro-basin present very deep soil collapse.

(3) Climate

There is not available measurement of climatic data in the nearby of the micro-basin; Referring to temperature and rainfall maps prepared by INSIVUMEH, the average climatic conditions of Pachum micro-basin are indicated in Table 5.1.1 (1). The climate is temperate; Annual mean temperature is about 15;° There is not 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.

(4) Water Resources

There are three major springs in Pachum, which are /will be very important to the villagers' living activities as listed below.

- *Xecandelaria* springs

- *Pachum2* springs

- *Pachum3* springs

Xecandelaria spring is the biggest water springs in the area. Presently the springs is the resource of Pachum 1 water supply system, but the effective usage of the spring water by the system is so low, approximately 6% in volume, and the remains are not utilized.

It is emphasized that, when an overall water resource development plan is formulated in Pachum area, the ownership of spring is so problematic and sensitive matter. Because Pachum is divided into 3 groups, so-call Pachum 1, Pachum 2 and Pachum3, which owes each independent water resource for their water supply system and they act exclusively regarding the water usage.

The detail information and the locations of the water resources are shown in Table 5.3.1 (1) and Figure 5.3.1 (1).

5.3.2 Socio-economic Conditions

(1) General Conditions

Pachum is a village that belongs to the municipality of Santa María Chiquimula, province of Totonicapán. The municipality of Santa María Chiquimula is made up by a head town, 17 villages (aldeas) and the caseríos that belong to the sub-villages. Pachum is a caserío of Xesaná's village. To the south of Pachum, the communal forest of Xesaná extends.

The population of this area is engaged in trade in the coastal area and agriculture in Pachum. The merchants follow their maize cultivation using assistants, however their main income source is the ambulant trade that carries out especially in the coast. Other groups perform to cultivate maize for self-consumption and to obtain wage in order to maintain their life.

Peoples in Pachum are apt to be on their guard against exteriors because of a

closed society, its geographically remote location and their socially conservative convention.

(2) Population and Administrative Structure

The total household and population in 2000 are 150 and 900, respectively.

The municipality of Santa María Chiquimula, is the minimum authorized administrative unit and it has an elected municipal mayor (Alcalde Municipal) for a universal vote. With the municipal mayor, the Municipality is in charge of local administration. The Alcalde auxiliars (A. A.) play the connection role between municipality and each community (caseríos or aldeas). His paper is not only connections. The auxiliary office that is composed of A.A and other positions is a real administrative unit in the communities. The election of the A. A. is in the hands of each community, and the municipality recognizes it.

Every Thursday the A. A. gather at the municipality and they carry out meetings with the municipal mayor. AA is in charge of sending message to the communities. Also inside the municipality 4 Majors and mayor's assistants are chosen from the villages, and they keep bullets and they carry out maintenance of warehouses etc. They work without remuneration.

In the building near the church at Santa Maria Chiquimula there are rooms for auxiliaries.

According to the municipality almost all the men have their identification, however only 20% women have identification. According to the census, however, they said that 100% of men and 5% of women have it.

(3) Communal Organization and Mechanism of Decision in Village

Pachum is one of caserios under Aldea Xesaná village that is the minimum real administrative unit.

(a) Village Xesaná

The auxiliaries of Xesaná are composed by auxiliary mayor, assistants, forest keepers, scholars, secretary, treasurer, 4 vocals and a middleman so called as principal before. Position of AA lasts one year and they alternate in 4 communities (Center, Pachum Xoltakche, Chuisiguan). AA's main work is to coordinate and receive the population's accusations. Assistants (Alguaciles) are elected to each caserio and they work for communication between aldeas and caseríos. They are also in charge of carrying out or coordinating some

activities in the communities. The forest keepers are 6 and they watch over communal forest. There are two scholars per school and they look after the school's maintenance. Middlemen are 2 per caserio and have 2 years of position. This middleman and the outgoing AA prepare a list of new candidate for the positions and they present it to the assembly.

There is no relationship between these positions and religious positions.

The general assembly is the making-decision body and takes place 2 times per year and 1500 men participate. The men also give services of 5-6 days for maintenance of highway reforestation.

(b) Pachum

In Pachum area there is neither a person who represents as authority. A system to make decision doesn't exist either. To carry out a general meeting in Pachum a convoking from the auxiliaries of Xesaná would be important. The committees in Pachum are formed for the interested population. And the representatives of these committees are also elected only by the participants of the mentioned. It is not necessary to request general assembly in the level of Xesaná neither Pachum.

(4) Ethnicity

Almost all the populations in Pachum are composed of peoples that were shifted from Santa María in the past and lived in Pachum are K'iches. No problems are observed among indigenous and no-indigenous population.

(5) Religion

In Pachum the evangelical sects' penetration has advanced a lot. The evangelical people have entered here 40 years ago and now over half of the population is assumed to be evangelical and remainder catholic. There were some people that rejected the rural development here due to the religious matter, however for majority of those that give support to the development are also evangelical. It cannot be easily said that the evangelical people are barriers for this type of activities. In Pachum there are 4 evangelical Churches and each has their shepherd. The Catholic Church is under the influence of Catholic Action and 10 families participate.

Other populations practice customs, they still maintain relationships with the Catholic Church. They are more or less 40% of the population and 4-5 mayan

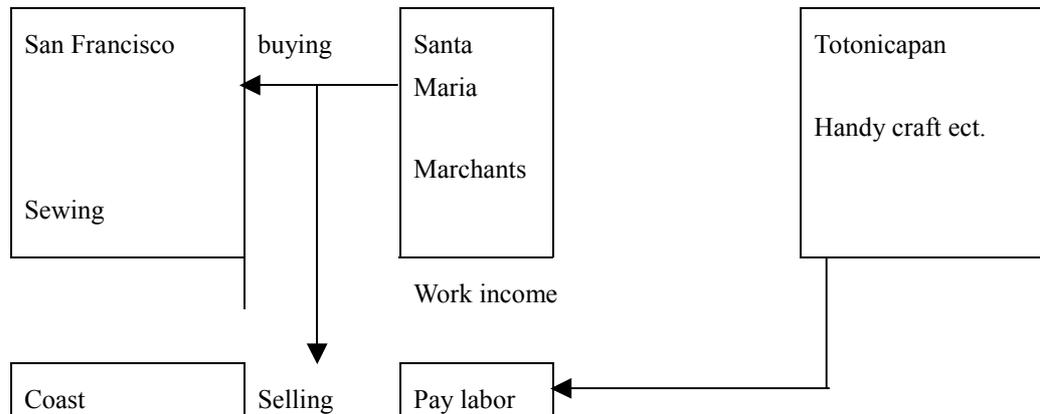
priests exist. People mention names of 4 sacred places. However to one of them (Cerro Saná) people can no longer arrive because an evangelical man bought this land and prohibits the entrance.

(6) Socio-economic

(a) Local Economy

The economy of the Pachum area can be characterized in two groups. One is the group of merchants that go down to the coast and other places. And the other are engaged in agriculture in their own lands and work daily.

For a wider focus, we can say that the merchants of Santa María buy (receive) their merchandise like clothes in San Francisco El Alto and they take it to the coast to sell it. And these merchants request wages for their cultivation inside the community. In the municipality of Totonicapán there are several small manufacturers, and the patterns of these manufacturers also look for wagers from Santa María. However inside this circle, in Santa María agricultural work doesn't increase, and they follow wages of low salary. This also blocks the accumulation of capital inside the area.



The merchants can divide into 3 groups consisting of merchants having stores in the coast or other places, travelling merchants and salespersons of some stores (especially young).

The merchants can also be characterized

- They have experienced their work with their father or family
- They speak Spanish more or less.
- From Friday to Monday or Tuesday go down to the coast or other places

- They have a boss and he advances merchandise to the merchant.

The agricultural workers get work in the community or outside of community. In the community the merchants look for wage. In the case of Totonicapán like Paquí, the bosses of small crafts or seam manufacturers etc. give work. Their daily payment is 15-20 quetzales.

From Pachum to Paquí it takes a half-hour and about 20 people work in Paquí. Besides these groups there are some families that are dedicated to the fabric. Agriculture hardly has any importance inside the local economy. Besides from maize some peach or apple trees are observed.

(b) Trade Form

i) Relationship with Boss

Most of the merchants' of this area have a boss and they advance merchandise to the merchants. And when finishing the sale they give the sale to the boss. These Bosses are from Warehouses from San Francisco or from the coast. But any type of merchandise works in this form. The merchandise that received in San Francisco are clothes and dresses. The merchants' profit is more or less 10 percent of the sale. Many go down to the coast like Escuintla or Mazatenango.

ii) Salespersons in the store

Some young people work as salesperson of the store. They spend one week where the store is. The salary is Q600 per month.

iii) Owner of Store

There are cases where they have their own store in the coast. The size of the store is not known. There are people that have tract in the market and others have their own permanent store.

(7) Land Holding and Tenure

The average land holding size is to be assumed 8-10 cuerdas. In this land, for 4-5 cuerdas they sow maize. It seems that the majority possesses public writing of land ownership. There are about 20 families that have more than 20 cuerdas. However due to the low yield of crops and less profit from crop production, the extension of land doesn't give a lot of influence to the economy of the community. It was said that there was a family that had more than 100 cuerdas. But because of the inheritance they already distributed it in several children and the extension of the land won't give a lot of influence to the social class in long term.

(8) Gender

(a) The Work of Women

The role of women differs from one another according to what the family is earning their income from. However it can be summarized as follows in general.

| | |
|---|--|
| (1) Preparation of food and eating | |
| 1. Grinding of corn* | Preparation of corn with grinding machine |
| 2. Cooking* | |
| 3. Washing dishes* | |
| 4. Going to market* | To Santa Maria Chiqimula and San francisco Once a week, husband also go to market in stead of women |
| (2) Acquisition of fuels and water | |
| 1. Collecting firewood and buying firewood* | 1 hr to reach the place where they collect firewoods |
| 2. Collecting water* | |
| (3) Hygine | |
| 1. Cleaning houses* | |
| 2. Laundry* | |
| (4) Gaining cash income | |
| 1. Sewing* | |
| 2. Livestock and poultry razing* | Most women keep livestock/poultry |
| 3. Paid agricultural work* | |
| 4. Handcraft "Matate"* | Some women can make traditional handing mattress/bags |
| (5) Agricultural work | |
| 1. Seeding | Mainly they grow corn and work as hire paid. |
| 2. Weeding* | |
| 3. Harvesting | |
| (6) Family care | |
| 1. Child bearing* | 5-10 children on average per woman in a lifetime |
| 2. Child raising* | Especially for girl children, aged 5 years and over |
| 3. Care of the sick and handicapped* | |

*: Main work which is performed by women

(b) Cash Income Source of Women

Cash income source is very limited for women in Pachum. As seen in the

following table, women do not obtain any constant cash income source. For example, some women are engaged in agricultural work as a paid farmer. However, this is a seasonal. Grazing livestock and poultry are not also their constant cash income source as they will mostly keep animals for their own consumption purpose.

The main source of cash income of women in Pachum

| Kinds of work | Work in Charge | How much per day or per unit or product (Purchasing price) | Problems |
|----------------------|---------------------------------|---|---|
| Agricultural Work | Harvesting crops | 15Q/ day | Seasonal Underpaid compared with Men's wage of 20 Q |
| Livestock/ Poultry | Hens and Cocks, Pigs Caws &Oxen | N/A | No appropriate knowledge to grow livestock/ poultry |
| Handcraft | - | - | - |

(c) Education and Women

The level of education that women receive in Pachum is quite insufficient, as most women do not have a chance to receive formal education. Among 25 women interviewed in Pachum, none of them went to school.

According to National Committee for Literacy, 76.0% of Pachum residents who are 15 year and over were illiterate in 1999¹⁴and it is estimated that majority of illiterate residents are women.

(d) Social Participation

In Pachum area, there are six committees consisting of 2-water committees, energy/electric committee, school committee, health committee and committee de Ampliacion de Car. Retera. There is one woman active member in the health committee.

Women are usually not involved in social organizations and not participate in decision making of such organizations in Pachum. Among Totonicapán department, Santa Maria Chiquimula can be considered one of very conservative municipalities where old Mayan custom still remains.

¹⁴ See *Poblacion Alfabeto y No Alfabeto del Departament de Totonicapán, Comprehdidos Entre 15 a Mas Años de Edad*

(e) Political Participation

The women's political participation is quite limited in Pachum.

