

2.1.3 Economical Aspects

In 1989-1994 periods, Bolivia continued the structural modification processes started in 1985. In the economical aspects, those changes are characterized by the introduction of structural adjustments such as privatization of state owned companies, free exchange of currency and the control of fiscal deficit, and during 1994 it was continued by the capitalization and taxation reforms. The deficit of public sector reduced and annual inflation decreased from 13,200% in 1985 to 8.5% in 1994. The weight of the reform and the structural adjustment lay heavily on the most impoverished sectors, and on the other hand, decreased on the sectors like peasants and miners.

Table 2.1.4 Evolution of GDP and Inflation Rate

Year	GDP	Annual inflation rate
1984	-0.6%	1,315%
1985	-1.0%	13,205%
1986	-2.5%	66%
1987	2.6%	11%
1988	3.0%	21%
1989	3.6%	16%
1990	4.4%	18%
1991	4.6%	14%
1992	2.8%	10.5%
1993	4.1%	9.3%
1994 ¹⁾	4.2%	8.5%

Sources: INE-BCB

Note : 1) Estimated data

Table 2-1-5 Other Macro-Economic Indicators

	1988	1989	1990	1991	1992	1993	1994 ¹⁾
- National Income per capita (US\$)	870	980	870	916	931	900	915
- Exchange Rate (Bolivianos per US\$)	2.36	2.7	3.17	3.58	3.9	4.27	4.6
- Total External Debt (Million US\$)	4,070	3,492	3,779	3,628	3,785	3,777	4,057

Source: INE-Central Bank of Bolivia-Estadístico No. 282

Note 1) Preliminary Estimate (P)

2.1.4 Education and Social Life

1) Education

(1) Illiteracy

According to the INE Census in 1992, the illiteracy rate of the inhabitants over 15 years old fell from 35.8% in 1976 to 20% with variations among departments. Table 2-1-6 shows the illiteracy rate at national level and in the rural sectors of the departments of the Study Area. It is observed that 3 departments out of 5 show the rates under the national level, on the other hand, Chuquisaca and Tarija are over the national level. In the rural sector, Chuquisaca have rates over the national level. The situation is more critical when the situation of illiteracy of women in the rural sector is observed: at national level, the half of women is practically illiterate, with the department of Chuquisaca in the worst situation, where the rate reach 66.3%.

Table 2-1-6 Illiteracy Rate

Country/Prefecture	Country/Prefecture			Rural Area		
	Total	Men	Women	Total	Men	Women
All country	20.0%	11.8%	27.7%	36.5%	23.1%	49.9%
Chuquisaca	39.5%	29.5%	48.4%	54.2%	41.2%	66.3%
La Paz	16.9%	8.5%	24.7%	31.2%	17.6%	44.5%
Oruro	15.4%	5.9%	23.9%	27.7%	12.4%	41.6%
Santa Cruz	11.1%	7.3%	14.9%	22.7%	15.4%	32.1%
Tarija	21.2%	12.7%	29.4%	35.0%	22.0%	48.6%

Source: INE-CNPV, 1992

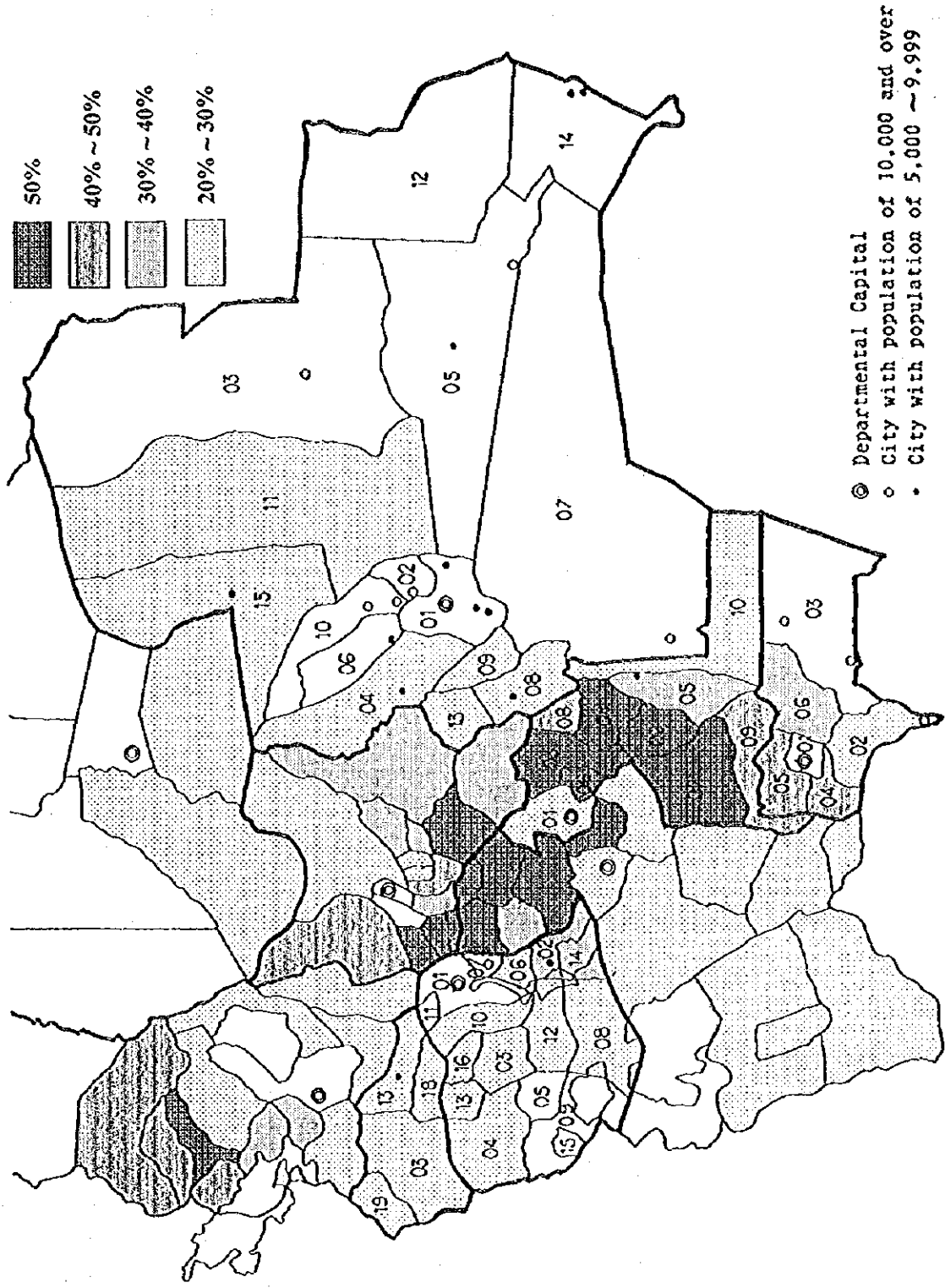


Figure 2-1-6 Illiteracy Rate (1992) by Province

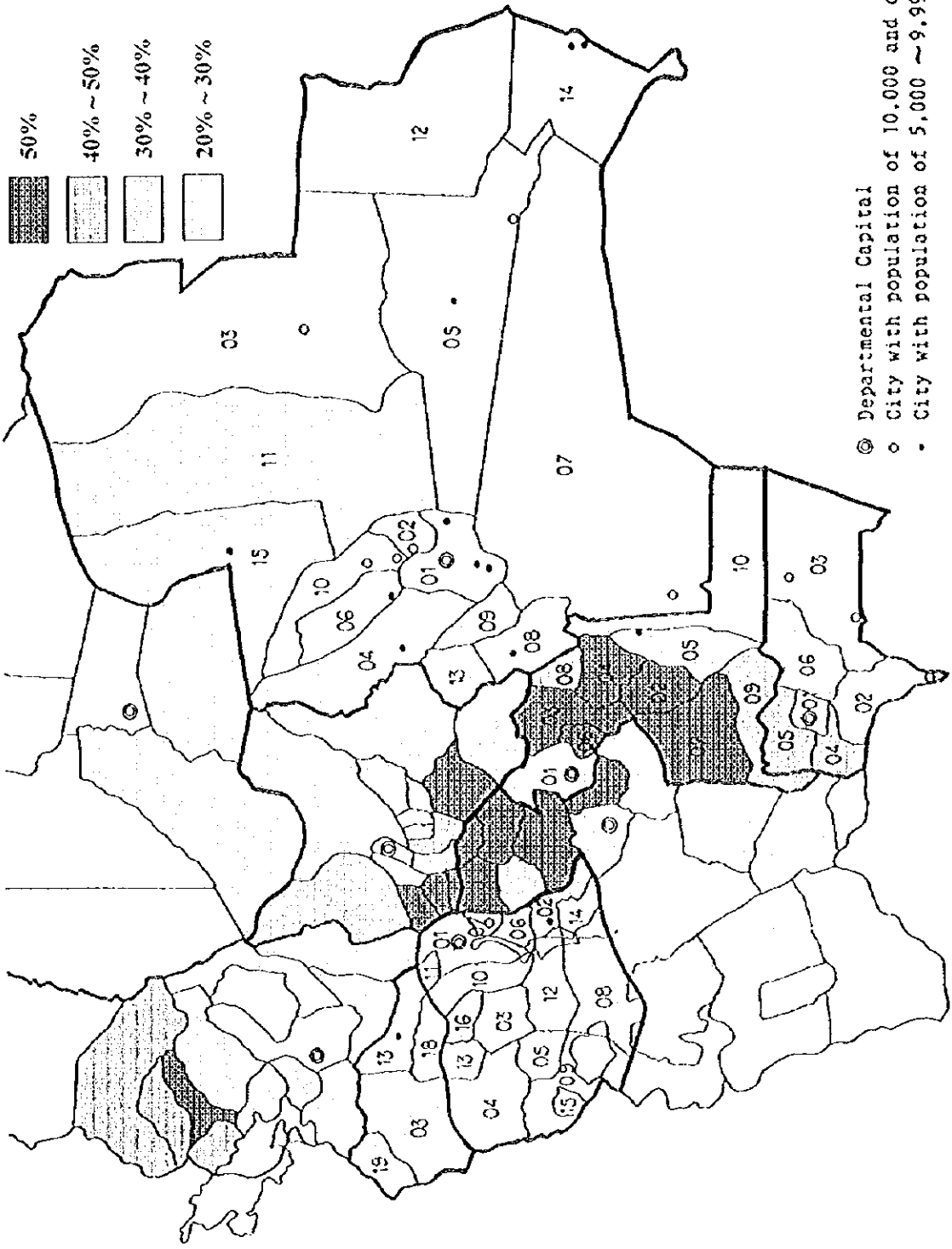


Figure 2-1-6 Illiteracy Rate (1992) by Province

(2) Level of instruction

Table 2-1-7 shows the level of instruction in formal education for the inhabitants aging over than 6 years old at national level and in the prefectures included in the Study Area.

It can be observed that paradoxically Chuquisaca has only 8.1% of inhabitants with medium instruction, but reach 5.4% with university instruction, and on the other hand, Santa Cruz with 18.8% medium instruction has only 4.6% of university level, the lowest of the all departments of the Study Area and also inferior percentage of national average.

Table 2-1-7 Level of Instruction

Country/Prefecture	Level of instruction					
	None	Primary	Medium	Normal	University	Other
All country	15.4%	59.9%	15.9%	1.6%	5.1%	2.1%
Chuquisaca	28.2%	55.5%	8.1%	1.9%	5.4%	0.9%
La Paz	14.1%	57.5%	18.2%	1.4%	6.2%	2.6%
Oruro	12.0%	58.7%	18.8%	2.5%	6.2%	1.8%
Tarija	17.1%	61.3%	13.3%	1.6%	5.2%	1.5%
Santa Cruz	9.1%	64.3%	18.8%	1.3%	4.6%	1.9%

Sources: INE-CNPV, 1992

2) Socio-cultural aspects

(1) Language

Table 2-1-8 shows the percentages of the inhabitants aging over than 6-year old classified by the language that they usually use in the daily conversation. Though 87.4% speak Spanish language in the country, it should be pointed out that in the Study Area, the Quechua language has influence in Chuquisaca (63.9%), Oruro (45.0%), and Santa Cruz (14.5%).

The Aymara language also has big influence in La Paz (61.5%) and in Oruro (37.5%). However, it is emphasized that almost 90% speak Spanish, and that the inhabitants who speak only Quechua, Aymara or Guarani do not reach 10% of total.

Table 2-1-8 Major Languages

Country/Prefecture	Spanish	Quechua	Aymara	Foreign	Guarani	Native
All country	87.4%	34.3%	23.6%	3.1%	1.0%	0.6%
Chuquisaca	74.1%	63.9%	0.9%	1.3%	2.1%	0.0%
La Paz	89.2%	9.3%	61.5%	3.3%	0.1%	0.1%
Oruro	92.8%	45.0%	37.4%	2.0%	0.1%	0.3%
Santa Cruz	99.4%	9.4%	1.9%	1.2%	1.4%	0.6%
Tarija	97.3%	14.5%	2.6%	4.8%	0.9%	3.2%

Sources: INE-CNPV, 1992

(2) Ethnical groups

58% of the total population of Bolivia is constituted by native people, having 3.8 million of inhabitants, which consist of 36 ethnical groups with big portion of Quechuas (2,250,000 inhabitants) and Aymaras (1,300,000 inhabitants).

The ethnical preponderance of the rural population in the departments of the Study Area is as follows:

Chuquisaca.....	Quechua
La Paz	Aymara
Oruro	Quechua, Aymara
Tarija	Quechua, Guarani
Santa Cruz.....	Quechua, various native ethnics

(3) Religion

Table 2-1-9 shows the percentages of rural population in the departments of Study Area according to the religion which they profess. A majority part of the population is catholic, and the church is a very important element in the mobilization of the rural inhabitants.

Table 2-1-9 Major Regions in Rural Area

(Unit: percent of rural population)

Religion	Chuquisaca	La Paz	Oruro	Tarija	Santa Cruz
Total	100%	100%	100%	100%	100%
Catholic	93%	76%	75%	87%	81%
Evangelic	5%	18%	20%	5%	17%
Others	-	2%	2%	5%	-
None	2%	4%	3%	3%	2%

Sources: INE-CNPV, 1992

2.1.5 Health and Sanitation

1) Health

(1) Mortality and Morbidity:

According to INE 1992 Census, the average mortality rate in all country was 18.6 per 1,000 inhabitants, and in rural area was 21.3 per 1,000 inhabitants.

Table 2-1-10 shows the infant mortality rate, which is an important factor describing the inhabitants' life condition, especially those relating to the water supply and sanitation. Department of Oruro shows the highest infant mortality, where 123 infants per 1000 births died before becoming one-year old, and 156 infants per 1000 births died before becoming five-year old.

Table 2-1-10 Infant Mortality in the Rural Sector

(Unit: number of deaths per 1000 births)

Country/Prefectures	Before one-year old	Before five-year old
National level	75	113
Urban level	58	85
Rural level:		
Chuquisaca	100	149
La Paz	81	136
Oruro	123	156
Tarija	74	118
Santa Cruz	78	118

Sources: INE-CNPV, 1992

For many years, acute diarrhea which is closely connected with the inhabitants' water usage and sanitation condition, was continuing to be the main cause of infant mortality. Caused by this disease, 66,490 cases were registered in 1991, and 152,407 cases were registered in 1992.

Recently, in Aug. 1991, numerous inhabitants in La Paz had been infected with cholera, and this disease spreaded to the rest of the country except the departments of Beni and Pando. Accordingly to OPS/OMS (Health Conditions in the Americas 1994), the following cases and deaths by cholera were registered in Bolivia.

Table 2-1-11 Cases and Death by Cholera in Bolivia

	1991	1992	1993	1994 (Jan/Aug)
- Cases	206	22,260	10,134	2,603
- Morbidity per 1000 inhabitants	3	347	158	41
- Death	12	383	254	46
- Lethality rate	5.8%	1.7%	2.5%	1.8%

Sources: OPS/OMS (Health Conditions in the Americas 1994)

(2) Resource and other health aspects

The document of OPS/OMS also presents the following information about coverage and resources of health for Bolivia.

- Life expectancy at birth, period 1990-1995 (men) 58.9
- Life expectancy at birth, period 1990-1995 (women) 63.5
- Percent of population having access to the services of health (1990) 34%
- Number of doctors per 10,000 inhabitants (1990) 4.5
- Number of professional nurses per 10,000 inhabitants (1990) 2.5

- Other persons of infirmity per 10,000 inhabitants (1990) 6.3
- Number of hospital beds per 1,000 (1990) 2.0
- Public expenses in health in GDP (1990) 1.4
- Public expenses in health of Central Government among the
that expenses of central government (1990) 3.29
- Total expenses in health in GDP (1990) 4.5%

(3) Unsatisfactory Basic Human Needs

As indicated in Table 2-1-12, in 1988, the population in rural area that was classified as under the poverty line, i.e. the population with income less than or equal to 70% of minimum salary, occupied 72.56% of the total population, and the extreme poverty occupied almost 40% of the total population. Since 1988, as observed by the surveys carried out in the last years, the rural inhabitants impoverished further. This poverty situation is critical and should be considered in the rural development programs, including the ones relating to water supply plans.

Table 2-1-12 Classification of Poverty in 1988

Indications of unsatisfactory basic necessity	At national level	At rural level
Population under poverty line	64.32%	72.56%
Population under critical poverty line	32.9%	39.02%

Sources: *Poverty in Bolivia-PNUD*

Table 2-1-13 shows the family income in the four major cities. With very few information obtained about the rural areas, it is estimated that the monthly family income in the rural communities varies from 30 to 100 US dollars.

Table 2-1-13 Monthly Family Income in 4 Cities of Bolivia in 1990

(Unit: US dollars)

	La Paz	Santa Cruz	Cochabamba	El Alto
Monthly family income ¹⁾	333	376	348	155

Sources: *INF-Questionnaire of family budget 1990*

Note: 1) Average family was constituted by 5 persons.

(4) Sanitation

Table 2-1-14 shows the number of toilets classified by its kind and its way of treatment, in urban and rural area of Bolivia. In rural area, there are 638,002 occupant houses, but there are only 111,526 (i.e. 17.5% of the total) with sanitary toilet, and among this there are only 9,980 (i.e. 1.6% of the total) with water-flushed toilet.

Table 2-1-14 Number of Occupant Houses With or Without Sanitary Toilets

	Total	Sanitary toilet		Unsanitary toilet	
		Total	Water-Flushed		Others
Total	1,444,817	618,669	283,112	335,557	826,148
Sewerage	298,301	298,301	203,870	94,431	0
Septic tank	116,408	116,408	79,242	37,166	0
Others	203,960	203,960	0	203,960	0
Nil	826,148	0	0	0	826,148
Urban area	806,815	507,143	273,132	234,011	299,672
Sewerage	292,360	292,360	200,528	91,832	0
Septic tank	102,296	102,296	72,604	29,692	0
Others	112,487	112,487	0	112,487	0
Nil	299,672	0	0	0	299,672
Rural area	638,002	111,526	9,980	101,546	526,476
Sewerage	5,941	5,941	3,342	2,599	0
Septic tank	14,112	14,112	6,638	7,474	0
Others	91,473	91,473	0	91,473	0
Nil	526,476	0	0	0	526,476

Source: INE-CNPV-92-Bolivia, Produced by: Muller & Asociados

2.2 Organizational and Institutional Contexts of the Sector

2.2.1 General Outlines of the Basic Sanitation Sector

The Basic Sanitation Sector until October 2, 1995 consists the following organizations:

- 1) The National Secretary of Urban Affairs national level
- 2) The National Direction of Basic Sanitation (DINASBA) national level
- 3) The Regional Corporations of Development (CORDES) local level
- 4) The Municipality or other local administrative agency local level
- 5) Other private organizations local level

1) Ordination of the Basic Sanitation Sector

Since November, 1991, the National Secretary of Urban Affairs (Ministro de Desarrollo Urbano) is the national authority and head of the sector of Drinking Water and Basic Sanitation.

Under this Secretary, the National Direction of Basic Sanitation (DINASBA) is the national executive organism of the Sector.

At local level, there are the Sectors of Basic Sanitation which are formed at the Regional Corporations of Development (CORDES), and at the local administrative agency such as the Municipalities, the Water Committees, the Water Cooperatives, the Administrative Councils, etc.

In addition, there are many non-official entities which are connected or participate actively in the basic sanitation sector, such as: Non Governmental Organization (NOG), consulting companies and consultants of private sector, the industry connected with the sector, universities and educational centers of formation of human resources for the sector, etc.

2) Scope of the Basic Sanitation Sector

The Basic Sanitation Sector's activities aim to preserve and improve the health and the quality of life of the citizens, and include the drinking water services, sewers, the elimination and management of solid wastes, control of environmental contamination, etc., in both urban area and rural area.

3) Legal Frame Relating to the Basic Sanitation Sector

The ordination of the Basic Sanitation Sector has been become concrete by a legal frame composed of many laws, decrees and supreme resolutions, ministerial resolutions and other dispositions. Among them, the followings are to be emphasized.

- Supreme Decree 22965 Ordination of the Sector
- Supreme Decree 22627 Finance of the Sector
- Supreme Decree 22964 Basic Sanitation of the Fight against Poverty
- Organic Law of Municipalities and Modifications
- Law No. 1551 of Popular Participation
- Law No. 1493 Ministries Law
- Policy of Tariff

- Capitalization Law
- Supreme Decree 23845 Regulation of Regional Corporations of Development
- Supreme Decree 11104 Creation of CONATA
- National Plan "Water for Everybody" 1992

Among them, the Law No. 1551 of Popular Participation, which was approved in April of 1994 is particularly important. This law lay stress on the appropriate distribution and administration of the national resources, to improve the live quality of Bolivian people in the rural area. Some of the scopes of this law are:

- Recognize, promote and consolidate the process of Popular Participation to articulate the indigenous, urban and rural communities into the juridical, politic and economic life of the country.
- Authorize the citizens participation and guarantee the equality of opportunities and the levels of representation for all citizen men and women.
- Define the national administrative division as following: the Country is divided in Departments, the Departments are divided in Provinces, the Provinces are divided in Sections, and the Sections are divided in cantons. There is only one Municipal at each Section of Province.
- Transfer to the Municipals the obligation to administrate, maintain and renew all local physical infrastructure of education, health, local roads, irrigation infrastructure, etc.
- Establish the principal of equal distribution of economic resources from the National Government to every citizen through the Municipals.
- Reorganize the public organizations in the frame of the rights and duties recognized by the Law of Popular Participation.

The details of this Law will be discussed in Section 2-2-4.

2.2.2 Institutional Structure of Rural Basic Sanitation

The organizations relating to the Basic Sanitation Sector, especially in the Study Area, can be described in detail as following.

1) National Direction of Basic Sanitation (herein after referred as DINASBA)

(1) General Information

The authority that concerns with this Study is the National Secretary of Urban Affairs (herein after referred as SNAU), an subsection of the Ministry of Human Development.

As prescribed by the Regulation of the Law of Ministries of Executive Power Art.81, the Subsecretary of Urbanism is the organization that takes the operative functions of the National Secretary of Urban Affairs and is responsible of the issues referred to the regional development and basic sanitation.

The DINASBA was created dependent on the SNAU by Art. 6 of Supreme 22965 in February 1992. Now, DINASBA is in direct charge of this Study.

DINASBA coordinate with the International Cooperation Agencies as one of their functions, by the Manual of Organization and Function issued in 1994 by Ministry of Human Development, National Secretary of Urban Affairs, General Direction of Planning and Coordination.

(2) Organization

The organization chart of the Authorities concerned with the Study is shown in the Figure 2-2-1.

DINASBA is composed of four departments: (1) Department of Programming and Management which is in direct charge of this Project, (2) Department of Basic Urban Sanitation, (3) Department of Basic Rural Sanitation, and (4) Department of Information System.

(3) Planning system of DINASBA

Under the dependence of Subsecretary of Urbanism, DINASBA plan, organize, direct, coordinate and control the works of the officials and collaborate in the implementation of the policies and strategies defined by the Subsecretary of Urbanism and the SNAU.

(4) Operation system

DINASBA implement the National Water Plan and Sanitation, and coordinate with the International Cooperation Agencies. Furthermore, DINASBA supervise and guide the works of CORDES, and check and actualize the National Water Plan.

(5) Personnel administrative system

Personnel of DINASBA decreased drastically from 1993 to present as shown in Table 2-2-1, after the promulgation of the Law of Popular Participation in April, 1994.

Table 2-2-1 Personnel in DINASBA and SNAU in Recent Years

(Unit: persons)

Year	DINASBA		National Secretary of Urban Affairs (SNAU)
	Total	Dept. of Programming & Management	
1992	17	5	-
1993	17	5	188
1994	13	3	130

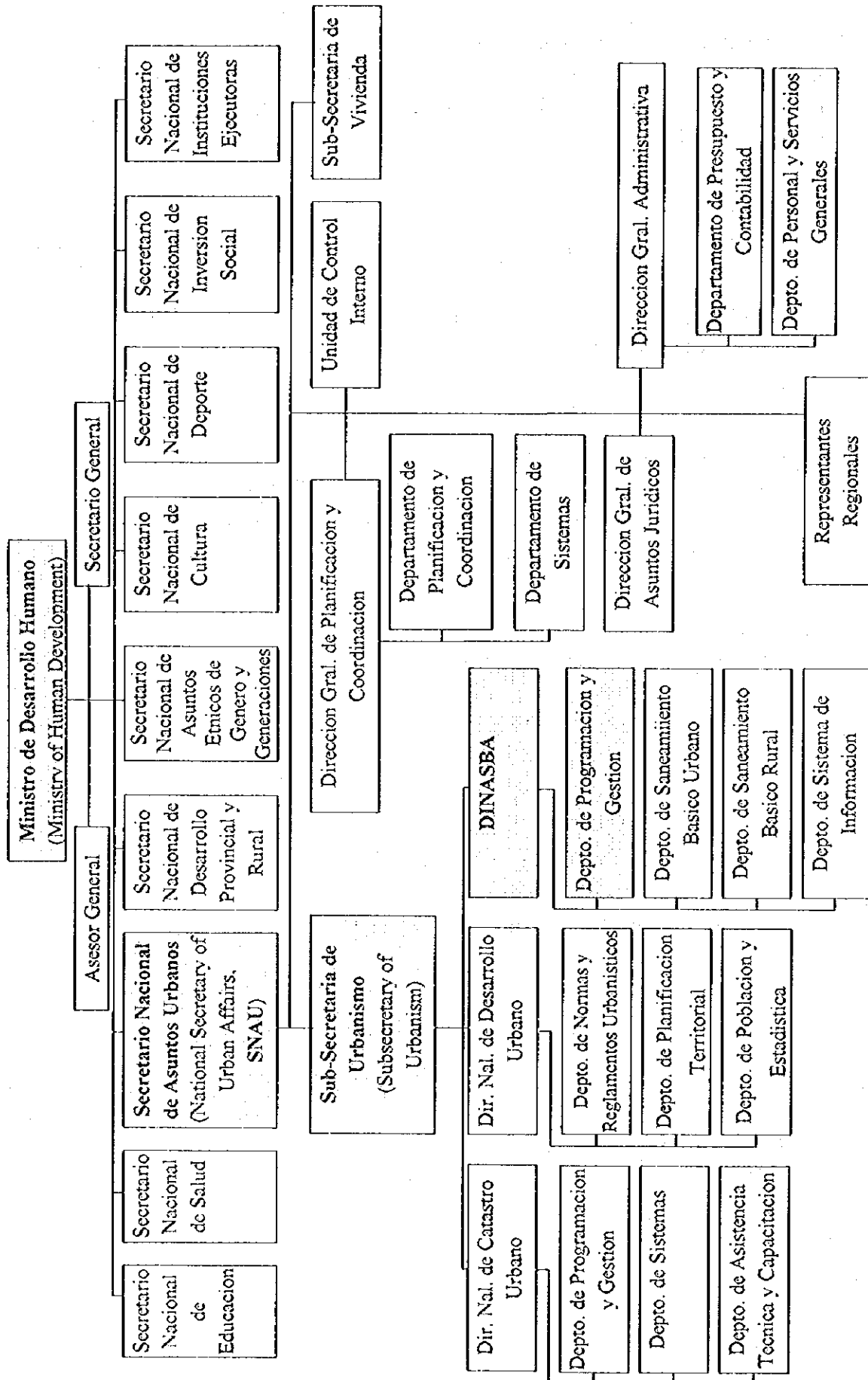


Figure 2-2-1 Organization Chart of the Concerned Authorities at National Level (until October 2, 1995)

(6) Budget

The budget of DINASBA consists mainly of general administration expenses such as personal expenses, travel expenses, office equipment, etc. which are of course supplied by the Government, included in the total budget of SNAU, which are Bs4,903,023 and Bs3,863,596 for 1993 and 1994 respectively.

