

Increase in the import is the major cause of increase in the current account deficit.

(8) Economic Relationship among the Neighboring Countries.

1) Latin American Integration Association (ALADI)

ALADI was created by the Montevideo Treaty in 1980 as an extension of a Latin American Free Trade Association formed in 1960. The signatory countries are Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela. Intra-regional exports within ALADI accounted for 16.7 percent of the total exports in 1994.

2) The Andean Pact (AP)

AP was created by the Cartagena Agreement in 1969, bound by Bolivia, Chile, Colombia, Ecuador and Peru. Since then Chile and Peru have left the pact, and Venezuela has joined. It established a common external tariff, though Bolivia and Ecuador got a preferential treatment. Intra- group exports only accounted for seven percent of the total exports in 1993. (In 1992 Bolivia made a bilateral free-trade agreement with Peru with the exception of three commodities, i.e., soybeans, sunflower oil and meat.)

3) MERCOSUR

MERCOSUR consists of four southern Latin American countries, i.e., Argentina, Brazil, Paraguay and Uruguay. Bolivia is one of two associate members of the MERCOSUR, another is Chile. Almost all Bolivia's trade with MERCOSUR would be tariff-free within ten years. Sensitive commodities such as flour and textiles will remain protected for up to 18 years, though.

2.3 Current Status of Agriculture and Other Industry

2.3.1 Agriculture

Bolivian agriculture is divided to the western Andes plateau called Altiplano and the eastern lowlands called Llanos, and the slope between those two parts is a complicated valley situated at the altitude of around 2,500 m. The 80% of the population in Bolivia lives in the Altiplano and Valley, which occupies 40% of the total land, and the eastern lowland occupies 60% of land with only 20% of the total population.

In Altiplano and Valley with a traditional subsistence agriculture, the farm land of every farmer shows a small size, less than 10 ha by 78% of farmers (less than 3 ha by 45%). While, in the eastern lowland with a modernized agriculture, each farm shows a large size, more than 10 ha by 75% of farmers (more than 50 ha by 37%), according to data 1990, Servicio Nacional de Reforma Agraria. Because of the subsistence agriculture in small size, 82% of the people in Altiplano is poor, and the 44% of them is in abject poverty.

Agriculture is still an important part in national economy, showing 16% of GDP (1994), and holding 44% out of total workers. Rural population still indicates 42.5% (1992), being expected around 40% even in the year of 2000.

The development in agricultural production can be seen in the annual growth rate of 0.5% for crop cultivation, 1.0% for meat, and 0.2% for mutton. The major development is achieved in the eastern lowland, located mainly in the Santa Cruz Department. Developing crops are soybean, garlic, wheat, sorghum, coffee, tea, pineapple, banana, etc. Data from 1985 to 1993 show that soybean extended the production up to 4.8 times in these 8 years, and became one of the main export products.

The unit yield of soybean is surpassing those in Brazil and Paraguay, and achieving 80% of that in Argentina. While, the decrease in the major crops in Altiplano, potato, broad bean, Quinua, is shown in the same years by 23 - 24%. The yield of potato is a quarter of that in Argentina, or around a half of that in Chili.

Livestock production is also unevenly distributed by area. Meat is produced 73% of all in two Departments; Beni (46%) and Santa Cruz (27%), pork is 61% in Santa Cruz (32%) and La Paz (29%), broiler chicken is 70% in Cochabamba, and eggs are 85% in Santa Cruz (64%) and Cochabamba (21%). While, sheep (mutton and wool), llama and alpaca are mainly produced in three Departments; La Paz, Oruro and Potosi (sheep 71% and llama/alpaca 98%). (Data by MACA, 1993)

As to the prospect for the agricultural development, the target of agricultural production in each crop and livestock was announced in public in December 1993, by "Estrategia de desarrollo agropecuaria 1994/2003 - Un camino contra la pobreza -" and "Bases del plan de desarrollo sectorial de mediano plazo 1994-1997". Major products in Altiplano are shown below;

Crops	1994-1997	Annual rate	Crops/Livestock	1994-1997	Annually
Sunflower seeds	167%	38%	Alfalfa	48%	14%
Wheat	128%	32%	Quinua	29%	9%
Pineapple	96%	25%	Potato	13%	4.2%
Kidney bean	81%	22%	Broad bean	11%	3.5%
Cotton	62%	17%	Forage Barley	9%	2.9%
Garlic	60%	17%	Milk	20%	6.4%
Soybean	50%	15%	Wool	13%	4.2%
			Mutton	11%	3.5%
			Meat	9%	2.9%

In order to achieve the end, effective use of foreign aid or NGO and the good arrangement of administrative support especially in extension service are expected.

2.3.2 Other Industries

(1) Industrial Structure

Mining sector contributed to GDP at the tune of 11.2 percent in 1995, manufacturing at 18.5 percent, and construction at 3.8 percent.

(2) Trends of Production and Income of the Major Industries

Top 50 companies in Bolivia accounted for a quarter of GDP in 1995. In terms of shareholders' equity, ENTEL is the biggest (763 mil.US\$), followed by two petroleum/gas exploration/production companies in 1996. On the other hand, Inti Raymi, a mining company (the eighth biggest equity) had the biggest turnover in 1996 (136 mil.US\$), followed by Lloid Aéreo Boliviano, and Banco de Santa Cruz. ENTEL was the fourth with a turnover of 105 mil.US\$.

(3) Foreign Capital

Foreign direct investment (FDI) accounted for 82 percent of the total private investment, which reached 663 mil.US\$ in 1996. FDI was equivalent to 5.9 percent of GDP in 1996. Investment from Italy, USA, Brazil, and Canada (amount in this order) account for about two thirds of FDI. A half of FDI was targeted to telecommunication, and petroleum/gas production sectors, a quarter to manufacturing, agricultural industries and electricity sectors.

2.4 National Agricultural Development Policy

In 1994, Bolivian Government announced "PLAN GENERAL DE DESARROLLO ECONOMICA Y SOCIAL DE LA REPUBLICA -EL CAMBIO PARA TODOS-" as the basic policy for the social and economic development of the country. In the Plan, constraints for the social and economic development in Bolivia are analyzed and strategic targets to conquer the issues derived from the analysis are pointed out. Following is a matter of consequence to achieve the strategic targets in the Plan;

- 1) Stabilization of macro-economy
- 2) Correction of economic differentials in other countries
- 3) Promotion of industrial productivity
- 4) Development of human resources
- 5) Harmonized development of urban and rural areas
- 6) Reorganization of polity and administration systems
- 7) Conservation of natural resources and environmental protection
- 8) Proper management on vital movement

Agricultural development policies in the Plan referred in the item "5)" are as follows;

- a) Activation of economy of the peasant
 - redistribution of land
 - establishment of land ownership
 - soil improvement and conservation
 - improvement of irrigation system
 - effective utilization of a genetic resources
 - proper disease and pest control
 - improvement of livestock production including stable improvement
 - improvement of small scale irrigation facilities
 - improvement of storage facilities for agricultural production
 - infrastructure improvement such as farm road, rural electrification, etc.
 - improvement of marketing system
 - promotion of agro-industry
 - ensuring a source of revenue
 - technology development and extension
 - establishment and strengthen of the development administration structure
- b) Turnabout of the migration policy
 - from the immigration policy to the promotion policy such as intermediate rural city development and upbringing small-to-medium scale enterprises
- c) Assistance to the habitants who lived dis-developped areas in the urban area
- d) Strengthen of the administration structure of cities, towns and villages

SNAG has responsible to perform the national agricultural administration. Following two basic strategic policies for promotion of the agricultural production in the country were announced in 1993;

- ESTRATEGIA DE DESARROLLO AGROPECUARIO 1994/2003
- UN CAMINO CONTRA LA POBREZA-
- BASES DE DESARROLLO SECTORIAL DE MEDIANO PLAZO 1994-1997

Strategic targets in the former policy are the food security for whole nation,

poverty alleviation and elevation of the living standard in rural area, enlargement of employment opportunity in rural area, diversification and expansion of agricultural products for export. To attain the targets, following action plans were constructed;

- 1) Improvement of agricultural structure
 - reformation and integration to the market economy of the traditional agriculture
 - expansion of agricultural products for export
 - promotion of rural industry
- 2) Correction of social and economic difference between urban and rural areas
 - development of the intermediate cities in the rural area
 - decentralization of the agricultural development
- 3) Reinforcement of the propulsion structure on agricultural development
 - reinforcement of the cooperation system between public and private sectors
 - reinforcement of the propulsion structure on agriculture and technical administration

The latter policy is the latest medium term agricultural development strategy of the SNAG. Major subjects to be propelled in the agricultural administration can be summarized as follows;

- Expansion of agricultural production
- Promotion of economic activities on agriculture
- Promotion of technical development on agriculture
- Improvement and reinforcement of propulsion structure on agricultural development
- Reinforcement of investment and international cooperation

The medium term development policy consists of three (3) basic programs to promote the agricultural production and four (4) assistance programs to realize the basic programs. Each program is as follows and the execution of feasibility study on agricultural development of Achacachi area is based on these basic programs.

a) Basic program

- Food Security Program
PROGRAMA DE SEGURIDAD ALIMENTARIA (PROSEGAL)
- Expansion and Competitiveness Program for Export of Agricultural Products
PROGRAMA DE EXPANSION Y COMPETITIVIDAD DE LA AGRICULTURA DE EXPORTACION (PROEXCE)
- Regional Agricultural Development Program Joint to Intermediate Cities
PROGRAMA DE DESARROLLO AGRICOLA REGIONAL ARTICULADO A CIUDADES INTERMEDIAS (PRODARCI)

b) Assistance program

- Technological Development Program
PROGRAMA DE DESARROLLO TECNOLOGICO (PRODETEC)
- Water Resources Management Program for Irrigation Purposes
PROGRAMA DE MANEJO DE RECURSOS HIDRICOS CON FINES DE RIEGO (PRORIEGO)
- Natural Disasters Prevention Program
PROGRAMA DE PREVENCION DE DESASTRES NATURALES (PRBVENDEN)

- Agricultural Public Sector Technical-Institutional Strengthening Program
PROGRAMA DE FORTALECIMIENTO TECNICO-INSTITUCIONAL DEL
SECTOR PUBLICO AGROPECUARIO (PROFORSA)

The main objectives of PRODARCI which is the political background of the Study are to impel the accumulation process of peasant income within a framework of economic exchange between urban and rural areas at regional and sub-regional levels. Specific objectives are;

- 1) to support commercialization process of peasant production and to develop its negotiation capacity in markets,
- 2) to stimulate modernization of farming system and techniques, to foster production of agro-industrial crops and the development of processing activities, and
- 3) to regulate the migratory flows from rural areas to large cities.

To achieve the PRODARCI efficiently, following three (3) sub-programs are provided;

- 1) implementation of Integrated Centers of Services (CIS) to offer the direct and integral technical assistance to small-scale farmers
- 2) supporting sub-program of Agro-industrial Transformation to develop activities of technical assistance, training and promotion directed to small and medium agro-industrial producers
- 3) supporting sub-program of Social Development in Urban Area to strengthen the municipal administration capacity

2.5 Agricultural and Rural Development Activities in the Study Area

(1) Omasuyos - Los Andes Rural Development Project

In 1977, an FAO / World Bank Cooperative Program mission identified the Omasuyos - Los Andes Rural Development Project as the succeeding rural development project of Ingavi and Ulla Ulla in the Altiplano. The project area is part of the northern Altiplano bordering Lake Titicaca's southern shore and extending roughly between 20 and 80 km north of La Paz. Administratively the project area is constituted by Batallas and Peñas in the province of Los Andes and Achacachi in the province of Omasuyos. The project includes following components;

- Productive investments; a credit fund, linked with provision of technical assistance, to support both crop intensification and livestock improvement on an estimated 4,000 small farms, and other viable investments in handicraft development, afforestation, purchase of boats and fishing gear, development of tourist-related services, development of small industries, construction and stocking of community shops and storage.
- Rural Roads; up-grading of existing roads.
- Rural Centers; credit for house improvement in towns of Achacachi, Huarina and Batallas.
- Studies and Pilot Schemes; feasibility studies for irrigation, drainage and fisheries.

In response to the recommendation of the project identified mission of FAO / World Bank Cooperative Program, MACA (MINISTERIO DE ASUNTOS CAMPESINOS Y AGROPECARIOS) had been carried out technical study on Omasuyos - Los Andes Project (PROYECT OMASUYOS - LOS ANDES) with the joint operation of DESEC in 1978. In the study, same components mentioned above were proposed to implement in the study area, however, no implementation was executed after completion of the study.

(2) Achacachi Municipality Development Plan

Preliminary edition of the "Achacachi Municipality Development Plan" (PLAN DE DESARROLLO MUNICIPAL DE ACHACACHI) was submitted to the FNDR (FONDO NACIONAL DE DESARROLLO REGIONAL) in July 1996. The plan was established under the program of "DIAGNOSTICO Y PROYECTOS EN CIUDADES INTERMEDIAS (MUNICIPIOS)" promoted by FNDR. The contents of the plan are the socio-economic investment program of the Achacachi municipality and those programs were set up with participation of related inhabitants in the municipality on the basis of the "Ley de Participación Popular". The study was executed under the technical cooperation of BID.

(3) Other Activities

In the Study area, small scale rural infrastructure improvement projects have been carried out at some communities. The executing body of such projects are the public and private (NGOs) sectors and/or joint operations.

The project for the provision of drinking water facilities and a latrine facility for each house were executed under the joint operation of CARE, CORDEPAZ and USLP at the communities Cala Cala, Avichaca, Suntia Comun, Suntia Chico, Suntia Grande, Pairumani, Icrana, Pajchani Grande and Pajchani Molino.

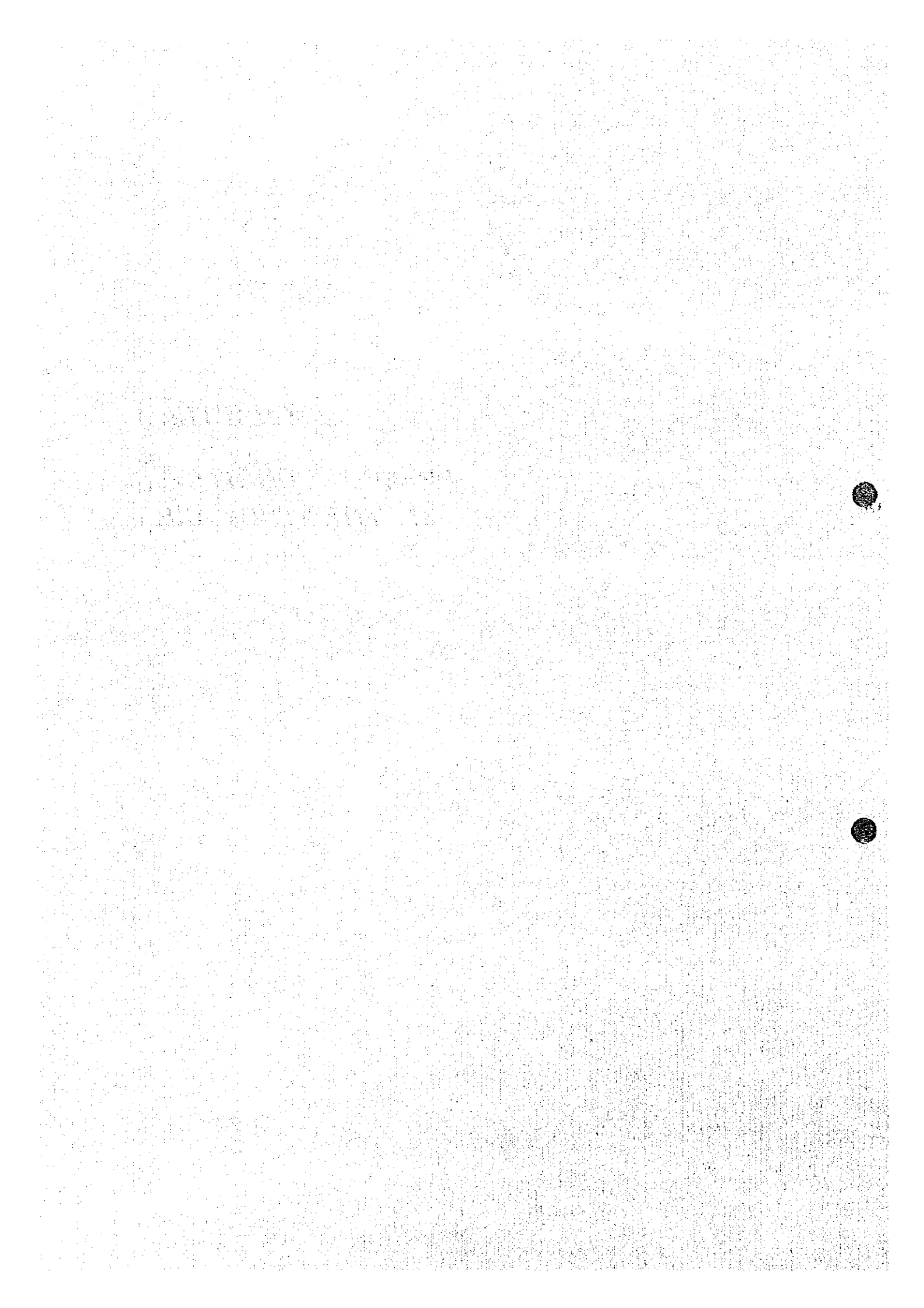
Nursery plant station for forestation was established in 1994 at Avichaca community under the joint operation of CEDEFOA, FAO and FIS. On the other hand, forestation project under the cooperation of USAID was started 1992 and is to terminate in 1997. In the Study area, 29 zones, areas and/or communities were joined the project.

As for the agricultural infrastructure improvement, facilities for collecting milk were constructed at the Taramaya and Jawir Laca communities in 1992 by CORDEPAZ.

With the law of Participacion popular, certain funds can be utilized for rural development on community (OTB) basis. In the study area, 20 shallow wells with manual pump for drinking purpose were constructed at Suntia Chico in 1997, and rural electrification of Cala Cala community is scheduled in 1997 under the fund of Participacion popular.