According to the group interview to women in Pachum, there were no women who are registered as constituency, *empadronamiento*. The acquisition of ID card, *cedula*, is estimated as 40% as shown below:

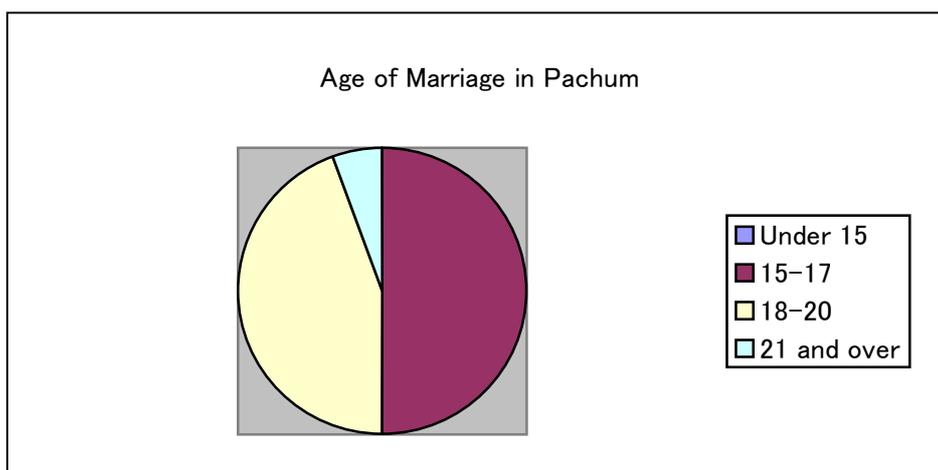
The Rate of Registration of ID and as Constituency in Pachum

| | Female | Male |
|------------------------------|--------|------|
| ID registration | 40% | 100% |
| Registration as constituency | 0% | 90% |

(f) Women's Marriage and Reproductive Rights

- Marriage

Among twenty-five women who were interviewed in Pachum, majority of women married at age of between 15 to 17 as shown in the following figure.



- Reproductive Health of Women

By interviewing 25 women in Pachum, the following data was obtained regarding their Reproductive Health.

| | |
|----------------------------|----------------|
| Average Age of Marriage | 16.5 years old |
| Times of Pregnancy | 4.9 times |
| Minimum Number of Children | 1 child |
| Maximum Number of Children | 12 children |

Note: The data is obtained from different generations. Therefore the data of time of pregnancy is smaller than the actual fertility rate.

(g) Observation and Proposal

- It will be very difficult to start a project that requires women to manage by themselves. Through a set of training or provision of services women can be encouraged to learn how to form a group to help each other to some degree.
- Spanish speaking group can be stakeholder among women in the project. Special attention toward non-Spanish speaking group should be paid, especially those who are relatively poorer in the community. In the observation, minority Spanish speaking group seemed atrophying majority of non-Spanish speaking group.
- Spanish comprehension is quite limited among women. It is strongly suggested that project facilitator should find good female translator in order to make sure that all the attendants can understand the project procedures.
- Women have never organized their own groups or any type of project. Therefore, it will take time to induce them to participate actively. Each process of the project should be implemented according to their capacity.

5.3.3 Agriculture Conditions

(1) Land Use

The present land use of Pachum micro-basin is estimated as follow: 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 agriculture production, and 5 % is covered by houses, roads and others.

(2) Cropping Pattern and Farming Practices

Maize is the only crop produce in important area in Pachum micro-basin; The present cropping pattern of maize is indicated below.

| Jan. | Feb. | Mar. | Apr. | May. | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|------|------|------|-------|------|-----|-----|-----|-----|-----|-----|-----|--|
| | | | Maize | | | | | | | | | |

The common farming practices carried out by maize farmers in Pachum micro-basin are described in Table 5.1.3 (1).

(3) Agriculture Production

Agriculture production in Pachum micro-basin is summarized as follows:

| Crop | Average Yield (qq per manzana) | Harvested Area (manzana) | Production (qq) |
|------|-----------------------------------|-----------------------------|--------------------|
| Maiz | 20 | 50 | 1,000 |

(4) Livestock Raising

The majority of families in Pachum micro-basin are engaged in livestock and chicken production at small scale; most families have 2 to 10 chickens and few goat and sheep.

(5) Market System

There is no product for market in the village and no merchant go in and out. Three small shops are selling daily requirement such as salt, sugar, soap, edible oil, beverage, etc. Villagers buy clothes, shoes, kettle, farming tools, medicine and fuel at the market opened on every Friday and Saturday in Santa Maria Chiquimula.

(6) Prices

About 1/3 families in this village do not own sufficient land and need to buy maize that is staple food. The price of maize is 60 to 70 Quetzales (local variety) and it does not year.

(7) Crop Budgets

Most farmers in Pachum micro-basin make very little investment for maize production; cash expense is only for fertilizer application, pesticides are not applied; all the labor used for maize production is from the family. The crop budget for maize in Pachum micro-basin is summarized below.

| Crop | Cost of Inputs (Q/manzana) | Paid Labor Cost (Q/manzana) | Total Cost (Q/manzana) | Production (qq/manzana) | Selling Price (Q/qq) | Gross Income (Q/manzana) |
|-------|-------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------|-----------------------------|
| Maize | 925 | 0 | 925 | 20 | No | No |

(8) Processing of Produce

In this village, there are two baker shops and four flour mills for tortilla, all of them are for village people at small scale. The baker shops nearly close because wheat production ceases and supply stops. In this village including its vicinity, there is no collecting center and processing facility for vegetable and livestock. Whenever village people need access to such a market, they have to carry the produce to Santa Maria Chiquimula 11 km far away.

(9) Irrigation Systems

In Pachum area there is no any existing irrigation system.

5.3.4 Health and Sanitation

(1) Major health problems

Major health problems in Pachum is upper respiratory infection, diarrhea and malnutrition. Chronic malnutrition is prevalent in this municipality and mortality rate caused by malnutrition is higher among female (62.5%). Vaccination coverage rate is comparatively low here so that they still have the incidence of measles although the number has decreased owing to vaccination program.

| | |
|--|--|
| Morbidity Causes in Xeatzán Bajo | 1. Intestinal parasitical diseases (25%) 2. Anemia (15%) 3. Pneumonia (13%) 4. Tonsillitis (13%) 5. Common cold (8%) |
| Infant Mortality Rate and Causes at municipality level | 48.04 % 1. Bronchopneumonia 2. Premature 3. Neonatal Septicemia |
| Mortality Causes at municipality level | 1. Pneumonia and Bronconeumonia(31%) 2. Malnutrition(2%) |
| Maternal Mortality rate and the causes | 101.7 (per 100,000 live births) 1. Eclampsia at delivery 2. Puerperal sepsis |
| Vaccination Coverage for children under 1 years old | BCG-76%, Polio-80%, DPT-80%, Measles-70% |
| Malnutrition prevalence ¹⁵ | SMC has 12 th highest rate(80.9%) among 329 municipality of chronic malnutrition prevalence for school children • Second highest among the municipality in Totonicapán |
| Delivery attended by | Comadronas 99.8%, Empiricist 0.18% |

Source: Memoria Annual de Vigilancia Epidemiologica, San. Maria Chiquimula 1999, MSPAS
Memoria Annual de Vigiancisa epidemilologica, totonicapan, 1999, MSPAS
Medical Statistics for Aldea Xesaná 2000, CDRO
Municipio Clasificados Segun Prevalencia desnutricaion Cronica en Escolares de Guatemala, OPS/INCAP

(2) Health related facilities, personnel and drug availability

In Municipality of Santa Maria Chiquimula, there are 1 health Center and three Health Posts, all of which are not easily accessible from Pachum. In addition to public health facilities, 4983 population¹⁶ is currently covered by coverage extension services under. SIAS program SIAS. Pachum is covered by a NGO,

¹⁵ Municipios Clasificados Segun Prevalencia de Desnutricion Cronica en Escolares de Guatemala, OPS/INCAP

namely CDRO.

| | |
|---|--|
| Health Facilities and health personnel, | <ul style="list-style-type: none"> • A Minimal Health Unit(MHU) attended by a doctor and a nurse of CDRO once a week. • Nearest public health facilities is HP in El Rancho(8km) • Ambulance available only at the hospital for referring the patients to Quetzaltenango or Guatemala City • Hospitalization available only at the hospital • In Totonicapán, some health post is attended by Cuban doctor although they do not exist in SMC. |
| Average number of patients a day | 15 to 20 every consultation on Thursday |
| Referral point | Health Center in Santa Maria Chiquimula or Hospital depending on the severity of the disease |
| Distance and transportation to the Health Facilities | <ul style="list-style-type: none"> • MHU is situated at the primary school in Pachum. • HC is located one hour walk to catch the bus at AutoRoute. On market days, there are direct transportation to San Francisco(3 days a week) and SMC(once a week), both costs 5Q |
| Drug availability | <ul style="list-style-type: none"> • Free drugs at HC in SMC, Cheaper drugs offered at Catholic Church Clinic in SMC. Private pharmacies in SMC and San Francisco, children under 5 years old and pregnant women get free drugs at MHU |
| Traditional and Plant Medicine | <ul style="list-style-type: none"> • No Plant doctor, but Maya priests exist. • CDRO gives training of plant medicine to health guards. • Comadronas sometimes give plant to pregnant women |
| Health Guard | 5 Health Guards (4men and 1women) |
| Health Facilitator | One facilitator living in Xesaná although he does not come to MHU in Pachum regularly |
| Comadronas | 2 in Pachum, 4 in Xesaná |
| Health Committee | 7 members, among whom 2 are from Xesaná and all of them are health guards as well |
| Basic Health Infrastructure (Water source, latrines). | <ul style="list-style-type: none"> • Majority(85%)¹⁷ with no latrines, some have informal ones • 70% with potable water, 30% with water from spring |

(a) SIAS Program by CDRO

They supply MHU with essential drugs exclusively for the children 5 years old and pregnant women every month, and send a doctor for consultation including prenatal care once a week (Thursday) and household vaccination visit every month, all of which are free of charge. Since 8 years, CDRO has been implementing health activities in Pachum. They give regular training for health guards as well as comadronas in Xotache in their local language, Kiché. Main target groups are the children under 5 years old and pregnant women, so that

¹⁶ Memoria Annual de Vigilancia Epidemiologica, San. Maria Chiquimula 1999, MSPAS

¹⁷ Basic facility survey by Mr. Murakami

the rest of the population can receive only the consultation and prescription, no drugs can be given in principle because of financial constraints. They also offer health services once a week in Xotache, 30 minutes a walk from Pachum, although the population in Pachum seems not going there. Finance from SIAS only covers salary of health personnel and drugs while NGO have to finance for transportation, maintenance and building of new MHU.

(b) Health Center

Health Center is situated in Santa Maria Chiquimula which is not very easily accessible from Pachum so that they do not have many patients from Pachum except on the market day (Thursday).

(c) Health Guards and Health Facilitator

Each Health Guard is in charge of 25 households, covering all the households in the community. Their activities include:

- i) Household visit for giving health education as well as finding out any health problem in the households although it is conducted irregularly only when needed.
- ii) Promotion of vaccination program
- iii) Giving limited kind of drugs in case of emergency or referring to the HC or hospital
- iv) Support of MHU-One of health guard attends every Thursday when the doctor comes.

In general, when village people become sick, they come to see Health Guards in charge, and in case of severe disease, they give drugs stocked at MHU. They receive regular training from CDRO including about plant medicine. They buy plants in San Francisco and sell them to the people with the purchasing price.

There is only one health facilitator who is in charge of giving consultation at both MHUs in Pachum and Xotache. He is supposed to attend at MHU in Pachum twice a week, however this system seems not functioning well as he does not attend at MHU in Pachum regularly.

(d) Comadronas

There are two comadronas in Pachum. The one interviewed with gives, besides attending delivery, prenatal care and FP education. She has basic materials supplied by Health Center such as scissors, bulb syringe, balance and sterile tie. She asks 50Q for attending the delivery. According to her, all the deliveries in

Pachum are attended by comadronas. She is advised to refer the women to the hospital in case of complication although there are not yet any case of referring.

(e) Health Committee

There are 7 members among which two are from Xesaná. All of them are Health Guards as well. It is in charge of administration of MHU and asks the population for contribution to buy equipment in MHU. It is also in charge of informing CDRO every month concerning MHU such as number of patients attended.

(f) Other organizations implementing health activities in Pachum

Intervida itself has various programs in the region, however in Pachum it has the health project targeting only for the school children and so far offers irregular consultation by the doctor and drugs for primary school student. **CARE** has food distribution and other health program all over the region, nearest service point from Pachum is Health Post in El Rancho. **Catoric Church Clinic in SMC** offers child and maternal health consultations by 5Q, reproductive health education, growth monitoring, vaccination program and food distribution programs.

(g) Referral Point and transportation

In principle, referral system functions from Health Post→Health Center→Hospital. However, because of the geographical location of Pachum(they have to walk to the same point whichever going to SMC or Totonicapán), some goes directly to the hospital depending on the severity of the disease.

(h) Availability of Drugs

Minimal essential drugs are available at the Minimal Health Unit exclusively for children under 5 years old and pregnant women except in case of emergency. Therefore those who are not covered by CDRO program have to go to San Francisco or SMC to get the drugs at HC (free of charge but less variety and often lacking), Catholic Church Clinic(cheaper than private ones) or private pharmacies. The people sometimes keep prescription without buying drugs, as they can not afford for expensive drug in private pharmacies.

