

Chapter 6 Traffic Management and Planning

6.1 Traffic Management Organization

The municipal traffic police (Policia Mucnupal de Transito: PMT) is responsible for traffic management and enforcement within the urban area. Each municipality has its own PMC. The organization chart of PMT in Asunción is shown in Fig. 6-1-1. Traffic controls such as parking restrictions and signal control are implemented by PMT in close cooperation with an organization in the municipality which is responsible for policy making, planning and coordination. PMT is mostly responsible for enforcement only. For example, the on-street parking management is under the responsibility of a private entity, CEA, which checks illegally parked cars. PMT works together with the staff of CEA and is responsible for imposing penalties.

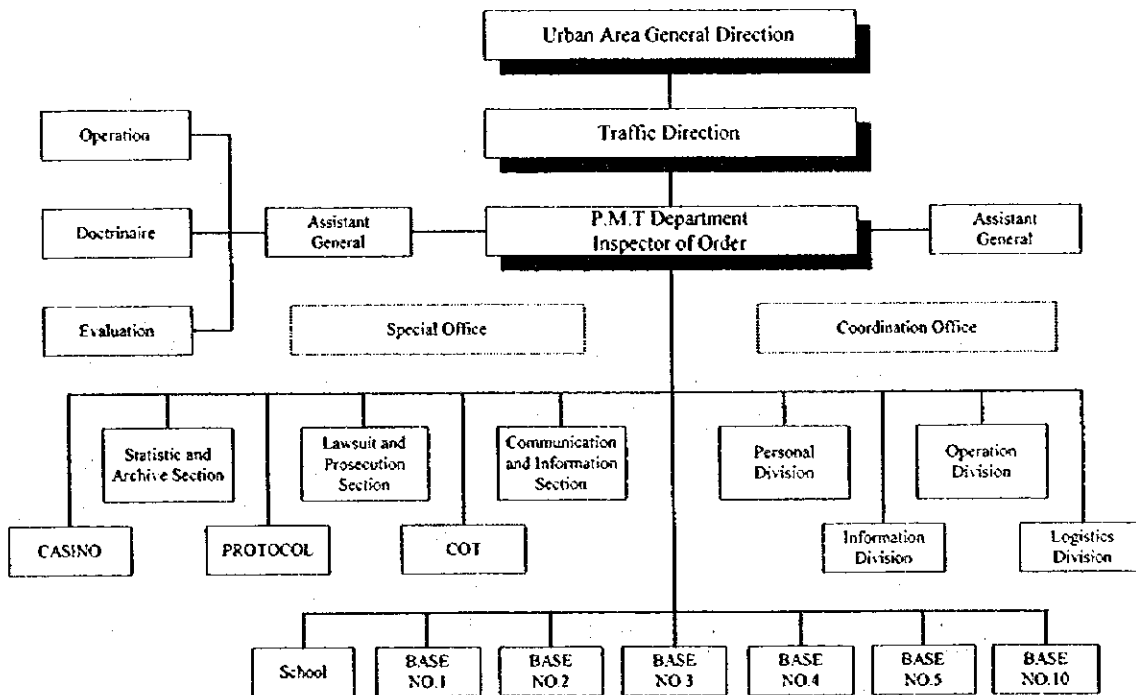


Fig. 6-1-1 Organization of PMT

Table 6-1 shows the number of policemen and their working hours in each city. The rates of registered vehicles to traffic police is over 400 vehicles per policeman, which clearly illustrates that the number of traffic control personnel is small. Moreover, their working hours are the same as those of other public officials, and thus there is no traffic control during the period from evening to early morning, or from 20:00 to 6:30.

Table 6-1-1 Number of Policemen

Municipality	Amount of P.M.T Persons (A)	Working Time	Registered Vehicles (B)	(B)/(A)
ASUNCION	199	06:30 12:30 16:00 18:45	198,624	998
FDO.DE LA MORA	22	06:30 12:30 16:00 19:00	11,964	544
SAN LORENZO	21	06:30 12:00 15:30 18:00	11,549	550
LAMBARE	11	06:00 13:00 15:00 20:00	18,604	1,691
MARIANO R.ALONAO	6	06:30 12:30 16:00 18:45	10,000	1,667
VILLA ELISA	10	07:00 13:00	7,940	794
NEMBY	2	07:00 12:00 16:30 17:30	5,115	2,558
LIMPIO	5	07:00 13:00	8,294	1,659
SAN ANTONIO	6	06:30 18:00	2,790	465
LUQUE	10	07:00 12:00 14:00 17:30	4,334	438
VILLA HAYES	N.A	N.A	N.A	--
CAPIATA	10	07:00 18:00 16:00 18:45	N.A	--
TOTAL	302		279,214	925

NOTE: Vehicle registration data was obtained until 31/12/95.

This Study proposes system control and improvements of traffic signals at major intersections. This will spare manual controls by policemen, but it will be necessary to educate and train them so that they are or "become" aware of the traffic control system. It will be particularly important to train them for data collection and analysis. This will require a curriculum of practical training on traffic flows through using the traffic control system and the establishment of an educational institution for traffic policemen.

The contents of the curriculum are as follows:

- Traffic rules and regulations
- Basics of traffic flows
- Data collection and analysis, e.g. traffic volume and accidents
- Traffic signal control system, e.g. control scheme and parameter management
- Traffic safety measures, e.g. emergency procedures
- Traffic flow control, e.g. standards and management for one-way roads and parking restrictions.

6.2 Driving License System

A driving license is allowed to those who are over 18 years old and is classified into general, commercial, for heavy vehicles, and for commercial heavy vehicles. A license needs to be renewed every 5 years. The license examination is divided into practical and written parts. The latter has questions on traffic regulations and vehicle mechanisms. Driving schools provide 30-hour practice and 40-hour lecture for a general license, but it is not necessary to go to a driving school to obtain a license.

Since improvements of intersections, markings, and signs are proposed as part of the traffic management plan, for such improvements to be functional, it will be necessary to provide education and training to drivers.

Education and training on traffic rules and safety for drivers include;

- Knowledge for safe driving, e.g. vehicle mechanics, performance, and influence of speed
- Driving techniques, e.g. safe start, places permitted for driving, pedestrian safety, safe speed and distance between cars, lane change, overtaking, driving intersections, parking and stop, dangerous roads
- Signals and signs, e.g. traffic signals, type and designation of regulations, directions, and guide signs.

In order to implement them, it is necessary to make traffic police well aware of traffic regulations and rules. At the same time, it is also important to found an institution that promotes safe driving, issues driver's license and other related documents, and carries out training programs. Meanwhile, traffic police should impose more strict penalties, improve the enforcement system, prepare documents and statistics on traffic accidents, and conduct periodic traffic surveys and management of database.

6.3 Vehicle Registration

Each vehicle needs to renew its registration every year. Vehicles can be registered at any municipality, and the registration fees are different from municipality to municipality. Therefore, many vehicles owned in Asunción city are registered in other municipalities. However, the law that requires registration for all the vehicles in an unified system in the country was established in 1995 and will be in effect from 1999. The present vehicle registration fee in Asunción includes the annual vehicle tax, and fees for registration, inspection and issuance of license plate. The vehicle tax is determined by the present value of a vehicle.

According to the vehicle registration data, 50 percent of the registered vehicles are over 15 years old. However, many vehicles actually running on the streets are relatively new, and thus the data seems to include a number of abandoned vehicles as well.

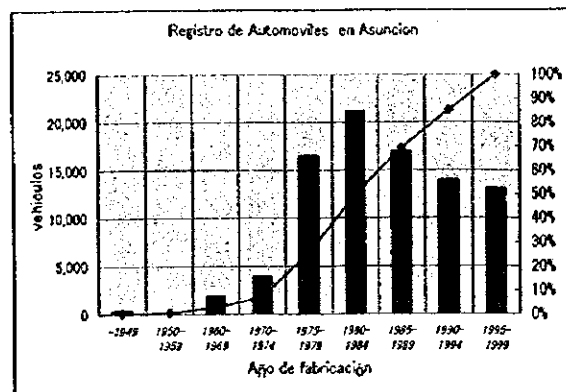


Fig. 6-2-1 Age Distribution of Registered Vehicles

6.4 Traffic Regulation

According to the traffic regulations, the driving speed is limited to 50 Km/h on all the roads in Asunción city, and to 60 Km/h on the national highways, but few drivers respect the speed limits, and little regulation of speed is actually carried out.

Although it is allowed at non-signalized intersections, left-turn is prohibited at most of the signalized intersections, especially at those on trunk roads. In order to make a left-turn at a signalized intersection, vehicles need to make three right-turns to go around the block. The lack of exclusive left-turning phase in a signal cycle and left-turning lane are to blame for this inconvenience. There are a few intersections with exclusive left-turning phase and left-turning lane at minor intersections, where enough space is available.

Chapter 7 Present Environmental Conditions

7.1 Institution and Legislation

7.1.1 Overall Framework

Environmental standards and legislation are established by the Government of Paraguay through the Ministry of Public Health and Social Welfare, the Ministry of Agriculture and Livestock and the National Congress.

The Congress established in 1990 the National Commission for Natural Resources Protection. The principal role of the Commission is to develop an efficient and effective action plan in order to protect resources and the ecosystem, and ensure environmental preservation. In order to realize this objective, the Commission is, in particular, in charge of the co-ordination of action among all the pertinent organizations which operate in this field. Two senators, two deputies, six ministries, Planning Secretariat, local governments, private sector, universities and indigenous organizations participate in the Commission.