CHAPTER 3

**PRESENT CONDITIONS
OF THE STUDY AREA**

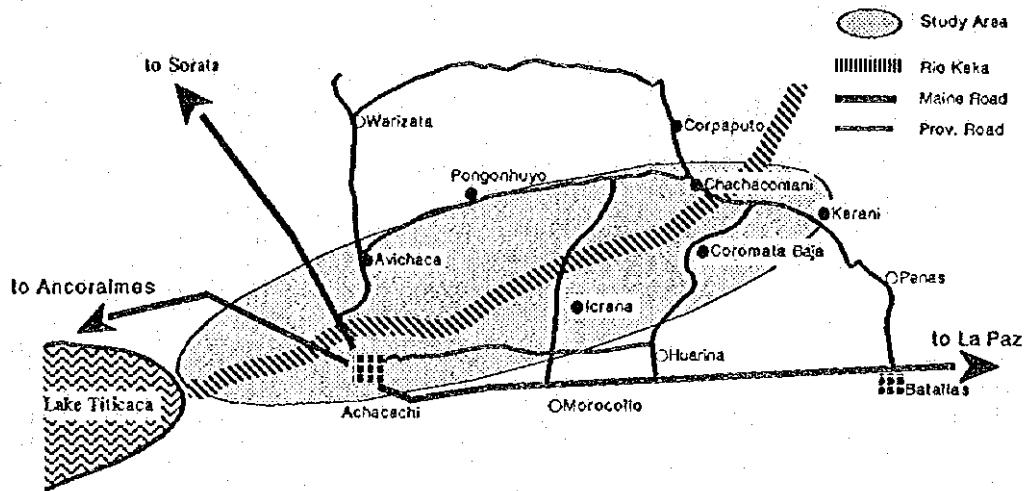


CHAPTER 3 PRESENT CONDITIONS OF THE STUDY AREA

3.1 Natural Conditions

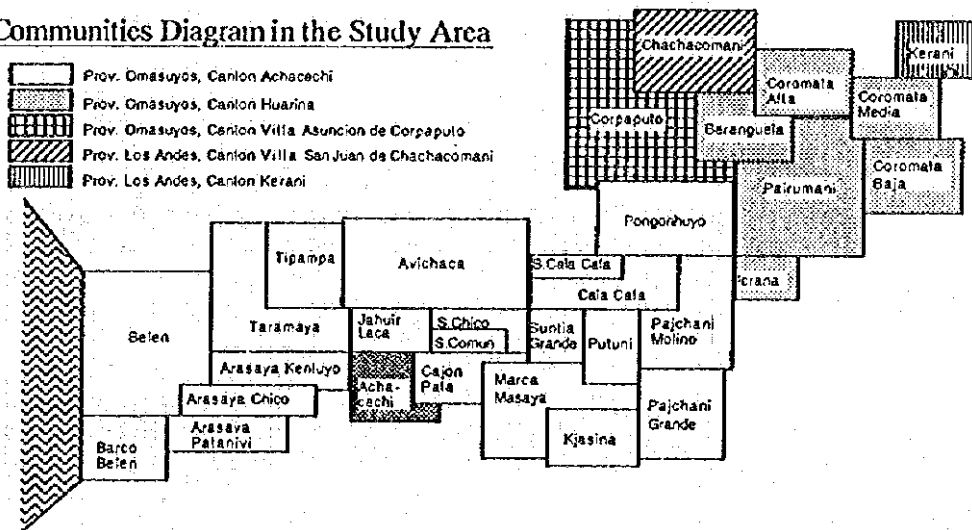
3.1.1 General

The Study Area belongs to Omasuyos and Los Andes Provinces in the Department of La Paz. The area stretches into Cantón Achacachi to the north and west, Cantón Huarina to the south, and Cantón Kerani, Villa San Juan de Chachacomani, and Villa Asunción de Corpaputo to the east. Achacachi City, located in the north-west of the Study area, is the capital of Omasuyos Province, being the center of administration and economic activities. It is at the distance of 80km from La Paz, the capital of the country.



There are 30 communities and Achacachi City in the Study Area. The Study Area is largely divided into three zones, as upper, middle, and lower basins, according to the topographical conditions, the availability of irrigation water, land use, farming characteristics, etc. Division of zones and its general characteristics of agriculture are shown in Fig. 3.1.1.

Communities Diagram in the Study Area



The population and the number of families in the Study Area are summarized in the following table:

No	Community	Population	Number of
1	Kerani	2,500	420
2	Chachacomani	2,314	630
3	Coromata Alta	400	70
4	Coromata Media	500	138
5	Coromata Baja	900	200
6	Berenguela	230	40
7	Corpaputu	1,500	250
8	Pongon Huyo	1,337	380
9	Pairumani	500	160
10	Icrana	150	34
11	Pajchani Grande	670	90
12	Pajchani Molino	300	80
13	Cala Cala	550	240
14	Barco Cala Cala	35	14
15	Suntia Comun	149	22
16	Suntia Chico	180	30
17	Suntia Grande	300	65
18	Putuni	180	39
19	Marca Masaya	600	145
20	Jahuilaca	700	150
21	Avichaca	1,700	300
22	Kjasina	900	200
23	Cajon Pata	100	32
24	Tipampa	500	123
25	Taramaya	1,500	350
26	Arasaya Chico	250	80
27	Arasaya Kentuyo	160	40
28	Arasaya Patanivi	170	40
29	Belen	2,000	500
30	Barco Belen	515	125
Total		36,790	6,610

More than 95% of the population is the Aymara. The rest of them are the Quechua, the mestizo, and the white. The Study on the rural society, therefore, has focused on the Aymara people and society.

3.1.2 Soils and Land Use

(1) Soil Characteristic in Each Basin

1) Soil characteristic in upper basin

The soils are superficial with a single horizon 0 - 20 cm of middle texture, being shaped by gravel and stones in deeper horizon. They have low capacity of humidity retention. Excessive drained, the contents of exchangeable Ca and Mg varies from Low to Moderate, the Na from moderate to High, cation exchange in K from Low to Moderate. According to the related characteristics, mainly because of thin arable layer, these soils are classified under the qualification of "Class 6". This category suggests non-suitable for annual crops due to texture and erosion problems.

In this area, most farmers are grazing beef cattle or dairy cattle, but with shortage on forage due to low productivity. Therefore, the land should be effectively used in forage cropping, it is advisable to plan a mixture crop of alfalfa with grass forage.

2) Soil characteristic in middle basin

The general characteristics of the soils are similar to those of upper basin, being superficial with low humidity retention capacity. These soils can be recommended to

cultivate perennial crops such as alfalfa associated with grass forage or weeping grass. The soils of this area require to be careful of irrigation management. It will be necessary to introduce better practice in water management.

These soils are classified as "Class 4", showing not suitable for annual crops due to soil erosion and humidity problems. Within this area, however, there is a small recent alluvial terrace, classified as "4S", where an intensive cultivation can be practiced.

3) Soil characteristic in lower basin

The soils of this area correspond to flat topography. They are moderately developed and moderately deep, with clayey fine to silty fine texture, having dark gray color at superficial layers and some mottles at deeper horizons. These are good retention humidity soils. The general chemical characteristics are neutral reaction to strong alkaline, showing pH 6.7 in the arable layer, and pH 9.0 in the depth of 50 - 64 cm. Exchangeable contents of Ca and Mg is Low to Moderate, and Na is High specially in the deep part. Therefore, the water management in irrigation should be very careful since the saline layers in the depth may appear with an excess use of water.

These soils are classified as "Class 3", showing to be suitable for annual crops. Farmers use the land to cultivate forage crops to feed dairy cattle, due to excess of animals that they have forage problems.

(2) Crop Adaptability to Soil Classes in Each Basin and Community

1) Crop adaptability and soil classes

Soils in the study area are classified into 4 classes, from "Class 3" to "Class 6". Out of these classes, "Class 3" and "Class 4" are recommended for annual crops such as Potato, Broad bean, Forage, Barley (Oats) and vegetables including Onion. While, "Class 5" and "Class 6" are recommended for permanent forages including Alfalfa.

With this classification, in upper basin, the "Class 3 and 4" count only 19% of all, so 81% of land is recommended for forage grasses. The "Class 3 and 4" occupy 42% in middle basin and 68% in lower basin. Classified soil map on crop adaptability is shown in Fig. 3.1.2 (1) to (3).

2) Actual land productivity under soil classes

Land is used in crop cultivation for self-consuming as the first priority, especially for the potato, that is a staple food of the people in the Study area. However, the soil condition in upper and upper-middle basin is not preferable for potato cultivation in most of the area. The extent of potato cultivation and the suitable land (Class 3) in every basin are tabulated as follows. Also, the land of "Class 3" in upper and upper-middle basins is mostly wet land and not distributed evenly as shown in the soil map.

Basin	Farm Household	Potato Cultivation Extent (ha/farm)	Total Potato Extent (ha)	Land of Class 3 (ha)
Upper	455	0.4	182	190
Upper-middle	695	0.4	278	435
Lower-middle	615	0.32	197	890
Lower	1,011	0.27	273	991

The yield of potato in each community depends on the conditions of soil conditions in each area as follows;

Community	Average Yield (kg/ha)	Extent of Class 3
<High yield community>		
Kerani	4,000	69%
Corpaputo	3,500	0 (Class 4= 67%)
Marca Masaya	7,000	96%
Avichaca	5,000	75%
Suntia Chico	4,500	74%
<Low yield community>		
Berenguela	2,000	0
Pairumani	2,000	0
Icrana	2,000	0
Cala Cala	2,000	15%
Pongon Huyo	2,000	15%
Suntia Grande	2,000	21%
Taramaya	2,400	25%
Arasaya Kentuyo	2,300	25%

Data by Farm Interview Survey, checked in the community farmers meetings.

As reviewed the above, the low yield area is mostly seen in the upper and upper-middle basins, where the soil of "Class 3 and 4" are scarcely shown in the map. Even in the lower and lower-middle basin, the low yield area is corresponding with the soil map. Actually, food crop production can't be recommended in those area, but forage crops including alfalfa. While, the yield increase in food crops and/or cash crops can be recommended by soil condition in lower and lower-middle basins, however, only a few farmers expectation the development of crop cultivation. Most farmers there except the income increase by dairy farming, and expectation to use their land for forage crops such as alfalfa. As a matter of fact, most farmers in Belen area give up the potato cultivation already, and they purchase potato with the income by milk production.

3) Land use in each basin and community

The detail of land use in the project area was measured from the topographic map of 1/5,000 compiled by the Study. Total agricultural land in the Study area is estimated at 6,585 ha. Out of which 5,346 ha is upland field, 1,239 ha for glass land. Land use is shown in Fig. 3.1.2 (4) and summaries are as follows.

Category	Upper Basin	Middle Basin	Lower Basin	Total
River	105.5	449.8	47.4	602.7
Residence, Roads	367.4	445.5	361.0	1,182.9
Grass Land	368.7	812.6	57.5	1,238.8
Upland Field	857.4	2,786.1	1,702.1	5,345.6
Total	1,708.0	4,494.0	2,168.0	8,370.0

As for the agricultural plan, the land use for grass land, upland field and other land in community-wise, are calculated as follows;

Name of Community	Unit: ha					Total
	Farm Land	Upland field	Grass land	Other land		
1) Chachacomani	11	8.2	3.0	15.8	27.0	
2) Corpaputu	12	3.6	8.8	6.6	19.0	
3) Berenguela	80	71.9	6.5	62.6	141.0	
4) Kerani	275	135.6	139.2	45.2	320.0	
5) Coromala Alta	165	138.7	25.9	131.4	296.0	
6) Coromala Media	502	370.2	131.9	72.9	575.0	
7) Coromala Baja	183	129.2	53.4	147.4	330.0	
8) Pairumani	398	226.4	172.0	173.6	572.0	
9) Icrana	102	52.1	50.3	9.6	112.0	

to be continued

Name of Community	Farm Land	Upland field	Grass land	Other land	Total
10) Pajchani Molino	501	356.4	145.1	280.5	782.0
11) Pajchani Grande	383	118.2	264.4	29.4	412.0
12) Putuni	152	149.2	3.0	72.8	225.0
13) Cala Cala	634	612.6	21.2	79.2	713.0
14) Barco Calacala	50	49.9	0.3	11.8	62.0
15) Pongon Huyo	204	112.4	92.0	75.6	280.0
16) Avichaca	352	352.2	0.0	22.8	375.0
17) Tipampa	181	181.2	0.0	8.8	190.0
18) Suntia Comun	24	22.2	2.0	20.8	45.0
19) Suntia Grande	148	129.1	18.9	62.0	210.0
20) Suntia Chico	145	144.8	0.0	34.2	179.0
21) Jahuir Laca	211	211.3	0.0	17.7	229.0
22) Marca Masaya	76	190.5	37.1	4.4	232.0
23) Kjasina	228	58.8	6.3	8.9	66.0
24) Arasaya Chico	65	131.7	0.0	23.3	155.0
25) Arasaya Kentuyo	132	139.2	1.0	29.8	170.0
26) Arasaya Patanivi	140	114.3	3.7	15.0	133.0
27) Cajon Pata	118	38.7	47.2	10.1	96.0
28) Belen	447	445.8	1.1	54.1	501.0
29) Barco Belen	337	332.3	4.5	22.2	359.0
30) Taramaya	319	318.9	0.0	73.1	392.0
31) Achacachi City	0	0.0	0.0	172.0	172.0
Total	6,584	5,345.6	1,238.8	1,785.6	8,370.0

3.1.3 Meteorology

The Study area belongs to the subtropical high land climate. The distinction of the rainy and the dry seasons is clear, and most of the annual precipitation is concentrated in the rainy season, and the days of the low temperature and high humidity last throughout the dry season. Average meteorological parameters in the Study area are summarized below:

Mean annual rainfall	590 mm
Annual mean temperature	7.1 °C
Average maximum temperature	14.6 °C
Average minimum temperature	-0.4 °C
Annual mean relative humidity	65.8 %
Mean wind velocity	12.8 km/hr
Average annual sunshine hours	2,859.4 hr
Mean annual evaporation	1,434 mm
Annual mean frost days	170 days
Annual mean hailstorm days	4 days

(1) Precipitation

There are 5 rainfall gauging stations in and around the Study area where the precipitation data are available for more than 15 years. The precipitation has been recorded continuously over 30 years at the El Belen station. Nearly 70% of the annual precipitation occurs from November to March. The lowest monthly precipitation is generally observed in June and July. No rainy days counts 14 days in June, 13 days in July and 8 days in August on an average. Observed monthly mean precipitation record in each station is as follows and isohyetal map in the Study area is shown in Fig. 3.1.3.

Station	Unit : mm												Annual
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
El Belen	97.6	72.4	61.4	23.9	19.0	9.1	6.3	12.3	23.7	32.0	42.5	80.5	480.6
Huarina	131.0	88.1	89.0	41.0	13.2	13.7	6.1	14.2	21.6	41.1	54.9	82.6	596.5
Corpaputo	156.3	103.3	90.7	44.0	20.2	17.6	8.7	16.2	27.5	33.2	63.0	105.6	686.3
Penas	184.9	115.3	124.8	38.8	19.8	14.2	7.4	19.3	32.2	77.0	78.9	108.5	821.1
Hichicota	163.9	109.0	82.3	40.8	17.4	19.7	6.3	20.4	23.3	40.4	69.4	86.0	678.9

Using mean monthly precipitation and the Thiessen Polygon as shown in Fig. 3.1.4, monthly mean precipitation of the Study area and the Rio Keka basin were estimated as follows;

Unit : mm													
Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Study Area	119.3	85.4	74.1	33.1	23.8	12.2	9.0	15.9	30.0	37.2	53.8	94.7	588.6
Rio Keka Basin	130.8	96.1	84.3	40.9	29.3	16.2	11.9	21.2	35.5	44.7	62.2	97.1	670.3

(2) Other Meteorological Parameter

Two stations observe other meteorological parameter such as temperature, humidity, evaporation and wind surrounding area of the Study. 30 years climatological data of these 2 stations can be used for the analysis. The average temperature is about 7 degrees, and it never exceeds 10 degrees. The average temperature decreases by about 4 degrees in July and August. The minimum absolute temperature is about -10 degree from July to June, and in certain years the freezing point temperature was recorded ever in December that it is the warmest month of the year. The maximum absolute temperature dose not fluctuate highly and it is around 17 degree throughout the year.

The annual mean relative humidity is about 66%, and is relatively high in January, and low in July. The annual total evaporation is more than 1,400mm, and much evaporation observe in October and November. The predominant wind is Northwestern and North. The total frost days were 170 days throughout the year, and more than 25 frost days are recorded in May, June, July, August. Not so much hailstorm is recorded recently, and that annual average is only 3 days. Detailed meteorological data of the study area shown in Table 3.1.1.

3.1.4 Hydrology

(1) River System

The Study area extends along with the Rio Keka which has 3 tributaries within the Study area namely Rio Corpa, Rio Japa Jahuirra and Rio Chiar Jokho from the upper reaches of the river course. Due to the infiltration of river flow to the riverbed, springs can be seen in middle reach of the river course of the Rio Keka. During the dry season, no water flow is available in the Rio Corpa and the Rio Japa Jahuirra due to irrigation water utilization in the upper stream reaches and infiltration of flow to the riverbed. Fig. 3.1.5 shows the river system of the Rio Keka together with the catchment area of each tributary.

(2) Irrigation Water Use of the Rio Keka

Over 30 irrigation systems take water from the Rio Keka. Among the existing irrigation systems, three systems have large commanding areas and take water for irrigation throughout the year. One is located at Coromata Alta (refer to upper intake), and others are at Pajchani Molino (refer to middle intake) and at Putuni (refer to lower intake). During the course of the field investigation, discharge measurements were carried out at the three major intake site of the canal mentioned above. Measurement results are the 0.23 m³/sec at upper intake, 0.10 m³/sec at middle intake and 0.35 m³/sec at lower intake. These intake volumes can be considered as the maximum canal capacity for each irrigation system. Intake system and catchment area are shown in Fig. 3.1.6.

(3) River Runoff

A time series of monthly mean discharge at the Achacachi gauging station and at major diversion sites for irrigation of Rio Keka were estimated on the basis of discharge

data at the Achacachi gauging station taking the runoff from the spring and intake volume at the major diversion sites into consideration. Results are shown in Table 3.1.2 and summaries are as follows. In the estimation, intake volume of diversion point(s) located at the upper stream reaches is deducted in case of the runoff at diversion points. As for the Achacachi gauging station, no deduction of intake volume at the upper diversion points is made.

(Unit : m³/sec)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Achacachi	10.05	13.84	10.96	7.19	3.27	1.58	0.79	0.64	0.61	1.11	2.87	7.23	
Upper reach (C. Alta)	8.48	11.78	9.24	6.04	2.71	1.31	0.64	0.57	0.58	0.95	2.42	6.09	
Middle reach (Putuni)	8.46	11.84	9.24	5.91	2.53	1.12	0.44	0.38	0.38	0.76	2.25	5.96	
Lower reach (Belen)	8.36	11.73	9.14	5.80	2.43	1.02	0.34	0.27	0.28	0.66	2.14	5.86	

(Unit : MCM)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Achacachi	26.90	33.47	29.34	18.65	8.76	4.11	2.12	1.62	1.58	2.96	7.43	19.35	156.30
Upper reach (C. Alta)	22.71	28.49	24.76	15.66	7.25	3.40	1.71	1.53	1.50	2.56	6.28	16.32	132.16
Middle reach (Putuni)	22.66	28.64	24.75	15.31	6.78	2.91	1.19	1.01	0.99	2.04	5.82	15.97	128.05
Lower reach (Belen)	22.38	28.38	24.47	15.03	6.50	2.64	0.91	0.73	0.72	1.75	5.55	15.69	124.75

Specific discharge and runoff coefficient were analyzed for above 4 points. Results are shown below.

	Runoff Ratio	Specific Discharge (m ³ /sec/km ²)
Achacachi	0.269	0.00715
Upper	0.531	0.01420
Middle	0.268	0.00720
Lower	0.258	0.00697

(4) Available Water

Probability analysis of the available river surface flow at each diversion point and the Achacachi gauging station was carried out based on the monthly mean discharge estimated at each point on the river course of Rio Keka. The analysis was made on each month for the high water year (probability of exceedance for return period of 5 years), average water year (probability of exceedance for return period of 2 years) and low water year (probability of non-exceedance for return period of 5 years). Calculation results are shown below. In the calculation, intake volume of diversion point(s) located at the upper stream reaches is deducted in case of the runoff at diversion points. As for the Achacachi gauging station, no deduction of intake volume at the upper diversion points is made.