(3) Health seeking behavior of the population

Children under 5 years old and pregnant women can be consulted and given drugs at MHU. Otherwise, the people usually go to Health Center in SMC for

consultation and buy drugs at San Francisco or SMC. A Catholic Church Clinic in SMC is also utilized as they offer cheaper drugs. Sickness occurs most frequently in December and May. There are particular plants very often used for the treatment of common diseases

(4) Family Planing, Reproductive Health and Vaccination

(a) Family Planning

The doctor of CDRO sells FP materials to the population by 70% of the market price. They can not offer them free of charge, as they do not have adequate quantity. Therefore, those who would like to use FP methods seem prefer to go to HC as they offer them free of charge. According to health guard and comadronas, the majority of the people do not accept FP.

According to the study by CDRO, contraceptive prevalence in their covering areas is as low as 4.9%¹⁸ and 43.8% answered ‘do not know’ to the question asking if they agree with the use of FP methods, which shows the necessity of FP education.

(b) Vaccination

Refusal of vaccine because of cultural belief sometimes occurs. There are two ways of vaccination, one is given at MHU on the fixed date and the other is household visit as many do not participate in the program at MHU.

(c) Reproductive Health (RH)

Reproductive health is very important considering the fact that women between 14 to 49 years old are large age group in Xesaná

| Age group | M | F | Age group | M | F |
|-----------------------|-----|-----|--------------------|-----|-----|
| Less than 1 years old | 135 | 109 | 5to 14 years old | 503 | 490 |
| 1 to 4 years old | 239 | 233 | 14 to 49 years old | - | 868 |

Complication during or after child birth is higher (21.4%) among CDRO covering areas in Totonicapán than other regions such as Quetzaltenango (7.6%)¹⁹. Quite high rate (99.8%) of delivery attendance rate by comadronas shows the needs for appropriate training for them. MHU does not own basic

¹⁸ Baseline information of four NGO projects in the Guatemalan Altiplano, Population Council, September 1998

¹⁹ Baseline information of four NGO projects in the Guatemalan Altiplano, Population Council, September 1998

MCH equipment such as a balance.

(5) Problem and needs Identification

(a) Health personnel: Jefatura de Area de Salud de Totonicapán

- i) The biggest problems for implementation of health activities in this region are: culture, religion and language. Some people refuse to be hospitalized.
- ii) Maternal Mortality rate is high due to high attendance rate by comadronas, bad timing for referring, refusal of sending pregnant women to health facilities by husbands and mother in law

(b) SIAS Program

- i) Lack of personnel for vaccination program
- ii) Lack of infrastructure-A small part of the primary school is used as MHU with almost no essential equipment such as beds.
- iii) Lack of drugs-Lack of quantity causes unavailability of covering whole the population.
- iv) Biggest need is health education for disease prevention and better economic situation, as people can not afford to buy drugs or pay transportation fee.
- (v) Culture and religion (refusal of modern medicine, vaccination etc)
- (vi) Language and illiteracy can be the problem especially for the training of comadronas and preference of the women for older comadronas hinders the training of new and young comadronas

(c) Health Guard

- i) They need drugs for adult people, medical equipment such as a stethoscope and balance and infrastructure
- ii) There is a lot of responsibility for the community that has lack of resources such as drugs
- iii) Incentive is preferable, as they are not even paid for transportation to attend the training.

(d) Comadronas

- i) The duty as comadronas is heavy task, as they are obliged to walk long distance to pregnant women's house and wait a long time.

(e) Problems and needs seen by village people

- i) Poor health, sanitary and nutritional condition
- ii) Insufficient health services and difficult access
- iii) High maternal mortality rate, Effects of smoke on health

- (f) Other problems found through the study
 - i) Too much task on a few health personnel
 - ii) Insufficient function of SIAS system

5.3.5 Education Service Conditions

(1) Profile of the Education Services

Pachum has quite limited source of education as other rural villages in Guatemala. There are one primary school and literacy classes held by CONALFA for those over 15 years old.

(a) Primary School

| | |
|-------------------------------|---|
| Name | Escuela Oficial Rural Mixta Pachum |
| Type | Official |
| Director | Hector Rumualdo Dunea Castro |
| Foundation | Year 1997 |
| Transportation | 5-15 minutes' walking distance for school children |
| Number of Teachers | 3 (2 female and 1 male) |
| Number of Bilingual Teachers | only 1 |
| Number of Classrooms | 3 |
| Number of School Children | 112 |
| Available facilities | 3 toilets only and no kitchen for preparing daily school snacks |
| Area the school covers | Pachum |
| Committee Members | 5 |
| Grade of Significant Dropouts | Between grade 1 and 2 |
| Main Reasons of Dropouts | 6. Lack of understanding of importance of education by Parents 7. Opportunity Cost 8. Low quality of education services |

(b) Junior High School

There is no junior high school in Pachum. The closest junior high school is in San Francisco de Los Altos, which will take one hour to reach with the cost of Q5 one way.

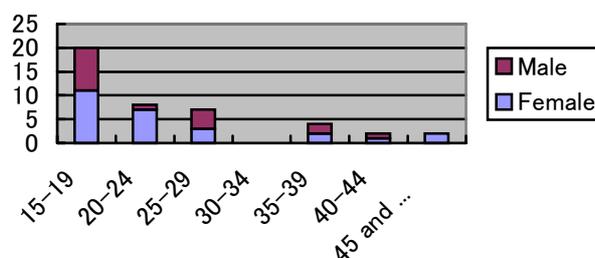
This high cost of transportation discourages both parents and school children to continue to study in junior high school.

(c) Adult Education/ Informal Education

CONALFA is giving two literacy classes for adults in Pachum and 42 people are registered.

| | Female | Male |
|-----------------------------------|---|--|
| Number of Literacy Class Students | 26 (equivalent to 14.8% of the total women in Pachum) | 16 (equivalent to 8.9% of the total men in Pachum) |

Age and Number of Literacy Class Students in Pachum



The age of literacy class is between 15 and 55. The majority of students are between 15 and 19 of age. Many of them have come to CONALFA from primary school directly. About 60 % of participants are female and 40 % are male.

Classes are held by Municipality, Santa Maria Chiquimula and the classes are from 15:00 to 18:00 on Monday, Tuesday, Wednesday and Sunday at the primary school in Pachum and from 15:30 to 18:30 on Saturday and Sunday at a house of one villager of Pachum.

(2) Primary School

(a) Condition of Primary School Education

There is one primary school in Pachum. The number of school children was not available in this survey.

(b) Problems of Primary Education

The dropouts of school children is the most serious problem among the other problems in relation to primary education in Guatemala. Among the three categories of the school, Urban Official, Urban Private and Rural Official, Rural Official School shows the worst number such as 3,6%. This roughly means that the only 36 school children out of 1000 reach the grade 6 as shown below.

Rate of Children in Grade 6 in SMC

| | | Rate of Children in grade 6 |
|-------|----------|-----------------------------|
| Urban | Official | 9.6% |
| | Private | 11.2% |
| Rural | Official | 3.6% |
| | Private | No School |

The main reasons of dropouts are considered to be as follows.

- 1) Custom in Pachum: In Pachum it is almost a custom to use primary school for only one or two years. Parents take primary school as kindergarten.
- 2) Language: While children speaks only Quiche, there is only one school teacher among three who can speak the language. This discourages mostly school children to continue their study.
- 3) Parents' Requirement: Parents want their children only to read and write simple Spanish. Therefore children are not encouraged to continue their study anyway.
- 4) Low quality of education: The number of school children per teacher is more than 40, Classes are inevitably combined class with a few grades together, lack of material

(3) Junior High School

Due to the high rate of dropouts from primary school, there are very limited number of children who go to Junior High School. As shown in the following table, there was no student who actually went to Junior High School in the past three years.

Number of Children who went to Junior High School from Pachum

| | 1997 | 1998 | 1999 |
|---|------|------|------|
| Number of Children who went to Junior High School | 0 | 0 | 0 |

The reason why children cannot go to junior high school can be summarized as follows.

- 1) Transportation is very bad: It takes more than 1 hour: 30 minutes' walk and 30 minutes' ride
- 2) Transportation is very expensive with a cost of Q10 return
- 3) There are not many students in grade 5 and 6.
- 4) Parents do not see higher education as an important one.

(4) Informal Education and Adult Education and Literacy Rate

The literacy class by National Literacy Committee, CONALFA, is a supplementary of formal education. There are three levels of classes in the afternoon.

According to CONALFA, the literacy rate of Pachum in 1999 is estimated as follows.²⁰

Among selected 177 people in Pachum, 35 people or 80% of the people are illiterate, while the illiteracy of Santa Maria Chiquimula is 33.5%.

(5) Identification of Problems and Needs

- The problems mentioned above are fundamental which are seen in most of rural villages in Guatemala. Government should spend more budgets on schemes for reducing the number of dropouts in rural areas.
- Departmental Supervision Office of Ministry of Education should pay more attention to localize appropriate bilingual teachers in rural areas especially where the rate of dropouts is high.
- Three teachers in Pachum are not from the village and enthusiastic effort of improving the education in the village are not seen among them. This is also a disadvantage for the village to improve the education condition. Special supervision or counseling should be given to support teachers.

5.3.6 Rural Infrastructure

In order to grasp general features of the rural infrastructure and the household facilities in Pachum, the survey of diffusion of the infrastructures was made at site. The interview survey was conducted at 75 houses in the area and its results are shown in the following table. The results show that the diffusion rates are less than 30 % in all items but the water supply and the infrastructures are not yet furnished in the area. The conditions of the survey and the detail results of the survey are summarized in Table 5.1.6 (1).

²⁰ Poblacion Alfabeta Y No Alfabeta Del Departamento De Totonicapán, Comprendidos Entre 15 A Mas Años De Edad

Results of the ad-hoc survey for house facility

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

The followings are the summaries of the present conditions of the infrastructures to be underlined, and all the detailed descriptions are given in Table 5.3.6 (1).

- **Drinking Water Supply System**

Presently the villagers face water shortage in the systems because of shortage of capacity in the conduction pipeline that delivers spring water from the spring to storage tank.

The daily water consumption in Pachum, is estimated 106 lit/day/person, and the water charge is collected by year at a fixed rate of Q.50/year/house. The low attention of wasting water and low awareness of saving tap water is one of the reasons of the chronic water shortage in the system.

- **Sanitary System**

The diffusion of toilet and drainage, 14 % and 0 % respectively, is remarkably low among the 4 selected pilot project areas. However it could not be observed as much as the diffusion rates indicate at site investigation in terms of sanitary condition. It might relate to the low population density of Pachum area.

- **Roads and Bridges**

Road condition in and around the community is so bad and deteriorated severely in many portions. In rainy season road is damaged seriously and even a 4WD car is hindering from passing because of mud conditions. And also road is frequently cut by slope land sliding in rainy season. They said it cannot pass every year and the repairing works of the sliding might take more than 1 month in worst case.

- **Improved Stove**

Diffusion of the improved stove in Pachum area is so low and they cook meals with open fire. They have quite large forest in the area and they extract firewoods there.

- **Sauna Bath “Tamascal”**

There is an ethnical sauna bath, so-called “*Tamascal*” in Pachum area. According to villagers, the diffusion of *Tamascal* in the area reaches almost 100%.

Compared with that of electricity (28%), toilet (14%) and improved stove (2%), it is very clear that the popularity of *Tamascal* is so high and it relates closely to their living in Pachum. The villagers enjoy the *Tamascal* twice or three times a week. It is composed of a dome made by blocks and clays and firebox. They heat up the dome with wood fire in the box. According to the villagers, consumption of firewood for the *Tamascal* is bigger than daily cooking fire and the *Tamascal* push up the consumption of fire woods in house. Taking into consideration of the heavy duty of firewood hauling by manual, the improvement of the *Tamascal* is effective way to alleviate heavy work. The general features of *Tamascal* are shown in Figure 5.3.6 (1).

5.3.7 Environmental Conservation Sector

(1) Soil Erosion and Collapse

The forest is a communal shipyard, to which have access all the inhabitants of the spot, therefore the activity of products and by-products extraction is daily. Forest management has been made approximately 10 years in the Pachum spot under tape-worm technical assistance on the part of project DIGEBOS - CARE, where a reforestation of approximately 20 extension ha was achieved being sown the kinds colored pine, white pine and cypress. To date CDRO supports to the community in forest activities.

As consequence of the wood and firewood extraction of the communal forest united with the shepherding, they have been originated some areas without vegetable cover, that as time goes by they can provoke erosion or degradation problems of the forest, mainly in the head-board of the basin of the river Pachum, and in the one which can be observed strong erosion problems in carcavas. To implement the restoration of carcavas in area the usage of agroforest is the first measure and also the conservation structures.

In Pachum, the slops and the thin layer of organic material that lies over a layer of hard clay, relatively waterproof, give little capacity of storing humidity during a long period of drought. The area has a material of Tertiary origin, of volcanic rocks. This is very related to soils, those which belong to the series "Patzite", the one which possesses soils little deep and it is very susceptible to the erosion, other of the limiting for the agricultural production technified, and intense.