On the other hand, an Inter-institutional Commission (IC), which is responsible for the appraisal of environmental evaluation, was established in 1991 in the Ministry of Agriculture and Livestock (MAG). The IC belongs to the Sub-secretariat of Natural Resource and Environment of the Ministry and it consists of the following members:

- Director General of Directorate of Road, Ministry of Public Works and Communication (MOPC)
- Director General of Directorate of Road Network, MOPC
- Technical Director of Paraguayan Institute of Indigenous People, MAG
- Director of National Office of Co-ordination and Administration of Projects, MAG
- Director of Planning of Institute for Rural Welfare, MAG
- Director of National Forestry Services, MAG
- Director of the Directorate of National Parks and Wildlife, MAG
- Director of the Directorate of Environment, MAG

IC can include any other organizations when it is necessary. IC is in charge of the preparation of TOR and the evaluation and appraisal of Environmental Impact Assessment as well as other support services. However, the organization, which is mainly responsible for the appraisal of environmental evaluation, is the Sub-secretariat of Natural Resources and Environment.

7.1.2 Functions and Organizational Structure of Relevant Public Organizations

(1) National Organizations

National organizations which deal with environmental issues are shown in Table 7-1-1.

Table 7-1-1 National Organizations Relevant to Environmental Preservation

No.	Name of Organization	Principal Responsible Areas and Issues
1	Ministry of Agriculture and Livestock (MAG)	Natural resources, forestry, national parks, wildlife: the Directorate of Environmental Ordinance is responsible for preparing TOR of EIA and EIA appraisal of all kinds of projects.
2	Ministry of Public Health and Social Welfare (MSPBS)	Sanitation, sanitary environment
3	Sanitary Works Corporation (CORPOSANA)	Water quality control, sewage
4	National Services for Environmental Conservation (SENASA)	Water quality control, solid waste treatment, hygiene, establishment of environmental standards
5	Military Institute of Geography, Ministry of National Defense	Preparation of topographic maps
6	General Directorate of Meteorology, Ministry of National Defense	Collection, processing and interpretation of meteorological data
7	Ministry of Public Works and Communications (MOPC)	Environmental Unit: Environmental studies on road projects; Hydraulic Resources Department: Hydraulic resources

(2) Asunción Municipal Government

In Paraguay, there are, in total, 218 local governments of diversified categories depending on their population. The principal role of local governments in terms of environmental conservation is solid waste treatment and food quality control.

Asunción Municipal Government has established an Environment Directorate. Fig. 7-1-1 shows the organization structure of the Directorate. The role of the Directorate is to:

- improve waste management
- promote awareness and community participation in environmental conservation
- promotion of technical co-operation with international organizations, governmental organizations and NGOs.

7.1.3 Environmental Laws and Legislation

(1) National Environmental Laws and Decrees

National environmental laws and decrees are cited in Copilacion de Legislacion Ambiental, which was issued by National Commission of Natural Resources Conservation. Principal laws and decrees are shown in Table7-1-2.

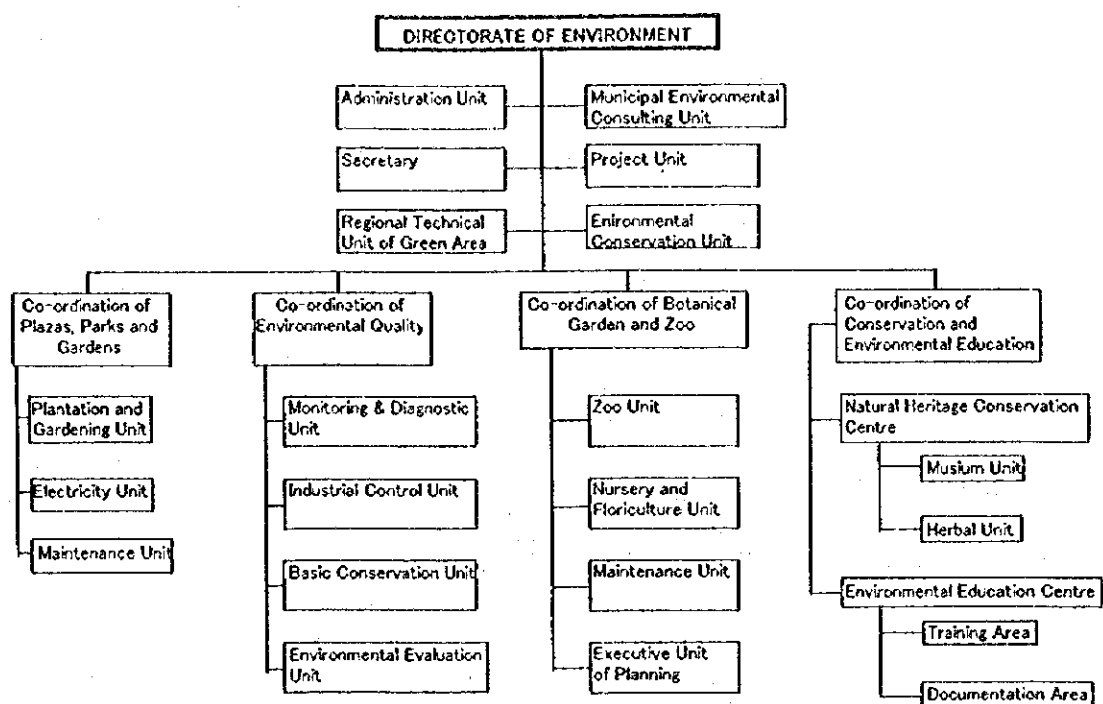


Fig. 7-1-1 Organization Chart of Directorate of Environment: Asunción Municipality

Table 7-1-2 Principal National Laws and Decrees

Law and Decree No.	Date of Issue	Contents
Ley 854	29/03/1963	Agricultural laws
Ley 369	01/12/1972	Foundation of SENASA (National Services for Environmental Conservation)
Ley 422	16/11/1973	Forestry laws
Decree 18.831	-	The establishment of environmental protection standards
Decree 5.055	18/08/1994	The exemption of obligations in terms of presenting forestry guide for the operation of export of certain wood products
Ley 836	15/12/1980	Sanitary code
Ley 946	14/10/1982	Cultural property protection
Ley 42	18/09/1990	The prohibition of import of dangerous industrial and toxic waste
Ley 123	09/01/1992	Adaptation of new mode of vegetation sanitary protection
Ley 96	24/12/1992	Wildlife protection
Ley 52	03/09/1992	Agricultural processing code
Ley 294	31/12/1993	Environmental Impact Assessment law
Ley 536	09/01/1994	Promotion of reforestation in the country
Ley 799	07/01/1996	Fishery law
Ley 716	02/05/1996	Sanction laws against the violation of environmental conservation
Ley 816	20/08/1997	Natural resources conservation
Ley 1100	26/08/1997	Control of noise pollution
Ley 583	24/08/1976	Convention on endangered fauna and flora species
Ley 1231	20/12/1986	Convention on world, cultural and natural heritage
Ley 234	19/07/1993	Protection of indigenous people

Source: Compilacion de Legislacion Ambiental: Comision Nacional de Defensa de los Recursos Naturales

(2) Asunción Municipal Government Ordinance

Asunción Municipal Government has established its own ordinances relevant to environmental conservation issues. The principal environmental ordinances are shown in Table 7-1-3.

Table 7-1-3 Principal Environmental Ordinances

Ordinance No.	Date of Issue	Contents
48/94	1994	Prevention of noise pollution
5486/66	1966	Control of discharge of polluted water
2583/90	1990	Establishment of standards on environmental pollution and waste treatment
481	21/01/1941	Smoke, emission and chimney control
19/97	13/08/1997	Air pollution control

(3) Expropriation of Land Law

There are no resettlement regulations and guidelines in Paraguay. However, Asunción Municipality Government has established the Expropriation of Land Law for the execution of human resettlement in any urban development project. According to the law, the city's mayor is supposed to inform the Municipal congress and other pertinent authorities of the legal situation of affected real estate and its future status.

In case of the new construction and widening of roads and other development activities, which may cause drastic increase in the price of target real estate, cash compensation will be reduced by 50%.

The municipal Government must pay the cash compensation to resettled people who own the real estate within five years. For the tenants of houses to be expropriated, the Government pay compensation within six months.