The reason of decrease in 1994 is because of the decrease of personnel due to the Law of Popular Participation.

2) The Regional Corporations of Development (hereinafter referred as CORDES)

Until December 31, 1995, the Regional Corporations of Development (or CORDES: Corporacion Regional de Desarrollo) had the following structures and functions.

(1) General Information

The CORDES is decentralized public institutions under the functional dependence of Ministry of Sustainable Development and Environment, with juridical personality, administrative, technical and financial management, with proper patrimony and indefinite duration. (Supreme Decree 23845 of Aug. 18, 1994; Organic Regulation of Regional Corporation of Development Art.2)

(2) The functions of the Corporations

Articulation with National Planning - The CORDES articulate in the prefectural plans of development, the policies of the Government in the areas, themes and problems which correspond to the prefecture, with municipal governments, subregional organizations and representatives of territorial organizations of base. (Art.7)

Prefectural Investment - The CORDES shall assign resources for the execution of projects jointly with municipalities. (Art.13)

Strengthening of Municipality - The CORDES shall support municipal governments to improve its capacity of management and giving administrative services at the request of the municipalities (Art.16). Municipality has to be fortified by the support of each CORDES as for the implementation of projects for the time being.

To fortify the Municipality, principal actions of the CORDES shall be oriented toward: (1) the action area (to support in the elaboration of plans and annual budgets, and of programs at medium and long period, to advise so that the current expenses may not exceed 10% allotted, to capacitate in the elaboration of cadastres, registers and resident cards, to promote the use of appropriate technologies, to cooperate in the maintenance of infrastructure); and (2) the administrative area (fortification of planning capacity of participation and sustainable management of natural resources, technical assistance in the contract of basic services, formation of human resources, identification and formulation of project in the phase of pre-investment and investment).

On the other hand, the CORDES may join in the co-finance of municipal projects, giving preference to the municipalities of less income.

(3) The organization chart of CORDES

The organization charts of the CORDES in Department of Chuquisaca (CORDECH), Department of La Paz (CORDEPAZ), Department of Oruro (CORDEOR), Department of Tarija (CODETAR), and Department of Santa Cruz (CORDECRUZ) in the Study Area are shown in the Figure 2-2-2 ~ Figure 2-2-6.

The Directorate is the superior organ of the institution which has the members as following: the President of the CORDES, the representatives of the principal public and representatives of private institutions of the Department.

President of the institution exercise its functions subject to the law of Corporation of Development, the legal dispositions in force and in the organic statute of the CORDES.

General Management is the principal executive, technical and administrative official of the CORDES, who should lead and supervise the operation and function of the proper activities of the Corporation.

(4) Planning system

Planning Management has the specific functions of elaborate plans, programs and projects for the regional development, dependent on the Ministry of Sustainable Development and Environment, as well as realize prioritization, evaluation and control and follow up in the execution of the projects.

(5) Operation system:

This is composed of Road Direction, Basic Sanitation etc. The functions are to elaborate, present the policy of operations of the projects and the works which are in charge of the CORDES.

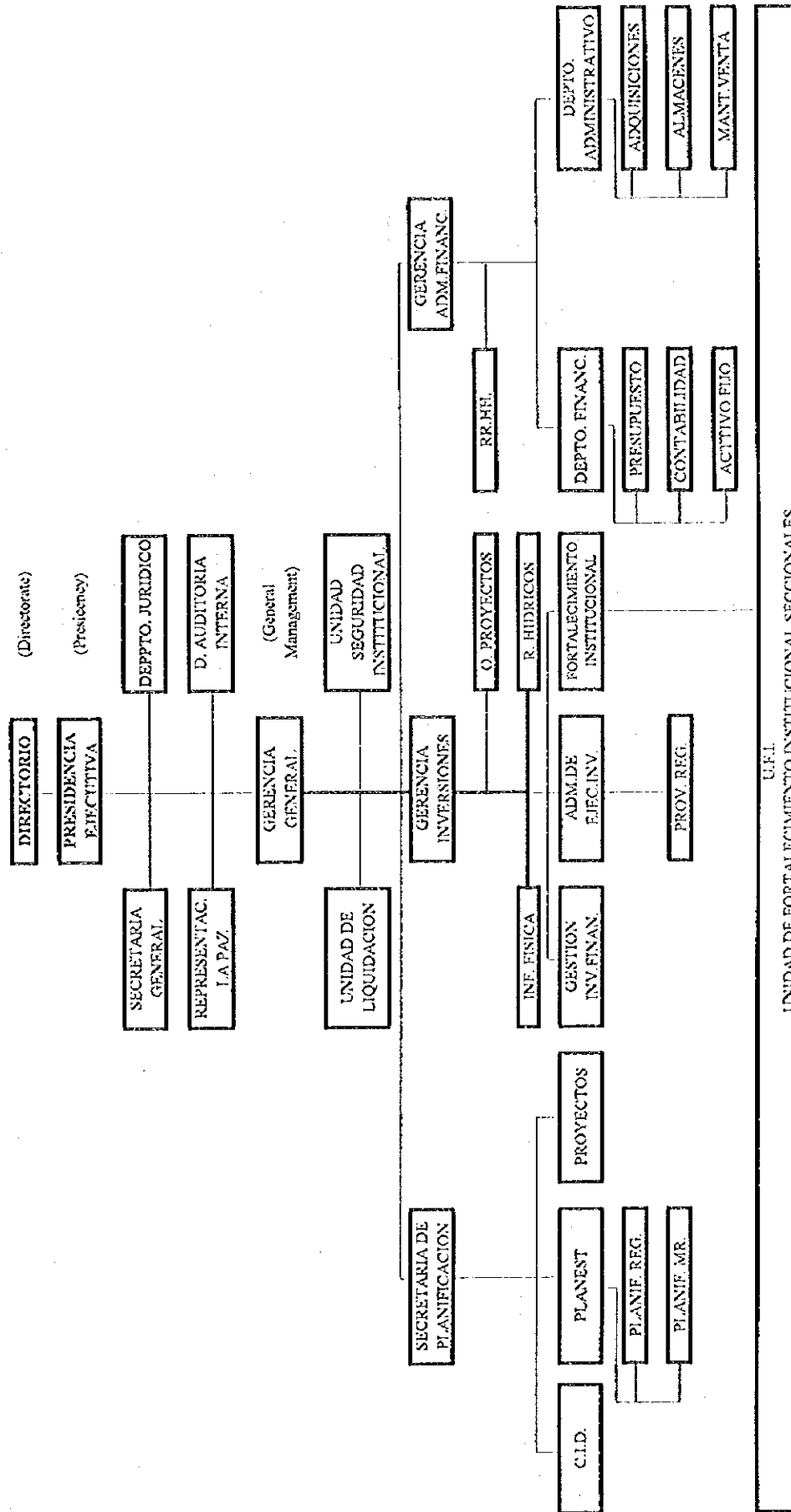


Figure 2-2-2 Organization Chart of CORDECH (1994-1995)

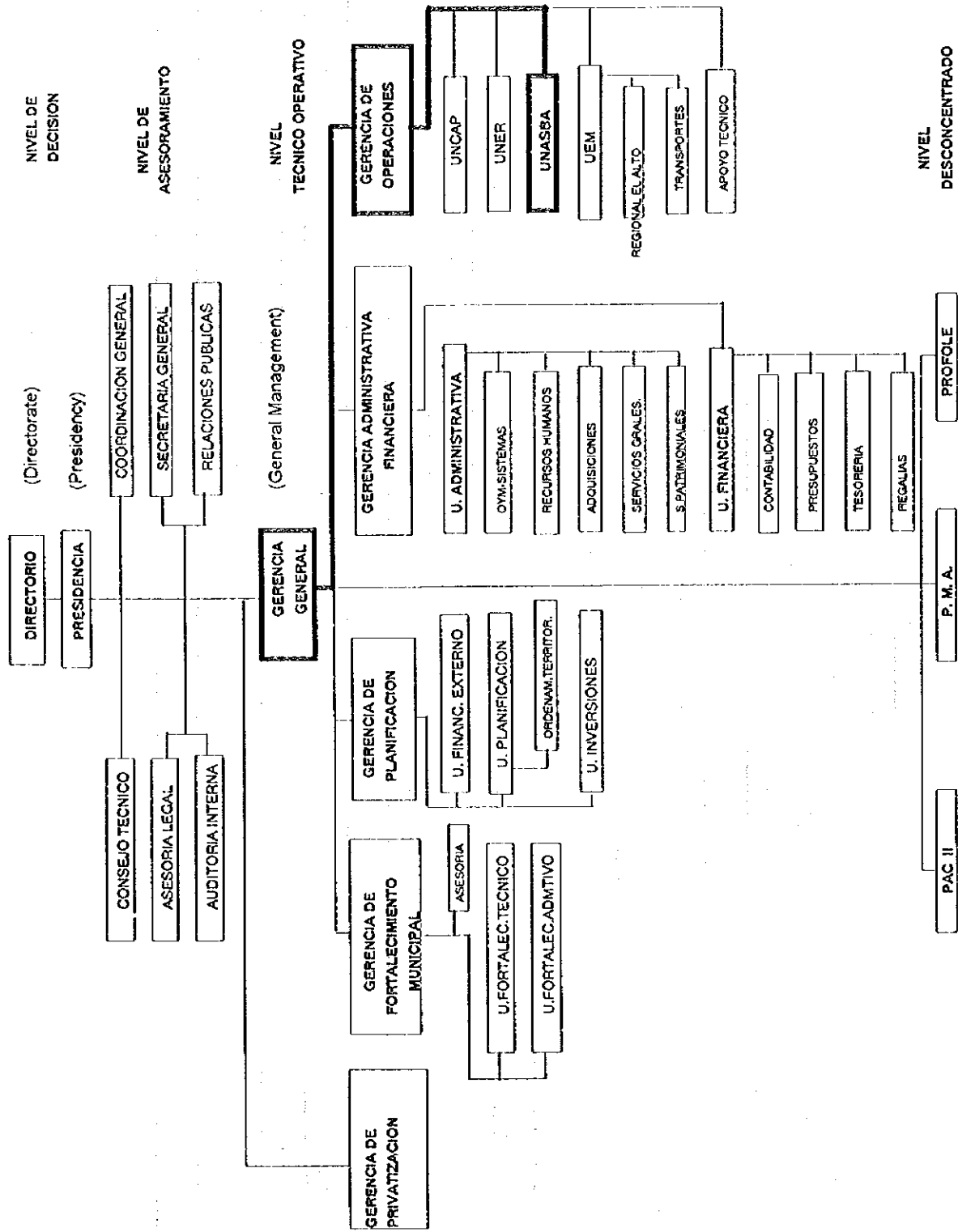


Figure 2-2-3 Organization Chart of CORDEPAZ (1994-1995)

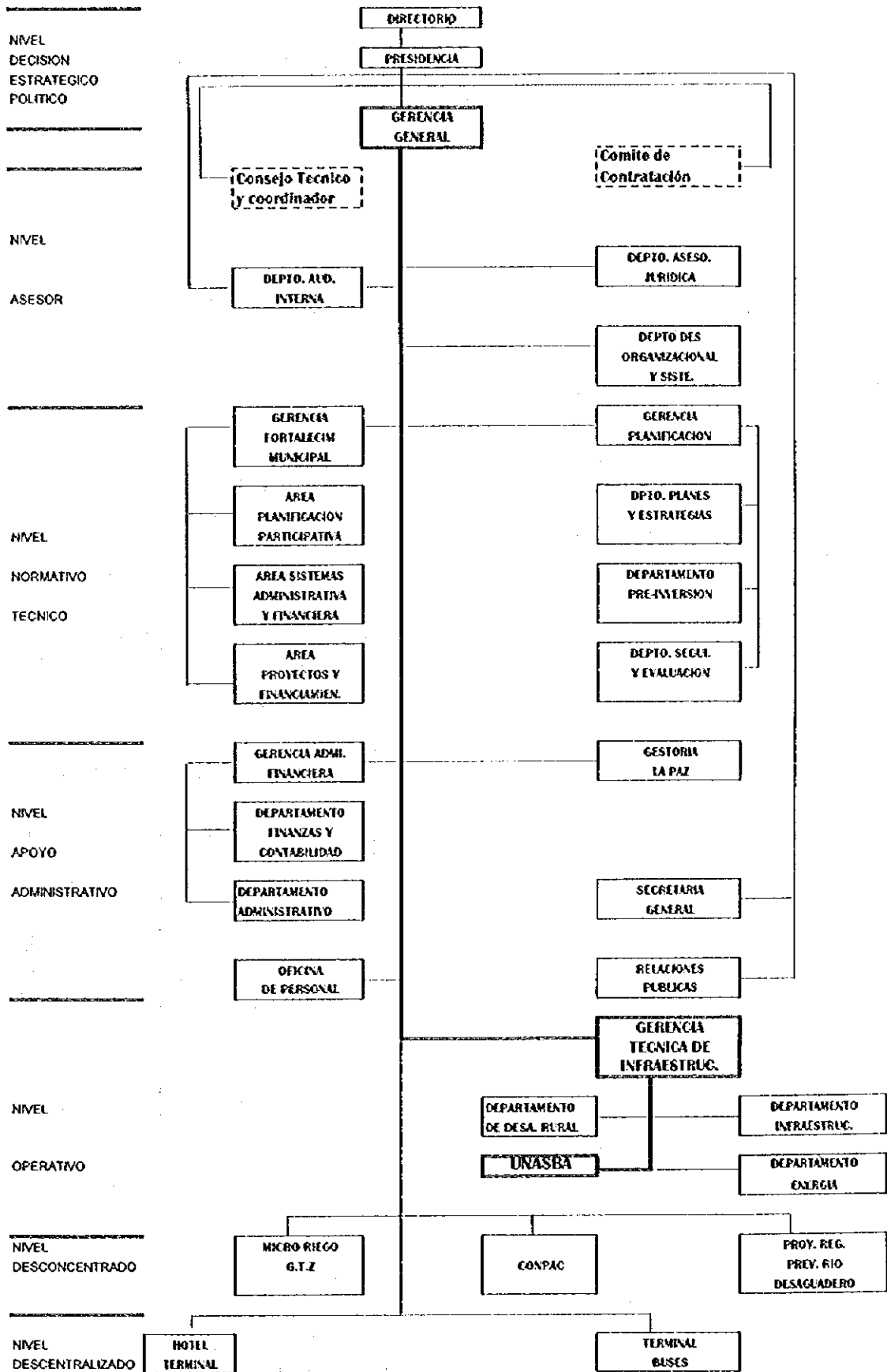


Figure 2-2-4 Organization Chart of CORDEOR (1994-1995)

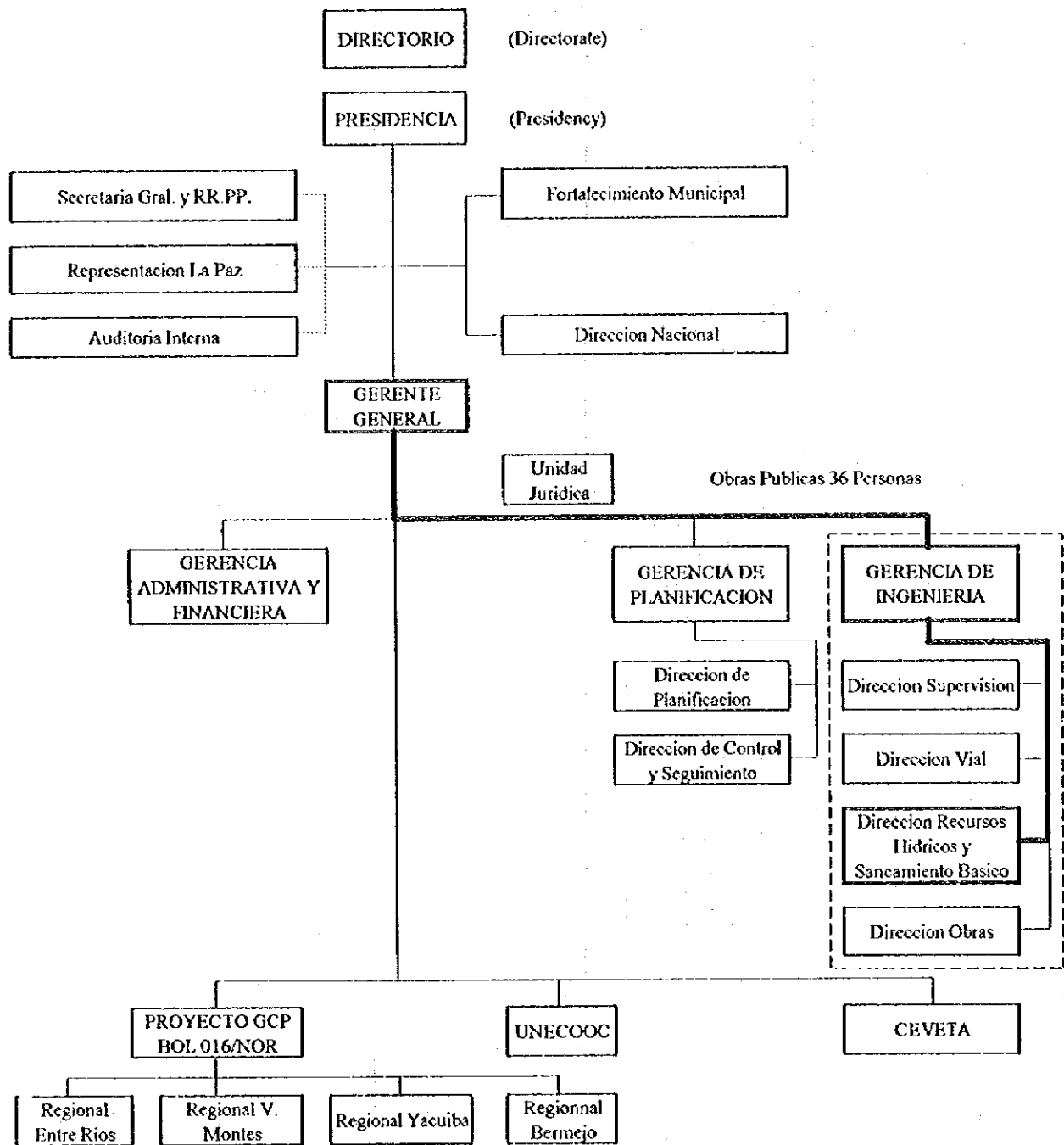


Figure 2-2-5 Organization Chart of CODETAR (1994-1995)

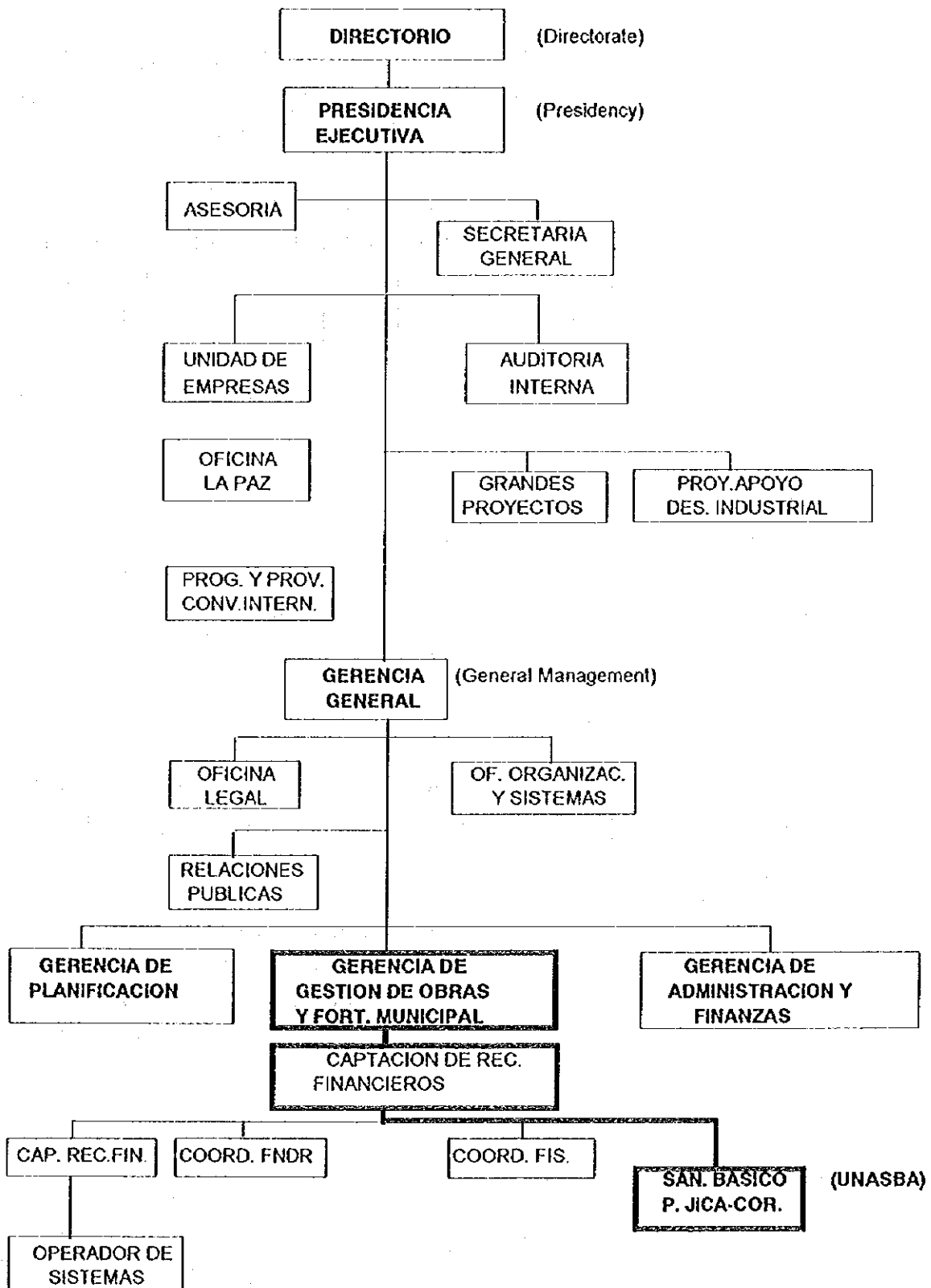


Figure 2-2-6 Organization Chart of CORDECRUZ (1994-1995)

(6) Personnel Administrative system:

The number of personnel of CORDES has been greatly decreased by the Law of Popular Participation as shown in Table 2-2-2. This reduction was due to the regulation of the new Law that personnel expenditure should be below 15% of total income of the CORDES.

Table 2-2-2 Number of Personnel of CORDES Before and After the New Law

	CORDECH		CORDEPAZ		CORDEOR		CODETAR		CORDECRUZ	
	Total	Unasba	Total	Unasba	Total	Unasba	Total	Unasba	Total	Unasba
1993 (Before the new law)	1,007	-	700	-	398	20	824	-	492	-
1994 (After the new law)	576	10	329	12	436	23	303	10	346	10

(7) Financial system

Administrative and Financial Management of the CORDES is in charge of formulating, organizing and presenting the financial and administrative policy of means and services of the CORDES, and is composed of Administrative Direction and Financial Direction.

(8) Investment

Table 2-2-3 shows the total investment of the CORDES in 1991, 1992 and 1993, and the amounts of investment for water supply sector.

It is noticeable that the amounts of investment for water supply sector in CORDEOR (Oruro) accounted for 20.0% of the total investment of CORDEOR in 1991, and increased continuously to become 49.3% of the same in 1993. On the contrary, the amounts of investment for water supply sector in CORDECH (Chuquisaca) seemed to stay at the low ranks (about Bs 2,000,000) and low percentages (less than 4% of the total investment) without any change.

However, the program "Water for Everybody" already started in 1992, but it seemed that the investment for the water supply sector at almost all of CORDES in 1992, 1993 had not been increased appropriately as planned in this program.