The principal risk is the land sliding that can occur in the slope in great areas of the micro-basins. Places where erosion occurs are the inside the woods, the slope along a road and in a farmland although the scale of erosion is small. To prevent

erosion in a farmland terrace and trench are set.

Some forest fires break out in a year. The cause of a forest fire is spontaneous combustion in a dry season.

(2) Contamination for Water

Water for domestic use was investigated. Six samples of the water of fountains, a tap, a well and rivers were taken at the site (Figure 5.3.7(1)). Each water quality was tested using a water test kit. The number of items of water quality is 12, as shown in Table 5.3.7 (1). Half of sample show that the water is not suitable for drinking without being boiled because of detection of coliform and bacteria. Gothic type shows that its value exceeds Japanese standards for potable water.

Nitrate was detected from half of the water samples.

Most houses have running water. They use water from the outside when the water supply is cut off during January and February. Some residents said they drank the raw water without boiling. The tap water at a primary school of Pachum was evaluated to be suitable for drinking water without treatment of boiling.

Summary of the result of investigation is shown below and its detail in Table 5.3.7 (1) and Table 5.3.7 (2).

| | | | |
|-------------------------------|---|---|---|
| Place | fountain | (branch of Pachum river) | fountain |
| Evaluation for drinking water | NO | NO | YES |
| Condition of water use | When water supply is cut off during Jan. and Feb. | When water supply is cut off during Jan. and Feb. | When water supply is cut off during Jan. and Feb. |
| Place | tap water | well | Pachum river |
| Evaluation for drinking water | YES | NO | NO |
| Condition of water use | all the time | When water supply is cut off during Jan. and Feb. | When water supply is cut off during Jan. and Feb. |

As described above, coliform, bacteria and nitrate were detected from half of the samples. This means that human waste and fertilizer seep into the soil. Pesticides must be detected, though not tested this time. The water in Pachum seems clean compared with those in the other three model areas, probably because

of conservation of forests and the existence of villages with low population density.

5.3.8 Existing Development Projects in and around the Micro-basin

(1) Agricultural Sector

Agricultural support project in Pachum micro-basin is limited to provision of fertilizer at low cost through the 2KR program, and some actions of “Food Security Program” from ALA 84/98, which provide some fertilizers.

(2) Social Infrastructure Sector

In the infrastructure sector, there were 3 projects in past, such as a) the water projects by “*Consejo de Desarrollo Urbano y Rural*” (CODEUR), b) sanitary project and c) the electricity supply project by PER III. Project under-going or planned is not exists at the moment.

The detailed information of projects is mentioned in Table 5.3.8 (1).

(3) Environmental Conservation Sector

MAGA and PAFG implemented "the Forest Management on Communal Lands Program". The existing projects around the study area are shown in the following table.

| Denomination | Location | Extension (Hectares) | Remarks |
|--|-------------|----------------------|----------------------------------|
| San Vicente Buenabaj, Momostenango Communal Forest | Totonicapán | 450 | Inventory, Management Plan, USAC |
| Paquí's partiality forest | Totonicapán | 90 | Interest |

There are environmental coordinators for Santa Maria Chichimula. Organisms that integrate it: PRODETOTO, CARE, FUNDAP, CDRO, ADAFORSA, AJTIKONEL and ADESMA. They are in charge of four programs of development: Program of Formation and training, of Natural Resource Managing Program, Organization Support Program, and Micro- management program. In addition, CARE, PRODETOTO, ADESMA and CDRO are in charge of the distribution of the 36 existent nurseries in the district, and PRODETOTO, of the study of the natural resources and the formation program.

CONAMA receives complaints about pollution filed by residents. In the rural area, complaints were about water pollution and dumped trash. The cause of water

pollution is a discharge of domestic wastewater. At this moment, there are no complaints from Santa Maria Chiquimula.

CDRO carries out environmental education to primary school pupils by holding some events and making a nursery bed on a schoolyard. They educate at the schools in Pachum and El Rancho.

CHIXOY PROYECTO takes measures against erosion. Some projects, such as construction of terrace and trench and rehabilitation of carcavas, to prevent erosion in agricultural land or forest, have been carried out in the sub basins of Chixoy River, which includes its tributaries of Blanco, Negro, Serchil and Molino River. This project is: To prevent erosion residents construct barriers of stones, which they quarry in the eroded site. Next, they cover the barrier with soil to plant trees. The soil, which is carried from nearby woods include organic matter. They say it took 8 months to complete the barrier. This rehabilitation of carcavas project does not include Pachum area. UNEPROCH implemented the project "Management and conservation of renewable natural resources in the upper basin of River Chixoy". The projects includes "Diagnosed rural participation in a community", which is carried out in Chuachituj, Casa Blanca and Racana in Santa Maria Chiquimula. The environmental problems, such as soil degradation in maize land, no existence of communal forests and water shortage, were proposed there.

5.4 Palestina Area in Quetzaltenango Province

5.4.1 Natural Resources

(1) Location

The Model micro-basin (herein after called as the Palestina model micro-basin or Palestina model area) selected in Quetzaltenango province, Palestina de los Altos municipality, Los Cabrerias, Los Díaz, Los Morales, Sector-I and Los Perez communities, is located near 14° 54` latitude north and 91° 36` longitude west; the elevation varies between 2,600 to 2,800 meters above sea level. The location of the Palestina model area is shown in Fig. 4.2.4 (1).

(2) Topography and Soils

The topography of the Palestina model area is very undulated in the entire area. The slopes of the basin vary in the range between 15° to 45°.

According to C. Simmons et.all (1954), the soils of the Palestina model area are classified in the group I, named as Volcanic Mountain soils under soil series of

Ostuncalco (Os). The parent material is volcanic ash of clear color. The soils are relatively shallow, less than 1 m; The soil color is dark gray and the texture is sandy loam to loam. The internal drainage is high.

(3) Climate

There is not available measurement of climatic data in the nearby of the micro-basin; Referring to temperature and rainfall maps prepared by INSIVUMEH, the average climatic conditions of the Palestina model area are indicated in Table 5.1.1 (1). The climate is temperate; Annual mean temperature is about 15;° 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.

(4) Water Resources

There are many seasonal springs and several constant springs in the model area. Among these springs, major springs that are very important for the living of people in this area are listed below.

- *Los Molinos* springs
- *Monteroso* spring
- *Los Díaz* public tank's spring
- *Sector I* spring

The Los Molinos spring is located outside of the model area and sends water to the area through the Rural Water Supply system. Average operation hour of the system is approximately 5-6 hours/day and effective usage rate of the spring water is estimated at around 30 %

The detail information and the locations of the water resources are shown in Table 5.4.1 (1) and Figure 5.4.1 (1).

5.4.2 Socio-economic Condition

(1) General Condition

The municipality of Palestina de Los Altos is located in the west part of Quetzaltenango border with San Marcos. In 1933 the municipality of Ostuncalco went independent. Palestina is composed of a town (head board), 3 villages and caserios which belong to them. There are three villages; EL Carmen, El Edén and San José Buena Vista.

In the past, the headboard had only two caserios (San Isidro y Roble Grande) and now it has 15 caserios.²¹ Among the study area there are several caserios and some overpass the micro basin. The caserios in the model area are Los Cabrerías, Los Morales, Los Díaz, Sector 1, Las Rosas and Los Pérez.

Most of the population of this area depends on agriculture. It's characterized by the combination of agriculture of subsistence on the highland in the model area and rent lands at the coastal area. The families that don't have enough land to make a living rent lands at the coast on rainy season and are engaged in cultivation to the maize crop.

Some people at Palestina de Loa Altos municipality have established as "Potato Producers' area" these years. In parallel with these tendencies, the migration to the US has increased. These started with the ladina population of the headboard and of El Eden 10 years ago, and now even the native population is involved.

(2) Population and Administrative Structure

The municipality, Palestina de Los Altos, has a municipal mayor that was elected. With him the municipality takes care of the local administration. Every village has an auxiliary mayor (AA) who has coordination with the municipality. Now 4 caserios of Palestina have AA according to the municipal mayor, they have meetings with the AAs once a month depending on the necessity. In the past, the AA had law power, now they trust this job to the Peace Judge and the AA doesn't have anything to do with it. Including the caserío Los Pérez, which have its AA at Buena Vista, in the model area there was no caserío where people would go to the AA to make questions about family matters or about problems inside the town. They directly go to the Police or other authorities.

Within the last 10 years the importance of the AA is decreasing. And some of them don't want to accept this charge because of it's an unpaid job.²² AA is appointed by the General Assembly and by the consent of the municipality.²³

The caserios that belong to the headboard have another characteristics. They neither have their own AA nor elect him. In this case, the municipal mayor

²¹ 8 years ago the name was San Isidro was changed to Los Díaz, and 2 years ago Los López and Matazano formed Sector 1.

²² The Municipal Mayor mentions the importance of the AA for the communication between the villages and the Municipality. And he says it's important to strengthen it, by giving salaries, setting a telephone on the auxiliary's office. And that also municipality has authority to define it.

²³ Now 4-5 persons form the AAs. The term of charge is 1 year. The caserios with AA are Nueva

represents the people of this caserios. On a village the AA represents the population, however at the headboard the municipal mayor, who is elected by the total people of the municipality, at the same time represents a portion of the municipality.

About the civil register, they say that 100% of the men and 40% of the women has an ID card (cedula de vecindad). The registration on the electoral roll they make, based on the register, has to be lower and the men seem have 90% and women only 10%.

(3) Communal Organizations and Mechanism of Decision in Village

There are no authorities that run the community. The people make “Committees” as an organization with and objective depending on the necessity. The Committee’s members are not elected on a population assembly of the community, but they’re made among the interested ones. They make a meeting and choose the representatives. Normally it’s composed of president, vice-president, secretary and treasurer and sometimes some vocals. In some cases one committee is formed by several caserios and there are also cases where the community forms two separated committees for the same objective.²⁴ The Committees negotiate with the municipal mayor and competent institutions depending on the necessity. The rural water project assisted by CARE is strengthening a new relationship among the people of the caserios and the municipality.

(4) Ethnicity

The communities of Palestina de Los Altos can be distinguished among the non-native (ladinas) and the native ones (Mam). At El Eden and its surroundings and headboard prevails the Ladina population. The communities such as El Carmen and Buena Vista are Populations of native Mams. There are no any conflicts between the native and no-native people at present. They say that until 10 years ago there was some sort of friction, but these years the relations have improved between ethnic groups. Then again there are some expressions that still show discriminations such as “*The native are now smart and taught* that’s why there’s more approach”. A non-native man says about the community’s women; “ here they are *civilized* that’s why they don’t do agriculture no more”. Marriage between native and no-native people is rarely seen. When a native

Palmira, Carmen II, Sinaí and Los Gonzales

²⁴ Los Morales & Los Cabrerias form a School Committee and along with Los Molinos form a Sol Committee (of Development). At Los Pérez there were two water committees before.

woman marries a no-native man, she has to quit to her traditional suit.

The native people keeps the traditions as the food based on tortilla and tamales, use of the Mam language and Chuj (some sort of steam bath). Then again, at the same time they have left their traditional ceremonies behind (costumes) after they become Protestants. The future of the ethnic identification is not clear as a native town; they will strengthen it, or leave it and go deeper on the assimilation. At least in the model area there is no movement for the revalue of the ethnical entity.

(5) Religion

The conversion to Protestants in Palestina area has advanced. It is assumed that 80% of the population is protestant, even though some mention around 50%.

On the other hand Catholic people are dramatically decreasing. The Catholic Church has a problem with the municipality for the Church's land, which is in the headboard, the relationship between them is cold due to this reason. About the costumes the native people used to practice, people don't mention it much. The people who became Protestants show some attitudes not to talk about the costumes they used to practice. At least they have the existence of some sacred places on the Palestina area.

They say that the Protestants are conformists and are divided into the sects. It is also said very difficult to organize them and to involve them into the development process. Then again, on the model area the participation of the Protestants is seen. Most of the committee members are Protestants. For these reasons, to be a protestant will not be a big barrier for the accomplishment of some activities.

However some of the subjects related to the body as vaccination and family planning are more delicate including the Catholics, and on every sect the reaction changes. The opinion of every sect has to be found out before, to avoid misunderstandings.

(6) Migrant and Migration

(a) Agriculture and its social impact

The people of this area depend on agriculture, having a small farm in the highland areas. Most of the families go to the coastal area and rent land there on the rainy season and sow maize. Their economy is still on subsistence level.

This activity at the coast causes negative impacts. One is that the children accompany their family and quit school. More than half of the families who

go down to the coast takes their kids. For this reason the children on school age lose the opportunity to continue in school.

Another negative impact is that living condition of the people become very badly because the field where they live is very severe in terms of health and sanitation. Many may suffer from diarrhea or some other illness in the coast.