7.1.4 Environmental Impact Assessment

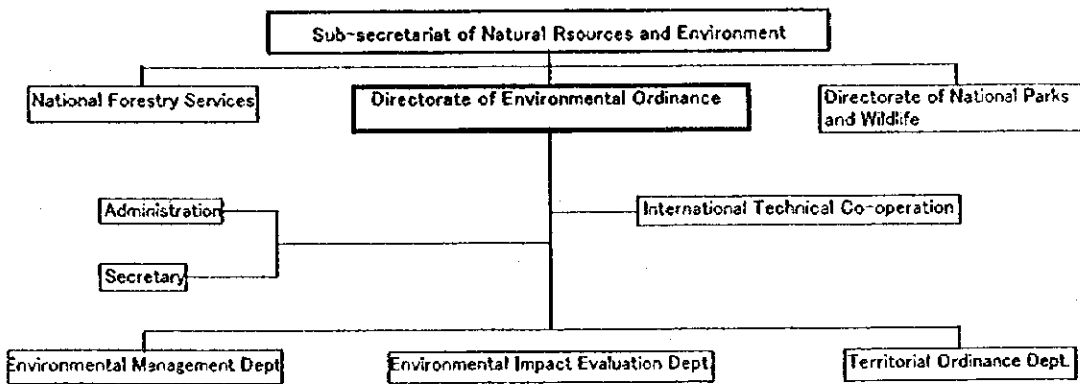
Environmental Impact Assessment (EIA) Law was established in Paraguay in 1993. According to the law, the following activities require EIA:

- human settlement and colonization
- agricultural exploitation
- construction of industrial complex
- mineral extraction and its processing
- fuel extraction and its processing
- construction and operation of water, oil, gas and mineral effluent facilities
- construction of hydraulic facilities
- construction of power plant
- production of carbon
- urban and industrial waste treatment
- road construction and improvement
- port construction and improvement
- airport runway construction and improvement
- deposits
- foundry

- demolish and excavation
- archeological activities
- production, commercialization and transport of a dangerous substance
- introduction of exotic species and exploitation of natural forest, fauna and flora
- any other activities which might adversely affect the environment

The organization, which is responsible for the preparation of TOR and the appraisal of EIA, is Directorate of Environmental Ordinance (DOA). Fig. 7-1-2 shows the organization structure of DOA.

General EIA execution procedure is shown in Fig. 7-1-3. The proponent submits Basic Environmental application (CAB), which consists of questionnaire, title of property, judicial declaration, municipal certificate and inter-departmental certificate. DOA, in conjunction with Inter-institutional Commission (IC) and other relevant people and institutions, reviews CAB and makes decision on what kind of environmental evaluation should be executed for each project. EIA is implemented only when DOA identifies it is necessary.



Administration of the Directorate of Environmental Ordinance

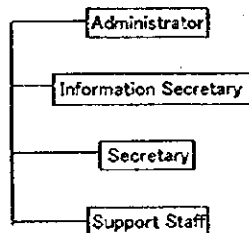


Fig. 7-1-2 Organization Chart of Directorate of Environmental Ordinance

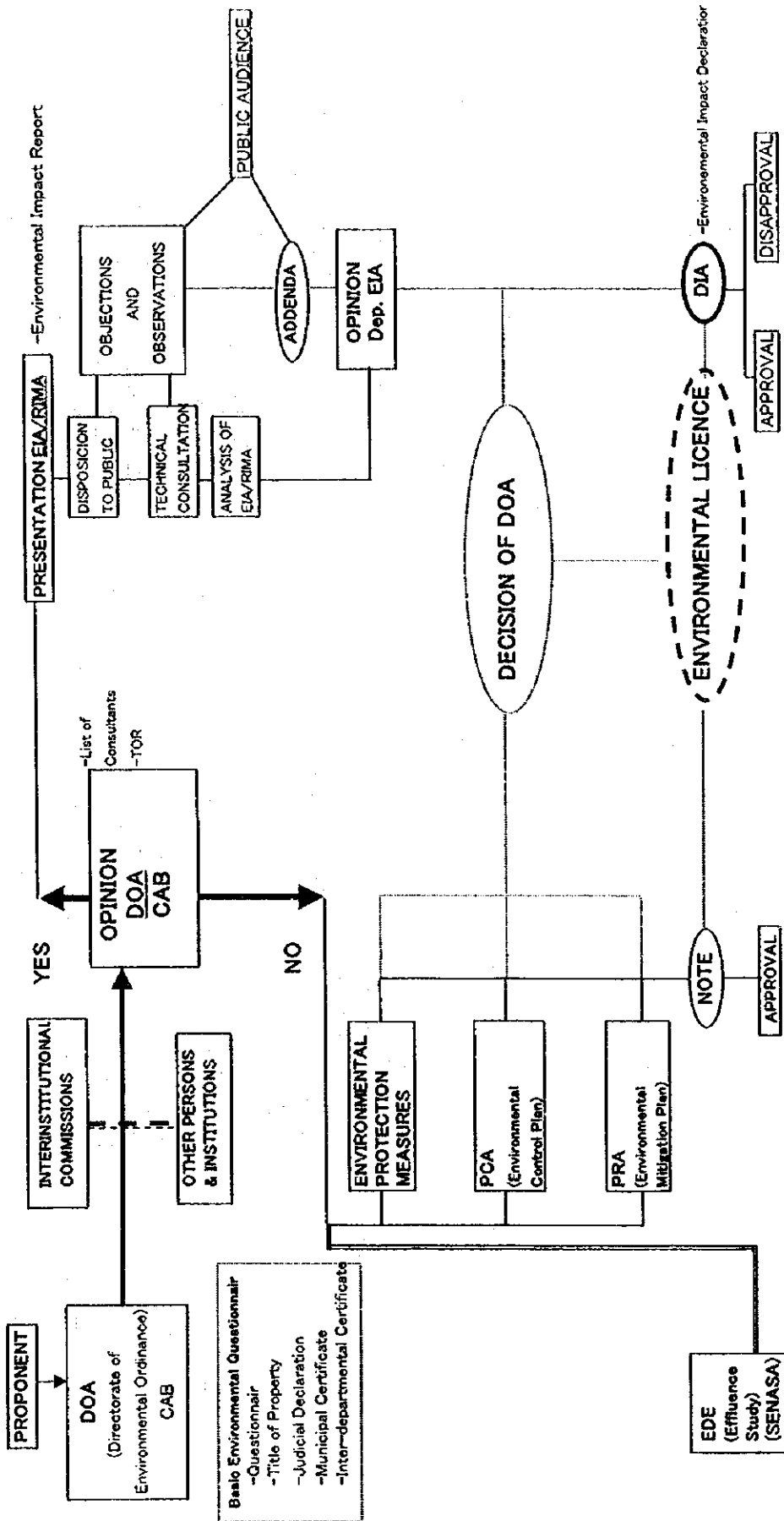


Fig. 7-1-3 General Process of Environmental Impact Evaluation

7.2 Natural Environment

7.2.1 Overview

Asunción Metropolitan area occupies about 711 km² and it is situated between 27° 38' 28" (southern latitude) and 25° 16' 16" (northern longitude) with a population of about 1,372,000 according to the National Census of Population and Housing, 1992. Approximately, 11% of the population, about 55,000 people or 10,000 families, live in northern and southern flooded areas (Banado Norte y Sur). The Northern part includes Jardín Botánico and Artigas, and the southern part extends from Tacumbu towards Cateura Park. These flooded areas occupy about 1,650 ha along the Paraguayan River and Asunción Bay.

Asunción Metropolitan area is located in a subtropical region whose monthly temperature varies from 17°C to 28°C. The maximum temperature recorded is 40°C and the minimum 0°C. The humidity fluctuates between 60% in September and October, and 80% in May and June.

According to the meteorological station which is installed at the International Airport Silvio Pettrossi in Asunción, the average wind velocity is approximately 5.0 km/hour, in the direction principally from northeast to south all the year round.

Precipitation is typically influenced by the hot and humid wind, which comes from Mato Grosso in Brazil, and the dry wind from the south. It is estimated that average precipitation per year is about 1,400 mm, which is usually concentrated in November and April. The rainfall in June and September is less intense.

7.2.2 Green Areas

In Asunción, green areas are identified as plazas, parks and roads with trees. The classification of these and their actual area is shown in Table 7-2-1.

Table 7-2-1 Classification of Green Areas

Green Area Type	Area
Plazas y Plazoletas	To 500 m ²
Plazas	From 501 m ² to 21,000 m ²
Paseos Centrales	Less than 5 m of width
Paseos Centrales	From 5 m of width
Parques	Less than 30,000 m ²
Parques	More than 30,000 m ²

Source: Situación Actual de Las Áreas Verdes en Asunción, 1996, Departamento de Administración Técnica Urbana, Municipalidad

In Asunción City, in 1996, only 5.84% is identified as green areas as shown in Table 7-2-2.

Table 7-2-2 Open Space in Asunción

Description	Number	Area (Has)	%
Plazas which are occupied with people	122	119.47	1.02
Plazas which are available to public	93	49.70	0.42
Plazas which are not available to public	44	22.70	0.19
Parks with equipment	5	282.74	2.42
Parks which are occupied with people	2	208.97	1.79
Flooded area	-	1,650.00	14.10
Asunción Bay (aquatic surface)	-	358.00	3.06
Roads	-	2,270.62	19.41
Residence blocks (without any green area)	-	6,737.80	57.59
Total	-	11,700.00	100.00

Source: Situación Actual de Las Areas Verdes en Asunción, 1996, Departamento de Administración Técnica Urbana, Municipalidad

However, compared with 1992, green areas in Asunción have slightly expanded by 3% as shown in Table 7-2-3. This is mainly due to the increase of plazas.

Table 7-2-3 Green Areas in Comparison between 1992 and 1996

Description	Number in 1992	Ha in 1992	Number in 1996	Ha in 1996
Parques	5	282.74	5	282.74
Plazas	65	39.14	93	49.70
Paseos centrales (more than 5m of width)	-	7.92	-	7.92
Paseos centrales (less than 5m of width)	-	14.00	-	14.00
Verdes lineales (along with rivers)	-	0	-	0.17
Total		343.81		354.53

Source: Situación Actual de Las Areas Verdes en Asunción, 1996, Departamento de Administración Técnica Urbana, Municipalidad

Green areas in the Study are shown in Fig. 7-2-1.