Table 2-2-3 Amounts of Investment of CORDES

(Unit: Bs 1,000)

Year	In 1991		In 1992		In 1993	
	Total Investment	For water supply sector	Total Investment	For water supply sector	Total Investment	For water supply sector
CORDES						
CORDECH	67,205	2,000	67,112	1,764	55,527	1,984
(in percentage)	(100%)	(3.9%)	(100%)	(2.6%)	(100%)	(3.6%)
CORDEPAZ	55,338	3,266	73,928	8,129	83,258	14,367
(in percentage)	(100%)	(5.9%)	(100%)	(11.0%)	(100%)	(17.3%)
CORDEOR	13,539	2,703	28,585	7,788	17,196	8,478
(in percentage)	(100%)	(20.0%)	(100%)	(27.0%)	(100%)	(49.3%)
CODETAR	55,208	6,848	84,946	3,377	72,034	8,627
(in percentage)	(100%)	(12.4%)	(100%)	(0.4%)	(100%)	(12.0%)
CORDECRUZ	137,920	-	133,676	15,834	150,996	16,414
(in percentage)	(100%)	(%)	(100%)	(11.8%)	(100%)	(10.9%)

3) Local level: Organization and Function

(1) Organization

Depending on the size of the community, its political and administrative characteristics, the grade of community participation and other characteristics, there are following organizations that may be in charge of water supply sector:

- Municipalities,
- Water Committees,
- Public Service Cooperatives
- Non Governmental Organizations,
- Private entities.

Generally, the Water Committees and Public Service Cooperatives have Administration Councils (with 3 to 9 members) and Surveillance Councils (with 3 to 5 members). The members of both Councils do not receive remuneration. Furthermore, in intermediate cities, the operation and management of water supply systems are in charge of Municipal Enterprises of Water & Sewerage.

(2) Function of local organizations

The principal functions of these local organizations are:

- Administration, operation, maintenance of the water supply systems, sewerage systems, etc.
- Establishment and collection of tariffs
- Finance of current expensed
- Planning of amplification and improvement of the service and regulation of use of water.

(3) Planning System

At local level, there is no planning system for amplification and improvement of the water supply, nor investigation of new water sources. Even when Municipalities and communities know the problems and also the capacity of the water sources, they were not in charge of planning at local level.

Previously, the planning originated from the national level or from the regional level, and so the persons in local level organizations did not feel responsible or owner of plans and projects. With the Law of Popular Participation, this is changing and the stage of participatory planning has started with direct intervention of the community.

(4) Systems of Administration, Operation and Maintenance

As prescribed in the Law of Popular Participation (No.1551), the Municipalities, Water Committees, Public Service Cooperatives, or other private entities, local organizations have the responsibility to administer, operate and maintain the existing water supply systems.

The field study carried out by the Study Team shows the following discoveries:

- At almost all of communities in rural area, there is the need to explain and reconfirm to the inhabitants there that all infrastructures such as the water supply systems in the community are properties of the community.

- It is defined that through the local organisms, the rural communities are actually administer, operate and maintain the existing water supply systems.

- In many communities, the operation and maintenance are not sufficient.

- Except some cases given by NGOs, at almost all of communities in rural area, the persons in charge of operation and maintenance of the water supply systems have not received corresponding training, and the inhabitants have not enough knowledge about the rational use of water.

- It supposed that the regional or municipal authorities should support the communities in personnel training, administrative and accounting supervision, etc. But, such relationship and coordination have not been clearly defined yet.

(5) Financial system

a) Investment in rural drinking water and sanitation

Figure 2-2-7 shows all possible sources of finance for construction and installation of rural water supply system and sanitation system. Those sources are based on the disposition of the Law of Popular Participation and other recent legal dispositions, and on the historical process of investment in this field of this country. The Supreme Decree No.22627 "Finance of the Sector" stipulates that in case of the rural areas, the investment projects for drinking water can be relied on direct transfer from Government. Furthermore, in the common projects without home connection, the contribution of labor of the community is appraised as 15% of the investment.

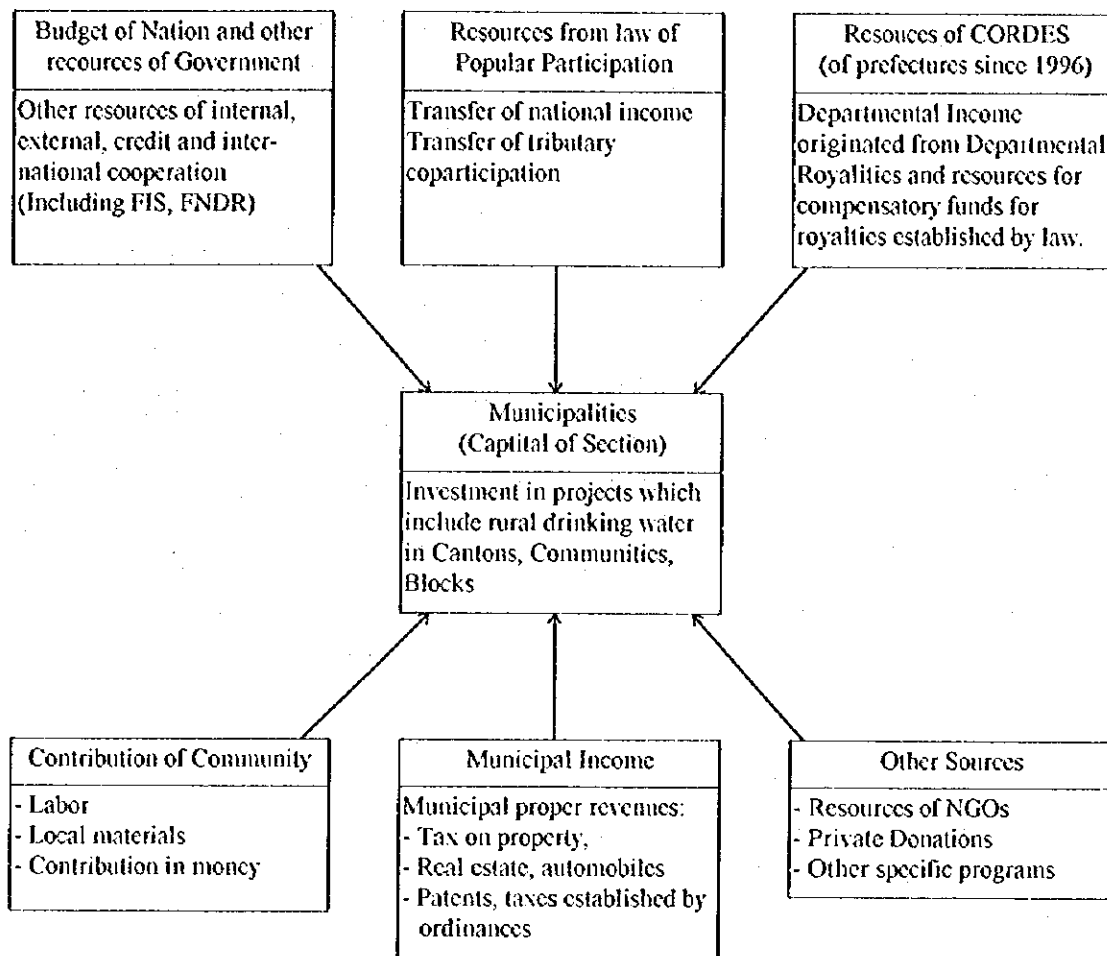


Figure 2-2-7 Possible Sources of Finance for Investments in Rural Basic Sanitation General

b) Finance of running expenses

In the rural area, one main object of the tariff policy is the sustainability of the water supply systems (such as the expenses for running, operation, maintenance and administration), the rational use of water and socioeconomic fairness.

The followings are recognized by the field study.

- It is advantageous that the administrative entities at local level establish their own water tariffs directly.

- In some rural communities, water meters are used in the system with house connections. This is positive and its use should be extended in the future.

- The tariff collection is around 60% to 80% against invoicing in many communities visited.

- Although in some rural communities, the income from tariff collection can cover all expenses for sustainability of the system, in many communities the tariff income is not enough when comparing with the expenses.

- The accounting systems are weak or do not exist. And, with exception of Surveillance Committees, the systems of supervision or audit do not function sufficiently.

(6) Human Resources

As already indicated, the members of Board of Directors of Water Committees and Cooperatives, and Surveillance Committees do not receive remuneration, but many of them are working very actively in the operation, maintenance of the water supply system.

Remunerated human resources, in those organisms, are very limited. In the communities with population of 2,000 to 10,000, there are a few persons remunerated. It varies from 1 to 10 persons, who dedicated in the operation, repair of the system, or collection of tariffs. In the communities with population of less than 2,000, there are no persons remunerated. They resort to personnel contracted for repairs.

With exception of NGOs and CORDECRUZ, almost all of persons in charge at communities are not trained. There is no professional personnel nor technical expert for operation and maintenance in the Municipalities or Committees visited by the Study Team.

4) Community Participation and Sustainability of the Water Supply System

For the sustainability of the water supply systems in rural area, the community participation is indispensable, and in Bolivia this is also emphasized by the Law of Popular Participation.

The community participation took the important role in the construction works in rural area of Bolivia during the past 30 years. With the traditional solidarity and communal cooperation, the inhabitants in rural communities used to contribute positively their labor, their materials and their moneys to the constructions of the water supply system of the community. However, the water supply systems could work well in some years after the day of completion, but its supply ability gradually fell down, the water quality became doubtful, and then the inhabitants became neglect to pay tariffs and went back to the traditional unsanitary water sources. Actually, among the communities in rural area which had been visited by the Study Team, almost 50% of those with water supply systems can not function well or stopped running because of various reasons.

Some communities are not sure whether the water supply system belongs to them. Therefore, more efforts are required to perform the correct understanding among the inhabitants in rural communities about the ownership of the water supply systems, and motivate them to the works to maintain these facilities.

5) Woman Role in the Water Supply Sector

The situation of women in the rural area of Bolivia, in relation with water supply sector can be summarized as following.

- Feminine population in the country reach 50.6% of total population (INE 1992 Census).

- In rural area, women's illiteracy rate is 49.9%, while men's ones is 23.1% (INE 1992 Census, as shown in Table 2-1-6).

- Maternal mortality is of 60 per 10,000 live births (UNICEF, 1993).

- Women alone of the head of a family reach 22.4% in the rural area (INE/ONAMFA-Situation, women 1993).

- Women participate actively in physical labor during the construction of drinking water system.

- Women continuously take a key role in the traditional activities of distribution of water and are the principal users of the water supply system.

- Women have the leadership in the Water Committees or Cooperatives, and other organizations those manage the water supply systems.

- Women organizational capacity is big, which is shown especially in the organization exclusively of feminine gender such as Clubs of Mothers, Groups of Health, Religious Associations, etc.

- Radio is the principal method of mass communication in the rural area, and almost 60% of women listen to it.

- The Supreme Decree 23858 of Popular Participation in Art.2 stipulates that "the Organization of Basic Territory (OTB) should incorporate women in the formation of their directors, in equality of opportunities and functions with men."

6) External Cooperation

In Bolivia, there are many programs with external cooperation and covers different sectors: Agriculture and Cattle Raising; Mining and Metallurgy; Industry and Tourism; Energy; Transports; Education and Culture; Basic Sanitation; Urbanism and Housing; Water Sources; Multisectorial; Human Resources; Governments, Finance; and others.

According to the information from the National Secretary of Finance (DICOPER/USI), the total cost of all projects which are in execution is about 842 millions dollars, and among them, the ones with external finance from 1988 to Sept. 1, 1994 is 558 millions dollars.

Relating to Basic Sanitation Sector, there are mainly: (1) the cooperations of international organizations or foreign countries, and (2) the cooperations of Non Governmental Organizations. Following is the outlines of these cooperations.

(1) Cooperation of international organizations or foreign countries

According to the above-mentioned information source, the cooperation of international organizations or foreign countries (bilateral cooperation) in basic sanitation sector reach 17 projects with a total cost of 36,649,499 US Dollars. Among these, those had been executed in the 1988-1994 period amounted to 21,078,577 US Dollars.

In the Study Area, as shown in Table 2-2-4, there are 11 projects relating to groundwater development field, with a total cost of about 18 millions dollars. Among these, there are 8 projects with cooperation of international organization (World Bank, Inter-American Development Bank,

United Nations Development Program, Pan-American Health Organization, World Health Organization); and 3 projects with bilateral cooperation (Japan, Belgium, Spain).

Table 2-2-4 Projects with External Cooperation Related to the Groundwater Development

Project Code	Project Name	Executed Entity	Area Covered	Finance Source	Cost (US\$)		Date		
					Total	Executed (88-94)	Start	Completion	
1	E-D-0025	Drinking water, Chaco, Tarija	SNH	Tarija	Belgium	507,469	79,350	6/10/93	5/10/93
2	I-D-0036	Drinking water and sanitation, Oruro	CORDEOR	Oruro	FNUDC	5,006,000	917,546	7/01/91	7/30/94
3					PNUD	229,700	190,959		
4	T-D-0379	Environmental, Sanitation	SNS	Nation	OPS/OMS	889,652	808,152	6/25/88	12/31/95
5	T-D-0718	Groundwater development in rural area	SNAU	Nation	PNUD	1,487,695	660,550	6/01/93	8/02/94
6					Japan	109,000	55,000		
7	T-D-0775	Support to drinking water program	SNAU	Nation	PNUD	655,000	289,552	2/10/93	12/31/95
8	T-D-0807	Feasibility study in sanitation sector		Nation	BID	7,800,143	2,693,878	7/01/93	3/30/94
9	T-D-0831	Preparation project, rural basic sanitation, PROSABAR	DINASBA	Nation	BM	485,000	289,142	6/01/93	3/30/94
10					PNUD	15,000	30,843		
11	T-D-0155	Solar energy project in Altiplano, (energy sector)	EMS.S.GR	La Paz	Spain	851,500	851,410	1/01/90	12/31/94

Source: National Secretary of Treasury-DICOPIER/USI

Note: PNUD: United Nations Development Program

OPS: Pan-American Health Organization

OMS: World Health Organization

BID: Inter-American Development Bank

BM: World Bank

(2) Cooperation of Non Governmental Organization (NGO)

There are 385 Non Governmental Organizations in Bolivia, which are acting in various areas. Some are international and others are national.

Following is the outlines of some principal Non Governmental Organizations which are actually working in the field of rural basic sanitation.

a) PLAN INTERNATIONAL, La Paz

Plan International was established in 1937 as "Foster Parents Plan for Children in Spain" to provide food, shelter and education for children suffering the Spanish Civil War. During World War II, the organization became "Foster Parents Plans for War Children" and worked in England, caring for displaced children from all over Europe.

Today, Plan International works in Africa, Asia, Eastern Europe, Latin America and the Caribbean region, continually adapting its programs to the real needs and actual circumstances of the people it serves.

Plan International consists of 9 donor countries (Australia, Belgium, Canada, France, Germany, United Kingdom, Netherlands, Japan and United States). Among these, Japan is ranking at the second place occupying 16.2% of total donation in 1994, next to the Netherlands (39.4% of the same).

Plan International supports programs based on proposals and priorities established by communities, focusing on health, education and development of the community and increase of production through a program of credits and small loans for agriculture, cattle raising, handicraft and shops handled by women.

The staff in Bolivia have been working here since 26 years ago, and now has about 100 members. The offices locate in La Paz, Santa Cruz, Sucre and Tarija. Plan International plans to expand its activities to Potosi and Oruro in near future, and perforate 25 wells in Potosi for drinking water with 60m depth.

Its annual income is said to be around 8,000,000 US Dollars in 1995. 80% of which is spent for project investments, 55% is said to be destined for Basic Sanitation investments.

During the past 6 years, Plan International installed 50 water supply systems, 2,400 hand pumps, and 15,000 to 16,000 latrines.

Average amount of each water supply system is said to be around 30,000 US Dollars, among which Plan International contributes 18,000 to 22,000 US Dollars. These systems were constructed generally in joint work with the communities, which offer labor and local materials.

Plan International considers that the Law of Popular Participation and the Law of Decentralization will favor its future activities, since it may be able to deal with Municipalities at local level or with Prefectures at prefectural level without resorting to the central level.

According to Plan International, the main problem relating to water supply projects is the sustainability of the systems, since once the water supply system completed and delivered to the community, its supply ability gradually falls down by many reasons such as administration, finance and technics. 45% of the system installed by Plan International are not working well regarding technical and sanitary aspects, and 90% of the systems have problems regarding the administrative aspects.

b) CARE, La Paz

CARE (Cooperacion Americana de Remesas al Exterior - American Cooperation of Remittance to the Exterior) was established in 1946 to help the inhabitants affected by the World War II, which destroyed major part of Europe. After concluding their work in Europe, CARE International have presented themselves in various under-developed countries in Asia, Africa and Latin America. Today, they are working in more than 40 under-development countries, with finance from 12 donor countries. Japan is said to be occupying very small portion as donor country.

In February 27th, 1976, CARE subscribed the Basic Agreement with the Bolivian Government, since then, they started to promote many projects such as: infantile maternal health, basic sanitation, community participation, communal capacitation, agricultural production, management of natural resources, promotion of women, etc.

The CARE's staff in Bolivia has nearly 300 members, with the offices in Potosi, Sucre, Tarija, Santa Cruz and La Paz.

The income of CARE Bolivia is said to be about 5,500,000 US Dollars in the past three years till 1993, out of which 60~70% was destined to basic sanitation sector. Since 1994, the investments for basic sanitation sector have been reduced to 25~30% of annual investments. Generally, the projects were executed in the joint work among CORDES, CARE and the community, in the proportion of 20/70/10% respectively.

Till 1993, CARE realized the following works in basic sanitation sector in Bolivia:

Water supply systems (installed or improved)	1,083 systems
Faucets installed	64,505 faucets
Inhabitants benefited with water	463,640 inhabitants
Community with latrine program	475 communities
Latrines installed	20,000 latrines
Inhabitants benefited with latrines	131,000 inhabitants

Almost all of installed water supply systems are by gravity, and only 5% are by pumps (gasoline, diesel, electric motors and solar panels). 200 water systems which installed since 1990 are running well. After three years of installation, 70% of the systems could work without any technical, administrative and financial problems, but the remaining 30% had some problems.

With respect to the Law of Popular Participation and the Decentralization Law, CARE Bolivia considers that both are positive and will improve their future activities and it is better that funds reach directly to Municipalities, and that CORDES are not the operating and executing entities.

c) Conclusions about NGOs

The study on Non Governmental Organizations working in the fields of rural basic sanitation of Bolivia leads to the following conclusions:

- The contribution from NGOs in basic sanitation sector in Bolivia is important. Plan International, CARE have installed or improved more than 1,000 water supply systems, more than 3,000 hand pumps, benefiting more than 500,000 inhabitants. Moreover, they have installed about 40,000 sanitary latrines benefiting more than 200,000 inhabitants.

- The investments of NGOs on rural basic sanitation sector in the past several years have been counted from 7 to 8 million US Dollars per year. The portion of investment of Bolivian side varies between 20% and 50% of the investment costs, and usually financed by the communities and CORDES.

- The main problem is the sustainability of the water supply systems, since there are many problems due to the deficient administration, operation and maintenance. Besides, water sources

utilized by NGOs are generally springs or filtering gallery, of which volume decreases considerably in dry season. Plan International estimate that 45% of the water supply systems installed by them do not operate well regarding technical and sanitary aspects, and 90% of these had problems regarding administrative aspects. CARE-Tarija indicate that almost all of systems installed by them suffer from water scarcity problems.

- Though there are works dedicated by NGOs to strengthen the administrative ability of Municipalities, the impact is not as expected because of temporal actions which have no continuity nor follow-up.

- The future perspectives of NGOs are not the same. While some of them like Plan International keep expanding their activities to other departments, others like CARE consider to reduce their actions in this field because of the reducing of donation from exterior.

- Almost all of NGOs which had been interviewed by the Study Team considered that the Law of Popular Participation, and the Law of Decentralization should favor their works in rural area.

2.2.3 National Plan of Drinking Water and Sanitation

The Government of Bolivia issued Supreme Decree 22965 in February, 1992, prescribing the ordination of the Sector of Basic Sanitation in the country, and the implementation of the Program "Water for Everybody", considering that Bolivia should protect the life, health of the inhabitants in promoting the basic sanitation in the frame of Art.132 of the Constitution of the State. According to this Supreme Decree, SNAU was nominated as the authority in charge of the basic sanitation sector, while the Drinking Water and Sewer Corporation (CORPAGUAS) was dissolved, and the Direction of Environmental Sanitation of the Secretary of Public Health had to pass all functions concerned to SNAU.

The outlines of the National Plan For Basic Sanitation "Water For Everyone" is described as follows:

1) Objectives

(1) General objectives

To assume the challenge of the sectorial adjustment program "Water for Everybody in the year 2000" that intends to improve the quality of inhabitants' life by providing, improving and maintaining service of drinkable water and sanitation.

(2) Strategic Objectives

a) To define new guidelines for the supply of drinkable water and sanitation services considering the policies of the National Plan for Development as well as the reorganization of the sector.

b) To achieve an effective participation among companies and institutions responsible for the supply of drinkable water and sanitation services, internal and external financing agents and cooperation agents as well as community members in order to reach the goals of the "Water for

Everybody in the year 2000" program.

(3) Specific Objectives

a) To develop projects that increase the water supply coverage and sanitation coverage, and improve the quality of these services in all country, with giving the priority to the communities in rural area.

b) To guarantee and promote the sustainability and continuity of quality services through support programs that achieve institutional development of the institutions of the sector as well as adequate administration of human resources and promotion of the community.

2) Policies

(1) Institutional policies

To avoid the dispersal of efforts and resources, it is necessary to implement various measures to reorganize the institutions that operate in the basic sanitation sector.

This refers to a new distribution of responsibilities within the Ministry of Urban Affairs (now Sub-National Secretariat of Urban Affairs, SNAU) and within local and prefectural entities, as a new definition for the range of operation of the entities that depend upon other ministries.

To this effect, the Government has issued the Supreme Decree for the Reorganization of the Basic Sanitation Sector in Bolivia in order to implement the "Water for Everybody Program", through an institutional arranging, efficient business management and active participation among internal and external financing organizations.

And the DINASBA (National Direction of Basic Sanitation) has been created to replace the National Direction for Urban Infrastructure (Dirección Nacional de Infraestructura Urbana).

(2) Financial Policies

Actually, Bolivia faces deficiency in the attention to the basic sanitation services because of fundamentally financial limitations, which require the adoption of define policies to confront the problem in its real magnitude.

In rural areas with scattered inhabitants, the Government should take the responsibility of investment, and the community should participate in the administration, operation and maintenance of the systems as well as contribute the labor in the execution of projects.

Financing entities must participate in the channeling of resources for the area. At prefectural capitals and intermediate cities, the National Fund for Regional Development (FNDR) is the financial agent that has the responsibility to channel resources for the investment in basic sanitation sector. Beside, for the same purpose at rural areas and marginal urban areas of low income, the Fund for Social Investment (F.I.S) is the financial agent.

(3) Social Policies

According to the Law of Population Participation, the objective of the basic sanitation service is to satisfy the primary needs of the inhabitants based on health prevention and the

improvement of life condition. This social policy is framed and supported by the Supreme Decree 22964 of the Basic Guidelines for the Fight Against Poverty. This decree states the following: "Be it declared as national priorities in basic sanitation the supply of drinkable water, sanitation sewage systems, excretion elimination, recollection and disposal of solid wastes, principally in the precarious fringe areas of cities."

3) Strategies of Action

To reach the proposed goals, following aspects are clearly stated.

(1) Will Power of the Government

The achievement of objectives in any area and in any country, is precisely based on the will power of government, without which all efforts would be reduced to irrelevant rhetoric.

(2) Inter-sectorial Coordination

The deficient inter-sectorial coordination has been one of the major obstacles for the improvement of sanitation in the country. Moreover, the absence of coordination not only made the work more difficult, but also misled to the diminishing effect of investments.

The current Reorganization of the Sanitation Field, enforced through a Supreme Decree, will guarantee the adequate and necessary coordination to guide operations and to prioritize the needs of the country.

(3) The Participation of the Community

The participation of the community has been identified as a fundamental importance in the preservation, operation and maintenance of the sanitation systems.

In this sense, sanitation education and community participation are included in the Support Programs to be executed in the current plan.

(4) Foreign Cooperation

One of the principal characteristics of the Actual Plan is the effective and coordinated participation of Foreign Cooperation Entities.

4) Scope of the Plan

The goals to be achieved in the year 2000 are as follows:

	In urban area	In rural area
Coverage of water supply	80%	60%
Coverage of sanitation	55%	50%

In rural area, the estimated population in 2000 is 4,222,000, and therefore, to achieve the above-mentioned goal, it needs to serve drinkable water to about 2,571,000 inhabitants in rural area.

	In rural area	Water Serve	Sanitation Serve
<u>Year</u>	<u>Population</u>	<u>Population (%)</u>	<u>Population (%)</u>
1990	3,550,000	1,054,000 (29.7%)	516,000 (14.5%)
1995	3,850,000	1,571,000 (40.8%)	940,000 (24.4%)
2000	4,222,000	2,571,000 (60.9%)	2,111,000 (50.0%)

2.2.4 Organizational and Institutional Problems and Perspectives

1) Problems and restrictions in the Basic Sanitation Sector

The followings are the analyses of the organizational, institutional restrictions and changes occurred during the execution of the Study. The Laws and regulations which caused those changes were issued after 13th December, 1993, the date when the Agreement between the Government of Bolivia (National Secretarial of Urban Affairs of Ministry of Human Development) and the Government of Japan (Japan International Cooperation Agency, JICA) was subscribed to conduct a study for the development of groundwater in rural areas of the Republic of Bolivia.

(I) Law of Popular Participation No.1551

This law was issued on 20th April, 1994, having determined modifications in the 3 levels of Basic Sanitation Sector, which are summarized in Table 2-2-5.

Table 2-2-5 Main Changes in the Basic Sanitation Sector by the Law of Popular Participation

Levels	Main Modification and Changes
National	<ul style="list-style-type: none">- Delimitation of territorial jurisdiction of Municipal Government for the Section of Province. That is, political and administrative division is as follows; the country is divided into prefectures, prefectures are divided in provinces, which are divided into sections and sections are divided in to cantons.- Only one municipality in one section.- Establishment and classification of the State income into National, prefectural and municipal income.- 20% of national income are destined to Municipalities which receive according to equality principle by inhabitant, and for the first time Municipalities receive funds for investment, among them, of drinking water, in annual form- The Law does not effect the function of DINASBA
Prefectural	<ul style="list-style-type: none">- CORDES can not assign more than 15% of their income for charges of function (therefore, they had to reduce personnel)- CORDES should transfer to Municipalities all the projects and works which they execute in Municipalities.- Reorganization of organic and administrative structure of CORDES reducing their executing and operating capacity.
Local	<ul style="list-style-type: none">- Financial autonomy is given to Municipalities- Municipal government is strengthened- Practically, provinces and cantons have only political administration character, Municipalities assume real power.- All physical infrastructure of education, health, roads, micro-irrigation etc. are transferred to Municipalities with obligation of maintenance and renovation.- The Law of Popular Participation has been very be beneficial for the basic sanitation sector at local level.

(2) Supreme Decree No.23792

This Supreme Decree was given on 30th May, 1994 and dispose the creation of National Secretariat of Popular Participation. Table 2-2-6 summarizes the changes in relation with the Basic Sanitation Sector.