Production of maize in the coastal area also affects an impact on the local economy. More than half of the maize crop which is produced in the coast, is sold at the highland on the shortage months especially on the province of San Marcos.

It appears in the recent year that some groups stay around the highland, because of the low profit from crop production in the coast and the failure of crops during these years due to the bad climate condition and also because of the expansion of the potato cultivation in the highland.

(b) Latest year's new tendency – Labor market expansion.

The number of men who work to more advanced agricultural areas such as Almolonga and Concepcion has increased during the latest years. This tendency started 5 years ago. According to a journal at Almolonga, salary there is Q35, being Q15 higher than that of the Palestina area.

Besides this kind of job, there are some that work as a bricklayer in Quetzaltenango.

(c) Migration to the U.S.A.

Besides these tendencies the migration to the U.S. has increased. The trend of the migration was extended on Palestina's non-native area. Thought this tendency prevails in the headboard and El Eden ten years ago, now it involves the native communities. By this fact of migration, the number of families with women only increases.

To migrate to the U.S, they need to pay the "Coyotes" Q25,000 to Q30,000 in advance and people look for loaners who charge 10% per month to pay them.

The people look migration from a positive point of view and many of them support migration of their sons. Then again, some parents lose the will to continue the agriculture. Now they concern a little bit more about elementary education looking forward at the possibility of future migration to the U.S. and

they think that at least they need to be able to master Spanish. To maintain the traditional economy of maize and lease holding they didn't feel the need for education, then again they now feel it's relevant to master Spanish to go to the U.S.

(7) Land Holding and Tenure

The Palestina area is characterized by small individual landowners. The land holding size per family is 5 to 20 cuerdas. According to information, the families who have less than 5 cuerdas are 40% more or less, in consequence of land fragmentation. In the caserios in the Palestina model area, big owners are not seen.

Most of the private lands are not legally registered in spite that they say they have public writing. Normally men and women receive heritage, but when they don't have enough land, men have priority in heritage.

There are some cases of lease holding system in the community and the rental fee is Q 150 per cuerda per year.

In the Palestina area and its surroundings the rent contract has been expanded. Some of them rent land in San Antonio and Santa Irene de San Marcos, where is irrigated on summer. These places have the advantage of not falling frost from December to March and they can sow potato in these months. The rental fee is Q500 per harvest. In case of Palo Gordo and San Marcos, the rental fee is only Q 100 per harvest but they have to install the irrigation by themselves.

(8) Social Conflicts in the Past

The only social conflict noticed in this area has its roots on the rural water project. On the wartime the presence of the army and guerrilla was too weak. There were some kidnappings at the headboard but it was informed that it was political matter.

The bump for the water project was very tough, so that the army had to come and take control of the situation. This project was financed by CARE and the municipality. In the first stage 1200 families out of 23 communities were expected. When the participants to the project was finalized, a very influent person offered another possibility for a cheap water project and about 300 people made another groups for the water project. In the end six communities totally backed up and in some communities 2 groups were formed (Committees) of water. There was also bump between communities and some of them even shut the pass

permit.²⁵

While time went on, this conflict was cooling off and they say that at July 2000 the doors were opened for the groups who refused the participation from the water project. There is no distance between groups in the same community. Then again, one community still doubts the participation on the project.

(9) Gender

(a) The Work of Women

The role of women differs from one another according to what the family is earning their income from. However it can be summarized as follows in general in five caserios in Palestina de Los Altos. Women's working hour is estimated to be 16-17 hours a day on average and the work is mostly unpaid.

| | |
|---|---|
| (1) Preparation of food and eating | |
| 1. Grinding* | Preparation of corn/grinding corn by machine |
| 2. Washing dishes* | |
| 3. Going to market* | To Palestina de Los Altos on Wed. transportation fee: Q5 one way by pick up, 30minutes-1 hr on foot |
| (2) Acquisition of fuels and water | |
| 1. Collecting firewood/buying firewood* | Mainly purchased at Q120-125/Tarea, every 3 weeks. Collecting is more economical but not many trees |
| 2. Collecting water* | 20-30 minutes once, 5-10 times a day or Q20/month for water supply |
| (3) Hygiene | |
| 1. Cleaning houses* | |
| 2. Laundry* | 20-30 minutes to water source for washing, once a 1-2 days |
| (4) Gaining cash income | |
| 1. Sewing* | |
| 2. Livestock/poultry raising* | Mostly livestock/poultry are for self-consumption. |
| (5) Agricultural work | |
| 1. Seeding | |
| 2. Weeding* | The extra work for women while their husbands work in the coast. |
| 3. Harvesting | |
| 4. Application of chemicals | |
| (6) Family Care | |
| 1. Child bearing* | 5-10 children on average per woman in a life time |
| 2. child raising* | Especially for girl children, aged 5 years and over |
| 3. Care of the sick and the handicapped* | Between May-Jul and Nov.-Feb., more sickness |

²⁵ They say that the agitator was a candidate for mayor and had politic purposes.

(b) Economic Situation of Women

Cash income source is quite limited in case of women in the Palestina model area. As seen in the following table, women do not obtain any constant cash income source.

The main source of cash income of women in Palestina

| | Work in Charge | How much per day or per unit or product (Purchasing price) | Problems |
|--------------------|--------------------------------|--|---|
| Agricultural Work | Harvesting Potatoes etc | 15Q/ day | Seasonal Underpaid compared with Men's wage of 20-25Q |
| Livestock/ Poultry | Hens & Cocks, Pigs Caws & Oxen | Q25-35(Q10-15) Q150-200(Q250-400) Q150(Q250-275) | No appropriate knowledge to grow livestock/ poultry |
| Handcraft | - | - | - |

(c) Education

The rate of school children in an official primary school in Palestina (*Escuela de Autogestion Comunitaria de Los Rosas*) is as follows.

| | Los Rosas | Guatemala 1996 |
|--------|-----------|----------------|
| Female | 44.8 % | 46.8% |
| Male | 55.2 % | 53.2% |

Compared with the National census of the year 1998 by Ministry of Education, the rate of female and male students of School of Los Rosas does not show any significant difference.

With regard to 22 women who were interviewed, there were only three women (or equivalent to 86% of the total women interviewed) who received formal education once in their lifetime. In order to encourage women's participation in projects, special attention should be paid toward their capacity of understanding Spanish and arithmetical issue.

(d) Land Property of Women

By Mayan tradition, women do not heritage land from their parents. Among male children their father's property is divided into. There were no women who own land in 22 women interviewed in the Palestina model area.

(e) Social Participation

In the Palestina model area, there are some formal committees and some informal groups of villages with purpose of solving problems for community welfare. None of the women is active members of the committees.

Formal and Informal Committees in 5 caserios

| | Los Pérez | Los Díaz | Sector 1 | Los Morales | Los Cabrera |
|-----------------------|-----------|----------|----------|-------------|-------------|
| Water | ○ | ○ | | | |
| Electricity | ○ | ○ | | | |
| School | ⊙ | | ⊙ | | ⊙ |
| Community Development | | | | | ⊙ |

(f) Political Participation

The women's political participation is quite limited in Palestina as other model areas.

The estimated rate of women who are registered as constituency, *empadronamiento*, is estimated only 10 %. The acquisition of ID card, *cedula*, is estimated as 40%, which is 50 % lower than that of men (90%) as shown below:

The Rate of Registration of ID and as Constituency in Palestina

| | Female | Male |
|------------------------------|--------|------|
| ID registration | 40% | 100% |
| Registration as constituency | 10% | 90% |

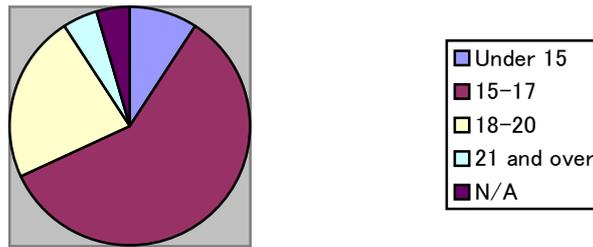
(g) Women's Marriage and Reproductive Rights

Twenty-two women were interviewed with Palestina de Los Altos about marriage and reproductive rights.

- Marriage

Majority of women married at age of between 13 and 17 as shown below;

Age of Marriage in Palestina



- Reproductive Health of Women

Reproductive health condition of women in the Palestina model area is summarized below;

| | |
|--|--------------------------|
| Average Age of Marriage | 16.8 year's old |
| Times of Pregnancy | 8.86 times ²⁶ |
| Minimum Number of Children | 1 child |
| Maximum Number of Children | 14 children |
| Average Number of Ideal Number of Children | 3.6 children |

Note: The data is obtained from different generations. Therefore the data of time of pregnancy is smaller than the actual fertility rate.

(h) Household Economics and Decision Making

In Palestina women do not know actual amount of their income of the household. Household heads are responsible for managing their finance and women receive certain amount of money that they need for expenses in markets. This is seen in most Central and South American states.

With regards to decision making, it is naturally judged from the following results of the interview survey that men are the stakeholders of the household.

- Women do not speak out in front of men usually
- Women cannot be against of men's decisions in general
- The opinion of men is prioritized.
- Domestic violence targeted women by men with relation to alcohol problems

²⁶ According to *Foro Nacional de la Mujer*, the fertility rate of women is 5.4 in Guatemala and 7.6 in rural area of the country. See *Foro Nacioanl De La Mujer Propuest Nacional: Propuesta Nacional*, 8th March 1999, Guatemala, pp20-21

(i) Religion of Women

The results of the interview to women about the religion indicate are summarized below:

| Name of caserío | Catholic | Evangelico | Actual Participants | | |
|--------------------------|----------|--|---------------------|------------|-------------|
| | | | Catholic | Evangelico | No Religion |
| Los Pérez | Catholic | Pentecoste Adventisto Dirino Maestro Inglesia de Dios | 0% | 66.7% | 33.3% |
| Los Díaz/ Sector 1 | Catholic | N/A | 33.3% | 66.7% | 0% |
| Los Cabrera/ Los Morares | Catholic | Agua Via Elim El Tabernaculo Adventistas Des 7 mo dia Presbyterian | 20.0% | 70.0% | 10% |

The majority of participants was Evangelico from different denominations. Any conflict among different groups of religion was not recognized. However, it is strictly recommended that any actual project plan should be presented to each religious group or leader in order to eliminate any possible problems between religious groups with different interests.

(j) Burden of Migration

In Palestina, women’s work becomes more difficult when they emigrate as they have to adapt themselves in new environment every year. Usually during their migration they are isolated from services that they are entitled in their villages such as:

- Services in Health Post
- Informal Education
- Formal Education
- Village Midwives
- Other services

Additionally, they have to get their own water source, search for fuels for cooking, cheaper food, and other necessities for daily live in a strange place.

(k) Observation and Proposal

- Many women in Palestina are literary household head while their husbands are away.
- Most women are illiterate. Special attention should be paid to the fact that most women cannot read/ write and are lack of arithmetic knowledge.
- In this research, women in Sector 1 were not participating. It is recommended to collect more information to understand why and try to involve them, if possible.
- Many households still emigrate in May. This fact should be taken into consideration when implementing any projects in Palestina.

5.4.3 Agriculture Conditions

(1) Land Use

The present land use of the Palestina model area is estimated as follow: 45 % of the land is dedicated to agriculture production, about 30 % is covered by forest; some 10 % is covered by bush and grass, and 15 % is covered by houses, roads and others.

(2) Cropping Pattern and Farming Practices

Maize, potato, and bean are the main crops planted in the model area; The present cropping pattern of main crops is as indicated below.

| Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | |
|------|------|------|--------|------|------|------|--------|------|------|------|------|--|
| | | | Potato | | | | Potato | | | | | |
| | | | Maize | | | | | | | | | |
| | | | | | | | | | | | | |

The common farming practices carried out by maize and potato farmers in the model area are described in Table 5.1.3 (1).

(3) Agriculture Production

Agriculture production in the model area is summarized as below.

| Crop | Average Yield (qq per manzana) | Harvested Area (manzana) | Production (qq) |
|--------|-----------------------------------|-----------------------------|--------------------|
| Maize | 24 | 140 | 3,360 |
| Potato | 240 | 45 | 21,000 (twice) |

(4) Livestock Raising

The majority of families in the model area are engaged in livestock and chicken production at small scale; most families have 5 to 20 chickens, few pigs, and 1 to 3 cow. Pigs and cows are kept in small spaces in the backyard of the house.