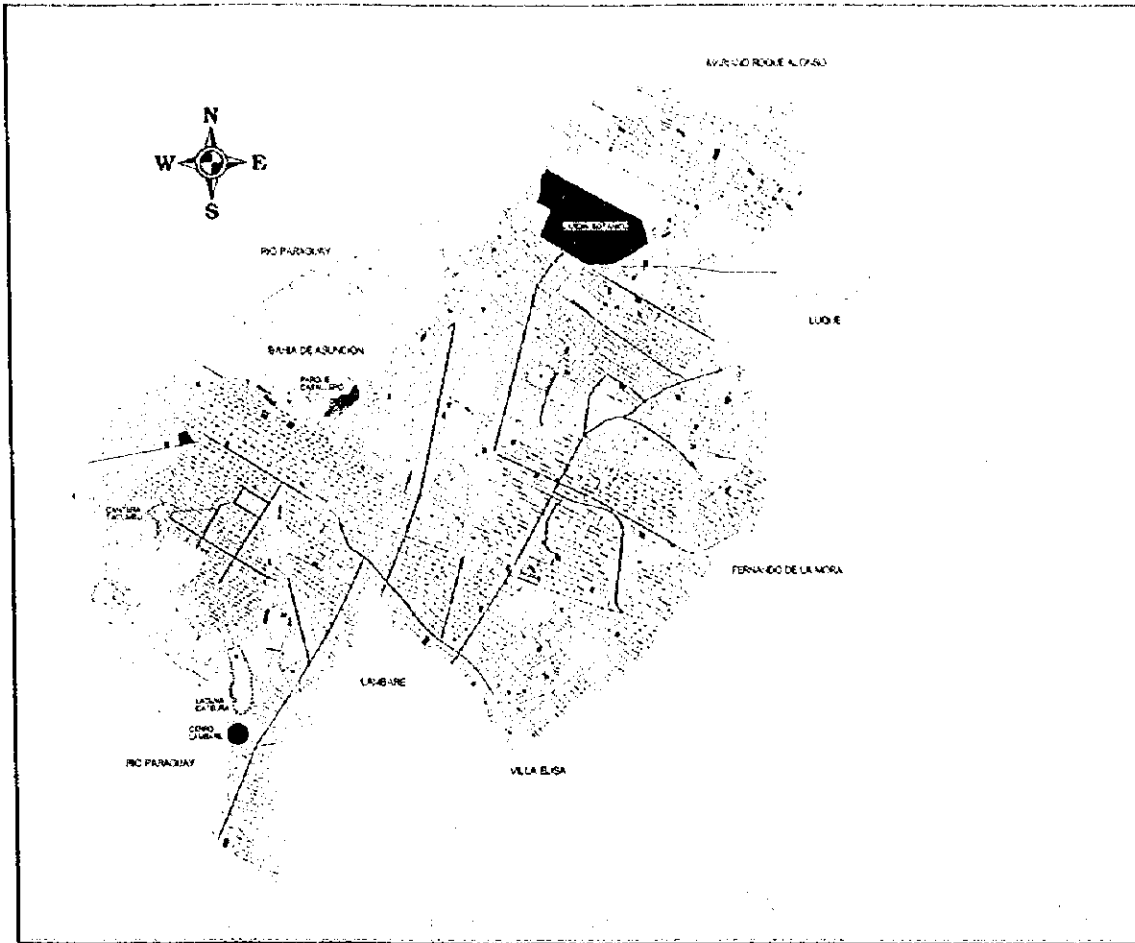


Fig. 7-2-1 Green Area in Asunción

Since there are a few green areas in Banado Sur (Franja Costera Sur), the Municipal Government has planned the conversion of Cateura Dumping Ground, near Cateura Lake, into a green area by reclaiming low lands with waste and planting grass and trees on its surface. This Cateura Greening Project will be completed in 2003. Two sites have been proposed for a new dumping ground: one in Chaco-i, proposed in 1994 by JICA Study Team of the Study on Solid Waste Management for Metropolitan Area of Asunción and another in Villa Elisa area by Municipal Government. However, the new site has not yet been determined.

7.2.3 Cultural Heritage

Asunción City is rich in terms of historical, cultural, archeological and aesthetic monuments and buildings. In particular, Sajonia, Avenida Carlos Antonio López, Central Area, Avenida Espana and Mariscal López are considered as cultural heritage areas. Other areas, which also have historical, cultural and aesthetic monuments and buildings, are Colon, General Diaz, Doctor Francia, San Roque, Jara, Las mercedes, Virgen del Huerto and Caballero. However, mainly due to the lack of protection laws and regulations, these cultural heritage areas have been suffering from deterioration.

Fig. 7-2-2 shows the historical, cultural, archeological and aesthetic monuments and buildings.

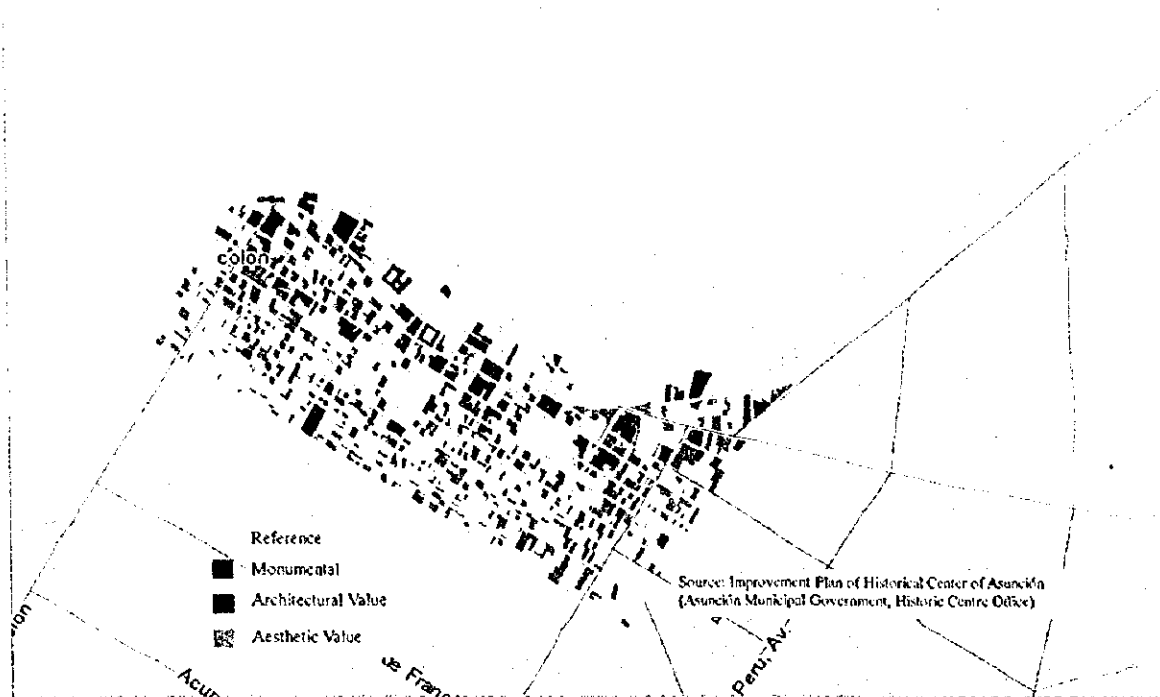


Fig. 7-2-2 Historical, Cultural, Archeological and Aesthetic Monuments and Buildings

7.2.4 Flood

One of the serious natural environmental problems is flooding. As it has been cited before, approximately, about 55,000 people or 10,000 families, live in northern and southern flooded areas, which occupy about 1,650 ha along the Paraguay River and Asunción Bay.

Though the Paraguay River, whose catchment area is about 1,000,000 km², is rather stable in terms of water volume, the water level significantly rises every 100 years. When the water level rises to 58 m, areas such as Banado Tacumbu, Banco San Miguel, a part of Ricardo Brudada and Blanco Cue de Tablada Nueva are severely affected. In the past 15 years, the Paraguay River experienced two significant water level rises: 62.6m in 1983 and 63.5m in 1992.

Due to the rise of the river water level, residents in flooded areas, in particular, Franja Constera, have to abandon their houses for as long as six months. Since this population is, on average, from low income households, they are evacuated, with the help of Asunción Municipal Government, to temporary camping sites in green areas such as plazas. During the evacuation period, the living conditions of people are extremely dsoriented due to the lack of work, food and access to sanitary infrastructure, all of which causes serious social, economic, cultural, psychological, public health and environmental problems.

On the other hand, the evacuation and emergency cost for the Asunción Municipal Government are such that the cost of dealing with floods is exacerbating the Municipal Government's financial situation.

However, storm rainfall of high intensity not only affects river coastal zones but also hilly land, in particular, roads. Due to the lack of appropriate drainage system in the city, storm rainfall concentrates on roads. According to Storm Drainage System Improvement Project Report, JICA, 1986, the river gradient varies from 1/34 to 1/318. Most of the gradients are steeper than

Lambaré, Bahía de Asunción and Banados Norte y Sur (northern and southern flooded areas). Among them, the most important areas, in terms of fauna and flora, are Banco San Miguel in Banado Norte and around Cerro Lambaré area in Banado Sur.

(1) Banco San Miguel

The biodiversity of Banco San Miguel, which some streams flow into, is very specific and less varied. The periodical flood of Paraguay River contributes to modeling and maintaining rich biodiversity in the area.

1) Flora

In the area, 97 species from 35 botanic families have been identified, most of which are aquatic vegetation. To date, no species has been identified as endangered, however, the vegetation in coastal area is becoming poor due to human activities. Table 7-2-4 shows the principal type of flora in Banco San Miguel area.