(m³/sec)

		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Achacachi	HW	19.26	24.35	20.37	12.11	5.04	2.09	1.06	0.75	1.67	1.88	4.53	15.06
	AW	11.53	14.93	11.46	6.01	2.68	1.17	0.65	0.52	0.71	0.98	2.45	7.06
	LW	6.91	9.15	6.44	2.98	1.42	0.66	0.39	0.36	0.30	0.51	1.33	3.31
Upper reach (Coromata Alata)	HW	16.46	20.94	17.43	10.20	4.19	1.72	0.85	0.71	0.94	1.63	3.85	12.80
	AW	9.73	12.68	9.62	5.00	2.20	0.95	0.51	0.49	0.60	0.83	2.06	5.90
	LW	5.75	7.67	5.31	2.45	1.15	0.53	0.31	0.33	0.38	0.42	1.10	2.72
Middle reach (Putuni)	HW	16.48	20.98	17.43	10.03	3.95	1.43	0.58	0.48	0.69	1.36	3.63	12.69
	AW	9.73	12.74	9.62	4.82	1.97	0.73	0.28	0.27	0.38	0.57	1.83	5.70
	LW	5.74	7.73	5.30	2.32	0.99	0.37	0.14	0.15	0.20	0.24	0.92	2.56
Lower reach (Belen)	HW	16.37	20.89	17.36	9.90	3.81	1.27	0.63	0.34	0.55	1.26	3.53	12.65
	AW	9.59	12.62	9.48	4.68	1.84	0.60	0.11	0.13	0.24	0.38	1.69	5.55
	LW	5.62	7.62	5.18	2.21	0.89	0.28	0.02	0.05	0.10	0.11	0.81	2.43

HW : High Water Year AW : Average Water Year LW : Low Water Year

(MCM)

		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Achacachi	HW	51.59	58.91	54.57	31.38	13.50	5.41	2.83	2.00	4.32	5.03	11.75	40.32
	AW	30.89	36.11	30.68	15.58	7.18	3.03	1.73	1.40	1.84	2.62	6.36	18.92
	LW	18.50	22.14	17.25	7.74	3.81	1.70	1.06	0.97	0.79	1.36	3.45	8.88
Upper reach (Coromata Alata)	HW	44.09	50.67	46.68	26.43	11.21	4.46	2.28	1.90	2.45	4.38	9.97	34.27
	AW	26.05	30.67	25.76	12.96	5.89	2.47	1.37	1.30	1.56	2.23	5.33	15.81
	LW	15.39	18.56	14.21	6.36	3.09	1.37	0.82	0.89	0.99	1.13	2.85	7.29
Middle reach (Puluni)	HW	44.15	50.76	46.69	26.00	10.57	3.72	1.54	1.28	1.80	3.64	9.41	33.99
	AW	26.05	30.81	25.76	12.49	5.28	1.89	0.76	0.72	0.97	1.52	4.74	15.27
	LW	15.38	18.70	14.21	6.00	2.64	0.96	0.37	0.41	0.53	0.63	2.39	6.86
Lower reach (Belen)	HW	43.85	50.54	46.49	25.66	10.19	3.29	1.68	0.91	1.44	3.38	9.15	33.88
	AW	25.70	30.53	25.40	12.12	4.92	1.55	0.29	0.36	0.62	1.01	4.38	14.86
	LW	15.06	18.44	13.88	5.73	2.37	0.73	0.05	0.14	0.27	0.30	2.10	6.51

HW: High Water Year AW: Average Water Year LW: Low Water Year

(5) Groundwater

Measurement results of groundwater level in the Study area was about 2m to 3m on an average from ground level in December. Groundwater level declines about -2m in July to October compared with the water level in December. With these groundwater level of the rainy season and its changes in the dry season, it can be considered that development potentials of shallow wells for small scale agricultural use.

(6) Flood Discharge

The flood discharge at the Achacachi station (catchment area of 868km²) was estimated by the rational formula method, based on maximum probable 24-hour rainfall data in the catchment area. The result is shown below

Return Period (yr.)	Peak Runoff (m ³ /s)	Duration Time (hr)	Rainfall Intensity	Value of f	Value of C	Specific Q (m ³ /s/km ²)
100	143.13	16.56	0.73	0.8	200	0.16
50	127.54	17.24	0.65	0.8	200	0.14
20	107.26	18.31	0.55	0.8	200	0.12
10	92.03	19.32	0.47	0.8	200	0.10
5	76.59	20.61	0.39	0.8	200	0.09
2	53.74	23.33	0.27	0.8	200	0.06

The design drainage discharge is also estimated by rational formula method based on 24-hour rainfall data. The result is shown below.

Return Period (yr.)	Unit Drainage Q (l/sec/ha)	Peak Drainage Q (m ³ /s)	Value of f
100	9.53	7.62	0.75
50	8.86	7.09	0.75
20	7.95	6.36	0.75
10	7.22	5.78	0.75
5	6.42	5.14	0.75
2	5.14	4.11	0.75

3.2 Regional Administration

3.2.1 Administrative Jurisdiction

(1) Introduction

The concept of development policy of the government of Bolivia has recently been shifting its emphasis from centralization of administrative power to decentralization.

This change is quite revolutionary, but only a logical follow-up of the consequence of the land reform of 1953. The following three laws had been promulgated successively during 1993 and 1995.

- 1) The Law on the General Plan of Socio-Economic Development (The Law No. 1493), Sep. 1993.
- 2) The Law of Popular Participation (LPP) (The Law No1551), Apr. 1994.
- 3) The Law of Decentralization of Administration (The Law No1551), Jul. 1995.

(2) Departmental Prefecture Level

Bolivia consists of nine departmental prefecture. The organizational chart of prefecture is given in Fig.3.2.1. There are two intermediate levels of regional administration, a province and a district, between a prefecture and municipalities or communities. A province is governed by sub-prefect, and a district is governed by corregidor.

(3) Municipality Level

Its organization chart is shown in Fig. 3.2.2. Following the promulgation of the LPP, the head municipalities of provinces have been entrusted the administration and management of the development process of the provinces.

Each Head Municipality of the Province manages to communicate with Basic Territorial Organizations (OTB) within the Province in which it is located through a coordinator of OTB to facilitate execution of public works.

(4) Basic Territorial Organization (OTB) Level

It consists of three types of community. They are:

- 1) farmers community (CC),
- 2) indigenous community (PI), and
- 3) neighbours assembly (JV).

(5) The Departmental Prefecture of La Paz and the Study Area

The Departmental Prefecture of La Paz consists of 20 provinces, in which nine are on the high plateau. The Study area ranges between Omasuyos Province and Los Andes Province. 21 out of the total 31 communities are located in Achacachi district of Omasuyos province, six in Huarina district (Omasuyos province), two in Villa Asuncion de Corpaputo district (Omasuyos province), and one each in Villa San Juan de Chachacomani districts and Kerani districts of Los Andes province.

3.2.2 Budget

(1) General

1) Departmental prefecture (DP)

- (a) Its revenue is transferred from the central Government Bourse.
- (b) 25 percent of the Energy Tax of the central government is allocated to the revenue source of the DPs.
- (c) Further for those whose revenue is less than an average, prefecture compensation fund will distribute subsidy.

2) Municipality

- (a) 20 percent of the national tax levied from the said Municipality is a rebate to the said Municipality.
- (b) A Municipality is to hand over the subsidy received to its OTBs according to the number of members.
- (c) A Municipality is to invest more than 90 percent of its own revenue.

(2) Departmental Prefecture of La Paz

The new five year development plan (1997-2001) will have been approved by the end of January 1997.

(3) Municipality of Achacachi

Investment plan for Omasuyos Province in 1996 is as follows;

Item	Inversion		Pre-inversion	
	No.	Bs.	No.	Bs.
Mejoramiento de la infraestructura urbana	22	1,051,006	17	165,998
Conservación ampliación de vías urbanas	7	178,500	7	132,329
Servicios de salud	7	376,054	0	0
Saneamiento básico	16	2,098,594	16	238,627
Servicio de educación	45	6,594,747	1	13,100
Ampliación de infraestructura deportiva	20	245,104	4	43,116
Incremento de la capacidad productiva	2	28,000	9	160,231
Apoyo al sector agropecuario	4	105,976	2	13,100
Fortalecimiento municipal	8	672,792	0	0
	131	11,350,773	56	766,501

3.3 Rural Society

3.3.1 Community

(1) General

A "community" used to be a social organization that was a territorially localized with several or more groups of the different clans, through which its members conducted most of their daily lives and dealt with most of their common problems. The members were closely interrelated within a community and shared the common services such as school, hospital, means of transportation, etc. The members were expected to fulfill their respective roles to achieve their common goals in their unity. Osborne (1954) explained with respect to the conditions existed by 1953, "Indian communities are organized in traditional *ayllus* or *clans*, which are controlled by *j[h]ilakatas* (headmen) or *mallcus*. Although these enjoy no official recognition, their moral influence is often very strong."

By the Agrarian Reform Law in 1953, the traditional communities were legally acknowledged and assured their existence, the function as social organization remaining the same. The communities were, by the Law, authorized their roles to represent officially the common interests of the members through their representatives. Another role of the communities was designated as to promote the well-beings of the members with the following subjects:

- a) education in and outside school
- b) improvement of housing and living standards
- c) protection of health and sanitation
- d) improvement of production skills and social and economical status
- e) acilitation of the cooperative systems, through which the individuals may be

able to practically contribute, to initiate the development programs for their own areas

In 1994, the Participation Popular Law conceded the legal right to the communities. The Aymara's traditional communities then became the lowest administrative entity, *organizacion territorial de base* (OTB). A coordinator, as a representative of the community, is to be placed at each OTB to supervise the public works implemented by the relevant municipality. The communities are also expected to plan and propose the works for their own development. The Law aims to assure the opportunity to participate into the public administration equally for all the nationals. Although it is not easily evaluated whether the Law has been successful to achieve this objective, the Law is clearly significant for the communities to have established their status as the political as well as social organization.

In addition, the Decentralization Law was issued in 1995 to transfer many of the functions of the central government to the departments and lower administrative organizations. Accordingly, the communities are at present allocated to the budget to promote their own development activities, which are subject to the approval from the municipal authorities. It is pointed out, however, the capacity of the communities still needs to be improved to be able to manage those activities.

The Inla Law, the new land law, was promulgated in October 1996 by the government. This Law comprises legislation to improve the land tenure and tiling systems and the creation of a national agrarian reform institute to be responsible for such tasks.

(2) Organizations

The community administration is headed by the secretary general. Under the secretary general, there are several secretaries of which the number and titles differ among the communities. For example, Coromata Alta has the secretaries of justice, acts, treasury, propaganda, sports, education, vocal, and transportation, while Icrana has the secretaries of justice, acts, and public relations. This administrative authority is called the agrarian syndicate. Some of the secretaries, including the secretary general, in the agrarian syndicate officially represent their own community and form the sub-central administration with the neighboring communities. The sub-centrals are located under their relevant Canton administration.

The secretaries of general and others are annually selected from the residents, by the vote of all adult members in the community. For example, Barco Befen is divided into three sections each of which has the candidate who either runs for by himself or is recommended by other people. People vote for one of the three candidates. The elections in this and other communities usually take place at the very beginning or end of the year.

(3) Information Flows

The meetings are often held among the community members, as the Aymara society places a great emphasis on mutual consent in decision making for the issues important for their community. The meetings are basically called by the secretary general or other syndicate members. The community members gather at *sede social*, the community head office, or school in the community at the time of the meetings. If the community has no such facility, they use somebody's house, road, hill, or other open places. The heads of families, usually men and widows, are supposed to attend the meetings. Young people, if more than 15 to 18 years old, can attend the meetings, although they are rarely given the opportunity to speak if they are not married.

Many community leaders mentioned that they seldom convey their messages

directly to the government. When necessary, the secretary general and other sub-central members discuss with the canton authorities, *corregidor*, at the regular or ad hoc meetings. The canton is basically responsible to convey the messages from the communities to the higher authorities.

(4) Conflict Resolution Mechanism

According to Drzewuebecki (1995), there are, in general, three jurisdictional levels in the traditional community of the Andes. The lowest level is authoritative members of the kinship group. At this level, the conflicts which can be dealt are those happened within the same family or the same kinship group and do not affect the community as a whole. Those who are directly in charge to solve the problems are usually the elders of the family or the kin group concerned.

The next level is a community authority which includes two basic types. The first type is the traditional authority. The structure of the traditional authority is hierarchically arranged with the members composed of the community males. The term of the individual duties is usually one year. The highest level of the traditional authority is called a *hilakata*, or *jilakara*. The *hilakatas* traditionally form an informal council of elders to whom people could bring their serious concerns. The second type of the community authority is an officially recognized authority. The highest level of this authority is the chief of the community who is annually elected. The patterns of the conflict resolution mechanism vary if a community has both the traditional and the official authorities.

However, the highest jurisdictional level in the community is always a community assembly. The community assembly is to deal with the conflicts that affect the community as a whole. The meetings and its facilities have, therefore, the significant meaning for the community administration in the Aymara society. In case the community assembly fails to solve the problems, the issues are brought out of the community to the canton or the higher level judges located at the capital of the province and then to court in the departmental capital.

Drzewuebecki also explains that the procedures of the conflict resolution are more or less standard in the Andean society. A problem is discussed with everyone involved before any kind of meeting is held. The more serious the problem, the more people are consulted, as it is likely to affect the whole community. The goal of the conflict resolution is to find a compromise or reconcile between the parties concerned rather than to seek equity or just distribution. "Equilibrium is a very important element in Andean political thought and the re-establishment of equilibrium is the goal and ideal in the resolution of all conflicts with the community."

Looking at the situations in the Study Area, the above description, especially concerning the jurisdictional structure, would be well applicable to the communities involved. For example, in the communities of the Study Area, there are the traditional authorities of which the chiefs are *hilakatas*. There are also the officially recognized authorities, called the agrarian syndicates. In addition, the community meeting itself is considered as the community assembly, which should be the most important organization to manage the community activities.

(5) Communal Work

Drzewieniecki writes that the Andean customary rules govern all aspects of the community life such as family relations, quarrels, exchange of goods, labor, land and other property, water, etc. "Customary rules are based on Andean principles of reciprocity, duality, and equilibrium."

One of those examples in the Study Area is the communal work through which

the community members (at least the heads of the families) provide labor for the benefit of the community such as construction and maintenance of roads, irrigation canals, or other community properties, without receiving any payment. In case the heads of families cannot participate, their wives shall work. In Belen community, all of the families usually clean irrigation canals twice a year. If they cannot participate into this work, they are asked to employ somebody else to work for them or pay fine (BS 20 to 30). Otherwise, they are not allowed to use irrigation water. In Chachacomani, they are not imposed to pay fine even if they do not participate. Instead, they are given some other works to do for the community.

(6) Mutual Assistance

Another important customary rule is the mutual assistance, *aine*, by which the community members help each other, especially when they are lack of labor for their farming and construction work. For example, when some community members work for somebody else to cultivate or harvest crops, those helped will work for those helping in return (exchange labor). Similarly, when some members bring some gifts for somebody else's wedding, those given will bring the gifts to those giving, at the same amount or more than initially given. According to the community leaders, the *aine* is applied only within the same community, i.e., the community members never exchange labor with the people outside their own community.

The customary rule of *aine* is not, however, seen in all the communities in the Study Area. Some communities pay with the products or money if they are helped. In the Aymara culture, it is called *minka* which is considered as the way to reward for the services they have been given. Through the system of *minka*, people clearly know and mutually agree what they have to do and what they will get in return. Both *aine* and *minka* systems are derived from the reciprocal concept of the Aymara's society.

3.3.2 Nature and Religion

(1) Pachamama

The Aymara people have historically rendered the special homage to earth, which has made *Pachamama*, Lady Earth, a true goddess. *Pachamama* is a goddess of good and evil, who can bring good luck or disaster, and therefore not only adored but feared by the people. According to Kolata (1996), for example, *Pachamama* is hungry and must be satiated in August. If she is satisfied, she will feed at the dawn of a new agricultural cycle. If she is not fed and feted, she will walk across the land destroying fields and canals.

The Aymara people sponsor two great festivals, one in August and September during the time of planting, and the other from January to February when the land is plowed for the first time to prepare it for planting in the following year. At the time of those festivals, *Pachamama* is perceived to be open to direct communion with human beings, and therefore receives water, seed, prayers, and ritual offerings. The offerings usually contain coca leaves, alcohol, wool, etc.; incense, and sometimes sacrifice llamas. The Aymara people, both men and women, consider those festivals really important, and enjoy drinking, dancing, and singing for days and nights.

(2) Religions

The main religion of the community members is Catholic. According to the survey results of the local consultant, 82% of the families are Catholic and 13% are Protestants. On the other hand, 58% of the families believe *Pachamama*.

3.3.3 Relationships Among Communities

The economical cooperation among the different communities is seen in order to distribute river water for irrigation. There are already two water users' associations organized by the communities located in upstream and middle/downstream areas respectively in the Study Area. The details of those water users' associations are described in the relevant sections. The political cooperation is also seen in order to manage the communities, basing on the sub-centrals which several or more neighboring communities organize under the canton administration. As mentioned above, however, the cooperation through the *aine*, the exchange labor, is not extended across the different communities in the Study Area.

In some cases, there are (or were) the problems between the communities. Most of the cases are attributed to two major issues; land border and irrigation water. Since the land border is not clearly recognized, the conflict sometimes arises. According to Pongon Huyo, Corpoputu, Casamasaya, and Pongon Huyo communities used to be one community, and it was divided into three communities at the hacienda time. Until now the border line has not been fixed yet, which sometimes causes the conflict among those communities. Suintia Grande had the land border problem with Marca Masaya 4 years ago, and fortunately it was reconciled by the *subprefecto* of the province.

Several communities mentioned that they have (or had) the conflict with other communities on the distribution of irrigation water. For example, a community does not allow the neighboring community to use irrigation water; a community has suddenly stopped supplying water to another community; a community is taking water without permission, etc.

Although it is difficult to identify how serious those conflicts are, the special attention shall be paid to the issues concerning the land border and the distribution of irrigation water.

According to Food Against Hungry (NGO) which has been working for a long time in Altiplano, the communities are in principle independent and do not positively cooperate with other communities. There are often conflicts between communities mainly because they are not accustomed to accept the new or different ideas and thoughts brought from the people in other communities or societies. It was suggested by this NGO that the balance between communities be carefully observed and the current social systems be well maintained.

3.3.4 Experience in Punata-Tiraque Project by GTZ

This project had the problem in coordination between two provinces, Punata and Tiraque. At the beginning, the project was proceeded without an agreement of those two provinces on the contents of the project, although it included the development of the new water resources through the construction of dams. The two provinces did not accept the initial plan of how the water should be distributed, and at last, it took two years to solve the problem. The solution was actually left to the provinces, let the project itself not intervene the process. It is suggestive from the experience of this project that the new projects, especially related to water resource development, should include the beneficiaries from the initial stage, and respect the existing mechanism of conflict resolution in the society. If the new water resources are to be developed, the sufficient time shall be allocated to obtain the agreement from all the people concerned.

The project is currently operated by two provinces independently with their own associations. Each association manages the matters of the communities in each province. If the coordination between two provinces becomes necessary, the issues are discussed in the project meetings. If those meetings cannot solve the problems, those are returned to

the relevant communities to discuss again. The project does not intend to integrate two associations into one organization (as the form of the project coordination unit), as it is understood that each association is well aware of the specific conditions of the area and people, and therefore is able to manage the problems properly. This system includes the important lesson that the existing organization should be maintained to control the peculiar people and areas, which would be much better than letting all problems be managed by the newly established organization.

3.3.5 Land Tenure

With the establishment of the Agrarian Reform Law in 1953, farmers, including the landless and small holders, were given the ownership of land, on the condition that the land is used for cultivation. The sizes of land holding per family currently range from 28 ha to 0, according to the survey result by the local consultant. The majority of people, however, own less than 3 ha. If people do not possess any land, they work on the others' land as tenants or borrow the land.