(5) Market System

Potato marketing system and its function is as shown in Figure 5.4.3 (1). It is said that in Guatemala, there are over 30,000 dealers engaged in the marketing of agricultural produce. These dealers operate mainly in the collecting centers in producing area, wholesale market in consuming area and engage in collection, assorting, packaging, transportation, brokerage and sales. Their functions in each stage of the above mentioned are as follows:

- a) Regatones/village middlemen; They engage as persuader/middlemen of collecting produce from farmers as subordinate of village middlemen (Coyote) in the area. They have no own working capital. In most cases, they own pickups and transport the collected produce on behalf of the middlemen.
- b) Coyote/area middlemen; They collect produce through plural number of village middlemen. In most cases, they own 10 ton trucks and engage in wide area transportation.
- c) Intermediator/broker.; They mediate the produce from area middlemen to wholesale market, general market, or retail market, depending on the case, they mediate from producing site to wholesale market or on the contrary from wholesale market to general market
- d) Mayorista/wholesaler. ; They engage in large scale trading on the basis of markets in producing area or consuming area. La Terminal in Guatemala city not only engage in commercial activities, procurement and supply of the produce within the city but also their activities cover surrounding cities and up to El Salvador.
- e) Distributor delivering middlemen ; They deliver and sometimes sell the produce from wholesale market or general market to retailer or restaurants in small lots by order. In the vicinity of Palestina area, there are local collecting and distributing centers of agricultural produce such as Concepción Chiquirichapa (Barrio Rosario), La Cumbre, Los duraznales, etc. Just in Chiquirichapa, number of Coyote/area middlemen is 25 and under them many regatones/village middlemen are working actively.

(6) Prices

In Palestina area, potato is harvested twice a year. In some parts of Conception

Chiquirichapa, there are places where potato is planted thrice a year. However, third time planting is for getting seeds. It is not necessary to sell much to the market. In this background, potato price lowers at June to July (the time of first harvest) and at October to November (the time of second harvest). On the contrary, price rises in January to May, when marketed quantity decreases. In a survey made at Concepcion Chiquirichapa by municipal office, average farm gate prices for the past five years are as follows: Details on price changes in wholesale market in Guatemala city in 1999 are shown in Table 5.4.3 (1).

| Crop season | Quetzals/quintal (45kg) | |
|-------------|-------------------------|----------------|
| Jan.-Apr. | 90-140 | Off season |
| Jun.-Jul. | 45-70 | First harvest |
| Sep.-Oct. | 80-90 | midway |
| Oct.-Nov. | 60-70 | Second harvest |

(7) Crop Budgets

Most farmers in the model area make very little investment for production of both potato and maize crops. The crop budget of potato and maize is summarized below. Inputs cost are only for fertilizers. The detailed financial crop budgets are shown in Table 5.4.3 (2).

| Crop | Cost of Inputs (Q/manzana) | Paid Labor Cost (Q/manzana) | Total Cost (Q/manzana) | Production (qq/manzana) | Selling Price (Q/qq) | Gross Income (Q/manzana) |
|--------|-------------------------------|--------------------------------|---------------------------|----------------------------|-------------------------|-----------------------------|
| Potato | 4,900 | 640 | 5,540 | 240 | 25 | 6,000 |
| Maize | 900 | 0 | 900 | 24 | No | No |

(8) Processing of Produce

There is no agricultural produce processing facility in Palestina and its vicinity. Presently, various processed foods including potato chips, fried potato, etc. are imported from U.S.A., Canada and Mexico in large quantity.

(9) Irrigation Systems

There is no irrigation system in the area. The regulation of the water committee prohibits the villagers from using tap water for irrigation. On the other hand, other water resources are located at almost bottom of the area.

5.4.4 Health and Sanitation

(1) Major health problems

Major health problems in this area are Upper respiratory diseases including pneumonia, diarrhea and intestinal infections. The latter two diseases can be caused by unsanitary living condition. Skin problems are often seen as well. In Los Pérez, it is informed that women often become cancers.

In addition, the people in this area regularly immigrate to the coastal areas where they get tropical diseases such as malaria and dengue as well as agricultural pesticide causes health problems. Besides, alcoholism is assumed as a social problem.

| | |
|--|--|
| Morbidity Causes at municipality level | 1. Pneumonia 2. Common Cold 3. Intestinal parasitic diseases 4 Acute diarrhea 5 Tonsillitis |
| Infant Mortality Rate and Causes at municipality level | 39.4 (per 1,000 live births) 1. Bronchopneumonia(95%) 2. Anemia(5%) |
| Mortality Rate and Causes at regional level | 1. Pneumonia 2. Intoxication for pesticide, Acute Myocardial Infarction, Diabetes |
| Maternal Mortality rate and the causes at regional level | 132.51 (per 100,000 live births) 1. Post-delivery hemorrhage 2. Eclampsia |
| Vaccination Coverage for children under 1 years old | BCG 70%, Polio 81%, DPT 81%, Measles 78% |
| Malnutrition Prevalence ²⁷ | 176 th highest rate among 329 municipality of chronic malnutrition prevalence for school children |
| Delivery attended by | Not confirmed |

Source: Memoria Annual 1999, Palestina de los Altos, MAPAS
 Memoria Annual de Vigilancia 1999, Quetzaltenango, MAPAS
 Municipio Clasificados Segun Prevalencia de Desnutricion Cronica en Escolares de Guatemala

(2) Health related facilities, personnel and drug availability

This municipality is covered one health center and three health posts (situated in Carmen, Eden and Buena Vista Centro) without coverage extension services. In these three targeted villages, there is no health committee or health facilitator/promoter except those trained by CARE.

²⁷ Municipios Clasificados Segun Prevalencia de Desnutricion Cronica en Escolares de Guatemala

| | |
|---|--|
| Health Facilities and health personnel | 1 Health Center(HC) and 3 Health Post(HP) in the municipality. A private doctor at a pharmacy twice a week |
| Average number of patients a day(the month with largest number of patients) | HC-40-50 people(January to March) HP-15-40 people(January) |
| Referral point | Hospital in Quetzaltenango |
| Distance and transportation to the Health Facilities | Palestina to Quetzaltenango: Red Cross Ambulance: 80Q daytime, 100Q night time Hiring the transportation:125Q Public transportation: 4Q Los Díaz to Palestina:40 minutes by walk Los Cabrera to Palestina:15 minutes by walk |
| Drug availability | 5 private pharmacy and 1 municipality owned pharmacy in Palestina. • Lack of drugs in public health facilities is significant. |
| Traditional and Plant Medicine | No traditional practitioner in these three villages Woman trained by Acordimam(NGO) comes to sell the plant medicine in Los Cabrera. Several kinds of plant available at the market. Cheaper than modern drugs. People often treat themselves by plant for common diseases. |
| Health Guard | None |
| Health Promoter | There used to be health promoters trained by CARE(3 in Los Díaz, 3 in Los Pérez, Los Cabrera-na) for water project, however since CARE left the area, the majority dropped out. |
| Comadronas | Los Díaz-1, Los Pérez-0, Los Lopez-1, Los Cabrera-2, Los Morales-2 More than 60 comadronas exist in whole Palestina area |
| Health Committee | It does not exist in these three villages |
| Basic Health Infrastructure (Water source, latrines). | Los Pérez-Half the population with tap water, all with latrines Los Díaz-Half the population with latrines Los Cabrera-n/a In total, 60% with water, 73% with latrines among 112 households |

(a) Health Center

Here are 1 doctor, 1 professional nurse, 1 health inspector, 4 auxiliary nurses and 1 secretary. HC owns no vehicle but 2 bikes. The drugs are supplied by Area Head quarter of Health(Jefatura) every three-month, which are not sufficient. They visit each household once a month for vaccination as well as health education for hygiene and Family Planning. Its service includes consultation and prenatal care.

(b) Health Post

At Health Post of Buena Vista Centro, there are three auxiliary nurses. They offer household vaccination program in the villages near-by including Los

Pérez. As well they offer general consultation, prenatal care, vaccination for pregnant woman, family planning and growth monitoring. They have the largest number of patients in January when immigrants come back from the coastal area. It is supervised by the nurse and the doctor of HC.

(c) Comadronas

| | Los Morales | Los Díaz | Los Lopez |
|--------------------------------|-------------|----------|---------------|
| The charge for each attendance | 50Q | 35Q | 50Q |
| Number of attendance a month | 3 to 4 | 2 to 3 | 5 to 6 a year |

There are usually comadronas in each community. Comadronas in Los Díaz, Los Morales and Los Lopez whom I had interview with used to receive regular training in Health Center every month. However, the training has been suspended.

Some of the comadronas were supplied with basic equipment by HC, although even essential ones are not included. The equipment owned by comadronas are:

| | |
|---|--|
| Los Díaz | soap, clothes, ring forceps, scissors, sterile tie supplied by HC |
| Los Lopez | Sterile tie supplied by HC, scissors |
| Los Morales | Clothes, uniform, alcohol and non-sterile tie, none of them given by HC. Using razor instead of scissors |
| Cf)Equipment for comadronas by CARE program | blanket, towel, steel tray, ring forceps, surgeon scissors, plastic bucket, antibacterial soap and the case, scale, flash light, measure, Metafen, Alfernicol, sterile tie, pomade bottle, bulb syringe and carrying bag |

Source: List of equipment for comadronas, CARE San Marcos

Besides attending the delivery they are trained to give prenatal care services as well as to encourage the use of contraceptives. However, family planning is not usually accepted or not used appropriately if accepted.

(d) Other organization implementing health activities

Due to the termination of activities by **CARE**, the promoters trained by CARE lost the supervision as well as supply of equipment so that most of them dropped out. The Community Oral Rehydration Unit (UROC's) settled by CARE in Los Pérez seems not to be functioning because of lack of equipment.

Intervida works only for school children as well as supply of secretarial equipment to HC. There is **Red Cross** who offers emergency transportation and first aid during the period when HC is closed (16:00 to 8:00) organized by health volunteer. **Pies de Occidente** has organized Association of Comadronas since several years with the aim of appealing their needs toward the municipalities and health facilities although Palestina is not covered yet.

(e) Referral Point and transportation

In principle, the patients should be referred to **Hospital in Quetzaltenango** although there is no rule, according to Area Headquarter of Health, to refuse patients come from other regions so that people also can go to hospital in San Marcos. However, it seems it sometimes refuses the patients coming from Palestina. In emergency, they have to hire the car which cost very expensive or use an ambulance of Red Cross which is sometimes not available as it is organized only by volunteers.

(f) Drug Availability

Lack of drugs in public health services is severe problem. The people often can get only the prescription from HC and buy drugs at municipality owned drug stores if there are any, otherwise obliged to buy expensive drugs at the private ones. On top of this, non-existence of drugs for tropical diseases such as malaria and dengue in Health Center can cause the problem as many of the population in Palestina regularly immigrate to the coastal areas where those diseases are prevalent. Drugs for malaria exist in private pharmacy that cost 70Q, receiving around 30 patients during the season when the immigrants come back from coastal area.

i) Existence of Municipality owned pharmacy

In Palestina, municipality finances for offering cheaper drugs to the population since 22 years. The prescription can be written by the doctor of HC. They sell 75 kinds of drugs much cheaper than private ones. Municipality sell the drugs by 110% of the purchasing price in order to cover the administration cost. The two workers and the shop belong to the municipality so that salary and shop rental fee are not necessary. Because of the security reason, they can not stock more expensive drugs that can be more effective. In case of expiry, the pharmaceutical company replaces them with the new ones. The lack of capital to invest in new drugs is the problem. They do not have any license to sell drugs as HC entitles authorization.

The population perceives that they do not have sufficient variety of drugs.

(3) Health seeking behavior of the population

The people in these two villages: Los Díaz and Los Cabrera usually go to Health Center. However they are often obliged to buy the drugs at the municipality owned or private pharmacies as Health Center lacks in drugs. They usually spend 30Q to more than 1000Q on each drugs depending on the diseases. For common diseases such as diarrhea, parasitical and URD, they at first treat themselves by natural plant. It is reported, in Los Cabrera, that people prefer plant medicine as it has less side effect except in the case of severe disease while in Los Díaz it is said that they use plant when they can not afford to buy modern drugs. In case of diarrhea, women in Los Díaz make oral re-hydration water as the promoters of CARE taught them how to make.

The nearest health facility from Los Pérez is Health Post in Buena Vista Centro. When they can not find appropriate drugs, they go to HC. In case of emergency, they go to Hospital in Quetzaltenango. Some goes to private clinic in San Juan. They often use plants to treat particular disease such as diarrhea Women seem to prefer plant medicine as it has fewer side effects.

(4) Family Planing, Reproductive Health and Vaccination

(a) Family Planning

Family Planning service is available at HC and HP. In HP, there are only pills and condoms available. In HC, they also have injection. Majority of the population, approximately 85% according to the HC nurse, would not like to accept FP mainly because of religious reasons. On the other hand, those women who would like to use FP methods often have to hide from their husband, as they would refuse it. Consequently most of those who accept ask for injection which can be used without being noticed by their husband. In Los Cabrera, it is reported that some women received sterilization operation offered by APROFAM.

According to women meeting in Los Pérez, majority of women do not have knowledge about family planning although they are willing to accept it. They recognize birth control is important for avoiding to have too many children. They expect for more information, but also are worried about the side effect.

(b) Vaccination

Vaccination for children less than one year old is given by nurse in HC and HP by visiting each household in each village once a month. Coverage rate of this year so far (January to June) among 533 new born babies is DPT:46.53%,

BCG:43.71% and Measle:41.84%, while TT coverage rate for pregnant women is 14.26% (among the total number of 722 pregnant women)²⁸.