Table 7-2-4 Principal Type of Flora in Banco San Miguel

Botanical Family	Scientific Name	Common Name
ESTRATO ARBOREO		
SALICACEAE	<i>Salix humboldtiana</i>	Sauce criollo
CAPPARACEAE	<i>Craiaeva tapia</i>	Payagua naranja
EUNHORBIACEAE	<i>Aporosella chacoensis</i>	Mbavy
ASTERACEAE	<i>Tessario integrifolia</i>	Palo bobo
FABACEAE	<i>Baubinia baubinioides</i>	-
ARECACEAE	<i>Copernicia alba</i>	Caranda-y
LAURACEAE	<i>Ocotea dyespirifolia</i>	Laurel moroti
SAPOTECEAE	<i>Pouteria glomerata</i>	Aguai
ESTRATO ARBUSTIVO		
FABACEAE	<i>Minosa pollita</i>	Yuqueri pony
	<i>Sesbania virgata</i>	Palo negro
	<i>Acacia sp.</i>	Yuqueri

Source: Estudio de Impacto Ambiental, Programa de Desarrollo y Defensa de la Franja Costera de Asunción, BID, 1997

2) Fauna

Aquatic environment of Banco San Miguel attracts many and various kinds of migrant birds. In fact, Paraguay River is a part of migrant route of various migrant birds including Laridae, Rhynchopidae, Scolopacidae and Charadriidae.

In the area, 294 species of 78 families have been identified. Those include 197 species of birds from 49 families, 24 species of mammals from 12 families, 33 species of amphibians from 5 families and 44 species of reptiles from 13 families.

(2) Cerro Lambaré Area

1) Flora

Trees and vegetation which have been identified in Cerro Lambaré Area are shown in Table 7-2-5.

Table 7-2-5 Principal Type of Flora in Cerro Lambaré Area

Botanical Family	Scientific Name	Common Name
SIGNONIACEAE	<i>Tabebuia heptaphylla</i>	Tayi, lapacho
	<i>Tabebuia ochracea</i>	Lapacho amarillo
	<i>Jacaranda mimifolia</i>	Jacaranda, caroba
PALMACEAE	<i>Arecastrum romanzoffianum</i>	Pindo
	<i>Copernicia alba</i>	Caranda-y
MORACEAE	<i>Ficus enormis</i>	Guapo-y
SAPINDACEAE	<i>Melicococus lepidopetalus</i>	Yvapobo
POLYGONACEAE	<i>Triplaris guaranitica</i>	Villetana
COMBRETACEAE	<i>Terminalia catappa</i>	Sombrero de playa
BIONOMIACEAE	<i>Tecorta stans</i>	Lapachito
	<i>Spathodea campanulata</i>	Corazon de la india
FABACEAE	<i>Bauhinia variegata</i>	Lluvia de orquideas
	Tipuan tipu	Tipa
	<i>Delonix regia</i>	Chivato
MELICACEAE	<i>Melia azedarach</i>	Paraiso
MYRTACEAE	<i>Eucaliptos sp.</i>	Eucalipto
PLATANACEAE	<i>Platanus acerifolia</i>	Platano
PONTEDERIACEAE	<i>Eichornia crassipes</i>	Camalote, aguape
	<i>Eichornia azurea</i>	Camalote
POLYGONACEAE	<i>Polygonum hidropiperoides</i>	
	<i>Polygonum acuminatum</i>	
ARACEAE	<i>Pistia atratiotis</i>	Repollo de agua
SALVINIACEAE	<i>Salvinia sp.</i>	
LEMNACEAE	<i>Lemna sp.</i>	
AMARANTHACEAE	<i>Alternanthera philoxeroides</i>	
CONVOLVULACEAE	<i>Ipomoea carnea</i>	Madyju-ra
MALVACEAE	<i>Hibiscus striatus</i>	
PONTEDERIACEAE	<i>Pontederia cordata</i>	

Source: Evaluacion de Impacto Ambiental Mejoras del Vertedero Municipal Cateura, NOVATERRA, 1998

2) Fauna

Birds, mammals, fish, reptiles and amphibians which have been identified in the area are shown in Table 7-2-6.

Table 7-2-6 Principal Type of Flora in Cerro Lambaré Area

Birds	Fish
-Paroaria sp.	-Tachydoras paraguayensis
-Mimus sp.	-Oxidoras kneri
-Zonotrichia capensis	-Pimellodella sp.
-Passer domesticus	-Potamotrygon sp.
-Pitangus sulphuratus	-Prochilodus sp.
-Trogglodites sp.	-Hypopomus brevirostris
-Columba sp.	-Symbranchus marmoratus
-Dasypterus sp.	-Schizodon sp.
-Molothrus sp.	-Cichlasoma bimaculatus
-Thraupis sayaca	-Cichlasoma dimerus
-Aratinga sp.	-Leporinus sp.
-Ara sp.	-Crenicichla sp.
-Leptotila verreauxi	
-Aramides ypecaha	
-Mycteria americana	
-Casmærodius albus	
-Anas sp.	

Reptiles and Amphibians	Mammals
-Bufo granulatus	-Cavia aparea
-Hyla punctata	-Akodon sp.
-Hyla raniceps	-Monodelphis domestica
-Oloolygon fuscovaria	-Mus musculus
-Ameiva ameiva	-Rutus sp.
-Hydrodynastes gigas	-Lutra sp.
-Philodryas spp.	
-Eunectes noteus	
-Cocodrillus yacare	

Source: Evaluacion de Impacto Ambiental Mejoras del Vertedero Municipal Cateura, NOVATERRA, 1998

7.2.6 Environmentally Sensitive Area -Franja Costera Area

The environmental control point in the study area, which the project should take into consideration in terms of natural and social environment, is Franja Costera Area.

Franja Costera is a fraction of the land of Asunción City, which was delimited in ordinance in November, 1996. It occupies 1,650 ha, which extends from Puerto Botanico of Banado Norte (Franja Costera Norte) to el Cerro Labare of Banado Sur (Franja Costera Sur).

About 10,000 families live in Franja Costera, which accounts for about 11% of the population of Asunción City. These families are from low-income households and the area is called Cinturon de Pobreza or Poverty Belt. These families periodically immigrate to temporary emergency camps in higher areas during the flood season.

Since the 1960s, people have gradually immigrated from rural areas and other areas of Asunción City into the area, which has no urban planning. Consequently, it has contributed to deteriorating social and environmental conditions in the area. Today Franja Costera is identified as a environmental bottleneck in terms of the high degree of environmental contamination not only for inhabitants in the area but also for other population in the City.

In order to understand the interrelation between Franja Costera and other parts of the City, it is important to analyze from the following viewpoints:

- Interface: River-Coast
- Interface: Coast-Coast
- Interface: Coast-City

1) Interface: River-Coast

This is a coastal zone where there are lots of beaches. However, there are also many cliffs along the coast. There are few inhabitants in this area, and there are dominated by fishermen, and those who extract sand and work at shipbuilding. According to the EIA report by IDB, this coast is highly contaminated mainly due to the streams which flow into the river.

2) Interface: Coast-Coast

This is a flooded area, where approximately 7,000 families reside. The flood level in the area varies from 57.2m to 63.5m, which was registered in 1992.

This area plays the role of terminal area for all the streams in Asunción City, which flow into ponds in the area. The soil in the area is clayey sand. The area is highly contaminated since the habitants discharge solid waste in to holes used as septic tanks. The waste is washed away from the holes by heavy rain and flood and flows into ponds, which is the source of contamination.

3) Interface: Coast-City

This is a highly contaminated zone for the following reasons:

- Large factories, military facilities, tall buildings form a barrier between coast and city.
- Streams, in the area, have become dumping grounds.
- People evacuated because of flood set up temporary camps in open spaces such as plazas and parks.

In order to improve this situation, the Asunción Municipal Government and the Government of Paraguay have planned the Franja Costera Development Project, which consists of the following components:

- Urban and social development
- Development of improved highway access to the city center
- Physical and cultural upgrading and consolidation of high density adjacent neighborhood
- Resettlement of people affected by flooding
- Flood defense works
- Environmental improvements and protection
- Provision and upgrading of infrastructure and services

The study was funded by Inter-American Development Bank (IDB) and a loan agreement for the implementation of the project was prepared. However, due to a change of Government, the project was suspended.

7.3 Environmental Pollution

7.3.1 Air Pollution

(I) Overview

Due to the fact that air pollution caused by high motorization in Asunción City is so bad, the Municipal Government established a law on air pollution control in 1997. The Ordinance No. 19/97, in particular, deals with the control of CO and other chemical elements in the air and tries to standardize the norms and sanctions against any violation of the standards. However, the Municipal Government has not yet established the norms for controlling air pollution.

According to the Ordinance, the Municipal Government is obliged to do the monitoring of air pollution, however, to date, monitoring was executed only in 1995 and 1996 at limited points and times. Table 7-3-1 shows the result of monitoring of NO_x in 1995.