Table 2-2-6 Main Changes in the Basic Sanitation Sector by Supreme Decree No. 23792

Levels	Main Modifications and Changes
National	<ul style="list-style-type: none">- Reorganization of Ministry of Sustainable Development and Environment, creating National Secretariat of Popular Participation within this Ministry.- Reorganization of Ministry of Human Development and their 8 National Secretariats. The National Secretariat of Urban Affairs, where DINASBA exists, does not suffer from modifications.- The National Fund of Regional Development (FNDR) remains under the Ministry of Sustainable Development and Environment.- The National Fund of Social Investment (FIS) remains under the Ministry of Human Development.- This Decree does not affect the function of DINASBA.
Prefectural	<ul style="list-style-type: none">- Without modifications in CORDES
Local	<ul style="list-style-type: none">- The National Secretariat of Popular Participation formulate programs of strengthening in the planning and execution of projects and in the municipal and communal administration, including supposedly the basic sanitation sector.- It favors the local level of Municipalities.

(3) Supreme Decree No. 23813 - Regulations of Popular Participation

This Decree was given on 30th June, 1994, and regulate the Law of Popular Participation. Table 2-2-7 summarizes the changes in relation with the Basic Sanitation Sector.

Table 2-2-7 Main Changes in the Basic Sanitation Sector by Supreme Decree No.23813

Levels	Main Modifications and Changes																					
National	<ul style="list-style-type: none"> - The number of Municipalities of whole country is fixed to 299. - The number of provinces and sections in the Study Area remains fixed as follow: <table border="1" style="margin-left: 20px; width: 100%;"> <thead> <tr> <th>Prefecture</th> <th>No.of Province</th> <th>No.Sections</th> </tr> </thead> <tbody> <tr> <td>Chuquisaca</td> <td>10</td> <td>27</td> </tr> <tr> <td>South of La Paz</td> <td>4</td> <td>20</td> </tr> <tr> <td>Oruro</td> <td>16</td> <td>30</td> </tr> <tr> <td>Tarija</td> <td>6</td> <td>11</td> </tr> <tr> <td>Santa Cruz</td> <td>15</td> <td>46</td> </tr> <tr> <td>Total:</td> <td>51</td> <td>134</td> </tr> </tbody> </table> - Therefore, as the participatory planning, including the installation of drinking water service, is made through Municipal Governments, the role of those is very important, relegating the importance of cantons and including provinces. - This Decree modifies the strategies of DINASBA in relation with Municipalities, determining more active participation in the municipal plans and projects of water and sanitation. 	Prefecture	No.of Province	No.Sections	Chuquisaca	10	27	South of La Paz	4	20	Oruro	16	30	Tarija	6	11	Santa Cruz	15	46	Total:	51	134
Prefecture	No.of Province	No.Sections																				
Chuquisaca	10	27																				
South of La Paz	4	20																				
Oruro	16	30																				
Tarija	6	11																				
Santa Cruz	15	46																				
Total:	51	134																				
Prefectural	<ul style="list-style-type: none"> - This Decree determines that CORDES should have a closer contact with Municipalities, since they should participate in the planning of investment and furthermore are obliged to give advice and training for the municipal strengthening. 																					
Local	<ul style="list-style-type: none"> - It regulate the administrative and financial management of the funds from Popular Participation. 																					

(4) Administration Decentralization Law No. 1654

It was issued on 28th July, 1995 and changed the Basic Sanitation Sector as summarized in the Table 2-2-8.

Table 2-2-8 Main Changes in the Basic Sanitation Sector by the Law No.1654

Levels	Main modifications and changes
National	<ul style="list-style-type: none"> - The Executive Power is decentralized at prefectural level. - The Prefecture is the structure of executive power at prefectural level. - Resources are assigned for prefectural dominion and use. - Governor will assign till 15% of resources to finance the administrative charges of his dependency. - The works and projects are transferred to Prefectures as well as international finance which have been executed by Central Government. (for example DINASBA and CORDES) - This Law affect DINASBA, since this keep DINASBA waiting to know how the Prefectures structure their UNASBAs.
Prefectural	<ul style="list-style-type: none"> - Starting from Jan. 1st 1996, CORDES are dissolved and their patrimony is transferred to Prefectures. - Municipalities are strengthened furthermore by this Law.

(5) Supreme Decree No.24113

This Decree was issued on September 2nd, 1995, and the National Secretariat of Popular Participation of the Ministry of Sustainable and Environment to the Ministry of Human Development.

(6) Supreme Decree No. 24134

This Decree, issued on 2nd October, 1995, disposes the restructure of the Ministry of Human Development. Table 2-2-9 summarizes the changes in relation with the Basic Sanitation Sector.

Table 2-2-9 Changes in the Basic Sanitation Sector by the Supreme Decree No.24134

Levels	Main modifications and changes
National	<ul style="list-style-type: none">- The number of Secretariat of Ministry of Human Development from nine (9) to six (6)- Disappearance of National Secretariats of Urban Affairs and Rural Development, which change to be Subsecretariat of the National Secretariat of Popular Participation, and to which Subsecretariat of Institutional Development is added.- Disappearance of Subsecretariat of Urbanism.- Maintaining DINASBA in the fourth level of structure of Ministry of Human Development- This Decree affects the rank of ex-National Secretariat of Urban Affairs and to some degree DINASBA.

(7) Supreme Decree No.24206

This Decree, given on 29th December, 1995, disposes the organization of Executive Power at prefectural level, through Prefectures. Table 2-2-10 summarizes the changes which will cause in the Basic Sanitation Sector.

Table 2-2-10 Changes in the Basic Sanitation Sector by the Supreme Decree No.24206

Levels	Main modifications and changes
Prefectural	<ul style="list-style-type: none"> - The executive level of Prefecture is exercised by 4 Prefectural Secretariat; of Sustainable Development, of Economic Development, of Human Development, and of Popular Participation, which shows giving the high rank to the last. - The Prefectural Secretariat of Popular Participation has 2 Bureaus: Municipal Strengthening and Community Strengthening. Lately, on January 12th, 1996, the National Secretariat of Popular Participation gave a Secretariat Resolution by which the Prefectural Bureaus of Basic Sanitation (called Prefectural UNASBA in this Report) are created in the Prefectures, dependent on the Prefectural Secretariat of Popular Participation. - It is determined that Prefectural Secretariats are formed by Bureaus and decentralized entities and Governor can ask the creation of executing units strictly operating and of transitory character. (Art.9 Clause I and II) - The personnel of project and specific programs of CORDES, will continue till culmination of contracts or conclusion of specific projects or programs (Art.89, Clause III) - Prefectures will assume responsibilities and commitment stipulated in the contracts of finance subscribed by CORDES.

2) Organizational and Institutional Perspectives

The organization of the institutional structure of the basic sanitation sector should be put within the legal mechanism previously mentioned and of policies and plans. That is, the institutional structure should respond with major efficiency for the fulfillment of the legal mechanism.

(1) National Level:

Figure 2-2-8 shows the organization chart of the national entity responsible for the Study after 2nd October, 1995.

DINASBA should continue to work normally, as having kept doing till present mainly in the following projects:

1. Project JICA: Development of Groundwater in the Rural Area. Its execution, development and culmination are the subject of this Report.
2. PROSABAR: Programa de Saneamiento Basico Rural (Program of Rural Basic Sanitation). This program is dedicated to improve the coverage and quality of the services of drinking water and sanitation in communities of less than 5,000 inhabitants, achieving the effective utilization of the services and the sustainability of the system in the long period.

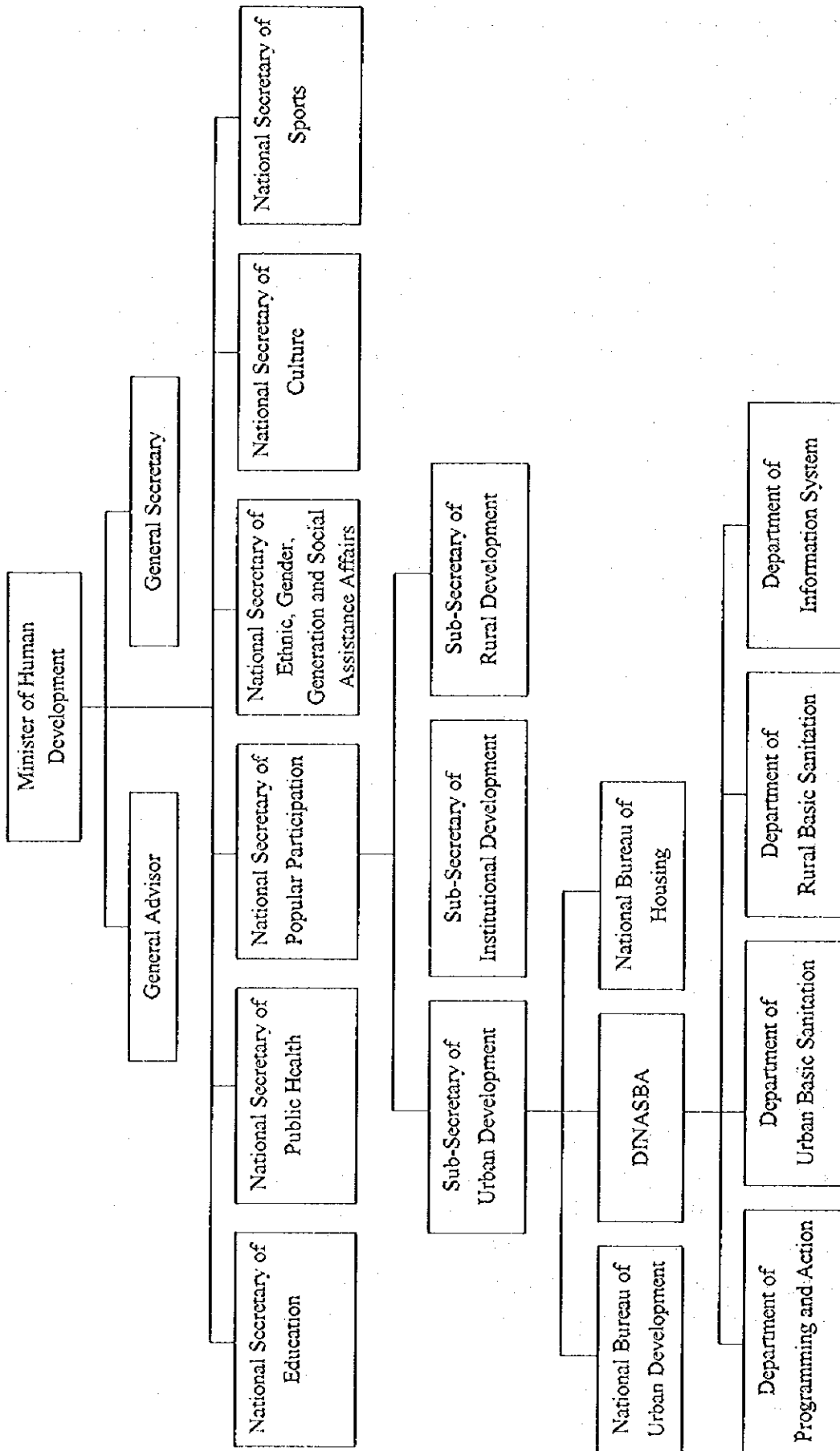


Figure 2-2-8 Organizational Chart of the National Entity Responsible for the Study (Since October 2, 1995)

This project has financial cooperation from the World Bank with a contribution of 26 million US Dollars approximately, and the execution period is from 1995 to 2000. This funds destined to pre-investment of projects and are managed by the FIS (Fondo de Inversion Social - Fund of Social Investment). This program is now under execution.

3. PRORPAAL: (Programa de pre-inversion de Proyectos de Agua Potable Alcantarillado - Program of pre-investment of Projects of Drinking Water and Sewerage)

This program is financed by the World Bank and is dedicated to the elaboration of studies at the level of final design in communities less than 5,000 inhabitants. The program includes the elaboration of projects for 100 localities, and assigned 400,000 US Dollars for this purpose. Those funds are managed by FNDR (Fondo Nacional de Desarrollo Regional - National Fund of Regional Development), and the program of actual execution should be concluded in the first months of 1996.

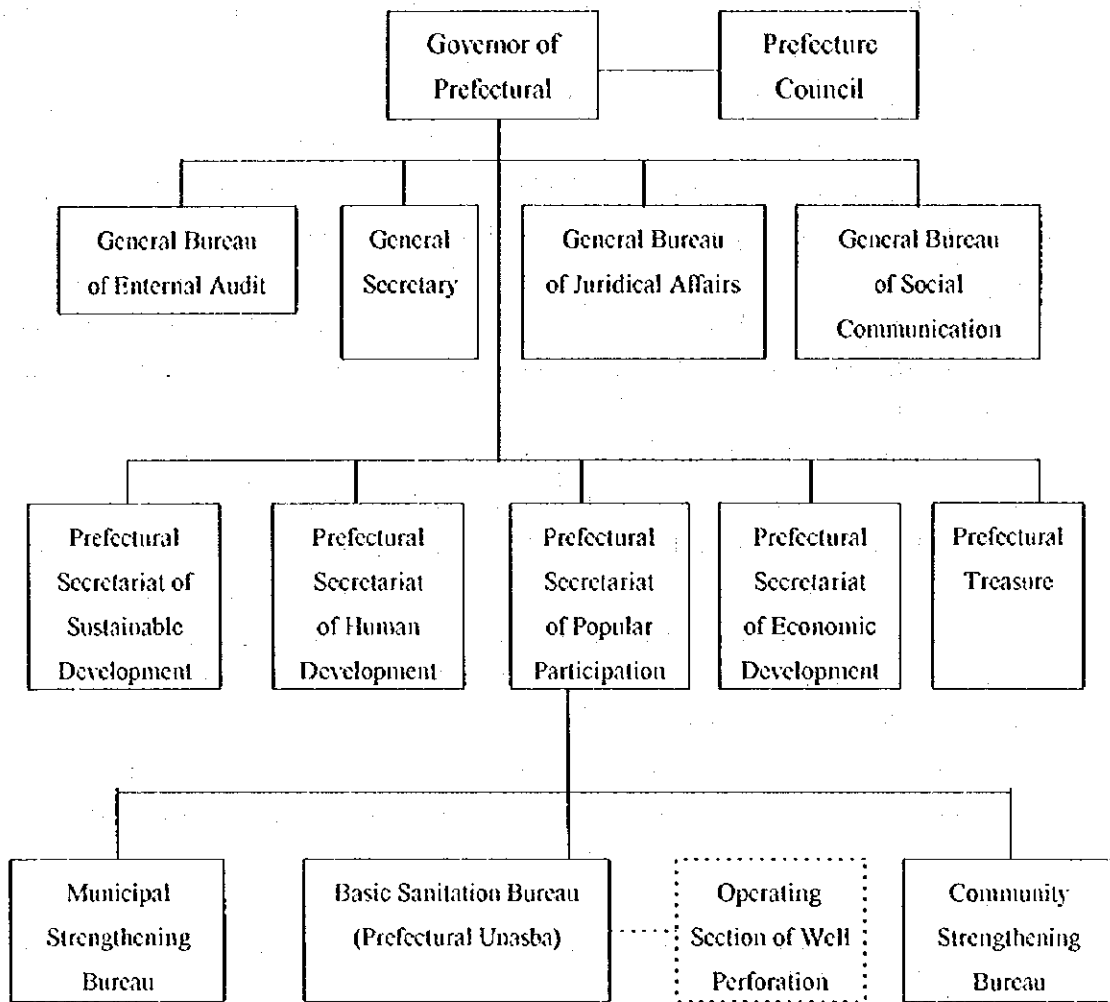
4. Project GAPS: (Gestion en Agua Potable y Saneamiento - Administration in Drinking Water and Sanitation). This project has an object to improve the capacity of administration of UNASBAs of CORDES (now Prefectures) through models of institutional administration, which may develop administrative, financial, information and technical assistance to the municipalities and local entities which manage drinking water and sanitation services. This project has cooperation from BID for an amount of 200,000 US Dollars approximately during 1995-1996 and has advanced by 10% in its execution.

All these projects linked to the Rural Basic Sanitation are not superposed nor duplicated and its implementation can be achieved efficiently under the coordination of DINASBA.

(2) Prefectural Level

Figure 2-2-9 show the perspective of organization chart of prefectural level in relation with basic sanitation.

Figure 2-2-9 Organization Chart of Prefectures in Relation with the Basic Sanitation Sector (Since Jan. 1, 1996)



This prefectural level has completely been modified, having constituted prefectural UNASBAs among the Prefectural Secretariat of Popular Participation.

Likewise there exists the perspective of organizing among the same Bureau an operating Section of Well Perforation, to concrete the corresponding donation of equipment.

If this organizational stage is managed carefully, UNASBAs within the Prefectures can be strengthened in comparison with UNASBAs of ex-CORDES.

(3) Local Level

a) Implementation and Perspectives of the Law of Popular Participation

The most important change is that the Popular Participation subject now is the Organization of Base OB, instead of the Territory Organizations of Base OTB's. This change does not affect mainly the participative planning nor the demand of water supply service of the rural communities.

The Law of Popular Participation has benefited extensively the rural basic sanitation, as shown in Figure 2-2-11~13. The number of projects and the amounts of investment relating to basic sanitation sector increased remarkably since 1994, i.e. the year when the Popular Participation came into effect. In 1995, there are 1,037 projects those were planned for water supply development in rural area, which means an increase of 182% and 573% comparing with the ones in 1994 (368 projects) and 1993 (154 projects) respectively. Furthermore, there are 281 projects relating to water supply development in rural area those had been executed in the first semester of 1995, i.e. an increase of 99% and 301% comparing with the ones in 1994 (141 projects) and 1993 (70 projects) respectively.

As the same order, the investments for water supply development in rural area after the implementation of the Law of Popular Participation had been increased extraordinarily. In the first semester of 1995, about 8,000,000 US Dollars was invested to this sector, 150% and 700% more than the ones in 1994 (3,200,000 US Dollars) and 1993 (1,000,000 US Dollars) respectively.

b) Municipalities

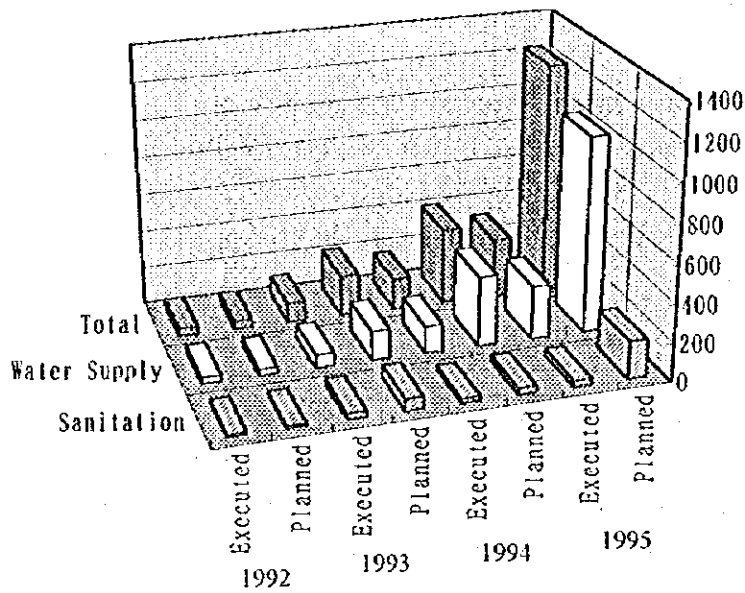
In spite of short time since the implementation of the Law of Popular Participation, the change occurred in the Municipalities is enormous. Following are some examples.

1. Municipality of Patacamaya (La Paz)

The Law of Popular Participation led to the changes as followings.

	Before the Law	After the Law	
		In 1995	In 1996
Number of Municipality workers (persons)	-	21	23
Budget (Bs)	-	1,700,000	2,000,000
Investment for water supply development (US\$)	70	200.000	200.000

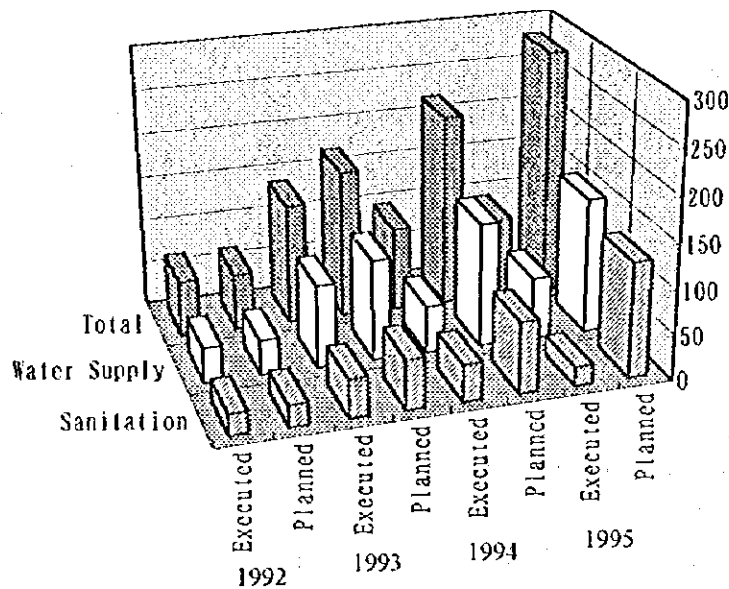
With the increased operative annual budget (PAO) effected by the Law, in 1996 the Municipality is able to buy a pump for the 100-depth well that JST/JICA constructed as a test well in 1995, and push forward the plan to supply drinkable water to 5 communities inside the territory of Patacamaya.



Number of Projects in Basic Sanitation in Rural Area

In rural area	1995		1994		1993		1992	
	Planned	Executed	Planned	Executed	Planned	Executed	Planned	Executed
Sanitation	197	32	35	22	62	32	10	10
Water Supply	1037	281	368	141	154	70	33	33
Total	1234	313	403	163	216	102	43	43

Figure 2-2-10 Number of Planned/Executed Projects in Basic Sanitation Sector in Rural Area



Number of Projects in Basic Sanitation in Urban Area

In urban area	1995		1994		1993		1992	
	Planned	Executed	Planned	Executed	Planned	Executed	Planned	Executed
Sanitation	128	21	79	41	55	43	24	24
Water Supply	152	69	138	53	112	92	39	39
Total	280	90	217	94	167	135	63	63

Figure 2-2-11 Number of Planned/Executed Projects in Basic Sanitation Sector in Urban Area

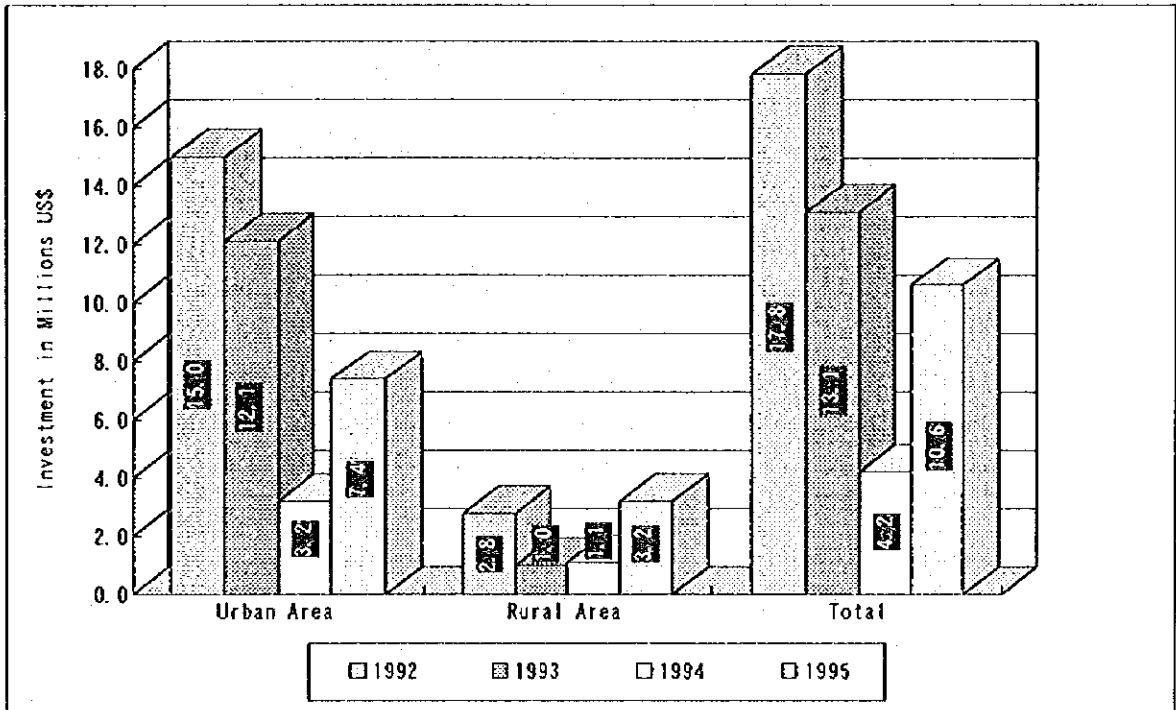


Figure 2-2-12 Investment in Drinking Water (in First Semester) According to Service Areas

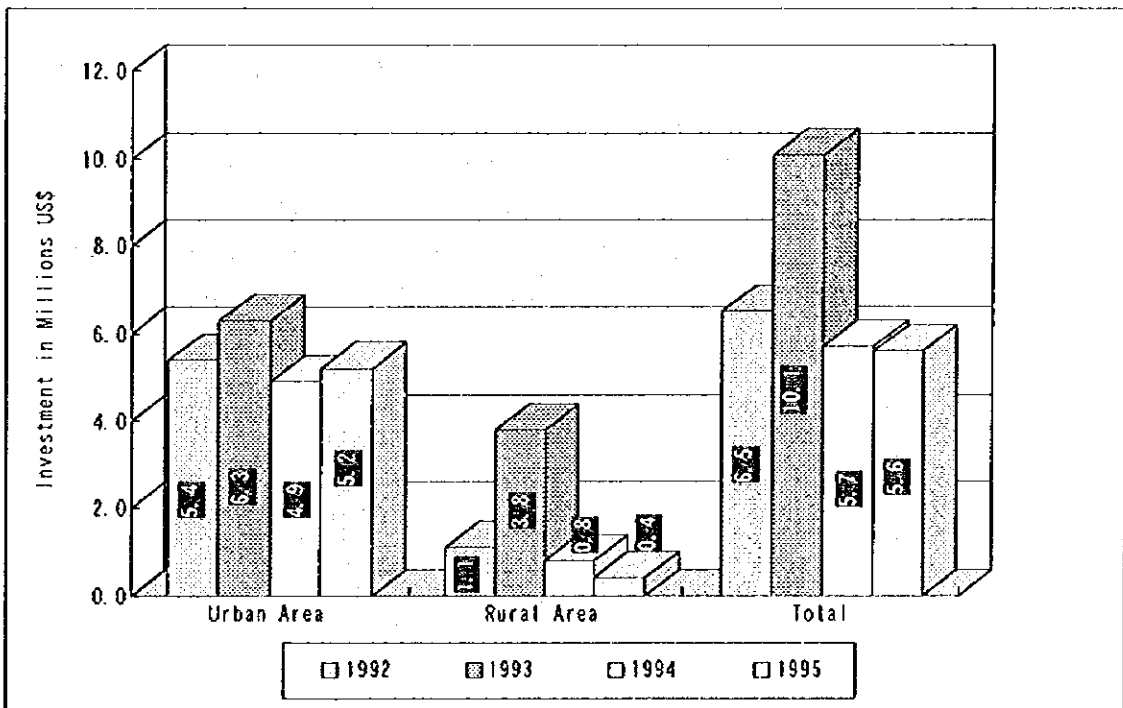


Figure 2-2-13 Investment in Sanitation (in First Semester) According to Service Areas

2- Municipality of Corque (Oruro)

The new stage of the Municipality under the Law of Popular Participation of the Municipality of CORQUE is as following.