(c) Reproductive Health (RH)

Prenatal care is given at HC and HP as well as by comadronas that received the training for RH. Majority of the delivery is attended by comadronas. In case of complication or emergency, pregnant women are referred to the Hospital in Quetzaltenango by comadronas. Comadronas are advised to refer pregnant women to the hospital when they are very young or old. Anemia is prevalent, according to a comadronas, among the pregnant women due to malnutrition, as a result the newborn babies are weak. Some pregnant women do not like to take neither iron pills nor TT vaccination because of its side effect.

(5) Problem and needs Identification

(a) Health personnel in the Institutions

- i) Refusal of vaccination; because of the side effect and religious reasons, especially particular groups of Evangelico
- ii) Lack of drugs: More variety of antibiotics and vitamins needed in HP
- iii) People is reluctant to go to public health facilities as they perceive it can not offer appropriate drugs.
- iv) Lack of health education and prevention, no equipment for this purpose
- v) Lack of resources in terms of personnel and finance

(b) Health Promoter of CARE

- i) Indifference of the people to health education
- ii) Non payment for their activities
- iii) Needs for doctor, drugs and training

(c) Comadronas

- i) Lack of equipment(balance, sterile tie etc)
- ii) Too low charge paid to them comparing to their tiring task
- iii) Women sometimes do not pay the charge
- iv) Work as a comadronas is not sufficiently valued

(d) NGO working in the region

- i) Lack of access to health services for the population in terms of economic, geographical and cultural aspects

²⁸ Health Center in Palestina de los Altos

- ii) Needs to integrate the work done by comadronas into health service system and they need to be respected by institutional health personnel
 - iii) Illiteracy of the population
 - iv) Agricultural immigration causes lack of sustainability of the educational program
- (e) Problems and needs seen by village people
- i) Los Cabrera
 - Lack of drugs and transportation
 - No sewage facility
 - Health problem by agricultural pesticide
 - High children mortality rate because of diarrhea and fever
 - ii) Los Pérez
 - Lack of drugs.
 - iii) Los Díaz
 - Needs for health facility in the community for the nighttime
- (f) Other problems found through the study
- i) Lack of transportation for vaccination program: no vehicles at HC, irregular gasoline supply for the bikes
 - ii) Machismo-refusal of Family Planning
 - iii) Dependence on non-paid volunteers and its sustainability is doubtful without appropriate supervision, support and incentives
 - iv) Lack of sustainability of the health program such as training for comadronas and health promoters
 - v) Lack of supervision or institutionalization (ex)association of comadronas) for village health workers in order to look for help and support when needed.
 - vi) Effect of Agricultural Pesticide on health and living condition in the Coastal areas

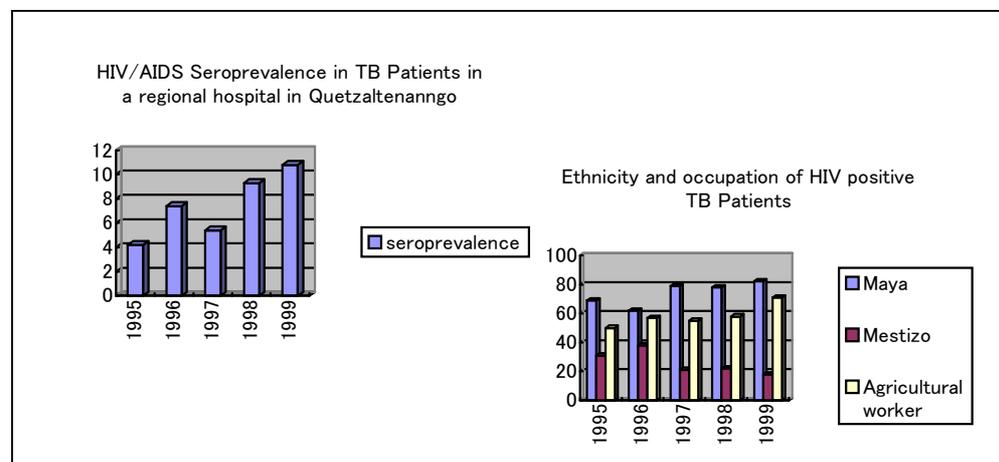
The people who immigrate to the coastal areas often become sick caused by agricultural pesticide and they live in extremely severe living condition without tap water nor latrines. They often live in the hut without appropriate wall to avoid rain or mosquito coming inside and keep pesticide inside of their hut where family cooks and sleeps. The hut is situated in the middle of the field where they spray huge quantity of pesticide. Besides, the very shallow well where they get the water from is located just beside the field, therefore,

the water could be contaminated by pesticide. They receive no education for prevention of pesticide caused diseases, and they can not afford to buy preventive equipment such as mask and gloves. Pesticides they often use are *Senevin, Potoxin, Gramoxon, Gasaprine, Edonal, Bolaton and Larvan*.

In short, lack of equipment and education to avoid pesticide caused illness

- i) Non-existence of drugs for tropical diseases in spite of large number of immigration
- ii) HIV/AIDS; It seems the problem of HIV/AIDS is not yet recognized as serious health threat as HIV positive rate is reported comparatively low (ex)0.5% for sex workers outside major urban areas in 1989)²⁹. However the figure can be underestimated and the HIV seroprevalence is increasing in these years.

The statistics of HIV/AIDS Seroprevalence in Tuberculosis Patients in a regional hospital in Quetzaltenango during year 1995-1999 show increasing seroprevalence, more than doubled since 1995. It is reported mayan agricultural workers are at increasing risk for contracting HIV/AIDS as can be seen in the table below.



Source: Abstract Form, IDEI

5.4.5 Education service Conditions

(1) Profile of the Education Services

There are two primary schools in the 5 micro basin in Palestina. The school of Las Rosas is on the outskirts Los Pérez.

²⁹ Epidemiological Fact Sheet on HIV/AIDS and STDs by UNAIDS, PAHO and WHO

(a) Primary Schools

| | |
|-------------------------------|--|
| Name of Schools | 1) Escuela de Atutogestion Comunitaria de Las Rosas 2) Escuela de Atutogestion Comunitaria de Los Díaz 3) Escuela de Atutogestion Comunitaria de Los Cabrera |
| Type | 3 Pronade |
| Foundation | 1) 1997 2) 1996 3) 1997 |
| Transportation | 5~20 minutes' walking distance There are no particular obstacles on the way through the year |
| Number of Teachers | 1) 5 (4 female and 1 male) 2) 4 (2 female and 2 male) 3) 5(3 female and 2 male) |
| Number of Classrooms | 1) 5: 3 classrooms are usual brick made and 2 are urgent extension 2) 3 class rooms 3) 3 class rooms divided by 5 rooms |
| Number of School Children | 1) 174: Female 78(44.8%) Male 96(55.2%) 2) 92: Female 52(56.5%) Male 40 (43.4%) 3) N/A |
| Available facilities | Toilets only and no kitchen for preparing daily school snacks |
| Area the school covers | 1) Los Pérez and Las Rosas 2) Los Díaz, Sector 1 3) Los Cabrera, Los Morales and Los Mendez |
| Committee Members | 1) 5 (2 from Los Pérez and 3 from Los Rosas) 2) 7(4 members are active, rest are not) 3) 6 (N/A) |
| Grade of Significant Dropouts | 1) Between grade 4 and 5 2) Between grade 2 and 3 3) Between grade 4 and 5 |
| Main Reasons of Dropouts | 9. Economic contribution rather than education 10. Marriage 11. Migration to the South Coast |

(b) Junior High School

There is no junior high school in 5 caserios. Those who want to go to Junior high school have to go to Palestina de Los Altos. There was no strong and urgent demand for junior high school from school parents.

(c) Informal Education

Among the 5 caserios in Palestina de Los Altos, CONALFA holds literacy classes.

| Caserio | Day | Place | Participants |
|-----------|-------------------------|-----------|--------------|
| Los Díaz | Mon, Tue, Thur and Fri. | At School | 75 |
| Los Pérez | Tue, Thur and Sat. | At School | 10 |
| Total | | | 85 |

(2) Primary School Education

(a) Number of School Children

In order to analyze the number and gender balance of school children in Palestina, the figure of school of Los Rosas is used here as shown in following table. The total number of school children in this school is 174.

**Number of School Children by Grade and Gender in
Escuela de Autogestion Comunitaria de Los Rosas**

| Grade in Spanish (Grade in English) | Number of Female Student | Number of Male Students | Totals |
|--|-----------------------------|----------------------------|--------|
| Preprimaria (Primary School) | 10 | 12 | 22 |
| Primero(First) | 20 | 25 | 45 |
| Segundo(Second) | 16 | 14 | 30 |
| Tercero(Third) | 9 | 22 | 31 |
| Cuarto (Fourth) | 20 | 15 | 35 |
| Quinto (Fifth) | 2 | 8 | 10 |
| Sexto (Sixth) | 1 | 0 | 1 |
| Totals | 78 | 96 | 174 |

Source: Censo De Poblacion Escolar 2001

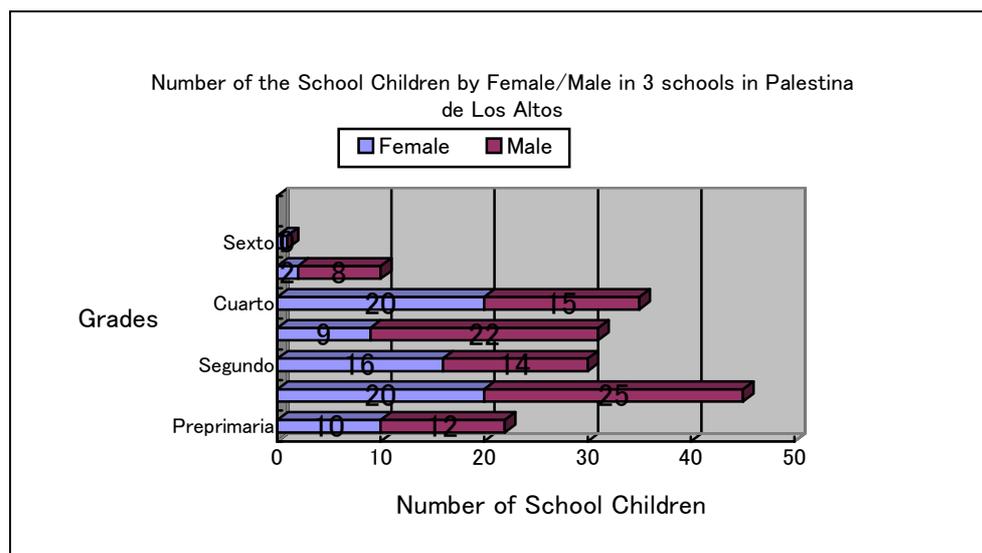
(b) Gender Balance of School Children

The gender balance of school children in Quetzaltenango is shown below:

| | Quetzaltenango 1999 ³⁰ |
|--------|-----------------------------------|
| Female | 47% |
| Male | 53% |

³⁰ Tasa Educativas 1998 Y 1999(2000) Ministry of Education

The following figure shows the gender balance of each grade of the school.



(c) Drop-outs and Stop-outs

It is common to dropout and stop out the education especially in rural are of Guatemala.³¹ It was not able to obtain the dropout rate in the five caserios. However, from the figure above, it is estimated more than 80 per cent of the school children dropout by the time they reach grade 6.

Here in schools in Palestina, the number of attendants falls dramatically in the grade 5 and 6. According to the interviewed school teacher, Ms Beni Concepcion Fuentes y Fuentes, this is a common tendency in the school to have more school children in grade One and Two and the only a few of them remain in school till their graduation.

The reasons why children drop out of education are quite complex and should be considered in economic and cultural context. The teacher interviewed raised the following three points.

i) Age

It can be said that the older the school children are, the easier to dropout of education. For example, during the year 2000, five students out of thirty-two in grade 3 dropped out. All of them are in age between 15 to 16. The school teacher interviewed roughly explained the role of children in a household in the village as follows.

³¹ Tasa Educativas 1998 Y 1999(2000) Ministry of Education

Children's role of the family

| | |
|--------------------------|---|
| 1 st children | Work for the family, paid work preferably |
| 2 nd children | Work for the family, paid work preferably |
| 3 rd children | Cook for the family/ Other work for the family at home |
| 4 th children | Looks after the smaller member of the family |
| 5 th and more | If they are under 10, then they may have chance to go to school |

Marriage is another factor to dropout. The average age of marriage for female in the villages is around 16- 17. By the time school children reaches grade 5 and 6, some are almost 15 and over. Their parents and also themselves tend to think that the education will not benefit them anyway after the marriage. Most parents think that the basic Spanish is enough for their female children.

They also feel ashamed being in same classrooms with younger children. The drop outs are usually the ones with older age as mentioned above.