Table 7-3-1 Result of Air Pollution Monitoring by Municipal Government

a) Interchanges at double lanes and single lane

Observatory	30/08/1995		14/06/1995	
	Time	Nox (ppm)	Time	Nox (ppm)
Espana / Tacuary	12:00	0.01	12:20	-
M López / Tacuary	12:20	0.01	12:35	0.04
E Ayala / Tacuary	12:35	-	12:45	0.02
M López / Antequera	12:50	-	13:15	0.02
M López / Paraguari	13:10	0.01	13:30	0.02

b) Microcentro

Observatory	30/05/1995		01/06/1995	
	Time	Nox (ppm)	Time	Nox (ppm)
M Estigarribia / Yegros	11:00	0.06	14:10	0.04
M Estigarribia / Ind Naci.	11:20	0.04	13:35	0.10
Palma / Chile	11:40	0.04	13:15	0.06
Palma / Alberdi	11:55	0.04	12:50	0.04
Palma / 15 de Agosto	12:10	0.04	12:20	0.04
E. Ayala / Ind. Nacional	11:30	0.10	13:50	0.10
E. Ayala / 15 de Agosto	12:20	0.10	12:00	0.10

c) Double lanes

Observatory	25/04/1995	
	Time	Nox (ppm)
Avenida Peru	12:00	0.14
Battilana	12:15	0.08
P Lovera / Otazu	12:32	0.08
Iribas	12:50	0.10
Yuty / Fernando de la Mora	13:15	0.06

Source: Asunción Municipal Government

The above monitoring result implies that NOx values are relatively high in Microcentro and double lane roads.

On the other hand, The JICA Study Team, in order to understand the present situation of air pollution in the study area, conducted simple air pollution monitoring, which examined the value of NOx and NO2. The following section presents the methodology and the result of monitoring.

(2) Methodology

NOx and NO2 monitoring was carried out by using samplers. 20 samplers were installed at major interchanges and in Microcentro in the study areas. The samplers were exposed for about 50 hours at each observation point and, accordingly, taken to Japan for analysis in a laboratory. However, one of the samplers, No.4, was stolen and the value at this point could not be measured.

(3) Result

Table 7-3-2 shows the result of NOx and NO2 monitoring.

Table 7-3-2 Air Pollution Monitoring Result

No. of Observation	Name of Intersection	NOx	NO2
1	Municipalidad	0.01	0.01
2	Ave. Espana / Ave. San Martin	0.05	0.02
3	Ave. San Martin / Ave. Mariscal López	0.09	0.02
4	Ave. Rep. Argentina / Ave. Eusebio Ayala	*	-
5	Ave. Fernando de la Mora / Ave. Rep. Argentina	0.03	0.02
6	Ave. Gral J G Artigas / Domingo Lombardo	0.11	0.02
7	Ave. Santísima Sacramento / Ave. Espana	0.03	0.01
8	Ave. Choferes del Chaco / Ave. Mariscal López	0.09	0.02
9	Ave. Choferes del Chaco / 25 de Mayo	0.12	0.02
10	Ave. Choferes del Chaco / Ave. Eusebio Ayala	0.03	0.01
11	Ave. Fernando de la Mora / Dr. Carlos Centurion	0.07	0.02
12	Ave. Jose Feliz Bogado / Ave. Gral. Maximo Santos	0.06	0.02
13	Presidente Franco / Oleary	0.05	0.02
14	Palma / Oleary	0.06	0.02
15	Estrella / Oleary	0.08	0.02
16	Oliva / Oleary	0.14	0.03
17	General Diaz / Oleary	0.06	0.02
18	Haedo / Oleary	0.08	0.02
19	Ave. Ygatymi / Oleary	0.06	0.02
20	Ave. Pettirossi / P. Levera	0.09	0.03

*Note.: Monitoring sampler was stolen at this point.

According to the findings, it has been revealed that the value of NOx is relatively high in Microcentro area and principal roads which go into and come out from Microcentro. As far as NO2 values are concerned, it is difficult to judge if these values are high, since there is no NO2 standard in Paraguay. In Japan, the average value of NO2 per day should be lower than 0.04ppm or between 0.04ppm and 0.06ppm. Based on this Japanese standard, it can be said that the value of NO2 in Asunción is within an acceptable range. On the other hand, compared with other big cities in the world, the value of NO2 in Asunción is also relatively low (Table 7-3-3).

Table 7-3-3 Comparison of Air Pollution between Big Cities and Asunción

ITEM		Nagoya	Tokyo	Kawasaki	Jakarta	Dahran	Bangkok	Asunción
Land	Area	326	621	144	650	550	1,569	711
Population	Population (000)	2,153	8,080	1,202	8,998	1,670	8,126	1,372
	Increasing ratio (%/year)	-0.3	-0.6	0.2	2.4	1.7	6.7	3.5
	Density of population (000/Km2)	6.6	13.0	8.4	13.8	3.0	5.2	1.9
Traffic	Total area of roads (km2)	51.5	93.2	15.8	85.0	8.7	29.3	23.2
	Number of traffics	1,031,391	2,512,432	352,546	617,565	79,035	1,551,023	218,918
Air pollution	NOx annual average (ppm)	0.06	0.09	0.09	0.07	0.06	-	**
	NO2 annual average (ppm)	0.03	0.04	0.04	0.04	-	0.12	**

Source: Report on The Countermeasures for the Air Pollution of Urban Transport, 1998, International Cooperation Association of Transport

Fig.7-3-1 and Fig.7-3-2 show NOx and NO2 values at each observation point and its possible affected areas.

Table 7-3-2 Air Pollution Monitoring Result

No. of Observation	Name of Intersection	NOx	NO2
1	Municipalidad	0.01	0.01
2	Ave. España / Ave. San Martín	0.05	0.02
3	Ave. San Martín / Ave. Mariscal López	0.09	0.02
4	Ave. Rep. Argentina / Ave. Eusebio Ayala	-	-
5	Ave. Fernando de la Mora / Ave. Rep. Argentina	0.03	0.02
6	Ave. Gral. J.G. Artigas / Domingo Lombardo	0.11	0.02
7	Ave. Santísima Sacramento / Ave. España	0.03	0.01
8	Ave. Choferes del Chaco / Ave. Mariscal López	0.09	0.02
9	Ave. Choferes del Chaco / 25 de Mayo	0.12	0.02
10	Ave. Choferes del Chaco / Ave. Eusebio Ayala	0.03	0.01
11	Ave. Fernando de la Mora / Dr. Carlos Centurion	0.07	0.02
12	Ave. Jose Feliz Bogado / Ave. Gral. Maximiliano Santos	0.06	0.02
13	Presidente Franco / Oleary	0.05	0.02
14	Palma / Oleary	0.06	0.02
15	Estrella / Oleary	0.08	0.02
16	Oliya / Oleary	0.14	0.03
17	General Diaz / Oleary	0.06	0.02
18	Huero / Oleary	0.08	0.02
19	Ave. Ygatymi / Oleary	0.06	0.02
20	Ave. Pettrossi / P. Levera	0.09	0.03

*Note.: Monitoring sampler was stolen at this point.

According to the findings, it has been revealed that the value of NOx is relatively high in Microcentro area and principal roads which go into and come out from Microcentro. As far as NO2 values are concerned, it is difficult to judge if these values are high, since there is no NO2 standard in Paraguay. In Japan, the average value of NO2 per day should be lower than 0.04ppm or between 0.04ppm and 0.06ppm. Based on this Japanese standard, it can be said that the value of NO2 in Asunción is within an acceptable range. On the other hand, compared with other big cities in the world, the value of NO2 in Asunción is also relatively low (Table 7-3-3).

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	Increasing ratio (%/year)	-0.3	-0.6	0.2	2.4	1.7	6.7	3.5
	Density of population (000 Km ²)	6.6	13.0	8.4	13.8	3.0	5.2	1.9
Traffic	Total area of roads (km ²)	51.5	93.2	15.8	85.0	8.7	29.3	23.2
	Number of traffics	1,031,391	2,512,432	352,546	617,565	79,035	1,551,023	218,918
Air pollution	NOx annual average (ppm)	0.06	0.09	0.09	0.07	0.06	-	**
	NO2 annual average (ppm)	0.03	0.04	0.04	0.04	-	0.12	**

Source: Report on The Countermeasures for the Air Pollution of Urban Transport, 1998, International Cooperation Association of Transport

Fig.7-3-1 and Fig.7-3-2 show NOx and NO2 values at each observation point and its possible affected areas.

It is known that automobiles, which emit more NO₂, use diesel engine. In Paraguay, 80% of automobiles and 100% of buses and trucks use diesel engines. The value of NO₂ and NO_x is high when diesel engines are not appropriately maintained. This is mainly due to incomplete combustion.

Table 7-3-4 shows road section traffic volume of buses at each observatory. Fig. 7-3-2 shows the correlation between bus volume and the value of NO_x at observation points. A coefficient of correlation between them is 0.604. Though there are some points which show no correlation between bus volume and the value of NO_x, like at No. 5, 9, 10, 13, 14 and 16, in general, it can be said that where traffic volume of buses is large, the value of NO_x is high.

Table 7-3-4 Traffic Volume of Buses at Each Observatory

Point No.	Bus	Value
1	1,630	0.01
2	2,450	0.05
3	2,603	0.09
5	3,866	0.03
6	2,905	0.11
7	837	0.03
8	2,862	0.09
9	44	0.12
10	6,080	0.03
11	2,231	0.07
12	763	0.06
13	10	0.05
14	0	0.06
15	3,028	0.08
16	2,862	0.14
17	2,773	0.06
18	1,385	0.08
19	1,491	0.06
20	3,912	0.09

*Note.: There is no value for point No.4, since monitoring sampler was stolen.