With the application of the Law, the Municipality may have new financial resources that come from the central government, from which 90% can be destined to the development of municipal social infrastructures such as water supply system.

Furthermore, the Municipality may fortify and modernize the municipal administration and improve the quality of its personnel, its computer system. After receiving advice and training from the Bureau of Municipal Strengthening of Department of Oruro, the Municipality of Corque may promote the plans to improve the water supply systems at the communities inside the Municipality, with a new and bigger view about the municipal management.

3- Municipality of San Lorenzo (Tarija)

With the Law of Popular Participation, the Municipality may assign 10% of the budget for administrative expenditures, and is able to employ 12 trained workers, and equip the office with computers, etc.

With the increased operative annual budget (PAO), in 1996, the Municipality plans to employ a technician to improve the operation and maintenance of 32 drinkable water systems, those all have problems of lack of water during the dry season. Furthermore, the Municipality now has more ability to improve the system of tariff collection, promote the campaigns on sanitary and hygiene education, etc. toward the inhabitants.

e) Drinkable water committee

The Drinkable Water Committee (CAP) is a kind of local level organization, which takes a key role in rural communities.

The role and function of these CAP are described in other sections of this report. Here, it is worth to mention that these CAP actually obtain many advantages with the application of the Law of Popular Participation, since now they can solve their problems directly with the community participation without long bureaucratic procedures requested by the prefectural authority or the central government as previous time.

2.3 Present Status of Water Supply

2.3.1 Statistical Profile

Table 2-3-1 and Figure 2-3-1 show the changes of water served population by area during the 1976 - 1992 period. Water served population ratio amounts to 58.22% in 1992; 86.35% in departmental capitals, 75.29 % in other urban cities (where the population is more than 2000), and 23.68 % in rural area. While the served population shows an increase of 1,884,660 for 16 years, the population growth reaches 1,807,306 through the same period.

Table 2-3-1 Changes of Served Population During the 1976-1992 Period - Total Country

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Total (1)+(2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Total (1)+(2)+(3)
Population	1,429,937	495,903	2,687,646	4,613,486	2,808,684	886,162	2,725,946	6,420,792
Unserved Population	186,660	124,955	2,448,428	2,760,043	383,375	218,963	2,080,351	2,682,689
Served Population	1,243,277	370,948	239,218	1,853,443	2,425,309	667,199	645,595	3,738,103
- In house	406,854	88,455	37,948	533,257	1,270,442	273,362	144,529	1,688,333
- Out house	836,423	282,493	201,270	1,320,186	1,154,867	393,837	501,066	2,049,770
Water Supply Coverage	86.95%	74.80%	8.90%	40.17%	86.35%	75.29%	23.68%	58.22%
Population Growth					1,378,747	390,259	38,300	1,807,306
Population Growth Ratio					196.42%	178.70%	101.43%	139.17%
Served Pop. Growth					1,182,032	296,251	406,377	1,884,660
Served Pop. Growth Ratio					195.07%	179.86%	269.88%	201.68%

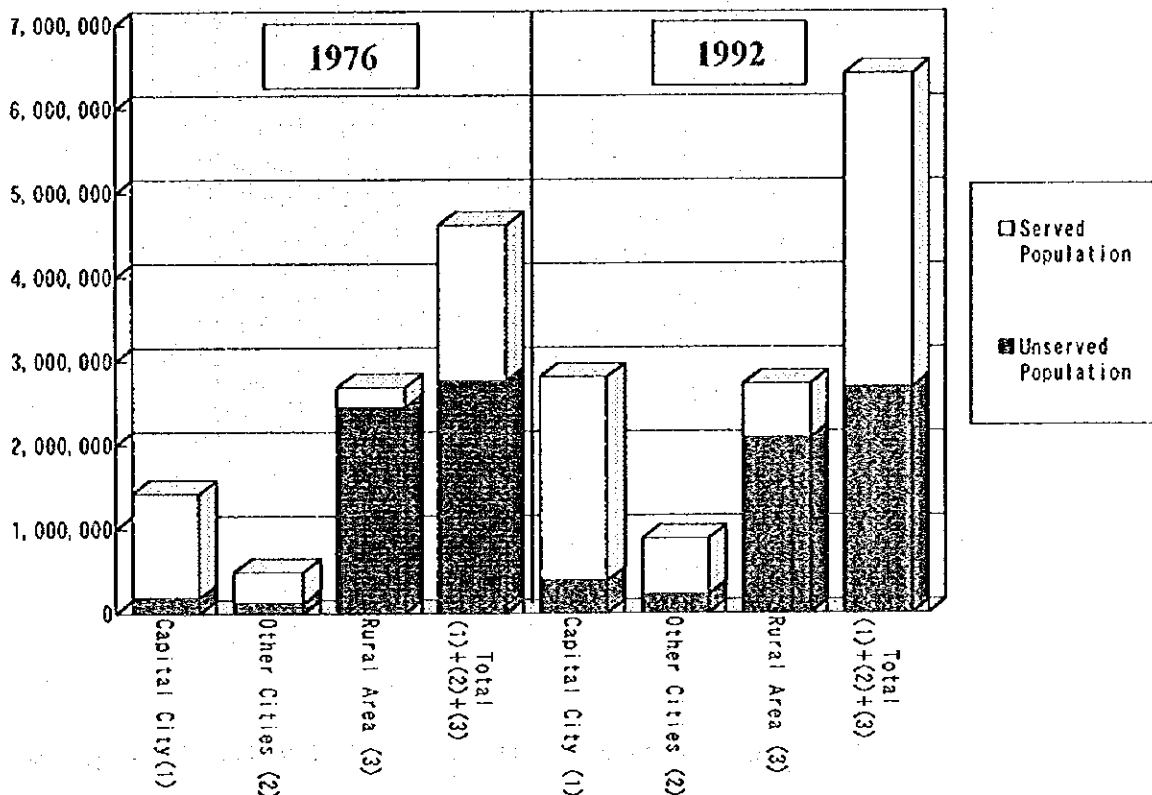


Figure 2-3-1 Changes of Served Population During the 1976-1992 Period - Total Country

In more detailed, Table 2-3-2-6 and Figure 2-3-2-6 show the changes of water served population in each department of the Study Area during the 1976 - 1992 period.

Table 2-3-2 Changes of Served Population During the 1976-1992 Period - Chuquisaca

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)
Population	63,625	13,890	280,973	294,863	131,769	15,632	306,355	321,987
Unserved Population	3,939	2,728	270,167	272,895	12,234	1,218	254,344	255,562
Served Population	59,686	11,162	10,806	21,968	119,535	14,414	52,011	66,425
- In house	23,142	2,751	2,497	5,248	68,801	4,859	12,654	17,513
- Out house	36,544	8,411	8,309	16,720	50,734	9,555	39,357	48,912
Water Supply Coverage	93.81%	80.36%	3.85%	7.45%	90.72%	92.21%	16.98%	20.63%
Population Growth					68,144	1,742	25,382	27,124
Population Growth Ratio					207.10%	112.54%	109.03%	109.20%
Served Pop. Growth					59,849	3,252	41,205	44,457
Served Pop. Growth Ratio					200.27%	129.13%	481.32%	302.37%

Source: INE Census

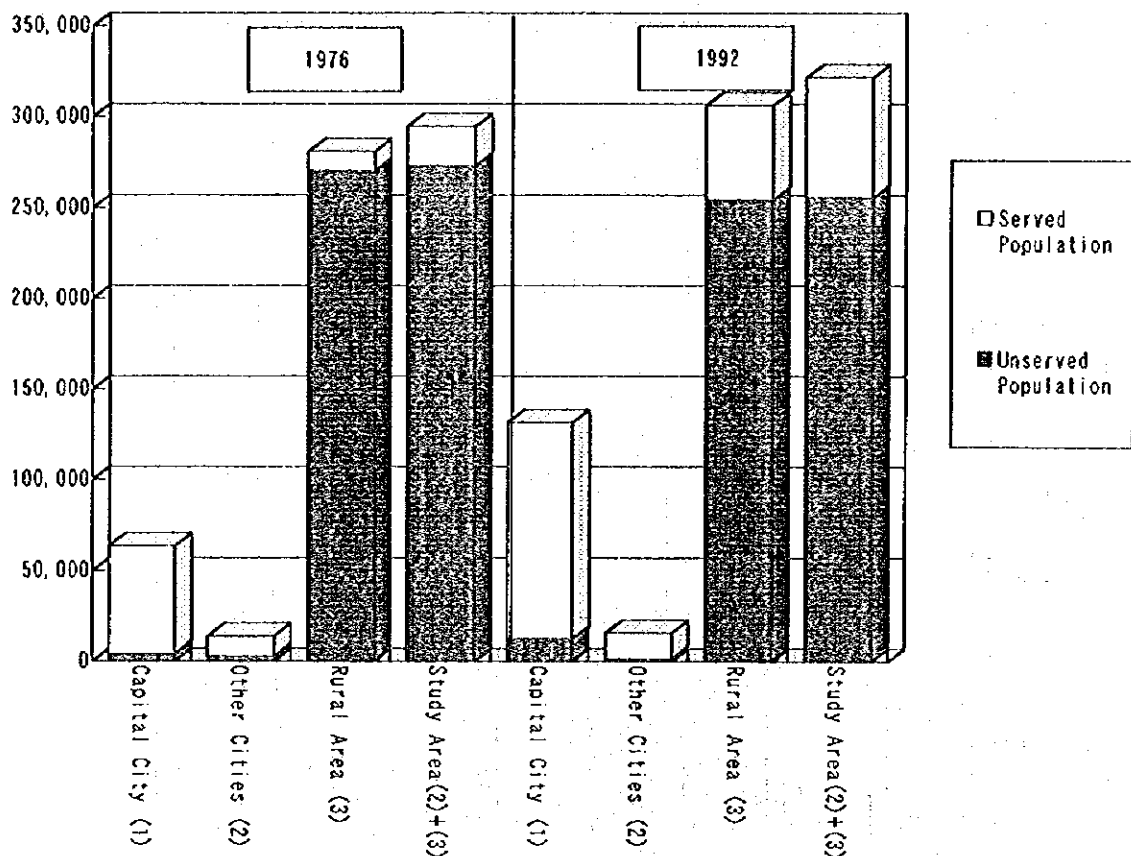


Figure 2-3-2 Changes of Served Population During the 1976-1992 Period - Chuquisaca

Table 2-3-3 Changes of Served Population During the 1976-1992 Period -

South of La Paz

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)
Population		8,744	139,292	148,036		8,512	116,831	125,313
Unserved Population		2,077	131,713	133,790		6,304	98,689	104,993
Served Population		6,667	7,579	14,246		2,208	18,142	20,350
- In house		753	580	1,333		692	2,620	3,312
- Out house		5,914	6,999	12,913		1,516	15,522	17,038
Water Supply Coverage		76.25%	5.44%	9.62%		25.94%	15.53%	16.24%
Population Growth						-232	-22,461	-22,693
Population Growth Ratio						97.35%	83.87%	84.67%
Served Pop. Growth						-4,459	10,563	6,104
Served Pop. Growth Ratio						33.12%	239.37%	142.85%

Source: INE Census

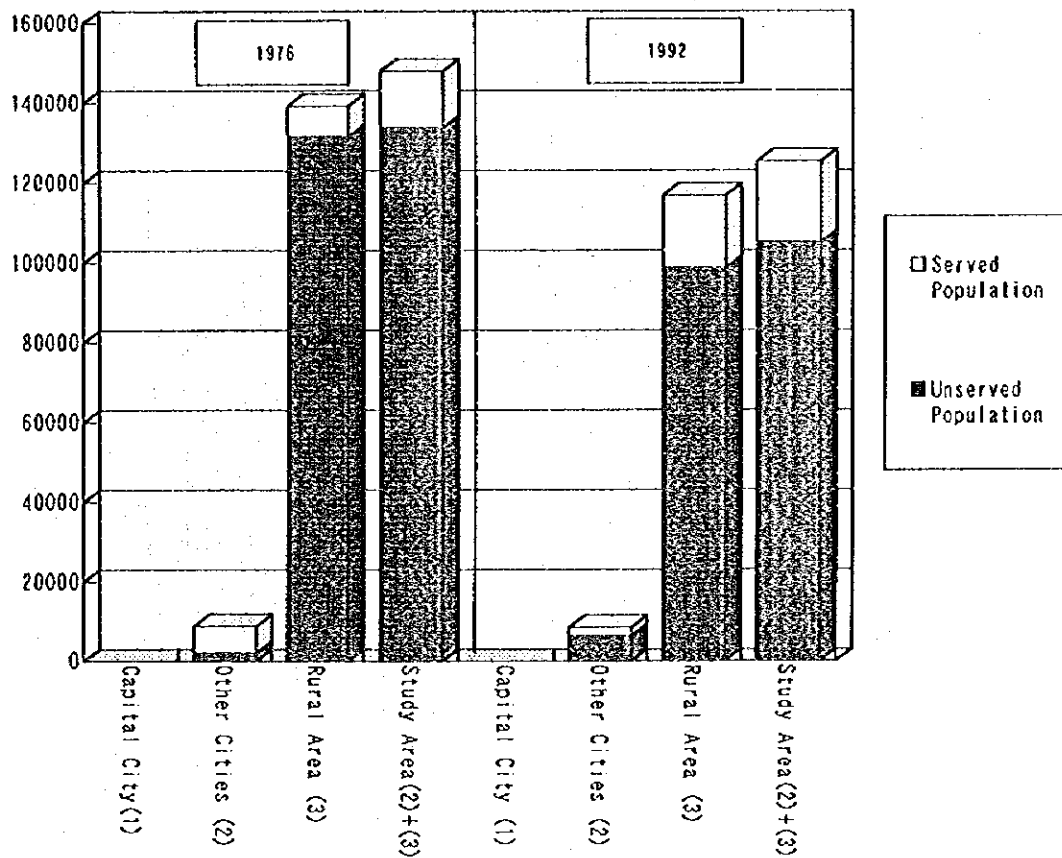


Figure 2-3-3 Changes of Served Population During the 1976-1992 Period -

South of La Paz

Table 2-3-4 Changes of Served Population During the 1976-1992 Period - Oruro

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)
Population	125,213	31,402	151,794	186,196	183,422	38,596	118,096	156,692
Unserved Population	13,065	4,985	137,964	142,949	11,838	5,903	89,158	95,061
Served Population	112,148	29,417	13,830	43,247	171,584	32,693	28,938	61,631
- In house	27,257	3,295	969	4,264	59,005	7,183	4,039	11,222
- Out house	84,891	26,122	12,861	38,983	112,579	25,510	24,899	50,409
Water Supply Coverage	89.57%	85.51%	9.11%	23.23%	93.55%	84.71%	24.50%	39.33%
Population Growth					58,209	4,194	-33,698	-29,504
Population Growth Ratio					146.49%	112.19%	77.80%	84.15%
Served Pop. Growth					59,436	3,276	15,108	18,384
Served Pop. Growth Ratio					153.00%	111.14%	209.24%	142.51%

Source: INE Census

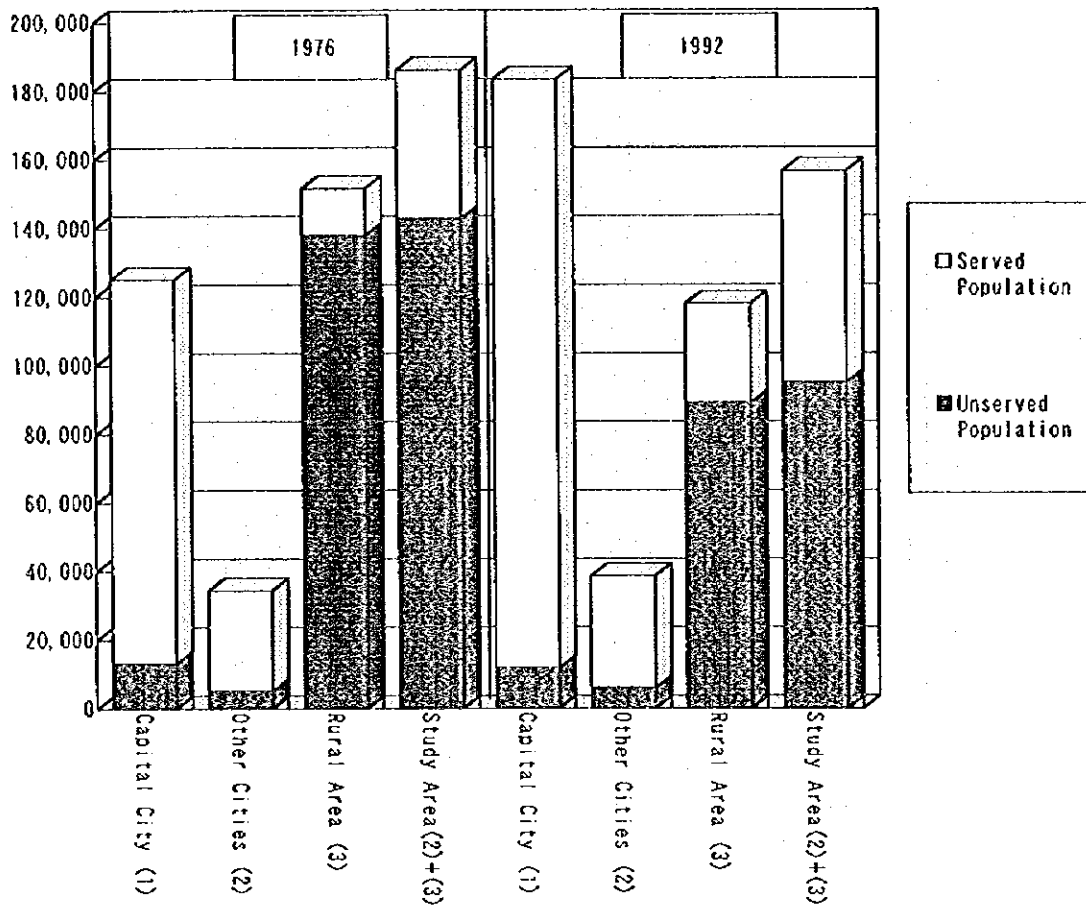


Figure 2-3-4 Changes of Served Population During the 1976-1992 Period - Oruro

Table 2-3-5 Changes of Served Population During the 1976-1992 Period - Tarija

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)
Population	38,916	33,824	114,464	148,288	90,113	69,325	131,969	201,294
Unserved Population	4,547	17,681	108,066	125,747	4,967	7,794	98,695	106,489
Served Population	34,369	16,143	6,398	22,541	85,146	61,531	33,274	94,805
- In house	16,298	5,989	1,760	7,749	46,792	28,563	8,464	37,027
- Out house	18,071	10,154	4,638	14,792	38,354	32,968	24,810	57,778
Water Supply Coverage	88.32%	47.73%	5.59%	15.20%	94.49%	88.76%	25.21%	47.10%
Population Growth					51,197	35,501	17,505	53,006
Population Growth Ratio					231.56%	204.96%	115.29%	135.75%
Served Pop. Growth					50,777	45,388	26,876	72,264
Served Pop. Growth Ratio					247.74%	381.16%	520.07%	420.59%

Source: INE Census

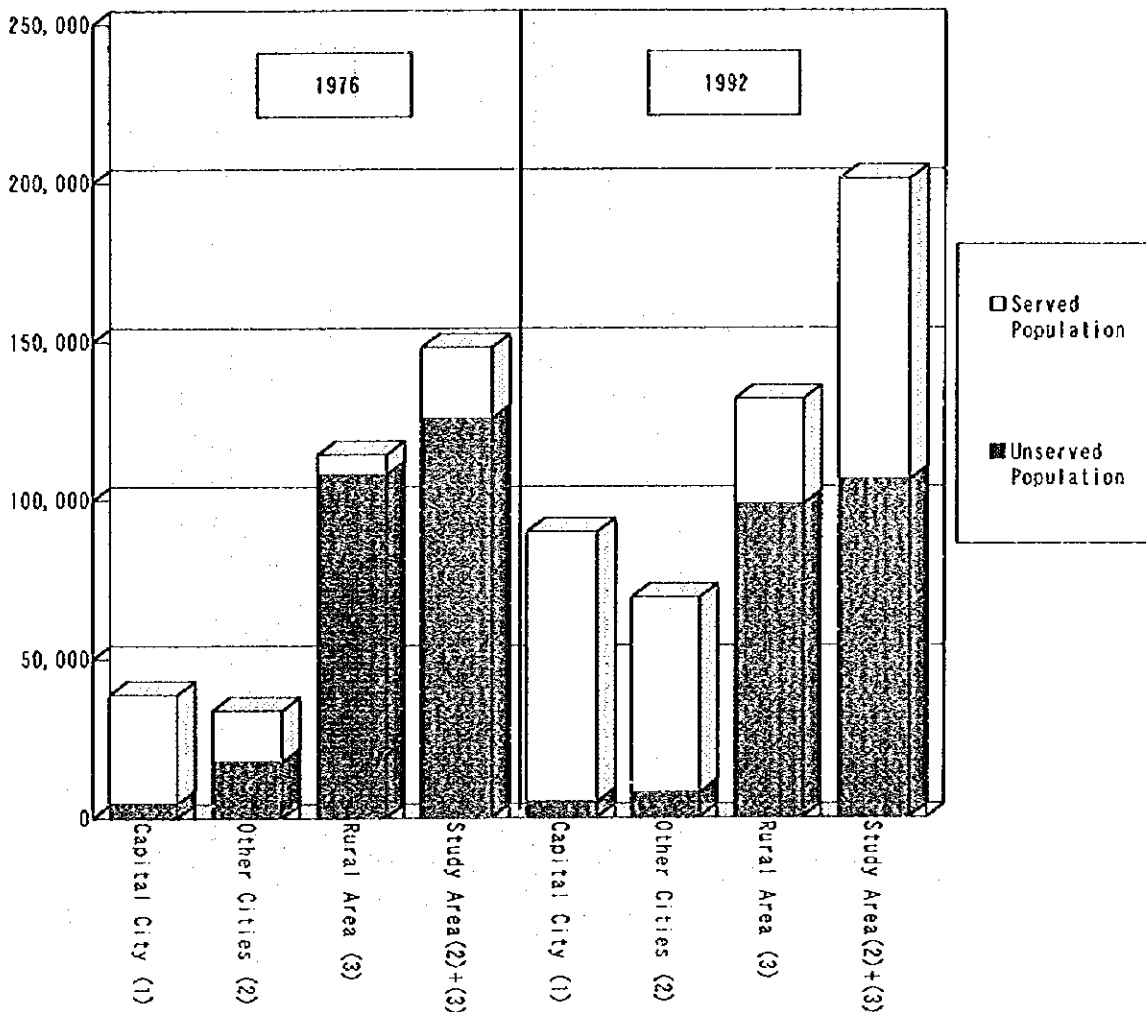


Figure 2-3-5 Changes of Served Population During the 1976-1992 Period - Tarija

Table 2-3-6 Changes of Served Population During the 1976-1992 Period - Santa Cruz

	1976				1992			
	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)	Capital City (1)	Other Cities (2)	Rural Area (3)	Study Area (2)+(3)
Population	254,682	119,923	336,119	456,042	697,278	285,118	381,993	667,111
Unserved Population	8,974	18,236	269,078	287,314	89,456	46,020	252,237	298,257
Served Population	245,708	101,687	67,041	168,728	607,822	239,098	129,756	368,854
- In house	100,625	32,145	14,985	47,130	319,182	98,856	34,515	133,371
- Out house	145,083	69,542	52,056	121,598	288,640	140,242	95,241	235,483
Water Supply Coverage	96.48%	84.79%	19.95%	37.00%	87.17%	83.86%	33.97%	55.29%
Population Growth					442,596	165,195	45,874	211,069
Population Growth Ratio					273.78%	237.75%	113.65%	146.28%
Served Pop. Growth					362,114	137,411	62,715	200,126
Served Pop. Growth Ratio					247.38%	235.13%	193.55%	218.61%

Source: INE Census

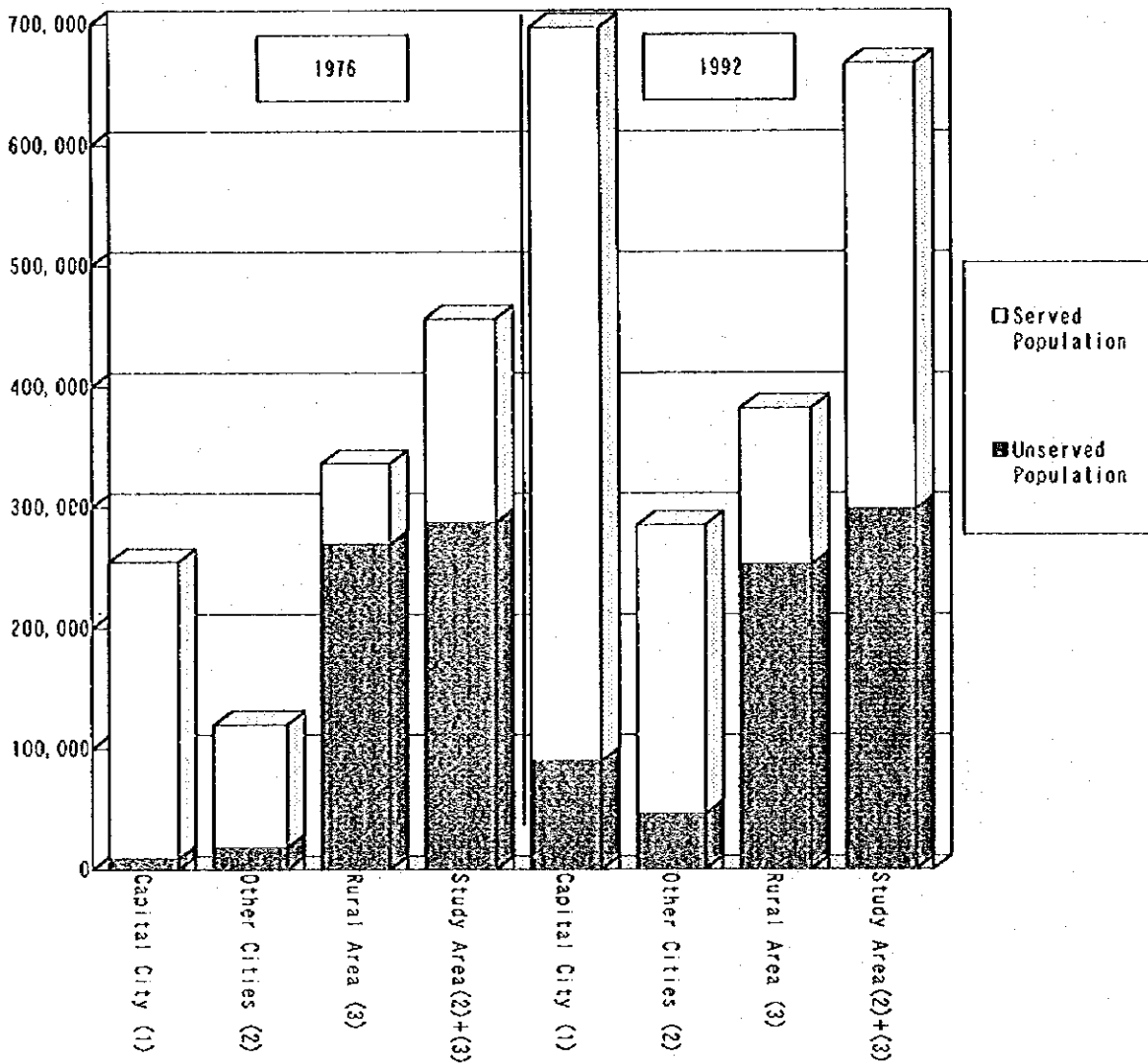


Figure 2-3-6 Changes of Served Population During the 1976-1992 Period - Santa Cruz

Table 2-3-7 and Figure 2-3-7 shows the water supply condition in each Department of the Study Area in 1992.