The ownership of the private land usually belong to the heads of family. In some cases, it belongs to both husband and wife. When the husband dies, the land ownership is often transferred to their children, both sons and daughters, or only sons. In the fewer cases, wives become the land owners solely or share the ownership with children. Through the interview to the community people, it became clear that they are not worried too much if they own the land legally or not. For example, they often say that the land belongs to them after the land has been given to them verbally, even if the legal ownership of the land is yet to be transferred. One widow explained that her land legally belongs to her sister, but she is not worried because it would be transferred to her son in future without problem.

3.3.6 Poverty

(1) Situation

The magnitude of poverty at the canton and higher levels in the Study Area is calculated, with the incidence (the proportion of the poor households in the area) multiplied by the intensity (average level of NBI {*Necesidades Basicas Insatisfechas*: Unsatisfied Basic Needs} of the poor households in the area). It is indicated that the Canton Cháchacomani belongs to the lowest (poorest) 1/3 strata in the Department of La Paz (142nd poorest among 435), the Cantons Kerani and Huarina belong to the middle (177th and 303rd respectively), and the Canton Achacachi belongs to the highest 1/3 strata (402nd).

The social conditions of the cantons in the Study Area are, in most of the cases, worse than those in other areas. For example, more than 95% of the households in the Study Area are not equipped with an adequate facility to obtain potable water, sanitary services, and/or sewage system, while 74% of the whole households in the county are not. According to the data, the condition of the Study Area is the same or slightly better than other areas in the country only with respect to the housing space.

(2) Population Movement

There are some communities such as Coronata Baja, Cala Cala, etc. whose populations are decreasing due to emigration to the cities. On the contrary, there are communities such as Avichaca and Belen, suffering from a population increase, which has caused the decrease of the cultivation land per family.

According to the community leaders, the reasons of the emigration to the cities were a) poor agricultural production, b) lack of agricultural land, c) no income generation

opportunity, and d) natural disasters. On the other hand, there are people who have immigrated into the Study Area, with the reasons such as a) living near school, b) looking for income generation opportunity, c) purchasing the land, etc.

(3) Social Stratification by Local People

Concerning the question about the proportion of rich, middle, and poor households, none of the community leaders except Belen replied that there is any rich family in their own community. In the case of Belen, the rich families correspond to the absent land owners, who generally live in the cities. Some communities think that most of the families are in the middle class, while some others consider that the majority of them are poor. The perceptions vary from community to community. However, the community people have the common benchmark on what distinguishes between the rich and the poor; either the number of cows or the size of the lands each family possesses. Those who do not possess the land and work as tenant farmers, and those who have less number of livestock than other people, are obviously considered as poor. In a few cases, the households in the middle class are referred to those who have any income source, such as milk and cheese production, or an opportunity of irrigation.

(4) Perceived Process of Impoverishment

As discussed above, the perceptions of the community people concerning poverty are commonly based on land size and number of livestock. This is closely related to the problem of increasing family population. For example, the land which a family possesses is inherited among its children, through which the size of land per person often decreases generation by generation. When their land gets smaller, the number of livestock they can feed also decreases. At this point, the new generation is losing their own assets. Their living conditions would get worse, if not the same, if they rely merely on the current agriculture system.

None of the community people feel that their living conditions are getting better recently. According to them, the reasons of no improvement are: meager agricultural production, no improvement of farming system, poor quality of livestock, poor health condition of family members, lack of labor, lack of land, loss of livestock by lightning, many children to take care, increasing burden of school expenses, etc.

Some patterns of impoverishment in the Study Area could be inferred from those perceptions of people. When a family rely merely on agriculture, land size, poor production, quality of livestock, etc. are the major deciding factors of their living conditions. The population pressure, natural phenomena, the number of family labor, their health conditions, etc. are closely related to those factors. When a family has somebody to work in the cities, the living conditions vary according to how much he or she can earn. The availability of family labor and their skills are therefore important. It is obvious that the improvement of the deciding factors will largely contribute to improve the living conditions of the families.

(5) Means of Local People Against Poverty

1) Common Practice

The community people have various means in general to cope with poverty. The following forms were identified at the site:

- a) Some of the family members, usually men, work occasionally in the adjacent communities as unskilled labor. Those work in Canton Huarina earn BS 10 to 15 per day.
- b) Either men or women help other families in their own community for any kind,

such as weaving bed covers/mats/clothes, spinning, constructing, cultivating land, harvesting, taking care of livestock, etc. mainly on demand from the neighbors or community leaders. Those who weave for other families earn BS 5 per day or BS 20 per one bed cover. Those who work as labor in the community earn BS 8 to 15 per day or get paid by products. The families who take care of livestock of other families are unpaid, if not paid by products, but are given a half or a whole number of the new livestock if their livestock gives birth.

- c) Some members, usually women, buy cheese at the local market and sell in the cities. One interviewee (widow) buys 50 pieces of cheese at the price of BS 2.5 each and sell them in La Paz at the price of BS 4 to 5 each. On the contrary, one husband mentioned that he occasionally buys toys, dishes, etc. in La Paz and sell them at the local market.

People can borrow money or products from their relatives or neighbors in the community with the range of 0 to 3% interest rate per month. The returning period is usually as long as 6 months. Cattle and/or land are used as bond to borrow money, if required. They, however, rarely use the credits from outside sources. Among 14 households interviewed, only one has ever borrowed money from outside, and only one has ever borrowed products from a merchant and worked for him/her in return.

Some community leaders, but not all, explained that the community members sometimes help those in difficulty in their community with food or money, if requested by the secretary general, although this is not a common practice. This is considered as a kind of *aine* custom.

2) Against Food Deficiency

If they cannot produce enough food, people usually buy or exchange food with products at the markets, sell own cattle, or at last migrate to the cities temporarily or permanently. In case of the lack of both food and money, the community leaders think that they have no other ways than working harder. Some poor families keep off hunger only with chewing coca leaves.

3) Against Sickness

If some member of a family gets sick but they do not have enough money to buy medicines or go to hospital, many of them use natural medicines that are available around the residence. They sometimes consult the *yatiris*, the shamans, to take care of the sick. The *yatiris* are a kind of the traditional counselors, and sometimes the fortunetellers, who can deal with serious concerns of the community as well as the individuals. The *yatiris* use herbs and pray to a god to cure the sick. The charge is usually BS 5 to 20. If not the *yatiris*, some families rely on the *curanderos*, the traditional healers. The *curanderos* are specialized in healing both body and soul of the sick with natural medicines as well as with the charm.

The *yatiris* and *curanderos* are, however, not always respected by the community people, especially those who have negatively experienced. It is observed that the tradition of *yatiris* and *curanderos* is disappearing in the Study Area. Nevertheless, most of people do not believe the treatment of hospital either. Some of them have never used hospital mainly because they fear the expense for the hospital.

(6) Needs to Escape From Poverty

It has been observed that the improvement of land productivity, improvement of livestock, implementation of family planning, etc. are important to raise the living standard of the community people. In addition, people express other needs which would

enable them to escape from poverty. It is important to consider if those needs could be included in the Project's activities, most possibly through the activities of the community revitalization centers. The needs from the community people include the following:

- Provision of agricultural machinery (tractor, harvester)
- Provision of weaving machines and sawing machines
- Provision of training for the skills related to income generating activities, such as carpentry, tailoring, plumbers, electricity, ceramic production, etc.
- Promotion of small enterprise activities (dairy milk production, balanced feed production for cows to have better milk and cheese, etc.)
- Supply of electricity to enable people to work at night
- Provision of health care (education program, sanitary post, and pharmacy)
- Promotion of trading of their products (cheese, onions, etc.) at the valley area
- Construction of latrines to prevent illness
- Provision of clean water (potable water, washing livestock, etc.)
- Provision of training with women for cooking and weaving

(7) Other Important Problems

There are other problems to be taken into account to improve the living conditions of the community people. Those are summarized in the following, according to the results of the interviews and site observations:

a) Education

- People do not have enough money to buy school equipment and uniform, and therefore cannot send their children to school or continue to do so.
- People do not feel comfortable to speak and write, even though they finished at least the primary school.
- The conditions of the roads to school are bad, which make it difficult for children to commute during rain.

b) Health

- The infant and child mortality rates are high. Among 14 households interviewed, 7 households experienced that their children died in the past.

c) Basic Services

- The quality of potable water is not good because the livestock use the same resources.
- People cannot use the electricity even if it is equipped, because they do not have enough money to pay.

3.3.7 Women's Situation in the Study Area

(1) Division of Labor

It has been observed in the existing literature that there is no gender distortion between men and women for agriculture and livestock work in the Aymara's household. There can be seen, however, the clear division of work between them. For example, the physical work, such as land cultivation by cattle and yoke, transportation of products to market, etc. are basically conducted by men, while planting seeds, weeding, trading (buying and selling) products, etc. are mostly done by women.

Although both husbands and wives are engaged in agriculture and livestock care, wives are responsible to cook, wash clothes, etc. much more than husbands are. In addition, child care is mostly done by wives, too. According to the interviews to the community people, most of them recognized that the house duties are heavily shouldered by wives, although the wives feel their husbands are cooperative. The wives think that

their work load becomes heavier especially when their husbands are absent because they work in the cities. One woman mentioned that her husband was chosen as the secretary of the agrarian syndicate in this year, which makes the husband travel to La Paz very often, and the wife is now compelled to manage almost all of the house duties.

(2) Economical Status

The survey result of the local consultant shows that wives are responsible to keep money in 55% of the households, husbands in 31%, and both of them in 10%. In most of the cases, the decision of how to use money and other assets is made by husbands and wives together. Both of them feel their opinions are equally reflected on the decisions.

Men, however, generally own more land, which is the most essential asset for rural people, than women. Also, the inheritance custom benefits more men than women. According to the result of the interview, when the land is inherited from the parents to their children, daughters usually receive less than sons do, and in some cases are not given at all. For example, in the case of one family, three brothers received 1.5 ha each, while a sister received only 1 ha when the land is inherited to all children. Generally, one of the reasons that daughters receive less is that people consider daughters will get it any way when they get married. In case of becoming a widow, the land is officially inherited to the children, not to the widow in many cases, after the husband has died. It, therefore, could be said that the status of women is not well protected by the laws and traditions, although the actual economical status between the husband and wife is not much different at the household level.

(3) Social and Political Conditions

Most of the community people interviewed mentioned that they would educate their sons and daughters equally. There is, however, a significant difference among men and women concerning the rates of literacy and school attendance. The educational level of women, especially in the rural area, is actually far lower than that of men.

One husband mentioned that he would stop sending his daughter to the primary school, as his elder son is going to high school and it will give him a huge economic burden. Another family has a daughter who does not go even to the primary school, as her mother is sick and needs help to accomplish the house duties. This daughter has one elder brother and sister and one younger sister, all of who finished or currently go to school. Generally, it is important for parents to keep daughters at home to take care of the house duties, but not to educate them. Sons, therefore, could complete school more easily than daughters because of the family's preference.

Both men and women think their relationship in the community is fine. Women also participate into the meeting, the communal work, etc. as men do. However, most of the community people feel that women are very shy. It is actually observed that women always sit behind men and do not speak out in the meetings. There is a tendency that women are reluctant to speak in front of the group of men and women, but most of women express their opinions well if it is only in the group of women or in a family. It, therefore, can be said that the women's presence in a society is not as strong as the one in a family.

Although there are female hilakatas, the female secretary generals or other secretaries are rarely seen in the Study Area. The following reasons were raised by both men and women concerning why the community leaders are commonly men:

- a) Men are more respected than women.
- b) Men can handle matters well. Women are less educated than men and

- sometimes are not able to think, read, and write well as men do. Even if women can do the job, they need men's help.
- c) Women are not confident to accomplish the duties.
 - d) Women cannot express their opinions well because they are not accustomed to.
 - e) Leaders have to travel to La Paz often, which makes difficult for women to be leaders as they have many house duties.
 - f) This is the custom. People generally prefer men to be leaders.

Women who have an experience to be leaders think that women are also capable and can perform their duties well. It was, however, observed that the way of thinking of the majority of Aymara men as well as women is still conservative concerning women's standings. It is, therefore, considered necessary to educate people (both men and women), if women's social and political status is to be raised.

(4) Suggestions

It is suggestive, from those observations, some kinds of training or educational programs are essential in order to provide some skills as well as confidence with women, if women's status is to be raised. The programs to provide women with the basic skills to improve the quality of their common life, such as cooking, weaving, sawing, spinning, nutrition, speaking, writing, etc., will also greatly contribute to achieve the objective. The needs of those skills were actually raised by the community people.

It would be effective and efficient to have women organized and received those programs. All women interviewed agreed to receive some kinds of educational programs through organizations, and they feel they have enough time to participate into those activities.

3.3.8 Community Center

All of the community people interviewed agreed to have the community revitalization center constructed by the Project. They feel that it would be very useful if some capacitation programs were provided to them through the center. However, most of them want the center to be built in their own community. They mentioned not many people would utilize the center if it is located in the other community, because it would be not only far for them, but also difficult to manage with the different communities. As the Project does not plan to have the centers constructed in all communities, it is necessary for the Project to explain constantly the community people, concerning the objectives and expectation of the center as well as the necessity of people's cooperation beyond their own community, until they understand those issues clearly.

3.4 Agriculture

3.4.1 Actual Land Holding by Farmers

Farm land size in each farmer on the average shows rather large (4 -6 ha) in the upper basin, and small (1.5-3.0 ha) in the lower basin of Rio Keka. The communal land is not yet divided in the upper basin, however, most of it has been divided into individual use in the lower basin.

There are a lot of small communities in the lower-middle basin, where most farmers were allotted two ha to each by the land reform in 1953. In those areas, the trend of both sides division, smaller and larger, is seen. Some farms show the subdivision by generation to generation, and others show the enlarged farms by getting more land.

The subdivision of land is the most remarkable in the lower basin, where most of

farmers hold 1.5-3.0 ha by allotment of communal land although the 80% of farmers legally hold less than one ha each. The farmers at Belen and Barco Belen can make use of inundation land (approx. 1,200 ha) in the lakeside of the Titicaca, in order to enlarge the forage crops in dairy farming.

As results of reviewing on the classification of land holding, the land holding sizes are classified by 2 ha of interval in upper and upper-middle basins, and by 1.5 ha of interval in lower and lower-middle basins, into three classes with middle class including the Mode and the Median, as follows;

Basin	0-2 ha	2-4 ha	4 ha-	Basin	0-1.5 ha	1.5-3 ha	3 ha-
Upper	25%	32%	43%	Lower-middle	27%	35%	38%
Upper-middle	16%	43%	41%	Lower	34%	54%	12%

The numbers of farm households in the project area are calculated as follows;

Basin	0-2 ha	2-4 ha	4 ha-	Basin	0-1.5 ha	1.5-3 ha	3 ha-
Upper	114	145	196	Lower-middle	166	215	234
Upper-middle	111	299	285	Lower	344	546	121

Animal husbandry by the traditional agriculture in the study area is another important factor. With the review on the relation between the land holding size and the animal heads of holding, farmers hold five heads (cattle) per ha at small size, three heads/ha at medium size, and one and half per ha at large size farms including medium size in upper basin.

Basin	Farm size	Average land	Animal head	Land extent/ head
Upper	Small	0.6 ha	3.6 heads	0.17 ha/ head
Upper middle	Small	0.7	3.3	0.21
Lower middle	Small	0.6	3.6	0.17
Lower	Small	0.5	4.1	0.12
Upper	Medium	2.8	4.1	0.68
Upper middle	Medium	2.7	5.5	0.49
Lower middle	Medium	2.0	5.9	0.34
Lower	Medium	2.1	6.1	0.34
Upper	Large	5.6	8.7	0.64
Upper middle	Large	6.1	6.4	0.95
Lower middle	Large	4.1	6.6	0.62
Lower	Large	3.9	6.3	0.62

3.4.2 Traditional Farming

Traditional farming is remarked as a farming for self-consuming by crops cultivation mixed with animal husbandry. Self-consuming products are milk, cheese and mutton, as well as crops such as potato, broad bean, quinoa and vegetables.

Annual consumption of potato counts 800-1,000 kg by one family with five members, however, this amount decreases with other self-consuming of grains or milk and cheese, then the actual self-consumption of potato is estimated at 600-700 kg per family. Required extent in potato cultivation for self-consuming is estimated at 0.3-0.4 ha in upper basin, and 0.2 ha in lower basin. Quinoa in upper basin and broad bean in lower basin are the secondary food crops for self-consuming.

Self-consumption of livestock produce can be seen in mutton by 2-4 heads/year per family, with a little more in upper basin (dead one is mostly used for self-consuming). Besides, cheese and fresh milk are consumed for themselves by 400-500 kg/year of milk per family, including the calf feeding.

The distribution of age of farmers, who is in charge for the traditional farming, was reviewed in every basin and farm size. The observation on this is as follows;

- (a) At the class of 0-1.5 ha in the lower and the lower-middle basins, there are lots of old farmers and the second generation, especially in lower basin. Those farmers are brought about by the land subdivision.
- (b) Generally, the class of medium and large size shows more than 70% in the farmers over 41 years. old, however, 40-60% of low rate in the lower basin.
- (c) In the upper and the upper-middle basins, the land size and the age of farmers are correlative, however, they are the reverse in the lower basin.

3.4.3 Crops and Cropping Pattern

(1) Crops Cultivated in Rio Keka Basin

The staple food of Potato and the forage crops of Barley and Oats are cultivated in all of the study area. Broad bean, Onion, vegetable crops, and Alfalfa can be seen mainly in lower and lower-middle basins. While, secondary food crops such as Quinoa, Oca etc. are mainly cultivated in upper and upper-middle basin.

1) Potato

Bolivia has more than 300 varieties of potato, and the area around the lake Titicaca is one of the main productive area, not only by fresh ones but also seeds potato and freeze dried potatoes.

In the study area, Belen Experimental farm is carrying out the national seed program (PROSEMPA; Programa Semilla de Papa), at Avichaca and Barco Belen. Popular varieties are called "Isla", "Sunny", "Rosa", etc.

2) Broad bean

Broad bean is mainly cultivated in lower and lower-middle basins, as a rotation crop with potato or barley (oats). Seeds are mostly self-provided. Growth period is 7-9 months according to the altitude. After the harvest, the plants are made for stack as a winter food of cattle. Yield standard in the study area is 500-900 kg/ha with around 100 kg/ha of seed rate.

3) Onion

Onion cultivation for cash crops can be seen mainly at small communities such as Suntia area in the lower-middle basin. Seed from Peru are sold at Achacachi, which is cheaper than Bolivian seeds. Onion seedlings are also sold at Achacachi market by farmers. Growth period is around 4 months after replanting of seedlings. Harvested onion is shipped to the market with leaves and roots.

4) Quinoa

Quinoa (*Chenopodium quinoa*) is mainly cropped in upper and upper-middle basins. It is a typical Andes crop next to potato as a staple food. There is a similar crop called "Canyahua". Quinoa is strong under the severe soils and climate conditions. The genetics experimental farm is in Patacamaya, IBTA, the national center of Quinoa research. The yield in the study area is around 500 kg/ha with 10 kg of seed rate.

5) Oca

Oca (*Oxalis tuberosa*) is a tuber crop produced mainly in Andes area. It is cultivated in upper and upper-middle basins as a subsidiary food crops. There is also a similar crop called "Papalisa". The growth period is 6-7 months, and the yield is around 2,000 kg/ha.

6) Barley and oats

Barley and Oats are cultivated in all the study area as a main stock feed for cattle in winter. They are stored by making for stack in the field during dry season. The grain yield is very low, sometimes nothing. The hay yield is around 2,000 kg/ha on the average with 100 kg/ha of seed rate.