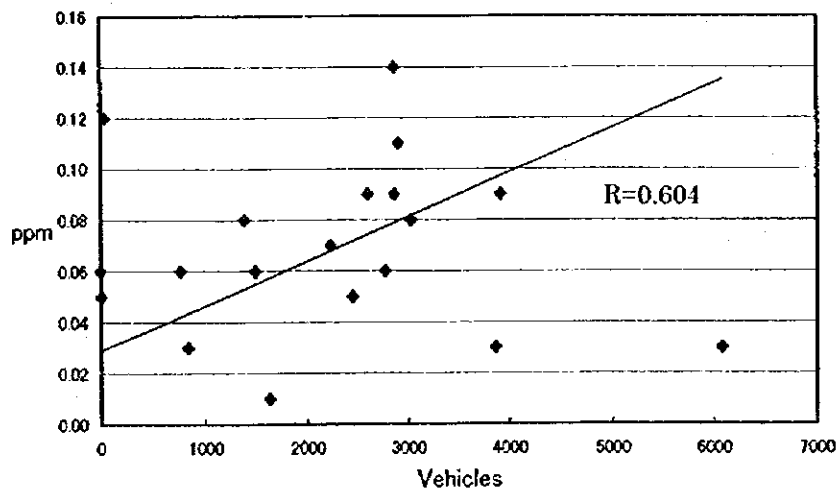


Fig. 7-3-3 Correlation between Traffic Volume of Buses and the Value of NO_x

7.3.2 Noise Pollution

(1) Overview

With regard to noise pollution, the Asunción Municipal Government established a law on noise pollution control in 1994. Ordinance No. 48/94 clarifies the standards of noise in the city. According to the Ordinance, the noise regulation is as shown in Table 7-3-5.

Table 7-3-5 Noise Regulation in Asunción City

a) Noise Regulation in City

Control Area	Night (22:00-06:00) (Db)	Day (06:00-22:00) (Db)	Busy Day (07:00-12:00; 14:00-19:00) (Db)
Residencial Area e.g. Jardín Botánico, Vertedero, Cerro Lambaré	55	60	70
Residencial mixed Area High density of Population Historical zone, Terminal, Market, Public Office	65	70	75
Industrial Area	70	75	80

b) Permitted Continuous Time of Noise per day

Noise Level (Db)	Permitted Continuous Time of Noise
85	8 hours
90	4 hours
95	2 hours
100	1 hour
105	30 minutes
110	15 minutes
115	7 minutes

c) Regulation on Vehicle Noise

Vehicle Type	Max Value (Db)
Motorcycle (50cc), Bicycle	75
Motorcycle (50-150cc)	82
Motorcycle (larger than 150cc) with 2-4 cylinders	85
Vehicle (smaller than 3.5 ton)	85
Vehicle (larger than 3.5 ton)	89

Source: Ordenanza No.48/94

The JICA Study Team, in order to understand the present situation of noise pollution in the study area, conducted noise pollution monitoring on principal roads which include Ruta Transchaco, Avenida General Artigas, Avenida Mariscal López, Avenida Dr. Eusebio Ayala and Avenida Dr. Fernando de la Mora. The following section presents the methodology and result of monitoring.

(2) Methodology

Usually, the grade of noise pollution is measured by Continuous Level of Equivalent Energy

(LEQ), which presents the average energy of fluctuating noise level, in other words, the grade of discomfort of a person, who is exposed to noise and suffer from it. LEQ measurers, Bruel and Kjaer type 2236 B, were used for monitoring.

Monitoring was conducted in the morning (07:30-10:20), midday (11:30-14:20) and afternoon (16:30-19:20). The number of observatories on each route is shown below:

- Ruta Transchaco: 26 observation points
- Avenida General Artigas: 38 observation points
- Avenida Mariscal López: 75 observation points
- Avenida Dr. Eusebio Ayala: 44 observation points
- Avenida Dr. Fernando de la Mora: 29 observation points

(3) Result

Table 7-3-6 shows the result of the monitoring for each route. Fig.7-3-4 shows average value of LEQ by roads. The result shows that the average value of LEQ of all the studied roads exceeds 75 DB, which is the maximum regulated value, except in industrial areas, in Asunción.

Table 7-3-6 Average LEQ Value on Each Route with Zones with Major Impact

a) Ruta Transchaco

Period	Value of LEG(Db)
Morning	76.4
Noon	75.5
Afternoon	79.8
Average	77.3

No.	Zone	Value of LEG(Db)
1	Tte.Gadea y Samidey	79.1
2	Loma Vistosa	78.7
3	Frente a la Manzana 1208	78.5
4	Frente a la Manzana 1014	78.4
5	Frente a la Manzana 1070	78.4

b) Avenida General Artigas

Period	Value of LEG(Db)
Morning	77.8
Noon	77.6
Afternoon	76.6
Average	77.4

No.	Zone	Value of LEG(Db)
1	Misiones y Ave.Peru	78.9
2	Pastor Ibanez y Martínez	78.8
3	JP Carrillo y Iro President	78.6
4	Pana Machain y Altos	78.5
5	Venezuela y Mbricao	78.5

c) Avenida Mariscal López

Period	Value of LEG(Db)
Morning	76.7
Noon	76.8
Afternoon	75.7
Average	76.4

No.	Zone	Value of LEG(Db)
1	May. Bullo y 22 Septiembre	78.7
2	Gral. Santos y Aca Vera	78.7
3	Gral. Briguez y May. Bullo	78.5
4	America y Venezuela	78.5
5	22 Septiembre y P Sanche	78.4

d) Avenida Dr. Eusebio Ayala

Period	Value of LEG(Db)
Morning	76.7
Noon	75.6
Afternoon	75.6
Average	75.9

No.	Zone	Value of LEG(Db)
1	M Aviacion y Mmme. Lynch	78.2
2	33 Orientales y G Caballer	77.6
3	Parriri y Gaudioso Nunez	77.4
4	Tte. Alvarenga y P Lezcan	77.2
5	C. Del Chaco y S.C.Sierra	77.2

c) Avenida Dr. Fernando de la Mora

Period	Value of LEG(Db)
Morning	76.4
Noon	76.1
Afternoon	75.5
Average	76.0

No.	Zone	Value of LEG(Db)
1	Argentina y Lapacho	78.2
2	D.L.Morquio y Yataty Cor	77.5
3	Rolon Viera y López Decou	76.8
4	B.Gonzalez y Rolon Viera	76.8
5	A.Sanchez y Br. Guggiari	76.6

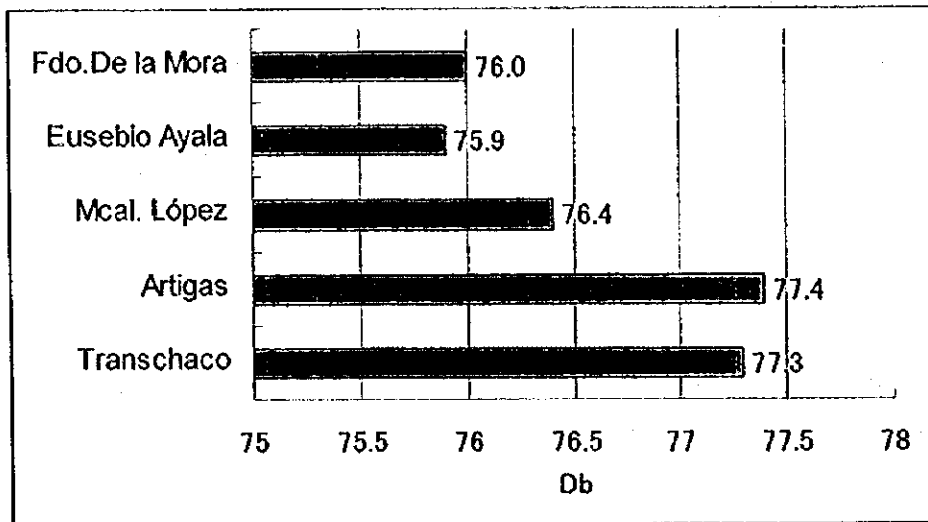


Fig. 7-3-4 Average Value of LEQ by Roads

7.4 Social Opinions on Transport Conditions

The Study Team held a workshop, on 19 November 1998, in order to understand public view on the actual urban transport situation and environment. 30 people, who are community leaders, Municipal Government officials, the NPO and CETA project team members, participated in the workshop.

Community leaders were invited from Comisiones Vecinales, which was organized by the Asunción Municipal Government in 1993. The following section gives details about Comisiones Vecinales.

7.4.1 Comisiones Vecinales

Comisiones Vecinales are groups of neighbors and each Comision consists of at least 20 families. Comisiones Vecinales were founded, under the supervision of Department of Social Services of Municipal Government, aiming at promoting community development. According to regulations, Reglamento de Comisiones Vecinales de la Ciudad de Asunción, 1993, the objectives of Comisiones Vecinales are:

- To contribute to improving the quality of life in the community by promoting active participation of neighbors,
- To constitute an organization, by involving neighbors, in order to defend their rights and make them assume their responsibilities,

- To constitute an organization, by involving neighbors, in order to defend their rights and make them assume their responsibilities,
- To promote:
 - Civic and non-formal education
 - Understanding and defending human rights
 - Conservation of ecosystem

Asunción City is socially divided into 6 regions and 12 zones. There is a coordinator, who represents Comisiones Vecinales, in each zone. These 12 coordinators form Consejo de Coordinadoras de Comisiones Vecinales in order to discuss their common issues.