It is also interesting to know that some students, especially female students, in their adolescence, show more interest in their outlook and will not come to school unless their parents can buy new clothes. Recently a female student of age 13-15 has just dropped out the school. The parents were very understanding to the education but herself insisted not to continue studying as she did not actually have new *Corte*, a traditional skirt.

ii) Opportunity Cost

There is no need to say that children are important labor force for the household. By the time they reach grade 5 and 6, they become almost 15 years old and that is considered to be adult in the rural village. Female students will engage in housekeeping with their mother and do most of the housework especially if they are the senior members among sisters/brothers. Male children also will work with their fathers. Male students are mostly engage in paid work in the agricultural field.

iii) Migration to the Coastal Area

As seen often in Palestina, migration to the south coast is common. Many of the families migrate to the south between April and June with all members of the family, which keeps children out of education. Firstly the place where they migrate does not always have school within easy reach. Secondly the

life condition even deteriorates in the south and that makes more difficult for parents to send them to school as children are given necessary role to take.

Months when Children Dropouts mostly

| | |
|--------------------|--|
| Months of the year | Agricultural Work and Role of Children |
| April-May-June | Seeding Corn, |
| Aug-Sep | Harvesting Corn, Seeding Sesami |
| Nov-Dec | Harvesting Sesami |

(d) Teachers

(i) Number of Teachers

Although there are 14 teachers in three schools, the absolute number of teacher is not enough. For example, in Atutogestion Comunitaria de Los Rosas, there is one principle of the school and 4 teachers. While they have to cover one preschool-class and 6 grades of the primary school with increasing number of school children, the number of teachers still remains the same.³² All the schools have been chronically short of school teachers.

(ii) Role of School Teachers

Teachers are responsible for giving classes for 180 days of the year starting January till the end of October. As there is no paid day-off except weekend and national holiday, they have to attend school work extra days as many days as they are absent from school.

(iii) Payment

The salary to the school teachers are uniformly the same regardless the experience and the position in the school. The actually monthly payment is just 1,600 Quetzales and no allowance is added. The actually payment procedure is controlled by the School Committee. In this school, the first payment is in April, after the three month's of work with no payment from January to March. The second payment is usually around middle of August that still leaves July with no pay.

Many teachers takes it a burden to receive no allowance or extra payment for the daily extra work or monthly training courses which are imposed on them and take 7 hours a day from 8 am to 5 pm.

³² Pronade has a regulation on number of teachers and school children. A class should not exceed 35 in number of children. When it does, extra class with a teacher will be provided by Pronade at the beginning of the year. In this case, total of 174 students require only 4.9 teachers whilst a teacher have to cover more than 40 and over.

Some teachers claim that their work is undervalued, as their working condition is quite demanding. Due to such environment, for example, out of 85 teachers in Category C (with 2 years of experience) in Quetzaltenango, as many as 43 teachers has already resigned.

(iv) Transportation

Some teachers are from outside Palestina. One commutes from San Pedro and two from San Juan Ostuncalco. The average time for commuting is thirty minutes and the mean of transportation is public buses which cost 3 Quetzales per person one way.

The cost of transportation is not covered.

(e) School Committee

This Committee is very active and according to the teacher interviewed the foundation of the school is thanks to the work of Committee.

(i) Members

There are about 5 to 7 members in each School Committee. Usually the Committee members change every 2 years. Committee members are appointed by the community members in general assembly respectively. They can continue their term of office once appointed again or resign the appointment if they do not want to continue.

(ii) Activities and Role of School Committee

Every 15 days or monthly, school committee has meetings except some period of the year when committee members migrates.

The role of the committee is the following.

- Financial Control of the School
- Quality Control of the Education by monitoring school teachers
- School Snacks
- Other necessary activities for bettering school condition

School Committee is responsible for School Snack. Pronade provides school with 50 centavos per school children registered. In this school, committee appointed a housewife to be in charge of the snack. School snack is usually

warm milk with cooked oatmeal and sugar with a package of small biscuits. She received 100 Q a month, approximately 5 Q a day.

(f) School Condition

As seen in Pictures attached, the classrooms are in bad condition especially the two extension classrooms in Las Rosas. They were built by committee members with other villagers. A part of the material was provided by the Municipal Office after a series of negotiation by the Committee.

The new classrooms are urgently required.

(3) Junior High School

There is a junior high school in Palestina. It is about 30 minutes on foot and every year there is a few students who go to the junior high school from 5 caserios.

(4) Informal Education and Literacy Rate

(a) CONALFA

CONALFA is holding literacy classes in Los Díaz and Los Pérez. The participants are 85 in total. The information about literacy rate in Palestina was not available.

(5) Identification of Problems and

- The problems mentioned above are fundamental which are seen in most of rural villages in Guatemala. Government should spend more budget on schemes for reducing the number of dropouts in rural areas.
- The school condition especially Las Rosas was quite alarming. Class rooms should be provided to school children in order to encourage their study.
- Emigration is one of the serious cause of dropout in Palestina. Many school children tend to dropout when they migrate.
- Children play important role in Palestina to increase household income. For example on the market day more than 40% of school children over 3rd grade are absent. They work for their parents at home or they make money at the market.

5.4.6 Rural Infrastructure

In order to grasp general features of the rural infrastructure and the household facilities in Pachum, the survey of diffusion of the infrastructures was made at site. The interview survey was conducted at 112 houses in the area and its results are shown in the following table. The conditions of the survey and the detail results of

the survey are summarized in Table 5.1.6 (1).

Results of the ad-hoc survey for house facility

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

The followings are the summaries of the present conditions of the infrastructures to be underlined, and all the detailed descriptions are given in Table 5.4.6 (1).

- **Drinking Water Supply System**

There are 2 potable water systems in the model area. One is called “Rural Portable Water system” and the another is “Urban Portable Water system”. The Rural system covers all the project area and sends water to the outside of the project area further. 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 Morares communities, which are located beside the central settlement area, have water services from the Urban system.

The water committee faces a financial problem recently. The committee receives revenue of water charge regularly but the electricity bill for the 3 pumps is more than that.

- **Steam Bath**

There is an ethnical steam bath, so-called “*Tamascal*” in Palestina area. The structure and feature of the *Tamascal* in Palestina has some differences from that in Pachum in Totonicapán. That is, instead of heating up the whole dome with fire, they heat stones up on an open fire and put water on it in order to generate hot vapor. It appears that efficiency of the heating with vapor is better than that of direct heating a dome.

5.4.7 **Environmental Conservation Sector**

(1) **Soil Erosion and Collapse**

(a) **Los Pérez**

The few forest areas with which count in Los Pérez are found deforested in a 30%. Generally, there are not community forests only small forest areas of individual property. The type of forest is formed by young trees where prevails aliso and in a minimum part cypress and the pine. The forests are small areas that the farmers have of a two or three cuerdas but that is not enough for all the

firewood they consume.

The land that is used for cultivation is found inclined or in pending and it does not have any infrastructure of soils conservation, therefore they are easily eroded. In addition to this, soils have always been cultivated with the same type of crops therefore they are already exhausted. The condition of the soil presents moderate and strong erosion levels in the greater slope lands.

(b) Los Díaz

The forests that exist in the community are mostly composed of young trees. They do not count on community forest, in the community the forests that exist, are of particular persons and are found deforested.

In the caserío do not exist flat lands, the almost flat areas constitute the 25% to 35% of the total land area. To crops, the lands have slopes that vary from 20% to 80%. 65% of agricultural areas have slopes that go from 35% until a 90%. The east and northeast part of the caserío has the greater percentage of eroded agricultural area in the one, which is observed that the sub soil is cultivated. The few land, which they count on, is found in pending and inclined therefore it's eroded and since it does not have any structure of soils conservation is easily eroded.

c) Sector I

In the Sector I, forests are not community forests, but belong to individual property. Young trees where the Aliso prevails and in a minimum part the cypress and the pine form the type of forest. The problem of the current forest is that does not guarantee a sufficient supply of fuel such as firewood to satisfy the demands of the inhabitants.

The use of the land is for the agricultural production, the condition of the soil presents strong erosion levels in the greater slope lands. Soils are found quite degraded.

d) Los Cabrera/Molares

They count on 2 forest areas. Generally, there are not community forests. Young trees form the type of forest where also prevails those which prevails in a 40%, 30% of cypress, and 30% of pines. The condition of the soil presents erosion levels of moderate to high in the greater slope lands. Soils are found quite degraded.

(2) Contamination for Water

Water for domestic use was investigated. Seven samples of the water of fountains, a well, tanks and rivers were taken at the site (Figure 5.4.7(1)). Each water quality was tested using a water test kit. The number of items of water quality is 12, as shown in Table 5.4.7 (1). All samples except river ones show that the water is unfit to drink unboiled because of detection of coliform and bacteria, which were not tested for river water, however, deserving to be unfit to drink. Gothic type shows that its value exceeds Japanese standards for potable water.

Nitrate was detected from all the water samples.

There is no water service in Sector I community. They go to a fountain to get water several times a day.

Summary of the result of investigation is shown below, and its detail in Table 5.4.7 (1) and Table 5.4.7 (2).

| | | | | |
|-----------------------------|---|---|---|---|
| Place | fountain | public tank | well | public tank |
| Evaluation for drinking use | NO | NO | NO | NO |
| Condition of water use | When water supply is cut. About 10 families will use this water | About 15 families utilize it as daily drinking water. | All the time. No affordability to have running water yet. | Washing place. Possibility to use the water to drink. |
| Place | fountain | river | river | |
| Evaluation for drinking use | NO | NO | NO | |
| Condition of water use | Several times a day. There is no water service in this community. | Washing place. Possibility to use the water to drink. | Washing place. Possibility to use the water to drink. | |

In Palestina model 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 dose, applying season, handling of leftovers and containers, which may increase the production costs, deficient plague control and risks of contamination and/or poisoning.

They use the same spraying bomb to apply several pesticides, which makes it a

risk for the crops from the incompatibility that some pesticides present and by the reactions that they cause.

All the farmers wash the spray bombs after every use. Even though every farmer washes the spray bomb after every application, this does not eliminate the possibility of getting the chemicals mixed and causing a negative effect in its next application.

Only 7% of the farmers have protection equipment (consisting of boots, gloves and mask) and that only 4% have received training about pesticide handling.

| How to wash the spray bombs after every use | | Deposit of the residues used for washing the spray bombs | | Use of containers or bottles of applied pesticides | |
|---|-----|--|-----|--|-----|
| By | % | Place | % | Utilization | % |
| water and detergent | 45 | not specify the place | 58 | throw the bottles | 54 |
| hot water | 29 | in areas next to the wells | 15 | bottle other pesticides | 17 |
| water and baking soda | 16 | in crop areas | 13 | bury them | 12 |
| water and lemon | 10 | throw them in the water fountains | 9 | burn them | 10 |
| | | in areas that represent no harm | 5 | bottle beverages | 7 |
| Total | 100 | | 100 | | 100 |

Source: Compilation of "Environmental Monograph in the Southwestern Region,1993."

As described above, coliform, bacteria and nitrate were detected from most samples. This means that human waste seeps into the soil. Pesticides must be detected, though not tested this time.

5.4.8 Existing Development Projects in and around the Micro-basin

(1) Agricultural Sector

Agricultural support project in the Palestina model is limited to provision of fertilizer at low cost through the 2KR program.

(2) Social Infrastructure Sector

In the infrastructure sector, there were 4 projects in past, such as a) the water projects by CARE, b) sanitary project by CARE, c) the electricity supply project by "Consejo de Desarrollo Urbano y Rural"(CODEUR) and d) the improved stove project by FIS.

The detailed information of projects is mentioned in Table 5.4.8 (1).

(3) Environmental Conservation Sector

MAGA and PAFG implemented "the Forest Management on Communal Lands Program". The existing projects around the study area is shown in the following table.

| Denomination | Location | Extension (Hectares) | Remarks |
|---|----------------|----------------------|--------------------|
| San Mateo Communal Forest | Quetzaltenango | 65 | Natural |
| San Martín Sacatepequez Communal Forest | Quetzaltenango | -- | Community Interest |

CONAMA receives complaints about pollution filed by residents. In the rural area, complaints were about water pollution and dumped trash. The cause of water pollution is a discharge of domestic wastewater. At this moment, there are no complaints from Palestina de Los Altos.

Municipality of Ostuncalco constructed a treatment plant of solid waste with the aid of CARE and FIS. This project is operated by organized group, namely, schoolteachers, municipality, a health center, a culture center and youth group. They collect garbage by two types, organic and inorganic. They make organic garbage compost and dump inorganic one onto the landfill. In the plant yard there are a nursery made use of compost and a laboratory for chemical analysis.

Presidential Secretariat of Environment and Natural Resources prepares "Environmental Action Plan" for each municipality. Making the plan for Palestina de Los Altos will start next January. The topics are latrine, stove and reforestation.

The municipality of Palestina de Los Altos has a committee in which an environmental member is in charge of environmental aspects, disaster and health issue in the municipality.

Both cities of Quetzaltenango and Almolonga have disposal sites with landfills sanitarly.