7) Vegetables

Carrots and Lettuce are most popular vegetables. Green pea (pod), Radish and Acelga (*Beta vulgaris*-leaf vegetable) can be seen also in the study area. Vegetable productions in green houses are seen at the military base at Achacachi, Suntia Chico, Suntia Grande. They cultivate Tomato, Cucumber and Cabbage, too.

8) Alfalfa

Alfalfa is an important forage crop for dairy farm. It is seen lower and lower-middle basins, especially in Belen area. The seed rate is recommended at 12-15 kg/ha by the experimental farm, however, farmers use only 6-10 kg/ha and the yield is low, 2,000-3,000 kg/ha in wet season, by three times cutting. Alfalfa seed is always sold at Achacachi market. The seeds are mostly from USA or Argentine. Suitable varieties of Alfalfa are Bolivia 2,000, Langel, etc. that are resistant to cold weather.

(2) Growth Period

Due to the severe climate (temperature) condition in Altiplano at high altitude (3,800-4,000m), the growth periods of crops are one-two months longer than usual.

Crop	Standard growth period*	Growth period in the study area*
Potato	90 - 120 days	150 - 180 days
Broad bean	180 - 200 days	210 - 270 days
Quinoa	150 - 180 days	180 - 210 days
Barley	100 - 120 days	150 - 180 days
Onion	110 - 140 days	120 - 180 days

* "Manual Agricola" by Ing. Juan Aitken Soux, 1987

** Hearing survey in Agricultural meeting

(3) Crop Calendar

Cropping calendar in every crop was heard from farmers leaders in agricultural meetings as follows;

Crops	Seeding	Harvesting
Potato(irrigation)	Sep. - Oct.	Feb. - Mar.
Potato(non irrigation)	Aug. - Sep.	Feb. - Mar.
Broad bean	Jul. - Sep.	Mar. - Apr.
Quinoa	Jul.(end)-Aug.(end)	Mar. - Apr.
Onion(irrigation)	Jul. - Sep.(transplant)	Nov.(end)-Dec.(end)
Barley	Sep. - Oct.	Mar. - Apr.
Oats	Oct. - Nov.	Apr. - May
Alfalfa	Oct. - Nov.	(1) Jan.(end), (2) Mar.,

(4) Cropping Rotation

- (a) In the upper basin, Alfalfa cultivation is not composed in their rotations. Broad bean cultivation is also very few, then, the rotation is mostly considered for the root crops (Potato, Oca) and the grain crops (Barley, Oats, and Quinoa.), showing 75% of all.
- (b) In the middle basin, Broad bean is usually cultivated prior to Potato or Barley (grain crops). This pattern occupies 61%. Rotation of Barley and Potato shows 23%.
- (c) In the lower basin, much more Alfalfa rotation (14%) can be seen than in the middle basin, Broad bean rotation shows 66%, and Barley-Potato rotation is only 20%.

3.4.4 Mixed Farming System of Crops and Livestock

The size of land holding and farm management have close relations. Generally, small size farmers show an intensive agriculture by labor and capital conditions, while, large size farmers are apt to become an extensive agriculture by land condition.

The large size farmers in the project area mean farmers held more than 4 ha in the upper and upper-middle basins, and more than 3 ha in the lower and lower-middle basins. Those farmers incline to upper basins, where the most of their farm lands are grassland or waste land due to the land constraints such as "Stipa" grass, gravel, and wet land. Their actual crop lands of large size farmers in upper basin show only around 1- 1.5 ha, showing almost the same as in lower basin, and the crops are only for the self-consuming with some forage crops of Barley or Oats. In the upper basin, the crop yields are much lower than those in the lower basin, due to the soil and climate conditions. Therefore, the farming in upper and upper-middle basins is specialized to sheep and cattle raising with making use of natural grassland and waste land. It is also remarked that there are lots of communal land (the right of common), which is not yet divided, in the upper and upper-middle basins.

In the lower basin, farm size is generally small, showing 2- 2.5 ha, however, the soil and weather conditions are much better than in the upper basin. Grassland and waste (or fallow) land show a small extent (less than 0.5 ha) mostly without communal land, since the communal land has divided into individual use for farming except for useless land. There are marketing facilities such as Achacachi city market and the milk collecting system, then, cash crops of vegetables and milk production are developing there.

The major source of farming income is sheep production in upper basin and dairy production in lower basin. Some farmers in small size farms obtain something by cash crops cultivation.

Basin	0-less than 2 ha	2-less than 4 ha	more than 4 ha
Upper	(1) Sheep	(1) Sheep	(1) Cattle
	(2) Cattle	(2) Cattle	(2) Sheep
	(3) Crops for self-use	(3) Crops for self-use	(3) Crops for self-use
Upper-middle	(1) Sheep	(1) Sheep	(1) Sheep
	(2) Cattle	(2) Milk cow	(2) Milk cow
	(3) Crops for self-use	(3) Crops for self-use	(3) Crops for self-use
Basin	0-less than 1.5 ha	1.5-less than 3 ha	more than 3 ha
Lower-middle	(1) Milk cow	(1) Milk cow	(1) Milk cow
	(2) Cash crops	(2) Sheep	(2) Sheep
	(3) Crops for self-use	(3) Crops for self-use	(3) Crops for self-use
Lower	(1) Milk cow	(1) Milk cow	(1) Milk cow
	(2) Cash crop	(2) Cattle	(2) Cattle
	(3) Crops for self-use	(3) Crops for self-use	(3) Crops for self-use

(1) Major source of cash income, (2) Supplementary income source, (3) Self-consuming income

3.4.5 Livestock

Sheep and cattle are the major animals raised in the Study area. It is estimated that 7,300 cattle, 6,000 cows and 24,500 sheep are kept in 2,800 farm household in the area. Llama and Alpaca are seen in the mountainous highland of the upper basin of the Study area. The serious problem on animal husbandry in the area could be summarized to a shortage of feed and poor quality and dwarf type of animals. It is caused difficulty of profitable livestock management due to severe natural condition.

Crop cultivation is possible in summer from September to March when the annual rainfall of 500mm to 700mm is in that period. Therefore cold tolerant crops as potatoes, onions, oats and barley are cultivated though their yields are extremely low. In many years, oats and barley have not even bearing grain and those are harvested as green forage used as hay during the winter.

Total milk production in the Study area is estimated at 1,800 ton per year, an average monthly production 150 ton by the farmers survey. However, PIL Andena reported 216.8 ton in the period of 4 months from September to December 1996 and it becomes about 54 ton per month. Sold amount to PIL Andena is equivalent to 36% of total production and other part is consumed for selling to other buyer, feeding to calves and cheese processing. Animals are traded in market of Achacachi and Batallas. Farmers bring to sell animals and their trade is directly to buyers.

On animal disease, foot and mouth disease (*Aftosa*) and burucellosis (*Burcelosis*) are not seen many and there is no effect of those diseases. *Faciola heprratica*, which is parasite to lever, is the most serious and it was observed many that infection on sheep in the lower basin and caused death of calves. There is no organization for protects animal disease and no technical guidance in the area.

The Study area is able to divide into upper, middle and lower basins of Rio Keka from the point of view of the natural and agriculture and livestock. Characteristics on livestock of respective basins are as follow;

(1) Upper Basin

Land holding in this area is 5 to 7 ha and raising 3 to 4 cattle and 20 to 30 sheep per farm, however, cultivated area is as small as 1 ha. Productivity of forage crops is low and it causes shortage of feed due to colder temperature comparing with the lower basin.

Animals are raised in natural pasture throughout the year and their feed is mainly depending on narrow leave grass as *Stipa*. Sheep eats young leaves in summer and palatability and nutrients of the grass are reduced when hardened in autumn. Cattle hardly eat it. This grass grows a little by receiving moisture from frost and dew in the night and plentiful sunlight even in winter and animal eat it. Therefore in winter period, dried oats is fed but amount of feeds is not enough and malnutrition is significant especially on cattle. It is also observed that low animal quality due to natural crossing by poor quality breeding male.

Mortality rate of calves in upper basin is very high and it is thought that diarrhea, infection from navel string and pneumonia are the causes. Most of farm does not have shed or pen for animals and young animals are weakened. It will expose them to cold and chilly wind as low as 10 degree below zero Celsius and they could die in the winter.

Sales of 2 to 3 sheep and rarely cattle are the only way of cash income because crop cultivation in upper basin is difficult. The prices are low and annual income is less than Bs. 2,000. Annual milk production per cow is 500 to 600kg and milk is sold as cheese due to geographically difficult for selling as fresh milk. Wool is used for home

consumption. This is an average practice of agricultural income in the area.

(2) Middle Basin

Upper-middle basin in east of Cala Cala is similar climate condition as the upper basin and farming type also resemble. Crops are not growing properly and feed shortage and poor quality of animals are major problem in the basin. In the lower-middle basin in west of Avichaca, land holding is 2 to 4ha with animal raising of 4 to 6 cattle and 10 to 20 sheep. Dairy farmers are seen many. They are not able to maintain enough feed due to small land and naturally can not give enough nutrients. Due to malnutrition and poor quality of cow, 4 to 5kg per day at peak milk production and annual production is 600 to 700kg in short lactation period.

(3) Lower Basin

In the lower basin represented by Belen and Taramaya, land holding is 1 to 3ha. This makes difficult of self-supplying feed and there are some farmers purchasing forage. However, there is a movement of improving food nutrient balance by Alfalfa production that is possible by warmer climate comparing with the upper basin.

There are many dairy farmers and milk selling is the base of agricultural income in the lower basin. In the peak of lactation period, milk production of one cow is 5 to 6kg per day. The lactation period is as short as 6 months and annual production is 700 to 800kg. The production is higher than of the other area, however, it is still low for profitable management. PIL Andena is purchasing milk in this area but purchasing amount is lower than of production. It is because milk may be used for feeding calves and home consumption.

3.4.6 Farming Types at Present

According to the major source of farming income, classes of farming types were considered as follows;

	Small size farms	Medium size farms	Large size farms
Upper basin	Type C	Type C	Type A
Upper-middle basin	Type C	Type B	Type B
Lower-middle basin	Type F	Type D	Type D
Lower basin	Type F	Type E	Type E

- (1) Type A; Cattle specialized multi-livestock management;
More than 4 ha of farm size in upper basin; 196 farm families: 1,098 ha
Farm land: 5.6 ha (Grassland: 4.6 ha) on the average
Sheep: 18 heads, Dairy cattle: 1.4 heads, Draft (beef) cattle: 5.3 heads
- (2) Type B; Sheep and dairy specialized multi-livestock management;
More than 2 ha of size in upper-middle basin; 584 families: 2,546 ha
Farm land: 4.4 ha (Grass land: 1.7 ha) on the average
Sheep: 13 heads, Dairy cattle: 2.1 heads, Draft (beef) cattle: 2.4 heads
- (3) Type C; Small size multi-livestock management;
Less than 4 ha of size in upper basin, and
Less than 2 ha of size in upper-middle basin; 370 families: 552 ha
Farm land: 1.5 ha (Grass land: 0.8 ha) on the average
Sheep: 12 heads, Dairy cattle: 1.3 heads, Draft (beef) cattle: 1.2 heads
- (4) Type D; Dairy and sheep specialized farm management;
More than 1.5 ha of size in lower-middle basin; 449 families: 1,389 ha

Farm land: 3.1 ha (Grass land: 1.5 ha) on the average
 Sheep: 7 heads, Dairy cattle: 2.5 heads, Draft (beef) cattle: 3.1 heads

- (5) Type E; Dairy farm specialized management;
 More than 1.5 ha of size in lower basin; 667 families: 1,620 ha
 Farm land: 2.4 ha (Grass land: 1.3 ha) on the average
 Sheep: 3 heads, Dairy cattle: 2.8 heads, Draft (beef) cattle: 3.0 heads
- (6) Type F; Dairy and cash crops farm management;
 Less than 1.5 ha in lower and lower-middle; 510 families: 272 ha
 Farm land: 0.6 ha (Grass land: 0.1 ha) on the average
 Sheep: 1 heads, Dairy cattle: 1.8 heads, Draft (beef) cattle: 1.8 heads

3.4.7 Pest and Disease in Crops and Livestock

(1) Pest and Disease in Crop Cultivation

As for pest and disease, pest damages are often heard in some communities. There are "gusano blanco (*Premnotrypes latinorax*)" and "piojo verde (*Mizus persicae*)". The former enters from leaves into tubers, and in the serious cases, most of the harvested potatoes are affected. The latter infects to other vegetable such as broad bean, lettuce etc. To control them, it is recommend some insecticides (*Novacron*, *Holidor*, *Metasistocs*, *Perfekthion*, *Tamaron*, etc.), however, a complete control is not easy since farmers lose the chance due to delayed finding or due to the difficulty of getting pesticide. Therefore, it is important to grow healthy potatoes by using good seed potatoes with enough cow-dung manure.

Pest and disease in crop cultivation are listed up as follows;

Name (Spanish)	Scientific Name	Control Technology
< Potato disease and pest >		
Sarna común	<i>Streptomyces scabies</i>	To burn the infected area
Sarna polvorienta	<i>Spongospora subterranea</i>	Cropping rotation
Verruga	<i>Synchytrium endobioticum</i>	Water control
Tizon tardio	<i>Phytophthora infestans</i>	Fungicide
Sarna negra	<i>Pellicularia filamentosa</i>	Cropping rotation
Gusano blanco	<i>Premnotrypes latinorax</i>	Insecticides
Piojo verde	<i>Mizus persicae</i>	- do -
< Broad bean disease and pest >		
Mancha de chocolate	<i>Botrytis fabae</i>	Fungicide
Roya o Polvillo	<i>Uromyces fabae</i>	- do -
Piojo verde	<i>Mizus persicae</i>	Insecticide
< Onion disease >		
Roya	<i>Puccinia allii</i>	Cropping rotation
Enanismo	Virus	- do -
< Lettuce disease and pest >		
Mancha bacteriana	<i>Xanthomonas vitians</i>	To use good seeds
Septoriosis	<i>Septoria lactucae</i>	Fungicide
Mildiu	<i>Brenia lactucae</i>	Fungicide
Piojo verde	<i>Mizus persicae</i>	Insecticide

3.4.8 Agro-processing of Freeze Dried Potato

Dehydrated potato processing called "Chunyo" and "Tunta" can be seen in all the areas in the study area in June and July. At the market in this season, most of women sellers are dealing with only chunyo and tunta.

Chunyo, black color one, is easy to be processed. During 3-4 days, the potato is

left in the field, under the sunbeam in daytime and freezing open air at night time, with stepping in order to remove the water. The weight decreases into a quarter of original potato, but the price becomes 5- 6 times.

Tunta, white color one, has a little long procedure to be processed. The potato have to be kept in the water during 40- 45 days. After the immersion, in order to get frozen, the potatoes are put on the open air for one night, and early in the morning they are stepped on to peel out. And during three days, the potatoes are just dried up in the shade without sunlight. The weight decreases into a quarter, but the price becomes 7-8 times.

3.4.9 Fish Culture

According to JICA experts in CIDPA (Centro de Investigacion y Desarrollo Piscicola del Altiplano), the trout cultivation extension program started in January 1997 at Challuyo community in canton Warisata, which is close to Tipampa in the study area, is being satisfactory in progress. The group of around 20 farmers is called "Cooperativa Piscicola Illampu Ltda." The size of the fish pond, which is donated by JICA at the cost of \$5,000, is 1.5m by 5m times 4 units in 1.2m depth.

The 3,000 pieces of fry by 100 g each were put in the pond in January. During these 5 months, 100 g of the fry has grown to 350 g in June. Until now (June, 1997), total 50 kg of large size trout was sold in Achacachi Market at the price of Bs15/ kg. Rough estimates of the budget are shown as follows;

< Production Cost >

- 1) Fry (100 g) Bs 2 / piece #3,000 = Bs 6,000
 2) Fish food Bs 7 / kg #600 kg= Bs 4,200 Total Cash Cost: Bs 10,200

< Gross Return >

- 3) Trout sale Bs 15 / kg #0.35 kg times 3,000 times Bs 15= Bs 15,750
 4) Mortality rate 5% #0.35 kg times 150 times Bs 15= Bs - 788
 Total Return: Bs 14,962

< Net Return >

- 5) Bs 4,762 #20 farmers Bs 238/ family (in 6 months)

3.4.10 Agricultural Production and Farm Income

(1) Unit Yield

The unit yield/ha in each crop is estimated as follows, with the results of farm interview survey by sub-letting work and the review at the community meetings.

Crop	Unit yield / ha	Remarks
Potato	2,500 kg	Upper and Upper middle basin
	2,700 kg	Lower middle basin
	3,600 kg	Lower basin
	5,000 kg	Cash crop farms
Broad bean	720 kg	Dry beans
Onion	1,500 kg	With leaves
Quinoa	500 kg	Grain
Barley/Oats	2,000 kg	Hay
Alfalfa	2,500 kg	Green

(2) Cash Outlay

Farming practice can be understood by cash outlay. Detail costs including self-provided ones are shown in Annex-E. The cash outlay per ha of each crop in the crop budget is listed up as follows;

Potato	(upper/upper middle)	(lower middle)	(lower)	(cash crop farms)
(a) Seed potato	Bs530/870kg	Bs810/560kg	Bs960/600kg	Bs2,000/1000kg
(b) Tractor	Bs25/0.5hrs.	Bs440/7hrs.	Bs100/2hrs.	Bs150/3hrs.
(c) Fertilizer	Bs100/30kg	Bs120/40kg	Bs240/80kg	Bs450/150kg
(d) Chemicals	Bs30	Bs30	Bs70	Bs100
(e) Hired labor	-	Bs80/8m.d.	Bs10/1m.d.	Bs500/50m.d.
(f) Miscellaneous(10%)	Bs69	Bs148	Bs138	Bs320
Cash outlay total	Bs754	Bs1,628	Bs1,518	Bs3,520

Other crops	Broad bean	Onion	Quinua	Barley/Oats	Alfalfa
(a) Seed/ Seedlings	Bs78/98kg	Bs830/83kg	Bs10/10kg	Bs200/100kg	Bs336/8kg
(b) Fertilizer	-	Bs132/44kg	-	-	-
(c) Miscellaneous(10%)	Bs8	Bs96	Bs1	Bs20	Bs34
Cash outlay Total	Bs86	Bs1,058	Bs11	Bs220	Bs370

(3) Crop Budget

Per ha crop budget in each crop is shown as follows;

1) Potato (per ha)

	(upper/upper middle)	(lower middle)	(lower)	(cash crop farms)
(a) Cash outlay	Bs754	Bs1,628	Bs1,518	Bs3,520
(b) Yield	2,500 kg	2,700 kg	3,600 kg	5,000 kg
(c) Price(f.g.p.)	Bs2/kg	Bs1.8/kg	Bs1.6/kg	Bs2 /kg
(d) Gross income	Bs5,000	Bs4,860	Bs5,760	Bs10,000
(e) Net income	Bs4,246	Bs3,232	Bs4,242	Bs6,480

2) Other food crops (per ha)

	Broad bean	Onion	Quinua
(a) Cash outlay	Bs86	Bs1,058	Bs11
(b) yield	720 kg	15,000 kg(with leaves)	500 kg
(c) price(f.g.p.)	Bs0.8/kg	Bs0.5/kg	Bs1/kg
(d) Gross income	Bs576	Bs7,500	Bs500
(e) Net income	Bs490	Bs6,442	Bs489

3) Forage crops (per ha)

	Barley/ Oats	Alfalfa
(a) Cash outlay	Bs220	Bs370
(b) yield	2,000 kg(hay)	2,500 kg(green)
(c) price(f.g.p.)	Bs0.6/kg	Bs0.8/kg
(d) Gross income	Bs1,200	Bs2,000
(e) Net income	Bs980	Bs1,680

(4) Farm Budget

1) Crop extent and animal heads/farmer in each type of farming are shown as follows;

(ha / heads)	Type A	Type B	Type C	Type D	Type E	Type F
(a) Potato	0.4	0.4	0.3	0.4	0.3	0.2
(b) Broad bean	-	-	-	0.2	0.2	-
(c) Onion	-	-	-	0.05	-	0.05
(d) Vegetable	0.1	0.1	0.1	0.05	0.1	0.05
(e) Quinua	0.1	0.1	0.1	0.1	-	-
(f) Barley(Oats)	0.8	0.6	0.2	0.4	0.4	0.1
(g) Alfalfa	-	0.1	-	0.1	0.1	0.1
(h) Grassland	2.2	1.7	0.8	1.5	1.3	0.1
(i) Sheep	18	13	12	7	3	1
(j) Cows	1.4	2.1	1.3	2.5	2.8	1.8
(k) Cattle	5.3	2.4	1.2	3.1	3.0	1.8

2) Farm budget in crop production

Farm budget in each farming type is calculated from crop extent and crop budget every crop as follows. (Cost of forage crops is included in livestock cost.)