Water supply coverage of the whole Study Area which excludes the departmental capitals is 41.6 %. In detail, the water supply coverage in Chuquisaca is 20.6 %, in southern part of La Paz is 16.2 %, in Oruro is 39.3 %, in Tarija is 47.1 %, and in Santa Cruz is 55.3 %.

Table 2-3-7 Water Supply Coverages in the Study Area in 1992

	Chuquisaca	S.of La Paz	Oruro	Tarija	Santa Cruz	Total
Population	321,987	125,343	156,692	201,294	667,111	1,472,427
- Urban area	15,632	8,512	38,596	69,325	285,118	417,183
- Rural area	306,355	116,831	118,096	131,969	381,993	1,055,244
Unserved Population	255,562	104,993	95,061	106,489	298,257	860,362
- Urban area	1,218	6,304	5,903	7,794	46,020	67,239
- Rural area	254,344	98,689	89,158	98,695	252,237	793,123
Served Population	66,425	20,350	61,631	94,805	368,854	612,065
- Urban area	14,414	2,208	32,693	61,531	239,098	349,944
- Rural area	52,011	18,142	28,938	33,274	129,756	262,121
Water Supply Coverage	20.6%	16.2%	39.3%	47.1%	55.3%	41.6%
- Urban area	92.2%	25.9%	84.7%	88.8%	83.9%	83.9%
- Rural area	17.0%	15.5%	24.5%	25.2%	34.0%	24.8%

Source: INE Census

Note: Data are subjected to the areas excluding departmental capitals.

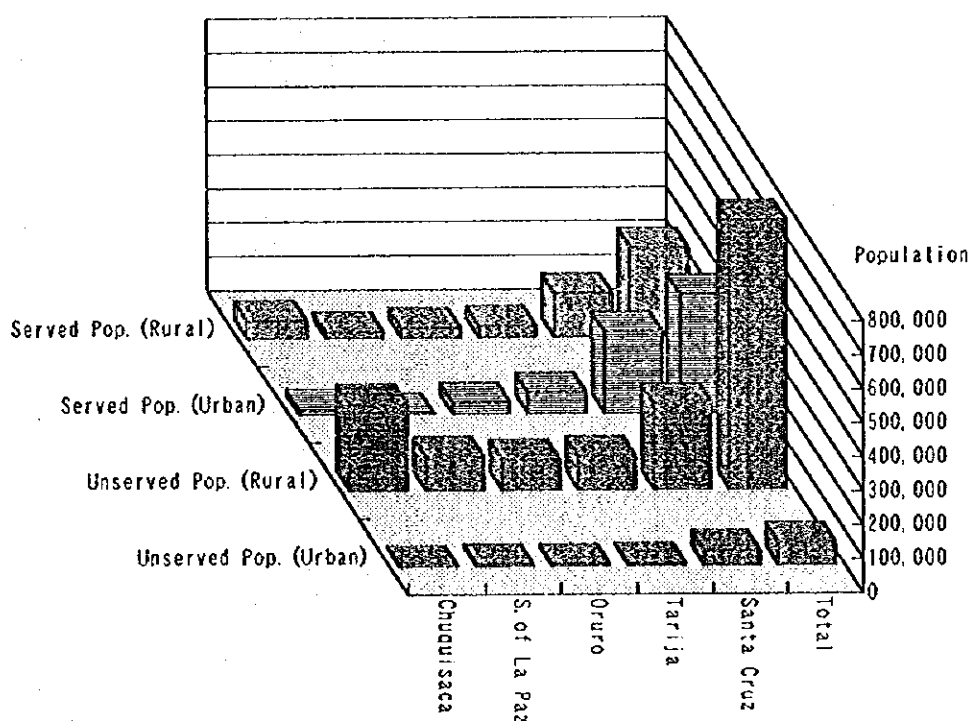


Figure 2-3-7 Water Supply Coverages in the Study Area in 1992

Figure 2-3-8 shows the statistical distribution of water supply coverages in each Province. Low coverage Provinces concentrate around the center of Altiplano, Oruro and the southern part of La Paz, and the valley area of Cadena Montanosa (chain of mountain) , Chuquisaca.

Figure 2-3-9 shows the distribution of principal water sources in each Province. Generally in valley area and around the foot of mountain is prominent the use of surface water such as river, lake, spring and irrigation ditch or canal. Well water is applied in the most part of Altiplano and the northern area of Santa Cruz.

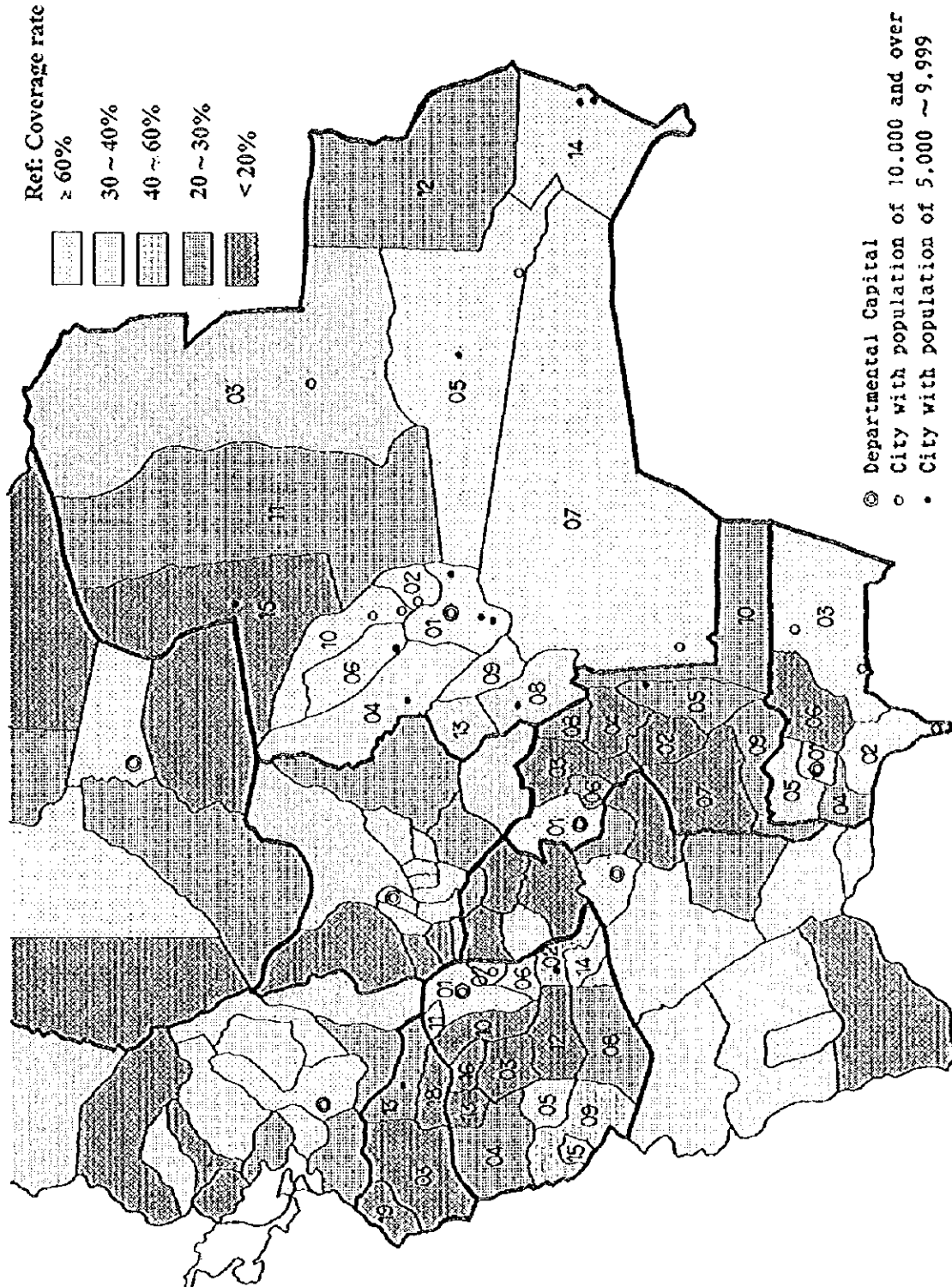


Figure 2-3-8 Distribution of Water Supply Coverage by Province

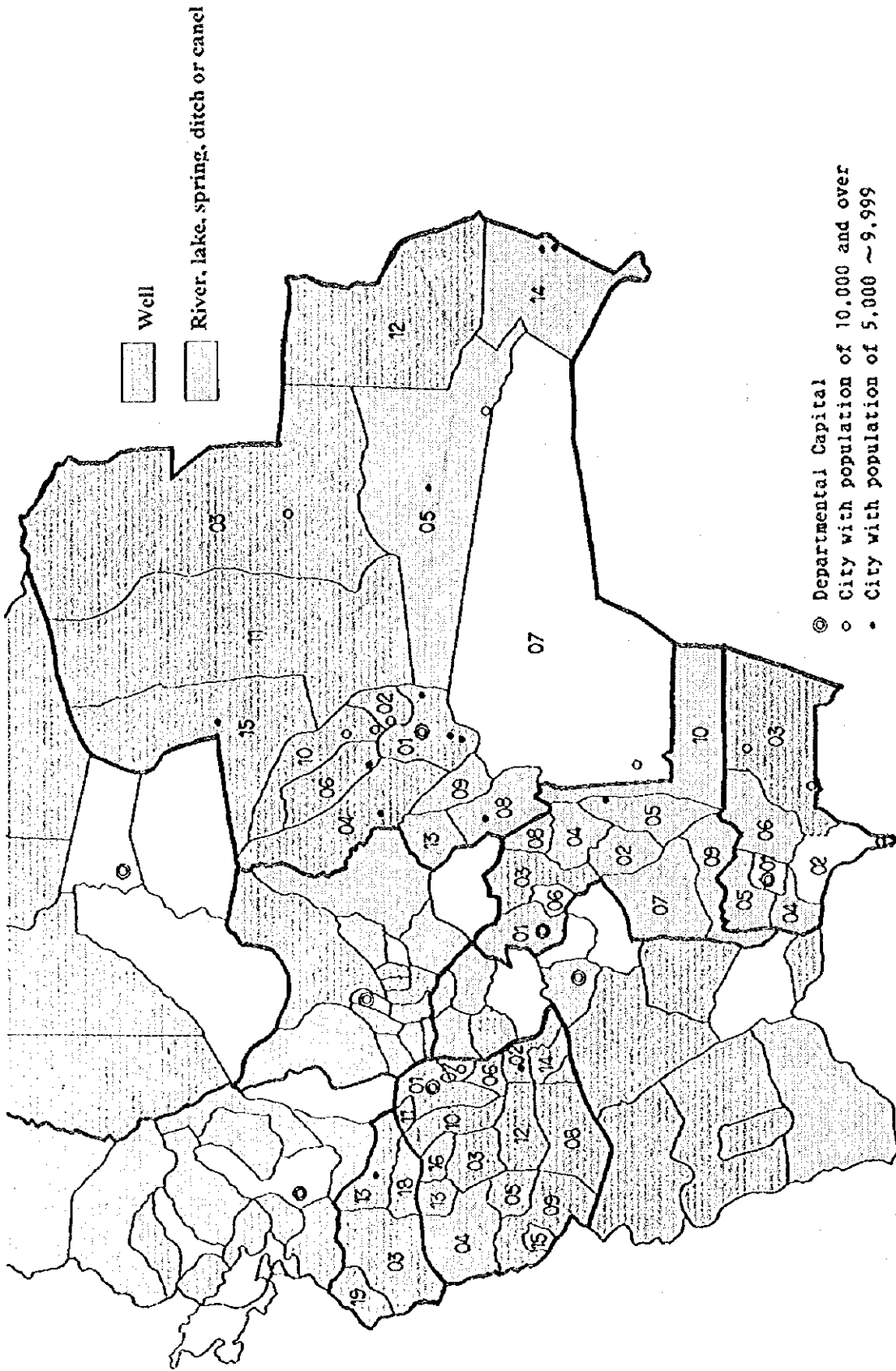


Figure 2-3-9 Distribution of Major Water Source Type by Province

According to the water supply database as shown in Table 2-3-8, in the Study Area, there are 623 water supply blocks whose water supply coverage is higher than 60% and its total population is 586,903. Beside, there are 3642 blocks whose coverage is below 60%, and its total population amounts to 818,316.

Table 2-3-8 Number of Blocks and Its Total Population by Water Supply Coverage

Coverage		Chuquisaca	S.of La Paz	Oruro	Tarija	Santa Cruz	Study Area
≥60%	Number of blocks	131	51	62	158	221	623
	Population	54,502	19,249	43,434	113,689	356,029	586,903
<60%	Number of blocks	1,092	711	482	353	1,004	3,642
	Population	234,627	107,100	94,012	86,469	296,106	818,316
Total	Number of blocks	1,223	762	544	511	1,225	4,265
	Population	289,126	126,349	137,448	200,158	652,135	1,405,219

Source: Water Supply Database

Table 2-3-9 and Figure 2-3-10 shows in more detailed, the distributions of population groups subjected to the blocks whose coverage is lower than 60%, while Table 2-3-10 and Figure 2-3-11 shows the distributions of population groups subjected to the blocks whose coverage is higher than 60%.

Table 2-3-9 Distribution of Population Groups of Blocks Whose Coverage Lower Than 60%

Population Group		Chuquisaca	South of La Paz	Oruro	Tarija	Santa Cruz	Study Area
≥2000	Population	0	8,512	9,175	0	24,402	42,089
	No. of Blocks	0	2	3	0	6	11
1000~999	Population	3,648	3,474	8,728	2,293	9,512	27,655
	No. of Blocks	3	3	7	2	7	22
500~999	Population	29,930	5,780	8,065	10,324	34,232	88,331
	No. of Blocks	44	8	11	15	53	131
400~499	Population	22,277	4,780	6,557	9,595	29,543	72,752
	No. of Blocks	51	11	15	22	67	166
300~399	Population	41,320	7,541	9,841	16,472	52,728	127,902
	No. of Blocks	120	22	29	48	154	373
200~299	Population	61,820	18,879	14,571	25,908	88,372	209,550
	No. of Blocks	255	79	62	107	362	865
100~199	Population	60,688	34,605	25,320	20,340	57,317	198,270
	No. of Blocks	411	251	179	138	355	1,334
50~99	Population	14,944	23,529	11,757	1,537	0	51,767
	No. of Blocks	208	335	176	21	0	740
Total	Population	234,627	107,100	94,014	86,469	296,106	818,316
	No. of Blocks	1,092	711	482	353	1,004	3,642

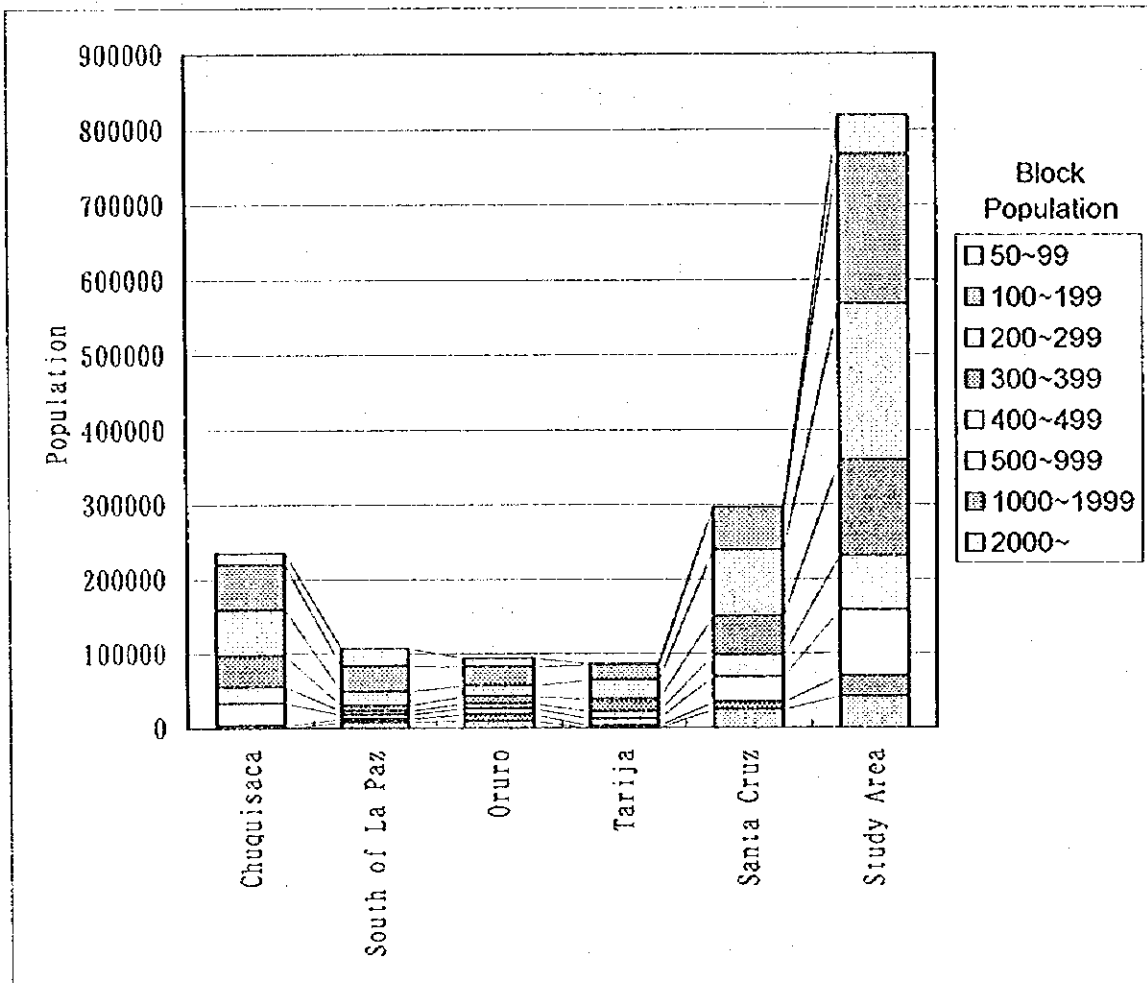


Figure 2-3-10 Distribution of Population Groups of Blocks Whose Coverage Lower Than 60%

Table 2-3-10 Distribution of Population Groups of Blocks Whose Coverage Higher Than 60%

Population Group		Chuquisaca	South of La Paz	Oruro	Tarija	Santa Cruz	Study Area
≥2000	Population	12,944	0	29,248	69,325	260,522	372,039
	No. of Blocks	4	0	5	5	35	49
1000~999	Population	11,546	6,648	4,021	6,587	35,213	64,015
	No. of Blocks	8	4	3	5	27	47
500~999	Population	6,949	4,523	2,291	8,543	26,585	48,891
	No. of Blocks	10	7	4	13	37	71
400~499	Population	3,605	3,146	913	2,831	8,906	19,401
	No. of Blocks	8	7	2	6	20	43
300~399	Population	3,798	1,074	1,318	5,925	9,042	21,157
	No. of Blocks	11	3	4	17	26	61
200~299	Population	7,448	692	1,651	11,476	9,945	31,209
	No. of Blocks	31	3	7	47	40	128
100~199	Population	7,300	2,389	2,774	7,744	5,816	26,023
	No. of Blocks	47	16	19	50	36	168
50~99	Population	912	777	1,218	1,261	0	4,168
	No. of Blocks	12	11	18	15	0	56
Total	Population	54,502	19,249	43,434	113,689	356,029	586,903
	No. of Blocks	131	51	62	158	221	623

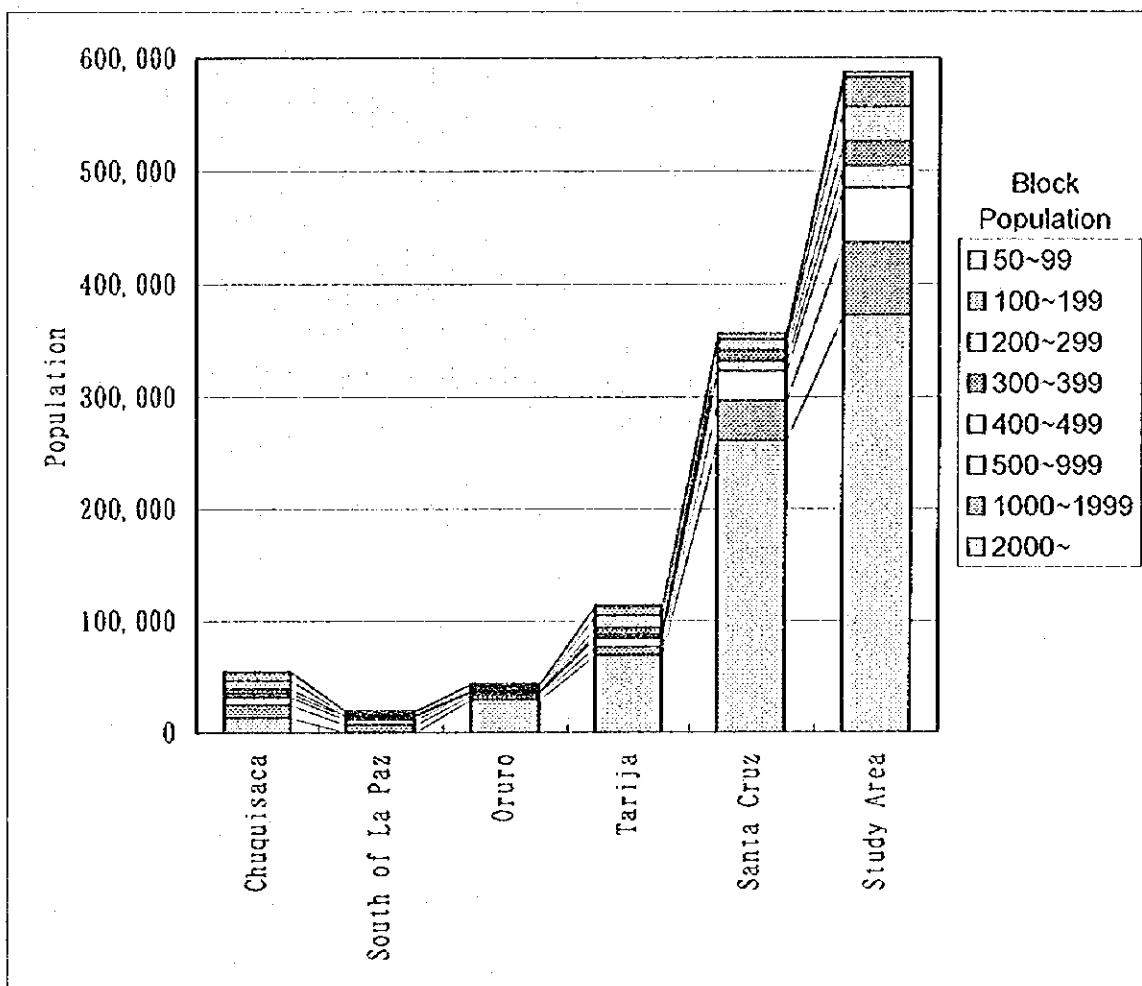


Figure 2-3-11 Distribution of Population Groups of Blocks Whose Coverage Higher Than 60%

As shown in Table 2-3-11, number of blocks without any water supply system is 957 in Chuquisaca, 672 in the southern part of La Paz, 353 in Oruro, 220 in Tarija, and 818 in Santa Cruz. In whole Study Area, number of blocks which has not water supply system amounts to 3,020, and occupies 71 % of the total.

Table 2-3-11 Distribution of Blocks by Its Population Scale and Water Supply Coverage

Population Scale	Water Supply Condition	Chuquisaca	South of La Paz	Oruro	Tarija	Santa Cruz	Study Area
Pop. \geq 2000	Coverage \geq 60%	4	0	5	5	35	49
	Coverage <60%	0	2	3	0	6	11
	No system	0	0	1	0	0	1
Pop. = 500-1999	Coverage \geq 60%	18	11	7	18	64	118
	Coverage <60%	47	11	18	17	60	153
	No system	27	5	5	3	32	72
Pop. \leq 499	Coverage \geq 60%	109	40	50	135	122	456
	Coverage <60%	1,045	698	461	336	938	3,478
	No system	930	667	347	217	786	2,947
Total	Coverage \geq 60%	131	51	62	158	221	623
	Coverage <60%	1,092	711	482	353	1,004	3,642
	No system	957	672	353	220	818	3,020

Table 2-3-12~16 and Figure 2-3-12~16 show the distribution of blocks by population groups and water supply coverage in each Department, and Table 2-3-17 and Figure 2-3-17 shows the same of the whole Study Area.

Table 2-3-12 Distribution of Blocks by Population Group and Water Supply Coverage in Chuquisaca

		Population Group			Total
		≥2000	500-1999	<500	
System existing Coverage ≥60%	No. of Blocks	4	18	109	131
	Total Population	12,944	18,495	23,063	54,502
	Served Population	11,449	15,233	17,972	44,654
	Average Coverage	88.5%	82.4%	77.9%	81.9%
System existing Coverage < 60%	No. of Blocks	0	20	115	135
	Total Population	-	15,336	28,443	43,779
	Served Population	-	2,757	9,266	11,973
	Average Coverage	-	18.0%	32.4%	27.4%
System no existing Coverage = 0%	No. of Blocks	0	27	930	957
	Total Population	-	18,242	172,606	190,848
	Served Population	-	-	-	-
	Average Coverage	-	-	-	-
Total	No. of Blocks	4	65	1,154	1,223
	Total Population	12,944	53,073	224,112	289,129
	Served Population	11,449	17,990	27,188	56,627
	Average Coverage	88.5%	34.5%	12.1%	19.6%

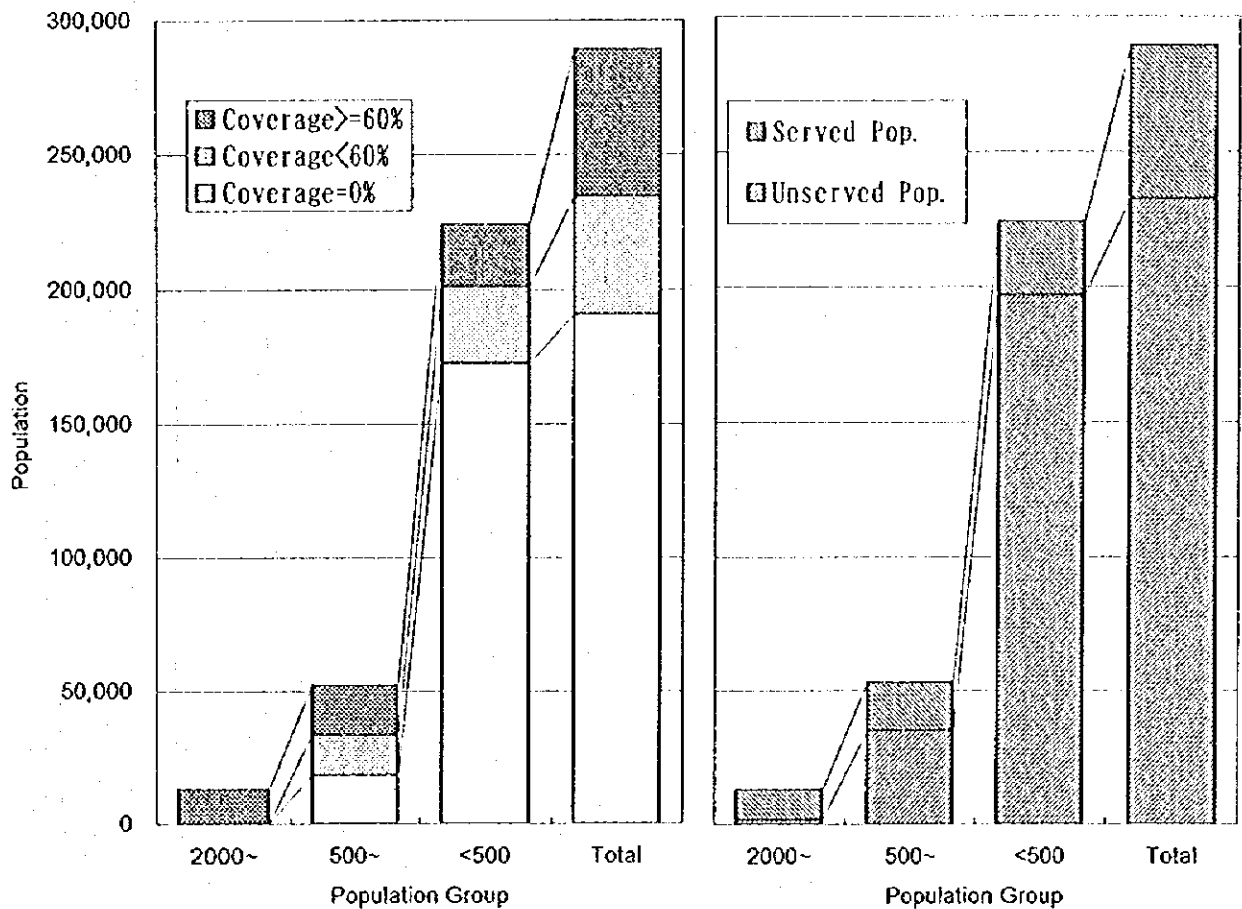


Figure 2-3-12 Distribution of Blocks by Population Group and Water Supply Coverage in Chuquisaca

Table 2-3-13 Distribution of Blocks by Population Group and Water Supply Coverage in Southern Part of La Paz

		Population Group			Total
		≥2000	500~1999	<500	
System existing Coverage ≥60%	No. of Blocks	0	11	40	51
	Total Population	-	11,171	8,078	19,249
	Served Population	-	9,188	6,784	15,972
	Average Coverage	-	82.2%	84.0%	83.0%
System existing Coverage < 60%	No. of Blocks	2	6	31	39
	Total Population	8,512	5,174	7,182	20,868
	Served Population	2,209	1,109	2,176	5,494
	Average Coverage	26.0%	21.4%	30.3%	26.3%
System no existing Coverage = 0%	No. of Blocks	0	5	667	672
	Total Population	-	4,008	82,152	86,160
	Served Population	-	-	-	-
	Average Coverage	-	-	-	-
Total	No. of Blocks	2	22	738	762
	Total Population	8,512	20,353	97,412	126,277
	Served Population	2,209	10,297	8,960	21,466
	Average Coverage	26.0%	50.6%	9.2%	17.0%

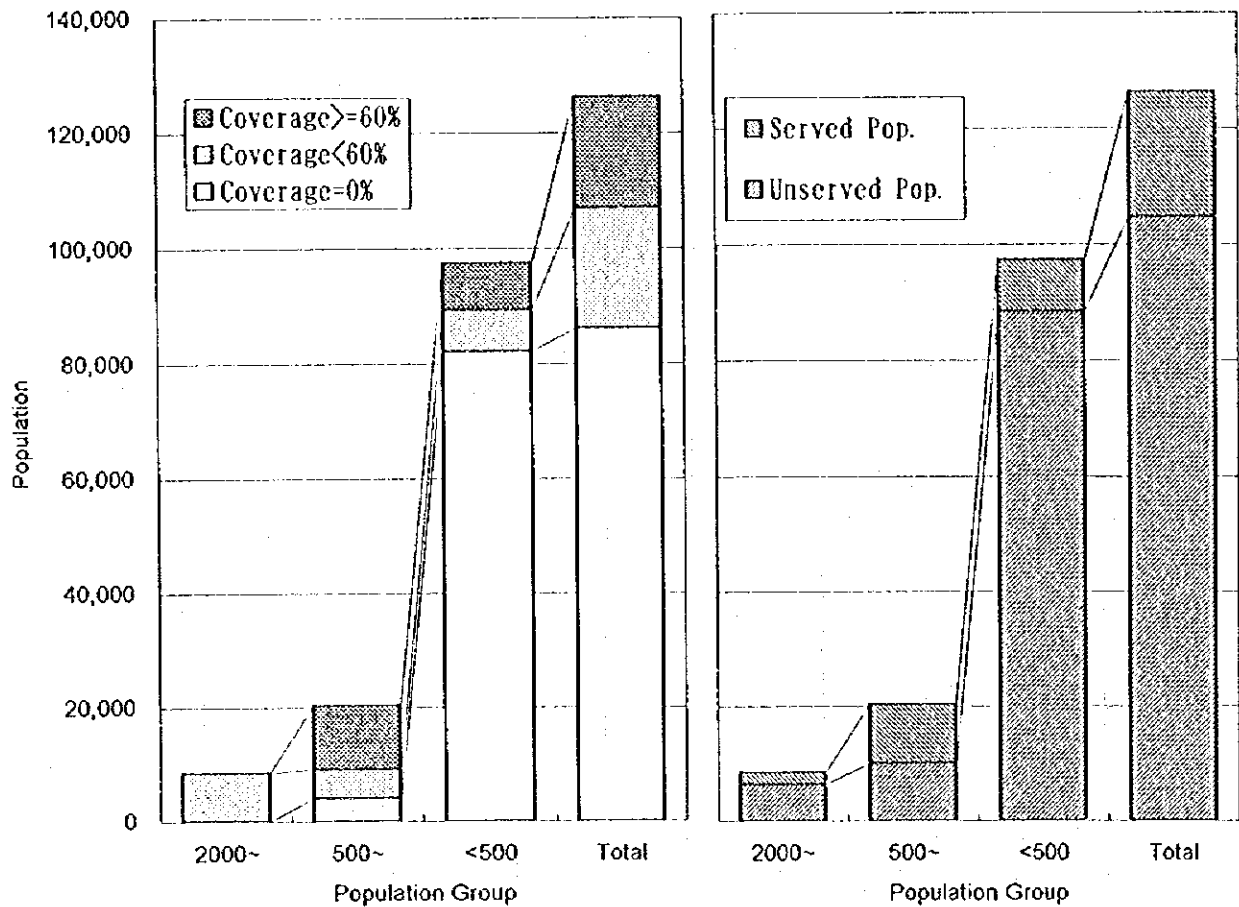


Figure 2-3-13 Distribution of Blocks by Population Group and Water Supply Coverage in Southern Part of La Paz

Table 2-3-14 Distribution of Blocks by Population Group and Water Supply Coverage in Oruro

		Population Group			Total
		≥2000	500-1999	<500	
System existing Coverage ≥60%	No. of Blocks	5	7	50	62
	Total Population	29,248	6,312	7,874	43,434
	Served Population	20,837	4,668	6,341	31,846
	Average Coverage	-	74.0%	80.5%	73.3%
System existing Coverage < 60%	No. of Blocks	2	13	114	129
	Total Population	6,945	12,483	24,015	43,443
	Served Population	3,486	3,548	6,502	13,536
	Average Coverage	50.2%	28.4%	27.1%	31.2%
System no existing Coverage = 0%	No. of Blocks	1	5	347	353
	Total Population	2,230	4,310	44,031	50,571
	Served Population	-	-	-	-
	Average Coverage	-	-	-	-
Total	No. of Blocks	8	25	511	544
	Total Population	38,423	23,105	75,920	137,448
	Served Population	24,323	8,216	12,843	45,382
	Average Coverage	63.3%	35.6%	16.9%	33.0%

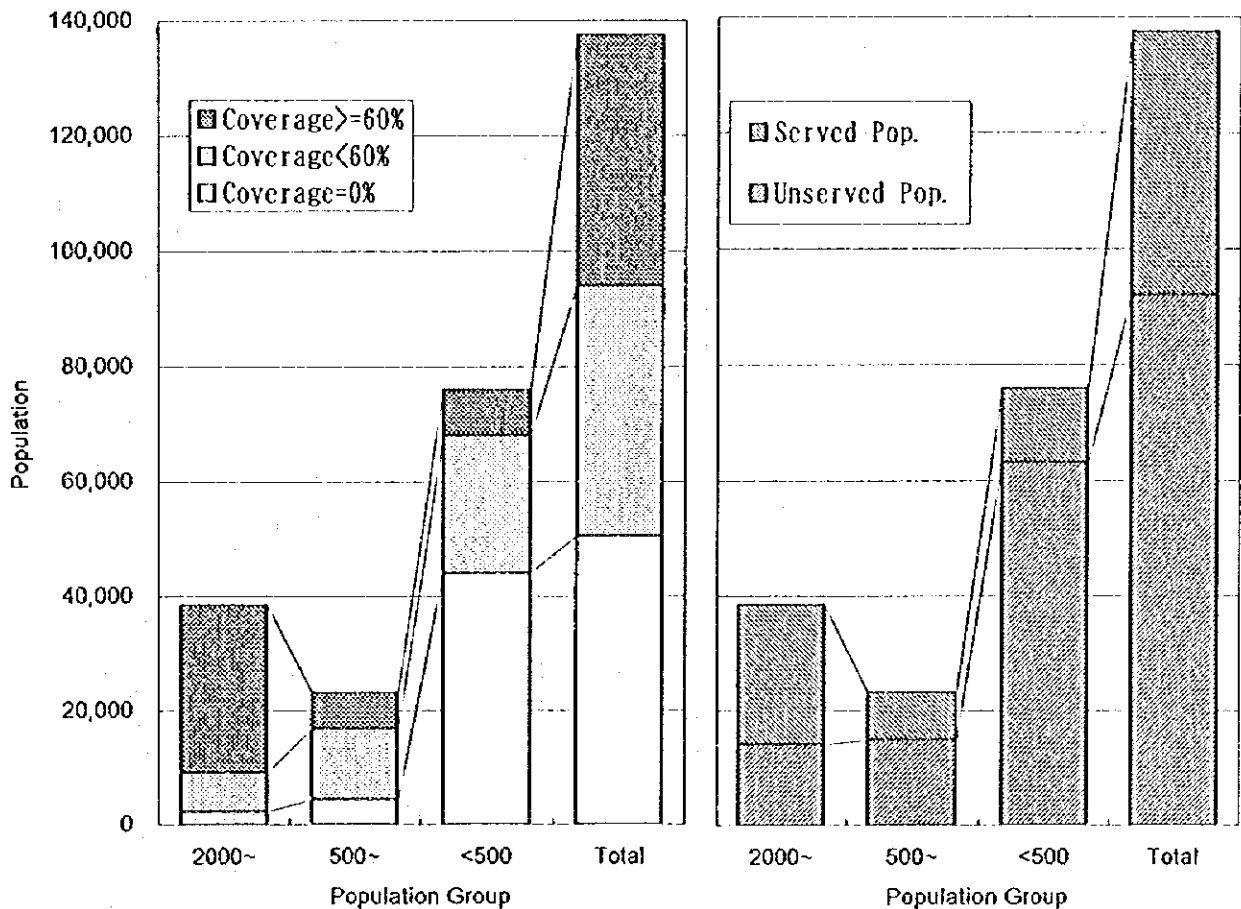


Figure 2-3-14 Distribution of Blocks by Population Group and Water Supply Coverage in Oruro

Table 2-3-15 Distribution of Blocks by Population Group and Water Supply Coverage in Tarija

		Population Group			
		≥2000	500~1999	<500	Total
System existing Coverage ≥60%	No. of Blocks	5	18	135	158
	Total Population	69,325	15,130	29,234	113,689
	Served Population	61,530	11,978	25,125	98,633
	Average Coverage	88.8%	79.2%	85.9%	86.8%
System existing Coverage < 60%	No. of Blocks	0	14	119	133
	Total Population	-	9,983	30,245	40,228
	Served Population	-	3,316	8,350	11,666
	Average Coverage	-	33.2%	27.6%	29.0%
System no existing Coverage = 0%	No. of Blocks	0	3	217	220
	Total Population	-	2,634	43,607	46,241
	Served Population	-	-	-	-
	Average Coverage	-	-	-	-
Total	No. of Blocks	5	35	471	511
	Total Population	69,325	27,747	103,086	200,158
	Served Population	61,530	15,294	33,475	110,299
	Average Coverage	88.8%	55.1%	32.5%	55.1%

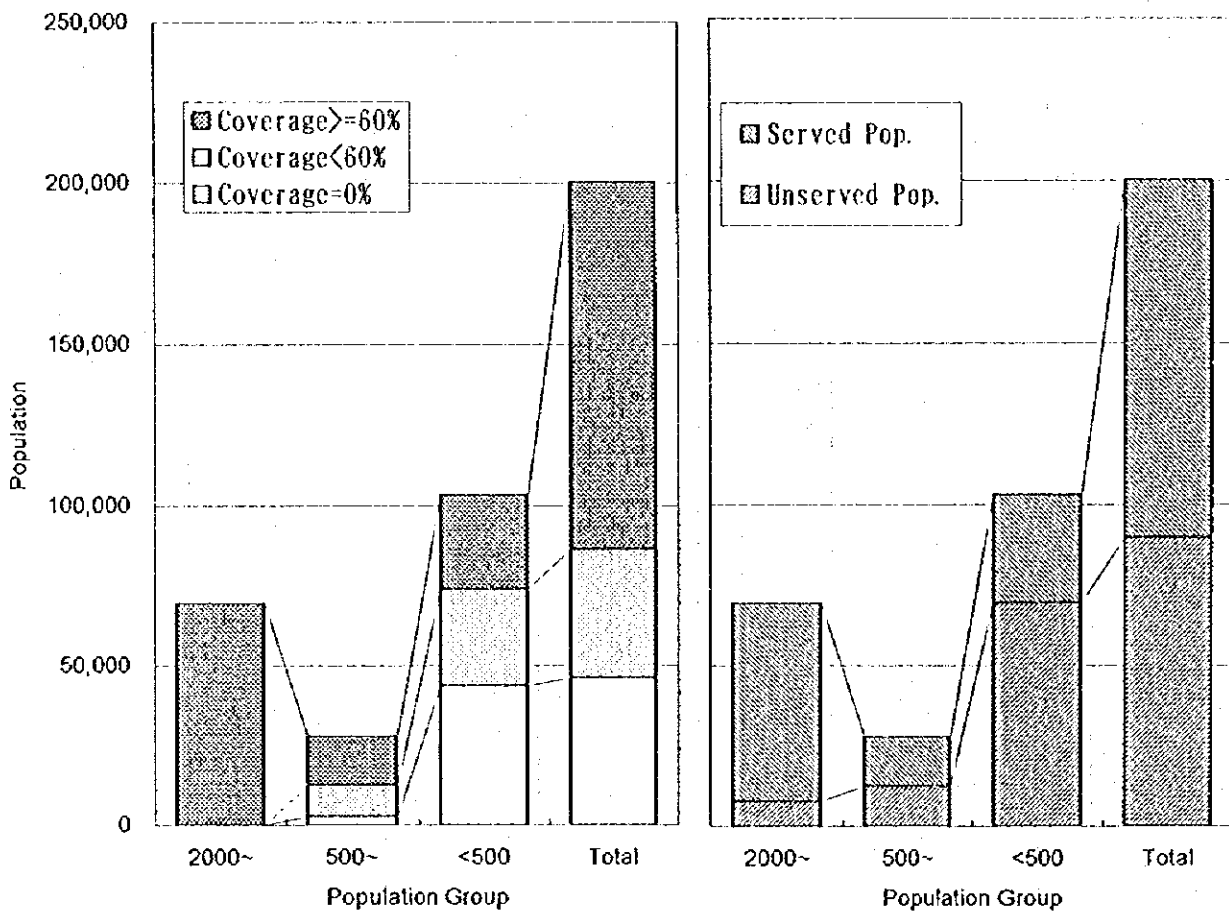


Figure 2-3-15 Distribution of Blocks by Population Group and Water Supply Coverage in Tarija

Table 2-3-16 Distribution of Blocks by Population Group and Water Supply Coverage in Santa Cruz

		Population Group			Total
		≥2000	500~1999	<500	
System existing Coverage ≥60%	No. of Blocks	35	64	122	221
	Total Population	260,522	61,798	33,709	356,029
	Served Population	229,581	54,289	29,765	313,635
	Average Coverage	88.1%	87.8%	88.3%	88.1%
System existing Coverage < 60%	No. of Blocks	6	28	152	186
	Total Population	24,402	23,189	39,047	86,638
	Served Population	9,322	4,409	8,519	22,250
	Average Coverage	38.2%	19.0%	21.8%	25.7%
System no existing Coverage = 0%	No. of Blocks	0	32	786	818
	Total Population	-	20,555	188,913	209,468
	Served Population	-	-	-	-
	Average Coverage	-	-	-	-
Total	No. of Blocks	41	124	1,060	1,225
	Total Population	284,924	105,542	261,669	652,135
	Served Population	238,903	58,698	38,284	335,885
	Average Coverage	83.8%	55.6%	14.6%	51.5%

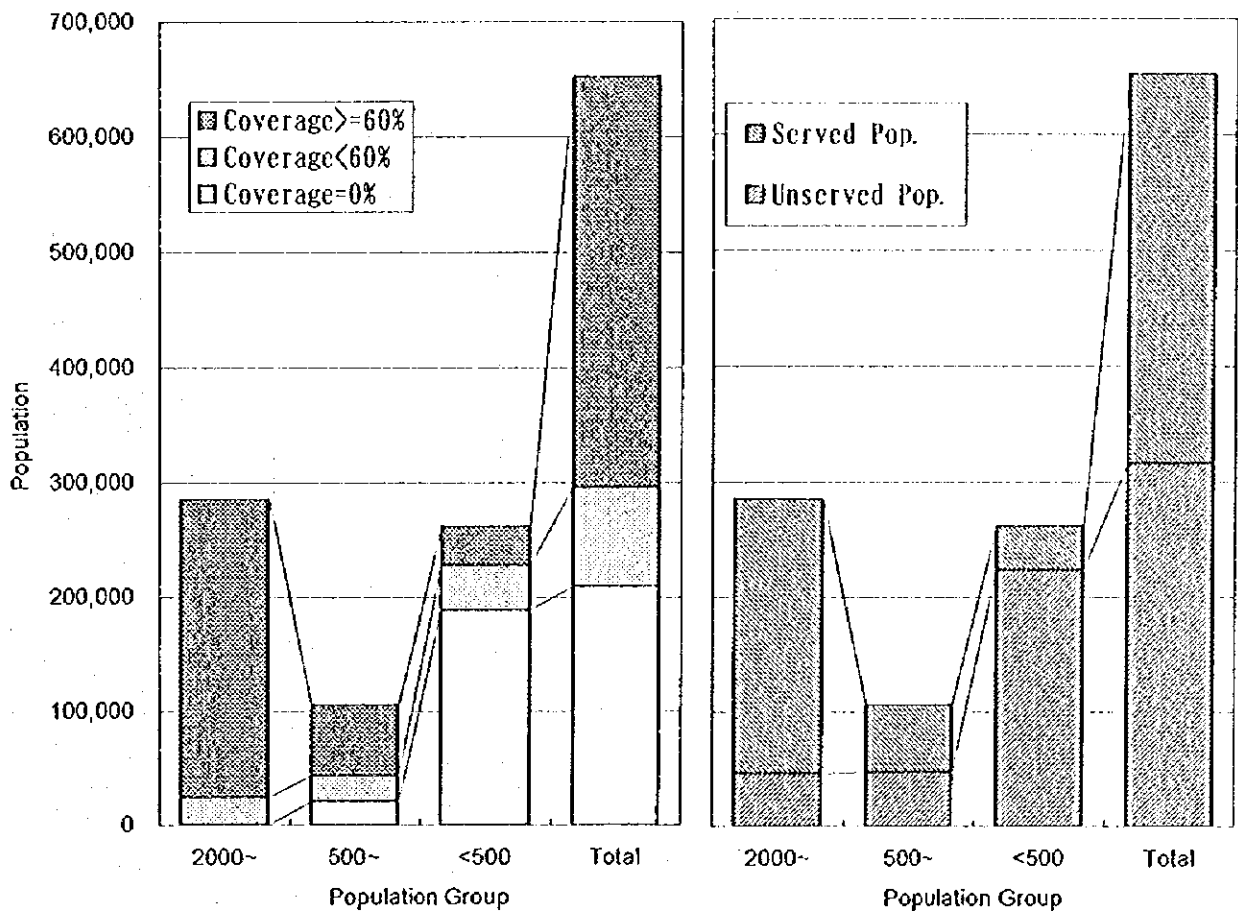


Figure 2-3-16 Distribution of Blocks by Population Group and Water Supply Coverage in Santa Cruz

Table 2-3-17 Distribution of Blocks by Population Group and Water Supply Coverage in the Whole Study Area

		Population Group			Total
		≥2000	500~1999	<500	
System existing Coverage ≥60%	No. of Blocks	49	118	456	623
	Total Population	372,039	112,906	101,958	586,903
	Served Population	323,397	95,356	85,987	504,740
	Average Coverage	86.9%	84.5%	84.3%	86.0%
System existing Coverage < 60%	No. of Blocks	10	81	531	622
	Total Population	39,859	66,165	128,932	234,956
	Served Population	15,017	15,139	34,813	64,969
	Average Coverage	37.7%	22.9%	27.0%	27.7%
System no existing Coverage = 0%	No. of Blocks	1	72	2,947	3,020
	Total Population	2,230	49,749	531,309	583,288
	Served Population	0	0	0	0
	Average Coverage	-	-	-	-
Total	No. of Blocks	60	271	3,934	4,265
	Total Population	414,128	229,820	762,199	1,406,147
	Served Population	338,414	110,495	120,750	569,659
	Average Coverage	81.7%	48.1%	15.8%	40.5%

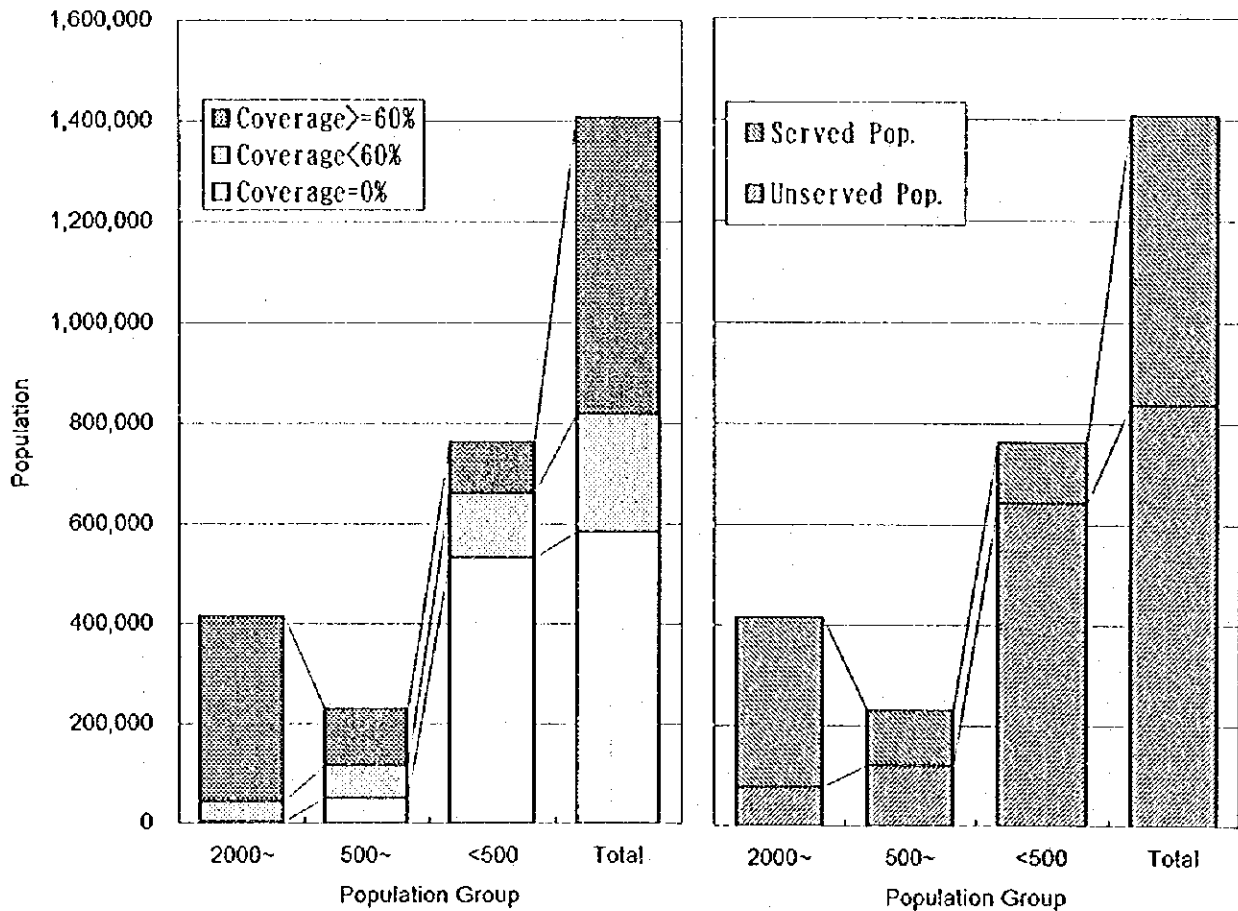


Figure 2-3-17 Distribution of Blocks by Population Group and Water Supply Coverage in the Whole Study Area

2.3.2 Water Supply System

Water Supply System is expected to exist in 1,241 blocks (29.1% in total) of the Study Area, in which 614 blocks satisfy a service level more than 60 % of the coverage and 627 blocks below 60 %.