(Bs)	Type A	Type B	Type C	Type D	Type E	Type F
(a) Cash outlay	304	304	228	711	473	352
(b) Gross income	2,074	2,074	1,574	2,496	1,614	1,440
(c) Net income	1,770	1,770	1,346	1,785	1,141	1,088

3) Farm budget in livestock production

(Bs)	Type A	Type B	Type C	Type D	Type E	Type F
(a) Cash outlay	248	210	136	246	250	155
(b) Gross income	2,479	2,093	1,352	2,452	2,495	1,550
(c) Net income	2,231	1,883	1,216	2,206	2,245	1,395

4) Farm budget total in each farm

Farm budget in each farm every type is calculated from 2) crops and 3) livestock as follows. (See in detail at ANNEX-E).

(Bs)	Type A	Type B	Type C	Type D	Type E	Type F
(a) Cash outlay	552	514	364	957	723	507
(b) Gross income	4,553	4,167	2,926	4,948	4,109	2,990
(c) Net income	4,001	3,653	2,562	3,991	3,386	2,483

3.5 Agricultural Support Services

Agricultural support services in the study area are generally not sufficient in order to promote rural and agricultural development. Especially an official institutional system of the support services are not practically functioned. However all the services provided in the study area were carried out by NGOs. The support of NGOs is provided to point to point, the systems of support services are applied by community base that organizations are approaching to individual community. Therefore the effect of support services has not been affected to the area.

The national agricultural research, technology transfer and technical assistance strategy are formulating by UPIA (Unidad de Promocion Investigacion Agropecuaria) for strengthening the future national agriculture by the assistance of the World Bank. Their draft of proposal was prepared as "Decentralization System of Research, Transfer Technology and Technological Assistance on Agriculture and Livestock" (Sistema Descentralizado de la Investigacion la Transferencia de Tecnologia Y la Asistencia Agropecuaria - SINITA) in 16 December, 1996.

3.5.1 Government Organization

(1) Agricultural Research

An agricultural research by the official organization in Altiplano is implemented by only two organizations. These are IBTA (Institute Boliviano de Tecnologia Agropecuaria) of La Paz department and the Belen Experiment Station of the UMSA (Universidad Mayor de San Andores) .

1) IBTA (Institute Boliviano de Tecnologia Agropecuaria)

Originally IBTA has started as the national livestock center in 1958, however, it

has been transferred to the prefectural government of La Paz department according to the policy of the decentralization and is located in Patacamaya, Aroma province about 200km from La Paz. The Institute has three research sections, livestock and Forage Crops, quinoa and potato sections. Research staff is five (5) in livestock, four (4) in quinoa and three (3) in potato respectively. Their research works are covered both the national subjects and regional subjects. Major subject of respective sections are as follow;

Livestock & forage crops section	Quinoa section	Potato section
- Sheep breeding	- Genetic resource collection	- Seed production
- Veterinary on camellias (Llama, Alpaca, Vicuna)	- Breeding	- Integrated pest control
- Forage crops adaptability and selection	- Integrated pest control	
- Extension	- Extension	

The institute is considered to be the national center for agricultural research in the proposed plan by the UPIA.

2) Belen Experimental Station -UMSA

The station is located in Belen where is about 3 km from Achacachi municipality in the study area. It is belong to Faculty of Agronomy UMSA (the Universidad Mayor San Andores) after being transferred from the national research station IBTA Belen in 1984. They are conducting four research programs and the subject of each program are shown at the table below.

Program	subject
Livestock and Forage Program (Programa de Ganaderia y Forrajes)	- Milk production - Forage production - Evaluation of 10 alfalfa varieties - Tuberculosis on cattle - Veterinary care
Andean Tubers Program (Programa Tuberculos Andinos)	- Certified seed potato production - Basic seed production - Commercial potato production
Agro-forestation Program (Programa Agroforestal)	- Basic seed production of barley and oats - Forest tree production - Broad bean production - Broad bean seed production - Horticultural crop production in green house
Andean Crops Gemplasm Program (Programa Germoplasma Cultivos Andinos)	- Establishment of germplasm bank(Quinoa, Canahua, Tarwi, Papa, Isano, Oca, Papaliza) - Quinoa and Canahua production

Four technical staffs are stationed. The station has 96 ha of land and 5 ha is for building complex, 66 ha is for research and seed production and 25 ha is not used at present. The budget for the station's activity is covered 70% by their own production.

(2) Agricultural Extension

Belen experimental station has started some agricultural extension services recently by Social Interaction program which is to provide services to the public as follow;

- Training on livestock and agriculture
- Field day
- Transfer technology on Agriculture and livestock
- Direct insemination service
- "Breeding Center" at 4 zones in Belen Community

- Veterinary medicine supply at cost price
- Free veterinary service

The social interaction program of the Belen experimental station is conducting a dairy development at four (4) zones of Belen community where is located adjacent to the station. The activity is "Centro de Monta" which is to improve quality of milk cow. The station has provided a fifty percent (50%) bred bull (Holstein or Brown Swiss varieties), material for constructing a cow shed and technical guidance of forage crop production to each center. The training is provided to youth recommended by Secretary General of surrounding communities which was 30 people in 1996/97 and 25 person in 1995/96. The training programs consist from four (4) cycle that are general knowledge at 1st cycle, feeding at 2nd cycle, milk production at 3rd and management at 4th cycle.

They are planning to start training program for milk production for women in future. The university has a future plan of transfer technology on crop cultivation and rural development, however, it is said that financial source is not confirmed. The station, from the standpoint of technical support by observation, is located suitable access to provide service and support to communities of the entire study area.

During the hearing of the dean of the faculty, He has mentioned that the faculty is to increase manpower and budget soon in order to strengthen the function of the social interaction of the Belen station. Although UMSA technical staffs mentioned in the interview that they are facing problem of shortage of budget and uncertain budget allocation because the university took over the station from IBTA recently.

(3) Financial Support Service

The situation of actual credit provided in the Study area is studied through the questionnaire and hearing in the community and credit institutions. Remarkable financial support for agriculture development by the official institution in the Study area is not seen during the field study except some private credit institution and NGOs' support associating with technical support projects.

1) Participacion Popular

There is new administrative system of financial support for rural and agricultural development. A new policy of Popular Participation Law (Lay de Participacion Popular - LPP) makes a municipality possible to allocate the fund to OTB (Organizaciones Territoriales de Base) according to PAO (Plan Anual de Operacion) which is proposed development plans prepared by communities. The fund is able to utilize development plans such as;

- Improvement plan for education, health and sanitary, sport, small scale irrigation and road facilities
- Improvement and introduction of school, housing, hospital, sport and production facilities in the communities

2) Fondo de Desarrollo Campesino (FDC)

Another official financial support institute is FDC, although there is no case of financing in the study area. The foundation is implementing following programs;

- Investment program for farmers development
- Credit program
- Institutional strengthening to banks and non banks
- Special programs (Cameloids project (Potosi), Potosi Quinoa program)

The foundation provides financial support on three components for farmers development and their activities are as follows;

Program	Activity
Basic Infrastructure	<ul style="list-style-type: none"> - Irrigation and Drainage - Farm road - Bridge for vehicles and pedestrian - Market, shipping center and handicraft workshop - Protection structure - Other basic infrastructure
Basic infrastructure	<ul style="list-style-type: none"> - Irrigation and Drainage - Farm road - Bridge for vehicles and pedestrian - Market, shipping center and handicraft workshop - Protection structure - Other basic infrastructure
Strengthen Institution	<ul style="list-style-type: none"> - Implement organization - Beneficial community - Pre-investment institute

The Japanese government fund of KR2 has been utilized for the foundation. The fund has been used for the Salinas bridge of Reyes Road in the department of Beni and the Ele Ele irrigation in the department of Cochabamba.

3.5.2 Non Governmental Organization (NGO)

Other agricultural support organizations implementing rural development programs in nationwide are NGOs. Registered NGOs to the Secretary National of Public Investment and External Finances in Bolivia is 501 in 1996 and 247 NGOs out of 501 are carrying out activities in La Paz department. Ninety-eight (98) NGOs in agriculture and livestock development, fourteen (14) in credit, one hundred forty-one (141) in education, sixty-seven (67) in environment and ninety-eight (98) in health are working.

(1) NGO Activity in the Study Area

It is found that NGOs are conducting agriculture, forestation and livestock projects in the study area. They had ever been implemented some other projects in the past as well. Vinyl house cultivation at two (2) communities, community forestation at four (4) communities and women's income generation at one (1) community are carrying on at present. A vinyl house program carrying out by CEDEFOA (Centro de Desarrollo y Fomento a la Auto-ayuda) is providing technical support and free material of vinyl sheet, however, local material, such as bricks and wood, and labor works are contributed by farmers.

Community forestation program at upper and upper middle basins is run by a CARITAS and the source of the fund is provided from the USAID food aid program.

An income generation program is targeted to women in Taramaya community and they call the group as "23 de Mayo". Its member was started with thirty (30) originally and is twenty-three (23) at present. CRECER is responsible for the program of this "Credit with organization". The financial sponsor of CRECER is the Freedom from Hunger. The member is responsible for the credit by group. The money is able to use various way as dairy production to small business.

(2) NGOs in Altiplano

NGOs supporting agricultural and rural development in and around the Study area were studied in order to understand their activities and the supporting system.

1) CIPCA

CIPCA is a NGO on rural development in Altiplano. It has been organized originally by the Jesuit (Campana de Jesus), however, now it is a civil association. The organization is supporting at the levels of farmers, municipality and region under the director. Necessary guidance on planning, implementation and management are approached and given to respective levels in order to improve present situation and maintain sustainable development project. They have programs in three (3) provinces (Aroma, Ingavi and J.M. Pando) in Altiplano but no activity in Omasuyos province. They are conducting programs on dairy, artificial insemination, forage crops, pasture and cattle shed in livestock, vinyl house and irrigation in crop production. Their program is not only technical but also credit and subsidy. Their way on agricultural development is that technical support and subsidy are provided by CIPCA and necessary credit is provided through FONDECO. The proportion of subsidy are determined depending on the program extents and a target commodity. They have their own technical staffs who are seven (7) agronomists, three (3) veterinarians, one (1) economist, two (2) sociologists, two (2) educationists and one (1) artificial inseminator of JOCV volunteer.

2) SARTAWI

SARTAWI is background of the Federation of World Lutheran. They have also organized a credit organization named the Servicio Financiero Rural (SFR) and a furniture training center named TIRATA. They are working on rural development, credit, small scale business, livestock and environment. They are carried on technical assistance which are soil conservation by agro-forestry, wool quality improvement of cameloids and small scale business by handicraft. They also have program of training for manufacturing furniture by TIRATA and loan/credit by SFR. Their technical support program is associating with a credit when necessary. The loan/credit scheme runs by the Servicio Financiero Rural is giving a loan with the maximum limit of US\$ 2,000 with an interest at the rate of 2.5% per month (30% per annum).

3) CEDEFOA

CEDEFOA is the one of the NGO working in the study area. They are acting mainly around the area of Titicaca lake basin of La Paz and Oruro Departments. Their major sponsor is the Konrad Adenauer Foundation of the Federal Republic of Germany which is shared 57.2% and other donors, national and international and official and private organizations.

Fields of their activity are community development, gender equity women in rural and urban and cooperatives promotion. Development on vinyl house, sukakollo and community forestation program in Suntia Chico, Suntia Grande and Avichaca are provided in the Study area

4) CARITAS

CARITAS is the Catholic backed organization founded in Rome in 1950 and CARITAS BOLIVIANA has initiated in 1958 officially though has been working since 1955. The organization is working in the middle to upper basin of the Study area and other part in Omasuyos and Los Andes provinces. Forestation project is in thirty two (32) communities in Omasuyos and four (4) community in Los Andes and is funded by USAID's food program. The project in the area has been carried out since 1992 and will be terminated in 1997. After the forestation project, dairy development project is to start by initiating forage production program from 1997 in the same communities.

5) Qhana

Qhana has established in 1977 according to the law of "Educacion Popular" then entered to the field of economic activities since 1983. They had radio station for the purpose of public education in Altiplano. Major financial sponsor is the European Union and other NGOs of France, Switzerland and Holland.

This organization is not working in the Study area but neighboring Los Andes province. Their approach is to CRACA (Cooperativa Agropecuaria Campesino) of the community. CRACA is constructed at several levels as at community, sub-central Agraria, central Agraria and provincial. They apply administrative and technical training programs that necessary to carry out the program to respective level. The administration program is as judicial law, government administration system and political for the provincial level and book-keeping, planing and management for community level for development and project's sustainability. Technical program are animal husbandry, artificial insemination and farm management. They have also conducting training for women in the community on group movement for women's leaders, animal husbandry, agricultural production, weaving, embroidery, marketing, food and nutrition, and health. They have their own training center near Batallas municipality. Thirteen (13) technical staff, agronomist, technicians for artificial insemination, veterinarians, educationist, specialists for communication, gender, training, and administration are working in the field. The staffs are stationed in three areal offices which equipped a wireless communication system among the offices and is also used for supplying necessary input materials such as semen for artificial insemination.

6) Plan International, Altiplano

Plan International, Altiplano is one of the active organization in the study area. Basically their working area is determined where children of the foster parents are there. There are 24 communities receiving the support in Omasuyos province. The office in Achacachi has opened in 1995. The organization carry out not only education field, but also road, irrigation canal, medical care center, portable water, latrine, rural electrification and teachers' training in the study area. The recently solar house program for school was started.

7) CARE

CARE has been started their activity in Bolivia since 1980. Major work of CARE is in potable water and sanitary program in community named PN-17 since 1986 to 1990. The project components were potable water construction and applying five kind of vaccines for children. Total 200 communities in the departments of La Paz, Oruro, Potosi and Chuquisaca and forty-two (42) communities were benefited from the project in Omasuyos province. During 1991 to 1996, Program PN-20 was implemented in 160 communities in the departments of La Paz, Chuquisaca and Cochabamba and one hundred (100) communities in La Paz were benefited by the program. The program was construction of portable water facility, training of sanitary and nutrition and vegetable cultivation in vinyl house. Avichaca community in the Study area is the one of beneficiary of the program in 1994. The community organize the portable water committee and managing the facility. CARE is to start new program of micro credit for women from 1997 to 1998 by the fund of the Freedom from Hunger. The credit is minimum amount of US \$ 100 to maximum US \$ 12,000 with 30% of the rate of interest per annum.

(3) Financial Support Organization

When NGOs apply the project in community, they are preparing either credit or subsidy schemes depend on the activity. They had supplied material, such as vinyl sheet, cement and roofing with free of charge for vinyl house, portable water and latrine projects.

Forestation project was paid by food. Credit project in the study area is only two (2) at present. One is income generation scheme for women in Taramaya community and other is credit for micro-enterprise by the private financial institute PRODEM (Fundacion para la Promocion y Desarrollo de la Microempresa).

1) CRECER

Women's income generation project in Taramaya which is called "27 Mayo" by themselves is organized in 1996 with thirty (40) members, however, it is reduced to twenty three (23) now. CRECER is organized the group by the fund of the Freedom from Hunger. The member has received credit for small business and improving dairy production. The member has responsibility for repayment.

2) PRODEM

PRODEM is the only financial institute in Achacachi city at present due to Foundation SARTAWI has moved their office to Batallas municipality recently and is one of fourteen (14) credit institution in La Paz department, it was started as NGO and now a private credit institution as FFP (Fond Financiado Privado). Major target of the client is micro-enterprise and there are some dairy farmer too. There are nine hundred twenty four (924) clients in the latest report. The largest number was 267 of Achacachi and followed by 85 of Chhipina, 35 of Belen, 30 of Avichaca. The minimum condition of receive credit is 4 to 5 member guaranteed from different family, own any document for identification and age between 24 to 54. The first amount of credit is Bs. 800 maximum in the term of 4 units of 28 days. The rate of interest is 4% per 28 days.

3.5.3 Farmers' Organization

(1) Milk Producer's Association

The dairy development program has started approximately 25 years ago in Omasuyos province by a Danish NGO - "DANCHURCHAID". La Paz Development Cooperation (CORDEPAZ) has reorganized the project with the cooperation of DANCHURCHAID and PMA-Bol (Programa Mundial de Alimento Boliviano-World Food Program) around 20 years ago. In 1995, CORDEPAZ was dissolved according to the policy of decentralization. After the dissolution, all the program supported by the project was suspended.

1) Asociacion de produccion de leche de provincia Omasuyos (APLEPO)

APLEPO (Asociacion de Produccion de Leche de Provincia Omasuyos) was organized in Omasuyos province. Their basic unit in the community level is called "modulo" is organized at community level. In case of Taramaya modulo, five board members are selected. APLEPO's member communities, number of cows and facility are described at table below.

Community	No. of Member	No. of Milking Cow	Tank	Promoter
Taramaya*	137	225	Yes	Yes
Chhipina	233	153	Yes	Yes
Irama Belen*	76	42	Yes	Yes
Jawirlaca*	59	87	Yes	Yes
Avichaca*	140	276	Yes	Yes
Suntia Chico*	37	57	Yes	
Chaura Pampa	76	132	Yes	Yes
Llokoputunc	17	21		
Warisata	17	12		
Tipampa*	43	13		
Barco Belen*	86	111		Yes
Chaura Chico	16	36		

Source : Extracted from APLEPAZ report, April 1997
 * : Communities in the study area
 Tank : Communities equipped 2000 liter tank
 Promoter : Existence of promoter in the community

Their system of activity is that all the product of the association is purchased by PIL Andena in La Paz which is provided vehicles for collecting milk from member communities to tank stations and from tank stations to La Paz everyday. Approximately 500 lit. of milk is sent from Taramaya modulo and 4,500 to 5,000 liters from APLEPO per day. Formerly one percent (1%) of the product is subtracted from the payment for managing milk collection centers and collection, however, they have increased to two (2) percent due to start various services mentioned below at APLEPAZ recently.

2) La Paz department milk producer's association (APLEPAZ)

APLEPA is the organization of milk producers at the department level above the APLEPO and consists from five provincial associations in Omasuyos, Los Andes, Ingavi, Murillo and Aroma as shown at table below. Total member of the association is 9,350 and 1,500 of the member is shareholder of the PIL Andina company. The association provides transportation from producers to PIL Andina. APLEPAZ and PIL Andina guarantee the price and transportation of milk. Credit service is started from 1996 for forage seeds and purchasing concentrated feed. Vaccination service was provided for 8,920 cows since February, 1997. As a future plan, they are trying to provide service of artificial insemination (AI) to the member and taking over the Kayutaka breeding station from the department La Paz which was used as CORDEPAZ property to provide semen and AI training to dairy farmers.

Province	No. of Modulo	No. of Member	No. of Milking Cow	No. of Tank
Omasuyos	14	937	1165	7
Los Andes	29	1468	1743	7
Ingavi	33	1024	1530	3
Murillo	18	878	801	2
Aroma	25	672	1068	0

Source : Extracted from APLEPAZ report, April, 1997

(2) NGO Related Organization

Other organization in the study area is group of community member who are doing some development activity with NGOs. Most of the group are only organized during the project period and its activity is improvement of living condition of the community.

1) Forestation group

This group is organized on the purpose of tree planting. The forestation project is carried out by a NGO named CARITAS Boliviana and its financial source is the food aid program of USAID. The project was started in 1992 for 5 years and is to terminate in 1997. Number of the member during the period of 1996-1997 is 3,440 in Omasuyos province and over 400 in Los Andes province. The communities in Omasuyos province joined to the project are located from upper to upper-middle basins of the study area. Unit of group is not only community but also zone or area in a community.

The process of activity in Coromata Baja was that they had contact with the NGO through a promoter who is a community member, then established a plan of the activity. The program was started from a lecture of the project and technical guidance on forestation then seeds are provided through promoter and prepared seed bed and nursery in each group.

The objective of the activity is to plant 50 trees by each member. However, very little number of tree as 10% to 20% are growing. It is due to cold weather and drought. The group organization, administration and working of the project are varied depending on the community and activity. Group administration is being decided within the member. The groups are receiving 55 kg of foodstuff, such as wheat flour, cooking oil, sugar, salt, etc. per annum.

2) Potable water and latrine group

The group for construction of water supply and latrine facilities was organized in Avichaca community with 118 families in 1994. Water supply facilities consist of pump and reservation tank on the hillside and supply to the individual houses with gravitational flow. Latrine was constructed at more than 80% of family in the community. After construction, portable water committee (Comite de agua potable) was organized and 2 to 4 persons are working to maintain the facilities. Water supply is charged and committee member are paid. This project was implemented by CARE and other organization involved were NRCA, UNIDAD and JICA. CARE provided health education and solar house construction as well in the community.

3) Women's income generating group

In Taramaya community, there is a group of women who borrow money for their income generation. They are able to do any of business with that money. Someone purchases milking cow and some is doing small commercial business. Maximum amount is Bs. 400 with interest rate of 3.5% per month. Term of liquidation is 16 weeks and they have to return part of money and interest every month. Originally the member was thirty (30) one year ago, however there are twenty four (24) at present. The organization that support their activity is CRECER but the fund is provided by Freedom from Hunger.

4) Other

The municipal development plan of Achacachi city has been drawn up by FNDR in 1996 (Plan Desarrollo Municipal de Achacachi, Vision Preliminar, July 1996, by Fondo Nacional Desarrollo Regional). In the plan, a new woman's organization called as Mother's club (Club de Madres) is proposed to take an activity mainly on health, nutrition and other in the municipality.

3.6 Socio and Agro-economy

3.6.1 Regional Economy

(1) Present Situation and its Potential

As Departmental Prefecture (DP) of La Paz covers all the geographical zones of Altiplano, Valle and Amazon basin, and includes the capital city of La Paz, some of the statistics/description of DP of La Paz do not represent the situation of Province of Omasuyos, not to speak of the study area. Therefore only those significant to the study area are selected and described at the level of DP, and it is tried to include the information closer and more relevant to the study area as far as possible.

Omasuyos Province had a following population statistics in 1995:

Population Density	35.7 capita/km ² ;
Annual rate of increase of population	-0.78%;
Indices of economic dependency	155.5%;
Average number of household	3.76 (average)
	Max:6.04 (Itenez of Beni),
	Min:2.66 (Sud Carangas of Oruro),

4.02 DP La Paz (average),
4.09 La Paz (city))

Source: INE: Anuario estadístico 1995

The economically active population in DP of La Paz is as follows:

	DP La Paz	La Paz	El Alto	Otros
Employed & Labourer	242,186	150,923	57,243	34,020
Self employed	292,819	62,124	34,664	196,031
Employer	11,134	8,488	1,292	1,354
Cooperative	6,053	2,894	414	2,745
Professional	2,215	2,085	89	41
Family labour	42,393	2,295	1,636	38,462
Not specified	164,488	44,325	32,434	87,729
Total	761,288	273,134	127,772	360,382

Source: INE: Anuario estadístico 1995

Macro-problems identified by the DP of La Paz are as follows:

- 1) The structure of production as a whole is heterogeneous and backward.
- 2) Social inequality, high indices of extreme poverty and high level of internal migration have been conspicuous.
- 3) Natural resources are used irrationally, which leads to the deterioration of physical environment.
- 4) Geographical structure is not articulated, and internal equilibrium is not maintained.
- 5) Structure of the departmental government and administration is weak and diffused.
- 6) Regional identity and awareness are weak.

(2) Growth Potential

Macro growth potential which was identified by the DP of La Paz are as follows:

- 1) geographic location
- 2) regional market
- 3) natural resources
- 4) organizational and cultural tradition
- 5) potential of tourism
- 6) small industries and handicrafts

(3) Agro-processing Industries

Leche Andina, a public company, was bought by the Peruvian milk-processing conglomerate Gloria with privatization policy of the government and has been renamed as the PIL Andina. It paid US\$ 8 mil., overbidding Vascal, a Bolivian company by US\$ 655 thousand.

"Asociación Integral de Ganaderos en Camélidos de Los Andes Altos (AIGACAA)" which has been led by a devoting general director was established eighteen years ago. It has 1200 associates at present. It has been running successfully 'Compañía de Producto de Camélidos S.A.' since 1991.

(4) Salary

Average nominal monthly salary in La Paz in June 1996 was Bs. 1,378, whereas the minimum salary legally approved was Bs. 223. Financial sector got 196 percent of

the average, construction sector 67 percent, commercial sector 91 percent, and service sector 103 percent.

3.6.2 Marketing of Agricultural Produce

(1) General

General marketing network dominant in the Altiplano for the small producers of potatoes, quinoa, onions, beans and meat etc. is as follows:

1) for urban consumers

There are several intermediaries between producers and consumers. Producers sell their produce either to itinerant middlemen or directly to the rural markets, which further sell them to middlemen. Then the middlemen will sell their commodity to either the retailers in the urban markets or wholesalers, who in turn sell them to the retailers in the urban markets. Wholesalers are sometimes truckers.

According to the study done by the SNAG in 1987, retailers of potatoes, for example, took 38.8 percent to the retail price in average as a commission, and wholesalers 11.6 percent, which left about a half to producers. Small farmers whose marketing channels have more intermediaries than big farmers have less share to hold.

Rural producers have an alternative by selling either to the urban retailers or directly to the urban consumers.

2) for rural consumers

There are either rural markets or rural retailers between producers and consumers. In rural markets barter system is available.

(2) Weekly Markets (fair) in the Study Area and its Environs

Weekly fairs are the places where many commodities change hands. They are taken place at present in the following towns and communities in the weekly intervals.

Weekly Fair

	Name	A day of the week
1)	Achacachi*	Sunday
2)	Chachacomani	Friday
3)	Kerani	Thursday
4)	Takamara	Saturday
5)	Warisata*	Thursday

*Daily market also opens here; in much smaller scale, though.

Generally speaking, those who live in the upper basin of the Keka river go to sell produce and to shop their necessities to Chachacomani fair, and the rest to Achacachi fair. Details of market places 1) and 2) of above-mentioned are given in Annex K.

(3) Agricultural Commodities

1) Produce from the study area

Major produce of the area are as follows:

Cereal : Barley, Oats*,

Pseudo-cereal : Quinoa,
 Bean : Broad bean, Alfalfa*
 Root : Potato, Oca
 Vegetable : Onion,
 Livestock : Sheep, Bull, Cow, Pig.

note: * for feeding of livestock

Llamas and Alpacas are only found in the higher areas than the study area.

2) Price and quality

Farm-gate unit prices of the following produce were observed during the inquiry survey in the study area.

Barley	Bs1.2/kg	Oats	Bs1.0/kg
Quinoa	Bs1.6/kg	Potato	Bs2.7/kg
Broad bean	Bs1.8/kg	Oca	Bs1.4/kg
Alfalfa	Bs1.0/kg	Onion	Bs17.4/kg
Sheep	Bs100-200/head (Wt.:15-20kg)		
Mutton	Bs12/kg at Achacachi market price		
Cattle	Bs2000/head (Wt.:200-250kg of 3 year-old) at Achacachi cattle market. Bs1.2/kg		
Milk	Bs1.4/l		

The prices of some of the above mentioned produce at La Paz wholesale market have shown seasonal and yearly fluctuation as usual. The following table gives the extent of fluctuation between 1993 and 1995.

(a) Barley:

	1993		1994		1995	
High	40.88	Feb	39.00	Mar	48.30	Aug
Low	37.13	Jul	32.25	May	38.31	May

(b) Oat: Fresh

	1993		1994		1995	
High	30.50	Oct	37.50	Dec	41.75	Dec
Low	12.63	Apr	15.00	Jan	16.25	Apr

(c) Broad Bean: Fresh

	1993		1994		1995	
High	14.33	Oct	17.50	Nov	22.00	Sep
Low	8.28	Apr	7.63	Apr	7.88	Apr

(d) Quinoa: Real

	1993		1994		1995	
High	165.00	Oct	177.50	May	182.19	Dec
Low	126.69	Jan	131.67	Feb	126.25	Aug

(e) Oca:

	1993		1994		1995	
High	15.85	Sep	18.69	Nov	16.25	Dec
Low	10.81	Apr	8.75	Jun, Jul	5.95	Mar

(f) Potato (first grade):

	1993		1994		1995	
High	15.47	Jan	19.75	Dec	26.75	Dec
Low	13.19	Apr	12.50	Apr	13.13	Jul

(g) Freeze Dry Potato (first grade):

	1993		1994		1995	
High	74.81	Jan	71.25	Apr	62.31	Feb
Low	57.94	Jul	55.00	Oct	45.75	Sep

(h) Beef:

	1993		1994		1995	
High	8.02	Oct, Dec	8.10	Jun	9.63	Dec
Low	7.63	Jul	7.50	Aug-Oct	8.34	Jan

(i) Milk:

	1993		1994		1995	
High	1.61	Sep	1.70	Jun, Jul	1.87	Jun
Low	1.51	Nov	1.55	Oct	1.74	Mar

(j) Onion with collar:

	1993		1994		1995	
High	20.38	Aug	15.69	Aug	23.44	Jul
Low	10.75	Feb	8.13	Apr	10.25	Dec

Source: Anuario Estadístico del Sector Rural 1995-1996, G-DRU

Another set of statistics, average monthly price indices of five major basic food 1980-1988, to show the monthly fluctuation of agricultural commodities is given below.

	High		Low		Difference
Papa	119	Aug	84	Apr	35
Cebada	108	Nov, Dec	91	Jul	17
Quinoa	115	Feb	93	Jun, Dec	22
Cebolla	123	Aug	84	May	39
Haba verde	128	Aug	80	May	48

Source: FDC

Agro-produce can find a suitable market according to their quality, variety and stage. The small producers of basic food who have some surplus can choose only the best ones, as most of the produce are for auto consumption.

On the other hand, cash crop production like vegetable growing will surely produce waste, for which rearing of rodent family may be planned for their meat and fur.

3) Demand and supply

Seasonal market fluctuation given in the above mentioned tables reflects demand and supply situation of the La Paz market area. Small producers' surplus usually goes to market at harvest season when price is low. For short of money they cannot afford to store them at home till the market feels scarcity of the commodity.

The prices of meat and fresh milk were more stable than the basic foods, even though milk has to compete with imported condensed milk. Cheese needs a wider market than the rural one, for which some of the industrially-minded individual in the area have

been expanding its market area as far as Cochabamba, though the market there is said to be saturated.

Fresh vegetable which cannot be stored long has to find a daily market. It fetches highest price in the driest month, and saturates markets in the rainy season.

3.6.3 Distribution of Agro-input

All the agro-inputs such as seeds, fertilizer, pesticides, farming implements, and veterinary products are available in the markets, with technical advice and aftercare services. Small farmers make such items as a part of implements, and use seeds from their own fields for some types of plants for some years to economize the expenditure.

3.6.4 Agricultural Credit

(1) Introduction

Still rural credit is not an area where commercial banks are interested in to give loans, though there are so much demand and potential in the area as a whole.

Article 81 of "Banks and Financial Institutions Law" defines three types of non-bankers. They are cooperatives, mutual banks and others. Others are further classified into four categories: 1) state funds, 2) private financial funds (FFPs) 3) Non-Profit Private Institutions for Social Development (IPDS), i.e., NGOs and 4) saving houses and pawn shops. And there are informal systems outside the approved banking system.

(2) State Funds

Agricultural Bank of Bolivia (BAB) was first established in 1941. It was ordered to close down in 1990 due to mismanagement. In 1989 Farmers Development Fund (FDC) was established. It followed suit the BAB with 99.4 percent of the direct investment which totaled 1.24 million US dollars in the process of compulsory execution at the end of 1995. It therefore had to transform itself into a more responsible entity.

(3) Private Institution for Social Development (IPDS)

1) History and present situation

The first IPDS which operated in the field of rural credit entered the stage in 1978. It was National Ecumenical Association for Development (ANED). Then IPDSs with the similar operational field has appeared in succession. As of the end of 1995 there were some 24 IPDSs whose service includes the rural credit out of about 420 IPDSs working in Bolivia.

Five IPDSs that concentrate in operation of rural credit formed an Association of financial Institutions for Rural Development (FINRURAL) in 1993.

The total coverage of their financial services in Bolivia as of the end of 1995 is summarized in the following table.

	Beneficiary No.	Coverage*1 %	Portfolio US\$	Average US\$	Arrears %
FINRURAL	72,435	5.8	16,623,954	230	
Non-F*2	12,197	1.0	8,224,455	674	
TOTAL	84,632	6.8	24,848,409	294	6.7
@ROI(90-95)*3	37.7%		36.8%		

*1 percentage over total rural economically active population, 1,250,322.

*2 AGROCAPITAL, the largest entity of all has 83.4 % of the portfolios.

*3 Average annual rate of increase between 1990 and 1995.

(Omasuyos)	1,890	7.1*	348,932	185	4.4
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* percentage over total rural economically active population, 26,702.

2) Modality of rural credit

There are five modalities of rural credit.

- (a) Rotational fund,
- (b) Associated credit,
- (c) Selective credit,
- (d) Credit for money at hand, and
- (e) Communal bank.

Classification of the destination of the rural credit by percentage provided by the IPDS as of the end of 1995 is given in the following table.

	TOTAL US\$	Money at hand	Agro- Livestock	Small*1 Industry	Commerce	Others
Bolivia	24,848,409	40.6%	38.3%	5.2%	9.9%	6.0%
Omasuyos	473,096*2	64.6%	6.4%	29.0%	0.0%	0.0%

*1 includes handicraft and agro-industry

*2 provincial totals of FINRURAL associates in La Paz prefecture do not tally with those in Table of summary of IPDS's services of rural credit

(4) Outside the Approved Banking System

Informal credit networks are prevalent throughout the country among extended families, friends, middlemen, and transport operators. According to the information provided by director of FADES, 25 percent of the farmers living in the Valle and Altiplano are working on credit, formally or informally.

Ref.: MARCONI OJEDA R., ONG's y Crédito Rural en Bolivia. FINRURAL 1996
"Pro Campo" CID/Bolivia/No.63/Agost de 1995

3.6.5 Farm Household Economy

(1) Introduction

A questionnaire survey for farm-household was conducted by a local consulting firm. The questionnaire survey has chosen 8 households randomly out of most of the community which totals 30 with three exceptions. Then study team carried out a verification study. Its objectives are to visit all the sample households (246 samples) to see if:

- 1) the samples represent all the sub-communities within the community,
- 2) the information drawn from a chosen household matches with its appearance when it is revisited, and
- 3) the extreme values and outliers are supported by the actual situation,

while study team get acquainted with all the communities. The detail of the verification study is given in Annex K.

With verification works completed, three tables have been prepared. They are: Table 3.6.1 Family and its Holdings, Table 3.6.2 Income and Expenditure, and Table 3.6.3 Major Sources of Income, in which averages of each community on the selected items of the questionnaires are calculated.

In the tables the study area is divided into five sub-areas; the upper basin, the upper middle basin, the lower middle basin, lower basin, and Achacachi urban area. The verification study has elicited a fact from the data gathered by the questionnaire survey that Achacachi township has a different characteristic from other communities in the study area. On top of that, it is likely in some cases that there may be a double counting on the cattle they have. So Achacachi is excluded from the calculation of total average of the study area. Besides the selected items from the questionnaires, two ratios are calculated; a ratio of irrigated land against the total land holding, and a ratio of obstructed land (a total of stony, weedy with stipa and swampy land) against the total land holding.

(2) Working-Hour

The traditional subsistent highlanders are so versatile that the productive activities of the members of a family are not limited to farming and cattle rearing but extend to cottage wool industry, commerce and masonry. These phenomena are backed up by the following statistics that show how the working hours of a pair of husband and wife are distributed among highlanders.

Activity	% of working hours
Agriculture	30.4 %*2
Animal Husbandry	3.8 %
Side Jobs	7.3 %
Sale & Exchange	13.8 %
Altruistic Labour	7.5 %
Public Duty	12.3 %
Others*1	24.9 %
TOTAL	100.0 %

*1 They include (a) social contacts, (b) recreation, and travel. (a) consists of mainly funerals and feasts of new house construction, and (b) football. Football, playing and watching, along with folklore becomes a national pastime, has reached a level of addiction, according to Mr. Mauricio Mamani, a Bolivian anthropologist.

*2 There are two onion growers whose percentage of work hours in agriculture activity reach 40 and 55 percent. They naturally have little time to do side jobs.
Source: Fujii, T.: Life of the Bolivian Peasants: An Analysis of Diary entries, Journal of National Ethnological Museum of Japan, Vol.16, No.3, pp521-587, 1991.

(3) Auto-consumption

Auto-consumption per household of 4.7 members amount to about 480 kg of potatoes, 24 kg of Quinoa, and 40 kg of green broad beans in average according to the FDC's statistics.* Besides, they take some vegetables, chicken, eggs, milk, cheese, and mutton. Since some of the basic food including rice, bread, condiments, salt and sugar are not produced, a household both has to exchange them with their products if any and has to spend Bs.160 monthly (see Table 3.6.2).

*The statistics which were applied to the people living in rural Altiplano are found in 'Guía de Evaluación Financiera - Económica', FDC-DTZ, 1995.

Three major foodstuffs are selected for calculation, 280 gr/person/day of potato, 14 gr. of quinoa, and 23 gr. of green broad beans.

$(0.28 \text{ kg} \times 4.7 \times 365 = 480 \text{ kg}; 0.014 \times 4.7 \times 365 = 24 \text{ kg}; 0.023 \text{ kg} \times 4.7 \times 365 = 40 \text{ kg})$

(4) Household Economy

A sample household economy of the study area is presented as shown below to show an average living standard of the area as a whole and its four divisions. It is an ideal type, all of the facets of which are converted into an average of the total number of the samples.