The water supply database compiles the data of existing water supply system by two (2) services levels, Level II and Level III. The data is compiled within 890 blocks to cover 71.7 % of 1,241 blocks.

Table 2-3-18 shows a summary of the existing systems

Table 2-3-18 Summary of Water Supply System Data

(Unit: number of blocks)

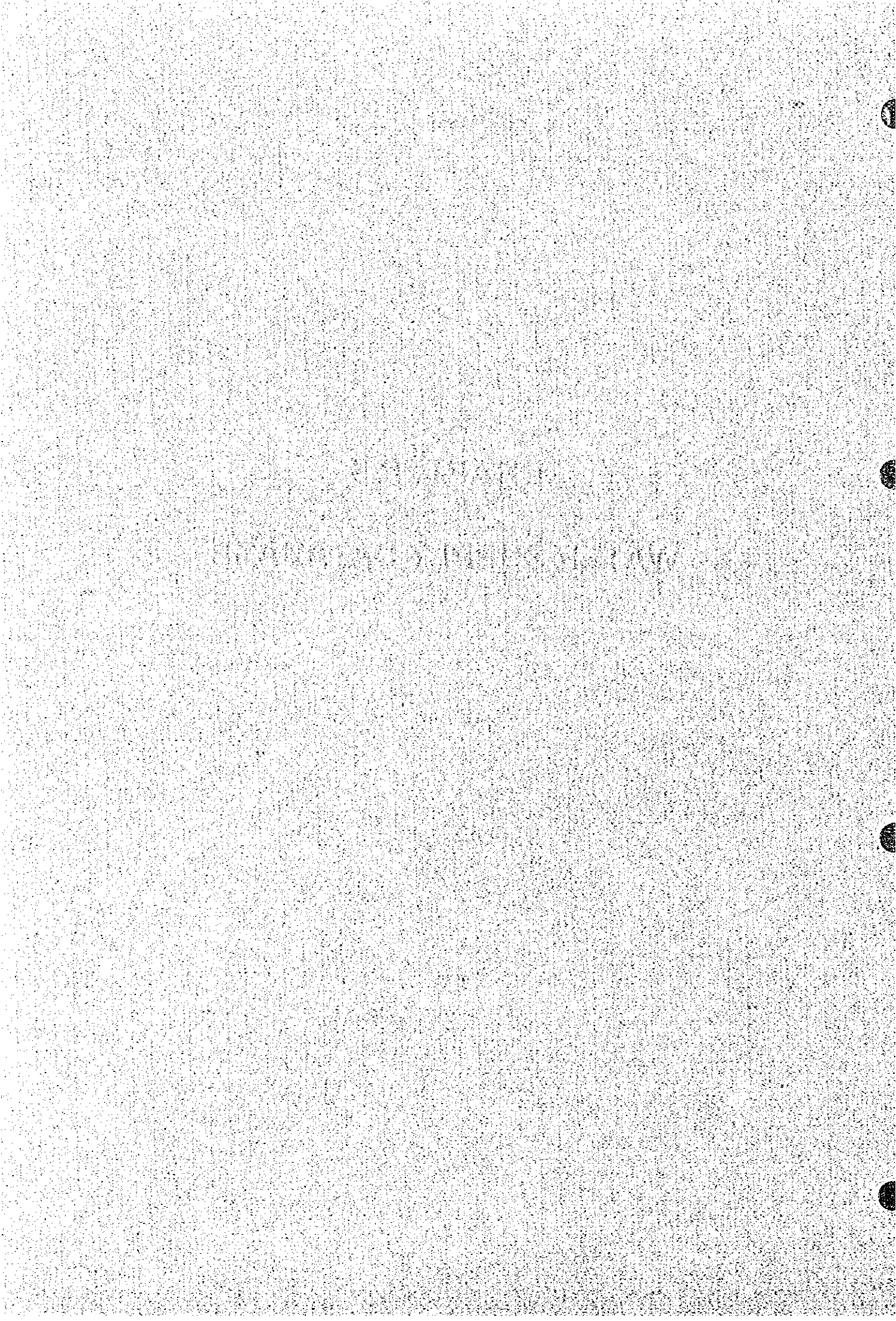
	Chuquisaca	La Paz (S)	Oruro	Tarija	Santa Cruz	Total
Number of Blocks	269	86	103	225	207	890
Service Level						
Level II	0	21	15	39	50	125
Level III	269	65	88	186	157	765
Served Population						
> 2,000	7	2	2	6	39	56
1,000 - 1,999	9	7	5	8	25	54
500 - 999	37	10	3	32	35	117
< 499	216	67	93	179	108	663
Construction Period						
Before 1969	2	6	0	4	16	28
1970 - 1979	15	8	0	13	69	105
1980 - 1989	159	21	0	81	19	280
After 1990	77	37	0	122	9	245
Unknown	16	14	103	5	94	232
Water Source						
Well	12	35	37	30	158	272
Superficial	252	50	66	131	31	530
Others	1	0	0	3	16	20
Unknown	4	1	0	61	2	68
O/M Organization						
Cooperative	2	15	0	17	157	191
Water Comitee	265	56	15	175	0	511
Unknown	2	15	88	33	50	188
Number of Staff						
> 6	1	2	0	53	12	68
3 - 5	33	7	42	110	40	232
1 - 2	224	47	35	28	152	486
0	11	30	-	-	-	41
Unknown	0	0	26	34	3	63
Management Condition						
Surplus	205	39	12	155	176	587
Balance	14	0	3	42	5	64
Deficit	50	4	0	28	26	108
Unknown	0	43	88	0	0	131
Tariff Structure						
Resident	249	45	77	169	201	741
Official	7	0	0	0	45	52
Industrial	8	0	0	18	24	50
Others	20	41	26	56	6	149

Source: Water Supply Database

CHAPTER 3
WATER SUPPLY DATABASE

CHAPTER 3

WATER SUPPLY DATABASE



CHAPTER 3 WATER SUPPLY DATABASE

3.1 Background of the Water Supply Database

3.1.1 Brief Introduction to Major Databases Used in Bolivia

In Bolivia, various databases (or information systems) had been constructed. Those related to water supply development projects include the following.

1) INE Database (REDATAM)

Developed by the United Nations using an unique programming language, this database program is used to manage the data obtained from the June 1992 Census Survey carried out in each department of Bolivia.

The INE Regional Office of each department of Bolivia has the responsibility to manage the data collected within the specified administrative area. And the INE National Office in La Paz has the responsibility to manage all census data, including that of the Department of La Paz.

However, some INE Regional Offices are not functioning as well as expected because of the lack of technical expert.

Besides, the smallest unit of the INE Census Survey in 1992 is an area defined as a "segment", which, in many cases, differs from the "community" or "locality" in the common sense of the word. Thus, in many cases, the INE data do not provide the real status of the communities which are defined as "blocks" in this Study.

Another problem that is often pointed out is the timing at which the 1992 Census Survey was carried out. In some departments, especially those neighboring other nations such as Argentine or Chile, numerous villagers go out of their villages to travel to other nations to look for work during the dry season every year. Because of this, the actual populations are greater than the data collected by 1992 Census Survey which was carried out in June, right in the middle of the dry season.

2) GEOBOL Database

Developed by a German institute, this database is being used at Tarija and Cochabamba to manage data on existing wells in these departments.

Using this database, one can easily get detailed information on the wells, including displays of the geological columns of the wells.

Almost all of the data which were input into this GEOBOL Database at Tarija (CODETAR) was converted and used to build up the well data files of Tarija.

3) SISABAR Database

With the original Spanish name "Sistema de Información del Proyecto de Saneamiento Básico Rural", this database is being developed by DINASBA, with the cooperation of the World Bank, in the project named "PROSABAR" (Proyecto de Saneamiento Básico Rural, 1994~).

The target of this database is to obtain detailed information on the water supply condition, sanitary condition, financial condition, etc. of all communities of Bolivia and to utilize these information to support the plan-making and plan-supervising processes related to the rural basic sanitary development sectors of the central government.

At the present time, the new second version of the software program (V.1.2), developed using the FOXPRO programming language, has been completed and is being used to process data.

Some datafiles of the SISABAR Database were utilized to build up our Water Supply Database, especially on the provincial level and departmental level.

4) Other developed database

Besides the databases (or information systems) mentioned above, there are others that are presently being developed. Below are some of the major ones.

(1) SSISSBA (Sistema de Información del Sector Saneamiento Básico)

This database is being developed by DINASBA with the assistance of United Nations (Proyecto BOL/92/101) with the same objectives as those of SISABAR. The development process is now in Step II, which is planned to be completed by Mar, 95. However, the majority of the data has not been input yet.

(2) SIMAS Database (Sistema de Monitoreo de Agua y Saneamiento)

This database has been introduced to all Latin American countries by OMS and UNICEF and was provided to DINASBA in May 1992. Its objectives are almost the same as those of SISABAR. With the cooperation of UNICEF, DINASBA provided the software program as well as the orientations and instructions therefor to 7 departments (La Paz, Santa Cruz, Beni, Oruro, Cochabamba, Potosí and Chuquisaca). However, the progress of the build-up of this system is unknown.

3.1.2 Objectives of the Water Supply Database

It is worthwhile to review the objectives of the Water Supply Database here. These are :

- 1) To compile, process, and manage a large amount of information;
- 2) To support the formulation of the Regional Groundwater Development Strategies;
- 3) To support the implementation of the groundwater development plans and related development projects; and
- 4) To support the evaluation of the groundwater development plans and the supervision of the progresses of these plans.

Therefore, for the short term, the main objective of the Water Supply Database is to support the formulation of the Regional Groundwater Development Strategies, but for the long term, its objective is to help evaluate the impacts of the water supply development and supervise the development processes.

3.2 Development of the Water Supply Database (WSD)

3.2.1 Structure of the Water Supply Database

To achieve the objectives described above, the Water Supply Database should have the structure with the four main factors shown below.

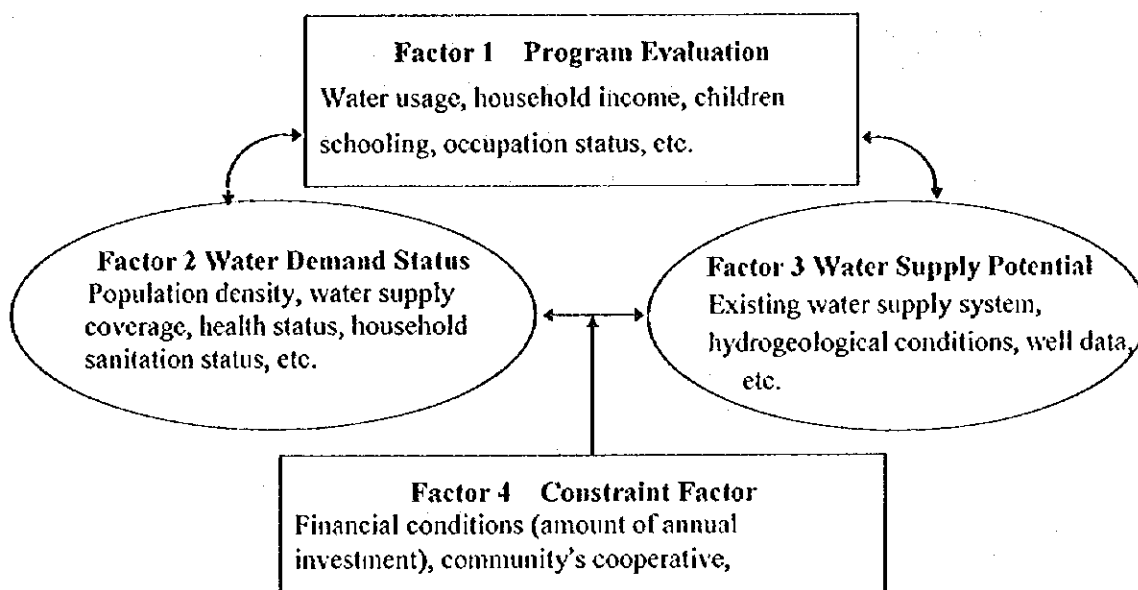


Figure 3-2-1 Four Main Factors of the Water Supply Database

In formulating the Regional Groundwater Development Strategies, two main factors have to be analyzed first. These are: (1)The water demand status (i.e. population density, water supply coverage, health condition, household sanitation, etc.) and (2)the water supply potential (i.e. information on existing water supply systems, well data and other information on geological, hydrological... conditions that help identify alternative water sources).

On the other hand, we also have to verify the constraints that actually affect the development process (such as the community financial conditions, the concern, willingness, cooperatives... of the inhabitants, the community's ability to operate and maintain the water supply system etc.).

To be more detailed, each of the main factors described above may include several sub-factors as shown in Figure 3-2-2.

Water Demand Status	
● Population density	Population, area
● Water Supply Coverage	Capture of existing water source, and its served population / household
● Health Status	Morbidity, mortality
● Household Sanitation	Number of sanitary toilets, water-sealed toilets, etc.

Water Supply Potential	
● Existing water supply systems	Productivity and other performance of existing water supply systems
● Other information	Well data and other hydrological, geological information

Constraints	
● Financial Conditions	Annual investment, funding, etc.
● Community's Cooperatives	Community's concern, willingness, cooperatives, etc.
● Operation and Maintenance Ability	Number of committees, their functions, efficiency, etc.

Program Evaluation Factors	
● Household water usage	Changes in water usage, water consumption, etc.
● Household income	Changes in household income
● Children schooling	Changes in percentage of school attendance
● Occupation status	Changes in occupation categories

Figure 3-2-2 Sub-Factors of the Water Supply Database

For the sake of convenience, these data are grouped into (1) numeric data and (2) graphic data and rearranged in the Water Supply Database as shown in Figure 3-2-3.

Almost all of these data have to be collected on the basis of water supply block (WSB, or community or village). The WSB is the smallest unit of the database. But some of the data do not follow this rule. In fact, it is better to define the data with the following hierarchical categories:

1. Department level
2. Province level
3. Community (or municipality, village or block) level

Figure 3-2-4 shows the hierarchical chart of these data.

(1) NUMERIC DATA

1. Socioeconomic data

- Area
- Population
- Number of households
- Percentages of urban and rural areas
- Number of schools, hospitals, banks, etc.
- Existence of local government office, airport, etc.
- Population growth (estimated future population)
- Education and occupation status
- Household income status

2. Health data

- Number of morbid and dead persons caused by the use of unfavorable or contaminated water in recent years

3. Household sanitation data

- Percentage of households using sanitary toilet, etc.

4. Existing water source data

- Type, capacity, ownership, equipment, etc.
- Coverage, served population, number of households served
- Operation and maintenance system

5. Financial data

- Projects being implemented, the financial sources, foundations, etc.
- Annual budget of local administrative government, its investments to water supply section, sanitary development section

(2) GRAPHIC DATA

1. Administrative boundary map
2. Topographical map
3. Geological map
4. Land use map
5. River flow map
6. Well distribution map
7. Road network map
8. Others

Figure 3-2-3 Groups of Data Used in the Water Supply Database

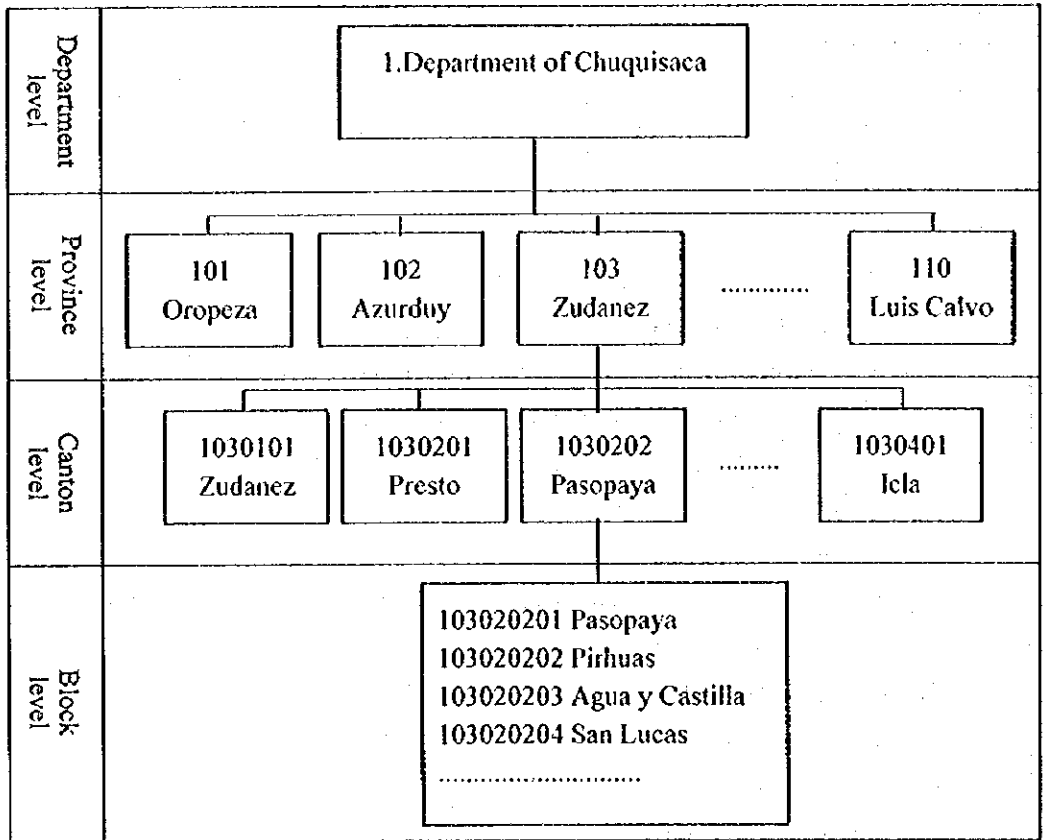
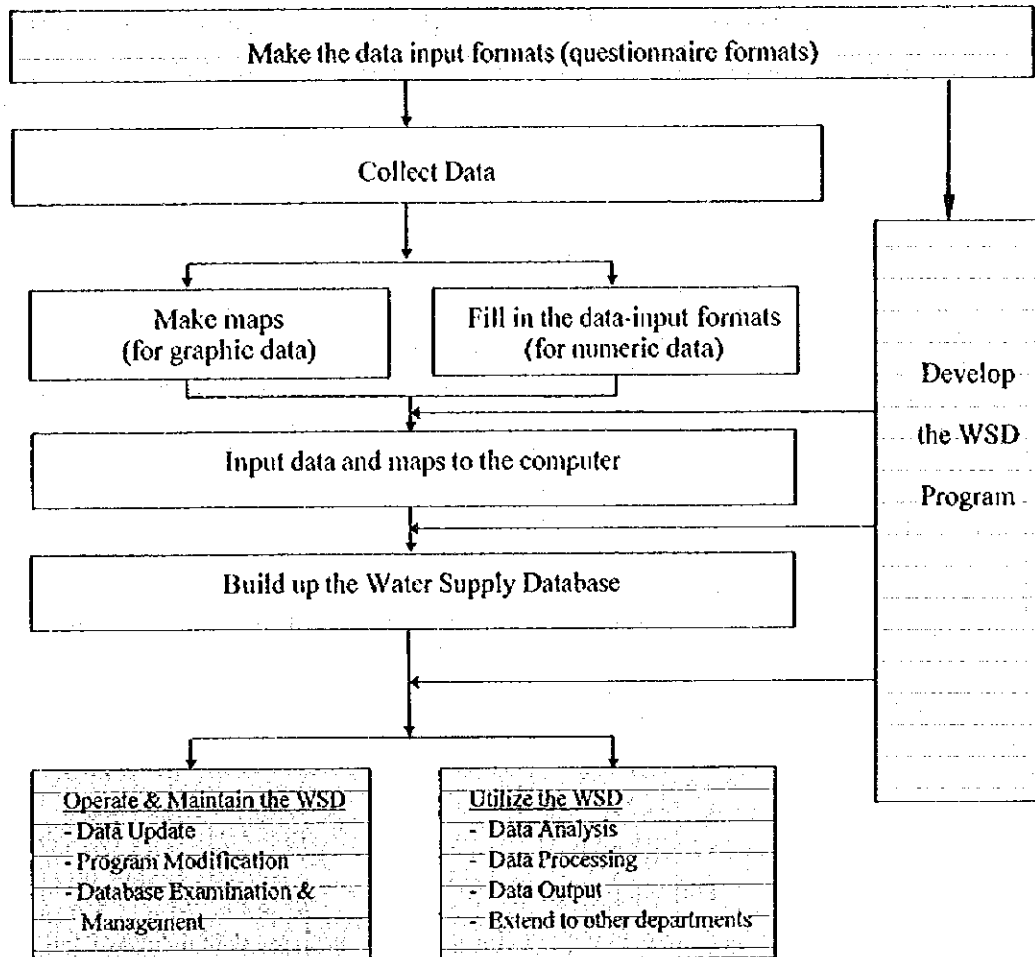


Figure 3-2-4 Hierarchical Chart of the Water Supply Database (in case of Chuquisaca)

Numerous of data input formats (questionnaire formats) have been made and used in the data collecting process based on the structure described above.

3.2.2 Building up the Water Supply Database

Figure 3-2-5 shows the flow-chart of the process to built up, operate and maintain the database, and the way that the database program control this process.



Note)



work done by the CORDES



work done by the Study Team with the cooperation of the counterparts in DINASBA and CORDES



works done by DINASBA with the cooperation of the CORDES

Figure 3-2-5 Process to Build Up, Operate and Maintain the Water Supply Database

The work of building up the Water Supply Database are assigned to the CORDES, the DINASBA and the Study Team. In detail, the responsibilities are shared as shown in Figure 3-2-6.

CORDES	<ul style="list-style-type: none"> Define blocks Collect data and process data Input data into the computer Conduct supplementary field surveys for the rest of the communities Update data
DINASBA	<ul style="list-style-type: none"> Operate & maintain the WSD Utilize the WSD Extend application to other four departments
STUDY TEAM	<ul style="list-style-type: none"> Make the data input formats Develop the WSD program Hold training workshops Prepare instruction manual Guide the CORDES' counterparts on the data input work Conduct sample field surveys to check the data input by CORDES

Figure 3-2-6 Assignment of the Work for Building Up and Maintaining the WSD

3.2.3 Collection of Numeric Data

First, data collection is started and the water supply blocks are defined by each CORDES.

Due to the limited amount of time, the counterparts of the CORDES were recommended to use the INE data as the basis data (population, number of households, estimated future population, household sanitation, etc.) for the blocks. But at some of the CORDES, the counterparts held that the INE data were not correct and thus should not be used. These counterparts therefore had to spend much time conducting field surveys to collect such data. For example, in the case of Omuro, the counterparts there reported that they had to visit almost all of the villages to collect data.

Table 3-2-1 shows the main sources of data used by each CORDES.

Table 3-2-1 Main Sources of Data Used by the CORDES

Object Dept.	Block Definition	Socio- Economic Data	Sanitation Data	General Water Supply Data	Water Supply System Level II & Level II	Well Data
Chuqui- saca	INE Cantones District Map (1/50,000)	INE data	INE data	INE data	Owned data files	Owned data files
La Paz	INE Cantones District Map (1/50,000)	INE data ----- Field survey	INE data ----- Field survey	INE data ----- Field survey	Field survey ----- NGO data	Field survey ----- GEOBOL data ----- NGO data
Oruro	INE Cantones District Map (1/50,000)	Field survey ----- INE data	INE data	INE data	Owned data files	Owned data files ----- GEOBOL data
Tarija	INE Cantones District Map (1/50,000)	INE data	INE data	INE data	Owned data files	GEOBOL data
Santa Cruz	INE Cantones District Map (1/50,000)	INE data	INE data	INE data	Field survey ----- Owned data files	Owned data files

3.2.4 Input of Numeric Data

The work to input the collected data into the computers was assigned to the CORDES. JICA has provided each CORDES with one computer system for the data input work. And several supplemental workshops were held to guide the CORDES' counterparts on the data inputting work and to instruct them on the use of the BADAA Program.

But a datum is meaningless if it is not correct. Therefore, a careful and detailed check of these data is indispensable.

The checking of the reliability of data input by the CORDES is described in detail in the next section.