Basin	Income (Bs/annual)		Expenditure*2*3 (Bs/annual)			Cost*4 (Bs/annual)		Balance	
	Principal	Aux.*1	Total	Regular	Irregular	Total	Agriculture	Livestock	Bs/annual
Global	3,786	860	4,646	2,662	705	3,368	208	714	356
Upper	3,198	623	3,821	2,001	498	2,499	165	692	465
Upper-Middle	3,986	994	4,980	2,680	331	3,011	390	598	981
Lower-Middle	3,652	836	4,488	2,958	361	3,320	209	651	309
Lower	4,691	1,139	5,830	2,892	665	3,557	154	909	1,210

Basin	Family Labor (no.)		Land (ha)		Irrigation	Furrow	Animal (head)		
	Nos.	Labor	Own	Others*5	Total	Land	Sheep	Cattle	Caw
Global	4.7	2.2	3.2	0.3	48%	29%	10.5	2.1	2.1
Upper	4.9	2.2	4.5	0.5	48%	28%	19.0	2.5	1.6
Upper-Middle	4.8	2.2	4.0	0.6	45%	58%	16.9	2.5	1.6
Lower-Middle	4.8	2.3	2.8	0.3	45%	25%	6.3	1.9	2.3
Lower	4.4	2.1	2.0	0.0	59%	14%	4.8	1.8	2.6

*1 income from the third of family member, 226 samples for average

*2 regular = foods+drinks+transport+electricity+water+fuel

irregular = construction+repair+installation of electricity+education+clothing+society+health

*3 comparison with statistics of Department of La Paz

Foods	Drinks	Transport	Electricity	Fuel	Construction	Repair	Health	Education	Clothing	Social	Total
1,145	-	136	-	133	-	84	124	159	533	253	2,567

*4 details in Annex K

*5 community + rental

1) Average living standard of the study area

Income does not cover the expenditure unless a contribution from the third (in some cases the fourth) family member is available. A tiny amount of sales from crops suggests that most of the produce are consumed by the family and cattle. Potatoes are mostly go to subsistence and exchange with maize or bread.

Taking the risk of hail and other natural hazards into account, if productivity of potato is set at 3.5 ton per ha^{*1}, of quinoa at 0.4 ton per ha^{*1}, and of fresh broad bean at 0.83 ton per ha^{*1}, the total land which is required to cultivate the basic foods is equal to 0.25 ha^{*2}. The rest, all inclusive except fallow, is about 3 ha, which is utilized for breeding of four cattle and ten sheep.

Total production costs for three subsistence crops amount to Bs.374^{*3}. Though not all the amount is deducted from the cash flow, final calculated cash balance of Bs.356 in the Table above may further be reduced by contingencies. This looks like quite a hard life indeed.

*1: 75 percent of an average in Altiplano

*2: $0.48 / 3.5 = 0.137$ (ha); $24 / 400 = 0.06$; $40 / 830 = 0.048$

*3: $(423.5 \times 0.137 + 73 \times 0.06 + 186.5 \times 0.048) \times 5.24 = \text{Bs.}374$ The value dose not tally with value given in Table 3.6.4 (Bs.208). The balance should be equivalent to the value of own labour.

2) Difference of living condition and standard among the four sub-areas

- The ratio of the stony, weedy land and that susceptible to inundation to the total land holding in lower basin is quarter of that in upper-middle basin, and half of that in upper basin
- An average household of upper basin has a right to use 2.5 times more land than one in lower basin, and four times more sheep.
- People in upper basin earn least, and spend least. People in lower basin earn most and spend most. Average total income of lower basin is 1.5 times of

upper basin. Average people in upper-middle basin earn 1.1 times more than average people in lower-middle basin but spend 9 percent less.

- (d) The ratio of households in upper-middle basin whose incomes are mainly rely on agriculture is three times more than that of households in lower basin.

3.7 Agricultural Infrastructure

3.7.1 Present Condition of Existing Irrigation System

(1) Irrigation and Drainage System

Prior to the field survey of the Study, fifty nine (59) intake structures for irrigation purpose were identified in the Rio Keka basin on the basis of the survey results of MACA executed in 1990. To get the recent data and information of existing irrigation and drainage system, inventory survey on the present irrigation and drainage system in the Rio Keka basin was carried out by the Study Team. Out of 59 intake structures, six were confirmed as the part of other irrigation systems, two were in now unused and four intake structures were newly identified through the survey. Finally, fifty five (55) irrigation and drainage systems were identified in the Rio Keka basin, 32 systems in the main river course and 23 systems in the tributaries. Summaries of the systems are shown below. Location of each system are shown in Figure 3.7.1 and description of each system is shown in Table 3.7.1.

Rio Keka Basin	No. of Irrigation System	Commanding Area (ha)
Main Stream Course	32	3,958
Tributaries	23	2,698
Total	55	6,656

No clear drainage system can be seen in each irrigation system. Dual-purpose canal for irrigation and drainage is general manners especially in the downstream reaches of each irrigation system.

(2) Irrigation Method

All irrigation system in the Study area is constructed by the gravity irrigation method from the water source to the each farm lots. To use the limited irrigation water equally among the beneficiaries, rotational irrigation method is widely diffused in each irrigation system. At the farm lot basis, furrow irrigation for crop cultivation is the prevailing irrigation method. Close to pounding irrigation method is also seen in the pasture land used under the natural conditions.

Since existing irrigation system in the Study area has been constructed by farmers themselves without consultation of technical background, most of existing irrigation systems have problems such as incoherence between the available irrigation water and the related commanding area. As the results, no theoretical irrigation water use on the basis of the crop water requirement has been carried out conventionally. Irrigation water distribution by simplified time schedule among the concerned farmers is being prevailed. Present irrigation water distribution method in major irrigation systems is as follows;

Irrigation system No. 9 in the inventory survey

After intake from the Rio Keka, irrigation canal reaches at Putuni diversion point. At this point, canal is branched into two, one is for Belen area through the Rio Keka and the others for Pajchani Grande, Marca Masaya and Kasina. Steel gate has been installed at the diversion point on the canal for Belen.

Basic regulation for water distribution is daytime for Belen area and night-time for Pajchani Grande, Marca Masaya and Kasina. Among the night-time users, duration for irrigation is fixed such as Monday and Tuesday for Pajchani Grande, Wednesday and Thursday for Marca Masaya and Friday and Saturday for Kasina. At each farm plot can get irrigation water once per two weeks on an average.

Irrigation system No. 27 in the inventory survey

Canal is branched into two at Coromata Alta. After diversion, one runs for Coromata Media and another for Coromata Baja. No gate is installed at diversion points. In case of canal for Coromata Media, irrigation for each farm plot is once a week, on the other hand, mixed rotation such as once a week and once per two weeks is prevailed on the canal for Coromata Baja.

Irrigation system No. 10 in the inventory survey

In mid dry season, no water for irrigation is available. Regulations for irrigation water utilization are not set up among the users. Preferential water use of upstream reach is generally performed.

(3) Canals and Related Facilities

1) Intake facilities

No special structures related to the intake facilities such as weir, dam and collecting channels can be found in the existing irrigation system. Water source of existing irrigation system is the river surface flow of Rio Keka and/or its tributaries. Lateral intake with training levee made by the river bed materials is the general features of the intake facilities. Some systems are constructed by the masonry lining on its intake portion, however, excavated earth canals are the normal features in other systems.

2) Canals

All canals are the excavated earth canal with rectangular shape. Concrete lining and/or masonry lining sections are found in two systems located in the lower reaches, however, those sections are limited less than one percent of the total canal length of each system. Because gravitational flow is the principal delivering method of irrigation water and construction works of canals were made by farmers themselves, all canals are meandered reflecting topographical condition and land ownership of the irrigation area.

3) Division structures

Irrigation canals in the existing irrigation system distribute to cover the irrigation area as many as possible. Generally, no structures are constructed at the canal division point such as from main to secondary, from main and/or secondary to farm lots. Stone and/or grass roots are used to close the outlet from the canal. Only two systems have division structures equipped with gate(s) at the diversion point from main to secondary canals.

4) Crossing structures

In the existing canal system, culvert, aqueduct and bridge structures are hardly seen to cross the existing roads and streams. Stones placed in the canal are the general measures to cross the canal.

3.7.2 Method and Organization of Water Management

(1) Water Management

Water users group in the Study area is constructed in community basis. As the chief of water users group, Alcalde Agua is nominated with the consent of the community members. Alcalde Agua has responsible for all O & M works of commanding irrigation canals. During the dry season, irrigation water distribution is made with rotation method to attempt equal distribution among the water users. Alcalde Agua decides the time and duration of rotation within the commanding canals. When commanding canals locate downstream reach of the other Alcalde Agua's commanding canal system, adjustment of water distribution will be carried out with related Alcalde Agua to secure the water for the community.

Generally, maintenance works of the irrigation canals are made by the farmers related to the canals prior to the rainy season. The major maintenance work is the clearing, dredging, repairing of canal walls and crossing section of the road. Farmers who can not participate the maintenance works of the canal must be engaged other communal works or paid some amount of money in several communities. Because collection of water tariff is not prevailed in the Study area, no budget is available for the maintenance works of the existing irrigation system. Materials insitu and work of the related farmers are the measures for the maintenance works.

(2) Water User's Association

The Rio Keka basin can administratively be divided into two provinces, Los Andes province in the upper stream reach and Omasyos province in the lower stream reach. In 1980 water user's association had been organized by the communities belonging to the Omasyos province, named as "Comité Central Rio Keka". At that time, communities belonging to the Los Andes province were not participated the association since those communities had been used enough water of the tributaries of Rio Keka. In response to the recent agricultural development program in the Rio Keka basin, seven (7) communities belonging to the Los Andes province established the water user's association in August 1996 named as "Asociación de San Juan de Chachacomani".

1) Upstream reach water user's association

"Asociación de San Juan de Chachacomani" is established in August 1996 with seven communities of the Los Andes province. Member communities are as follows;

1	Villa San Juan de Chachacomani	5	Zona Pura Purani
2	Zona Keruyo	6	Zona Kellhuani
3	Zona Sorapujro	7	Zona Alto Cruz Pampa
4	Zona Japupampa		

Purpose of the association is the nucleus of propulsion for development program covering the Chachacomani area and its outskirts. A board of directors is composed seven members, president, vice-president, secretary, accountant, publicity and two other board members. At present no term of service is fixed for board members and no regulations of association is also provided.

(2) Downstream reach water user's association

"Comité Central Rio Keka" had been organized in 1980. Twenty-eight (28) communities which draws irrigation water from the Rio Keka were firstly joined the Comité. At present same number of communities organized the Comité to adjust the water utilization of Rio Keka among the community. All member communities belongs to

Omasyos province.

A board of directors of the Comité is composed five members, president, vice-president, secretary and two other board members. The term of service of board members is one year and selection of board members is rotated by the list of communities. The Comité has regulations of the organization and registered to the La Paz Department. Member communities are as follows;

1	Belen	15	Marca Masaya
2	Taramaya	16	Palrumani
3	Jahuiraca	17	Arasaya Chico
4	Tipampa	18	Barco Belen
5	Suntia Grande	19	Arasaya Kentuyo
6	Suntia Chico	20	Corpaputo
7	Suntia Comun	21	Arasaya Patanivi
8	Putuni	22	Pongon Huyo
9	Pajchani Grande	23	Berengueta
10	Pajchani Molino	24	Cajon Pata
11	Kjasina	25	Coromata Alta
12	Avichaca	26	Coromata Media
13	Cala Cala	27	Coromata Baja
14	Barco Cala Cala	28	Icrana

3.8 Rural Infrastructure

3.8.1 Road Networks

(1) Road

According to the information of SNC (Servicio Nacional de Caminos), roads in Bolivia are divided into three categories such as trunk road (Troncal), provincial road (Vecinal) and farm road (Senda). The trunk roads in the study area are comprised of three routes such as La Paz - Achacachi (95km), Achacachi - Sorata (40km) and Achacachi - Ancoraimes (45km). These trunk roads are linking from the study area to the major cities in the country. Only La Paz - Achacachi route is paved. These trunk roads are under SNC control.

The study area has seven (7) provincial roads with total length of 96km. And the area is encircled by these roads. They run north - south and east - west without pavement. These roads are under control of Achacachi municipal office. Effective width of these roads are 2.0m to 4.0m. Bumpy surface conditions seriously hamper the flow of traffic, transportation of agricultural products and daily necessities. In particular, the road crossing the Keka river has no bridge and so poorly maintained that it is not passable for vehicles and residents. These poor road conditions should be corrected by improving road foundation, bridges and drainage facilities.

On the other hand, the study area have 60 farm roads with total length of 107 km. All farm roads are without pavement. Effective width of these farm roads are 1.0m to 2.0m. Car traffic is not available in many places and this factor causes difficulty to form network of farm roads within the study area. Existing road network is shown in Fig. 3.8.1.

Following is the major items to be improved on the road network in the area:

- Strengthening provincial road functions with pavement, bridges, cross drains, etc.
- Dissolution of impassable sections
- Improvement of foundation for farm roads and cross drains
- Make up the road network in the study area

(2) Transportation

1) Public transportation

Only the folk bus service is available as a mean of public transportation in the study area. Folk bus is under the control of the provincial union named "Sindicato de transportistas (a nivel urbano - rural)". Between La Paz and Achacachi is about two hours trip by microbus. A microbus operates for 15 minutes interval until PM 19:00 from am 04:00. Tariff of La Paz-Huarina is Bs.3.5, and La Paz-Achacachi is Bs.4.5. Charge for the cargo is Bs.1.5 to 2.0 per quintal.

Moreover, the microbus operates every day to the principal cities in and around the study area. Like this, the traffic network by the microbus is indispensable in the study area. However, no rational traffic network by the microbus in the study area is built up with the reason such as few users or poor condition of roads.

In the community located the upper basin of the study area such as Kerani, Chachacomani, Corpaputo and Pongonhuyo, residents move to La Paz directly via Huarina or Peñas, not via study area, this phenomenon take place due to insufficient traffic network within a study area in addition to the geographical conditions.

On the other hand, the temporary buses operate on Sunday and the day of weekly fair among the communities within the study area.

2) Farm products transportation

Transportation of farm products from farm to communities is made by man power, donkey, bicycle and folk bus. A farmer is carrying agricultural products directly to the market because no collecting and shipping facilities are established in the study area.

3.8.2 Rural Water Supply

In Omasuyos Province including the study area, Achacachi, Warisata and Huarina city have water supply system. But, most of communities in the study area don't have water supply system.

In 7 communities such as Kerani, Icrana, Pairumani, Cala Cala, Avichaca, Barco Cala Cala and Arasaya Kentuyo have the water supply system. System of Icrana, Kerani and Pairumani and Arasaya Kentuyo is communal tap method, therefor beneficiaries are only few inhabitants of the community.

Community	Supported	Beneficiaries	Communal Tap	Water source	Dray season
Kerani	NGO	-	2	stream	dray up
Icrana	NGO	-	2	stream	dray up
Pairumani	NGO	-	2	stream	dray up
Cala Cala	CARE	80	-	Infiltration	no problem
B. Cala Cala	CARE	40	-	Infiltration	no problem
Avichaca	CARE+JICA	120	-	Deep well	no problem
A. Kentuyo	CARE	20	-	Deep well	no problem

In rural area, scattered house arrangement is the reason to make difficult the diffusion of water supply service. Also, financial capability of the inhabitants is one of the reason to make difficult the construction of the facilities. Most inhabitants take water from dug well and/or the river as drinking water.

The communal wells are constructed by CARE and NGOs (Plan International

Altiplano) in the area. But, the well isn't utilized by inhabitants effectively, because the well is located far from most of the users. Therefore, inhabitants are dug well directly in the garden of their house to get drinking and washing water.

Now water supply system is under construction at three communities (Coromata Alta, Media and Baja) by Achacachi Municipality.

3.8.3 Other Social Infrastructure

(1) Electricity

Electric power is supplied to the study area through substation in Achacachi, Huarina, Warisata and Villa Sanjan de Corpaputo. Electric power is first reduced from 220 kv to 66 kv at each substation, and it is further reduced to 23 kv at secondary substation.

In study area, only thirteen (13) communities established electric power supply system (five communities are full operation and eight communities are operated partly). The other communities will be left without electric supply system because the basic transmission networks are not established in the whole area. Though the plan of rural electrification in the study area is beginning to materialize, it will take much time to realize the electrification in the rural area.

Now electrical system is under construction at three communities (Cala Cala, Barco Cala Cala and Pongonuyo) by Achacachi Municipality and ENDE.

(2) Medical Facility

The study area has one hospital named "Capitán Juan Uriona Suárez" at Achacachi City. The architectural infrastructure has permitted the organization of their service with the installation of small medicine rooms for males and for women, a operating room, a pediatrics, a infectious and a maternity. It has fifteen beds of internment in total and rely on the support of auxiliary services. The personnel's are two doctors, a dentist, a graduated nurse, five assistants of infirmary, a laboratory analyst and a X-ray technician. And other facilities are an ambulance and a motorcycle. Achacachi is the only district of the province where exercise private practice two doctors, besides registering the operation of four pharmacies. Current situation of medical and health care facilities in and around the study area is as follows:

Community	Facility	Doctor	Infirmary	Specialist
Achacachi	Hospital	3	5	2
Batallas	Hospital	2	3	1
Huarina	Dispensary	1	1	1
Warisata	Dispensary	1	1	1
Chachacomani	Health Center	-	1	-
Kerani	Health Center	-	1	-

No health and medical treatment facilities are available in the rural area. Therefore, medical facilities in the city have to use, if necessary, when an inhabitant becomes sick. However, inhabitants can't receive enough treatment because there is no monetary margin or no traffic means. Therefore, inhabitants meet with illness by the folks treatment, some herbs and some patent medicines. As a result, cases that a slight illness becomes to face death are sometimes occurred since early medical treatment aren't sufficient. Improvement of health and medical care system is strongly desired among the rural habitants.

(3) Education

1) Education system

The following is the education system in Bolivia.

Infant education	(Pre-Basico :one or two years)
Primary education	(Basico :five years)
Mid-level education	(Intermedio :three years)
Advanced education	(Medio :fore years) (Ensenanza tecnica)
High-level education	(Universidad)

The primary education is five years long. The constitute stipulates that education is mandatory for every school age children therefore free of charge. However, the parents bear the costs of school uniforms and other expenses such as notebook, pencils, etc.

The mid-level education for seven year long is divided into two periods. The first half called Intermedio is one to three years and the last half called Medio is four to seven years. This Medio is further divided into the general course and technical course named Ensenaza tecnica.

2) Current situation of educational facilities

Twenty-five primary schools are established in the study area. Schooling distance is set at about 5 km as a rule, but it is up to the students which school to attend. The schooling is composed with two time sets, morning and afternoon. Each class is 40 minutes long and five classes a day.

The school starts on Feb. 26th and ends on Nov. 30th, with a 15-day-long winter break in August and a 80-day-long summer vacation starting in December.

Major schooling indexes in the area are as follows:

Schooling rate	:	80 %
Rate of students taking upper education	:	90 %
Rate of students taking High school	:	3 %

Six (6) mid-level education school, "Intermedio" institute are located in Chachacomani, Kerani, Coromata Alta, Pongonhuyo, Belen and Achacachi City. No education facilities are six (6) communities such as Suntia Comun, Suntia Chico, Arasaya Chico, Arasaya Kentuyo, Arasaya Patanivi and Cajon Pata.

(4) Telecommunication

In the area, telecommunication facilities such as telephone do not exist without Achacachi City. A telephone station of COTEL is located in Achacachi City with one line. Long distance and overseas calls can be made through the operator. The other hand, nineteen private telephone lines are established by ENTEL in Achacachi City. Two lines are used by official use for Achacachi City. This line has dialing system, then local, long distance and oversec calls can be made directly without through the operator. Current situation of telecommunication in and around the study area are as follows:

City	COTEL line	ENTEL line
Achacachi	1	19
Huarina	1	.
Warisata	1	.