Fig.7-4-1 shows the organization chart of Comisiones Vecinales and Table 7-4-1 presents the details of zoning and number of Comisiones Vecinales in each zone.

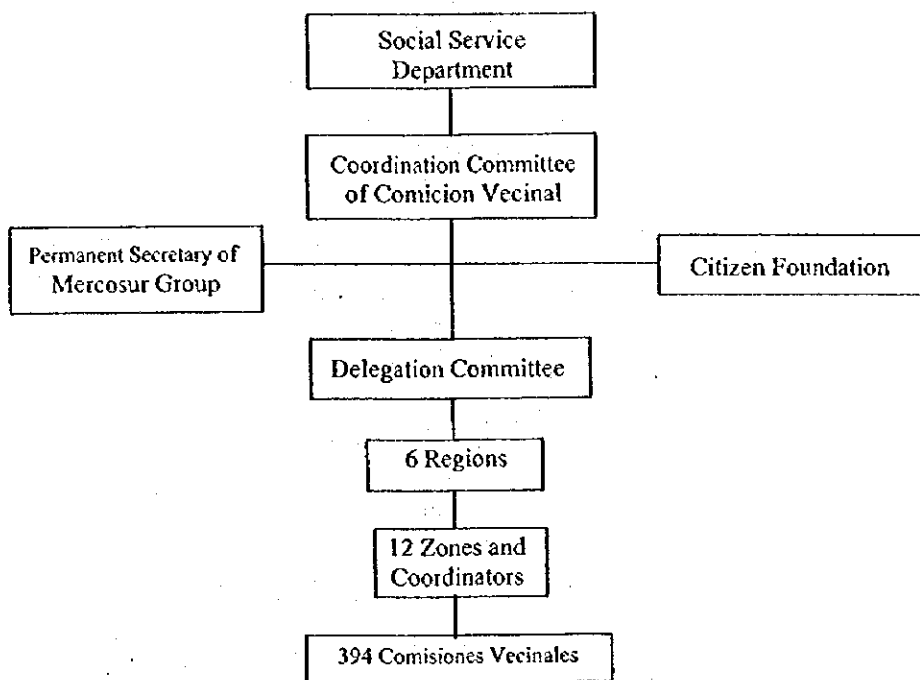


Fig. 7-4-1 Organization Chart of Comisiones Vecinales

Table 7-4-1 Comisiones Vecinales in Each Zone

Region	Zone	Zone Code	Number of Comisiones Vecinales
Region 1	Ira Yhatte	I	73
	Lag. Cateura	A	28
Region 2	Onondivepa	2	56
	Marangatu	7	21
Region 3	Jopoi	3	15
	Nepytyvo	E	20
Region 4	Mburukuja	4	28
	Solidaridad	H	18
Region 5	Koeti	5	13
	Jeruti	6	21
Region 6	Ara Poty	I	16
	Vya Pave	K	40
Total			349

A zone map is shown in Fig. 7-4-2.



Fig. 7-4-2 Zone of Comission Vecinales

Each Comision Vecinal consists of a president, a vice-president, a secretary, a treasure, a vice-treasure and members. Main activities include the improvement of community infrastructure such as bridges, road pavement and walls (65%), the improvement of plaza (18%) and social development such as education and public health (17%). There are three types of community participation by degree of participation:

- 100% community participation
- Cost sharing with the Municipal Government, in particular, in pavement activities
- 100% public investment with the initiative of communities

Among them, cost-sharing type of participation has been significantly contributing to community development in Asunción. According to the Department of Social Services, in 1996, 96 works were executed under Comisiones Vecineles activities. For these works, the Municipal Government disbursed G450 million, while the community invested G650 million, which reduced G400 million of public expenditure on community development.

7.4.2 Workshop on Urban Transport and Environment

(1) Methodology

30 people, 12 coordinators of Comision Vecinales, a NPO (Cuerpo Bombero Voluntario), Municipal Government officials and the CETA Project members, participated in the workshop. The workshop was divided into two parts. In the first part the, actual transport situation and problems were identified through an active discussion among the participants and, in the second part, participants suggested possible solutions for the problems. The Study Team

presented, in the second part, some ideas on the improvement of urban transport and listened to opinions of the participants. These opinions have been taken into account in formulating a master plan for urban transport in Asunción Metropolitan Area.

(2) Findings

Table 7-4-2 shows the main opinions on actual urban transport problems.

Table 7-4-2 Actual Urban Transport Problems in the View of Community Leaders

Item	Urban Transport Policy and Institutions
Opinions	<ul style="list-style-type: none"> -There is no regulatory institution in Municipal Government -Existing institutions do not implement actions in accordance with present laws -Directorate of Transit, Municipal Government, is inefficient in terms of issuing number plate -Though National Government and Municipal Government prepare plans on urban transport, they do not implement them, and this have generated distrust towards authorities among the people -There is no appropriate co-ordination among entities responsible for urban transport, in particular, MOFC and Municipal Government
Item	Urban Transport System
Opinions	<ul style="list-style-type: none"> -It is more difficult, due to the large number of vehicles, to have access to Microcentro from other areas -There is no regulation of taxi terminal
Item	Public Transport
Opinions	<ul style="list-style-type: none"> -There are excessive numbers of buses -There is a disparity in service coverage of buses between the city center and other areas (the city is expanding towards outside of the city center) -Many buses have the same itinerary on the same route, which causes heavy congestion at bus stops -Bus drivers only care about maintaining time schedule but not about passengers, which endangers passenger's life -Frequency of bus service is not appropriate -Public transport is unsafe and its service is inappropriate -There are few bus lines which have direct service to the city center (people usually have to transfer several times in order to get to the city center)
Opinions	<ul style="list-style-type: none"> -Since there is no parallel street to Colon, traffic congestion in Colon street is heavy, which causes environmental problems -Since most people buy used parts, vehicles easily break down, which in turn hinders smooth traffic flow -There are many bumps in roads where they should not be -Road planning is inappropriate -Road conditions have deteriorated, which damages vehicles -Some signals are installed in wrong places, which causes traffic accidents -In general, vehicles are not well maintained -Automobile inspection has not been appropriately conducted -Car parks are not appropriately planned
Item	Others
Opinions	<ul style="list-style-type: none"> -There is not enough enlightenment of people on traffic accidents -In some streets, due to heavy traffic, constant change of position of bus stops and illegal parking, people cannot easily cross roads -Drivers, in general, do not follow traffic rules -Itinerary of buses is not well controlled, which affects mental health of people

Table 7-4-3 shows ideas, which were suggested by participants, in order to improve urban transport.

Table 7-4-3 Suggestions Made by Participants on Improving Urban Transport

Item	Urban Transport Policy and Institutions
Opinions	-Transport authorities must control automobiles 24 hours a day. -Apart from urban transport improvement, authorities should also implement urban development projects -Capacity building must be implemented for transport related institutions in order to increase their accountability
Item	Public Transport
Opinions	-Single ticket system must be introduced for buses in order to facilitate transfer -Since Asunción has been horizontally expanding, authorities should get rid of disparity in services between city center and other areas -Authorities also must develop public transport system between city center and newly developed areas -The maximum number of passengers of buses must be reduced and controlled -Electric tram and trunk buses must be introduced -Paratransit system, such as mini-bus, must be introduced
Item	Infrastructure, Installation and Equipment
Opinions	-Vehicle inspection by authorities must be strengthened -Some roads and streets must be widened -Car parks must be increased
Item	Others
Opinions	-According to a statistics, 65% of population in the city are willing to pay for any improvement of urban transport in terms of itinerary, comfort, etc. -Education on transport must be promoted

7.4.3 Public Opinions on Present Transport Conditions

The public opinion survey was carried out by interviewing the five most serious problems among the 47 problems pointed out by the counterparts as shown in Table 7-4-4.

Table 7-4-4 Transport Related Issues

(1) Road		(2) Bus		(3) Traffic Management	
1	Unpaved	11	Expensive	22	Few sidewalk
2	Caved	12	Uncomfortable	23	Few traffic signs
3	Baddy drained	13	Too complex route	24	Inappropriate signs
4	Dark	14	Too congestive	25	Few lighting
5	Narrow	15	Few frequency	26	Complexed double way
6	Too many buses	16	Unscheduled operation	27	Few signals
7	Obstacles	17	Violent operation	28	Few traffic lanes
8	Congestion	18	Dirty fleet	29	Road paint
9	No continuity	19	Uncomfortable busstop		
10	Few avenue	20	Reckless driver		
		21	Less route		
(4) Parking		(5) Environmental Pollution		(6) Others	
30	Few parking	36	Air pollution	41	Bad traffic manners
31	Expensive charge	37	Noise pollution	42	Bad serviced cars
32	No parking	38	Vibration pollution	43	Expensive of the fuel fee
33	Much restriction	39	Water pollution	44	Bad road repairing
34	Few flexibility	40	Visual	45	Few traffic control
35	Lack of control			46	Applicate regulations
				47	Lack of traffic education

The minimum, average and maximum answered numbers of each item by the 6 categories are given in Fig. 7-4-3. The highest maximum is in the category "road" followed by "others" and "Parking". The category "others" includes the issues on traffic management and administration. The lowest maximum is in the category "environment", however the range between the maximum and minimum of this category is the smallest among 6 categories, which implies that most of the people are conscious of the importance of urban environment, however they think it is not yet so serious compared with others. The range of the category "public transport" has a low maximum and low minimum, which implies that the urban bus services are in rather good condition at present.

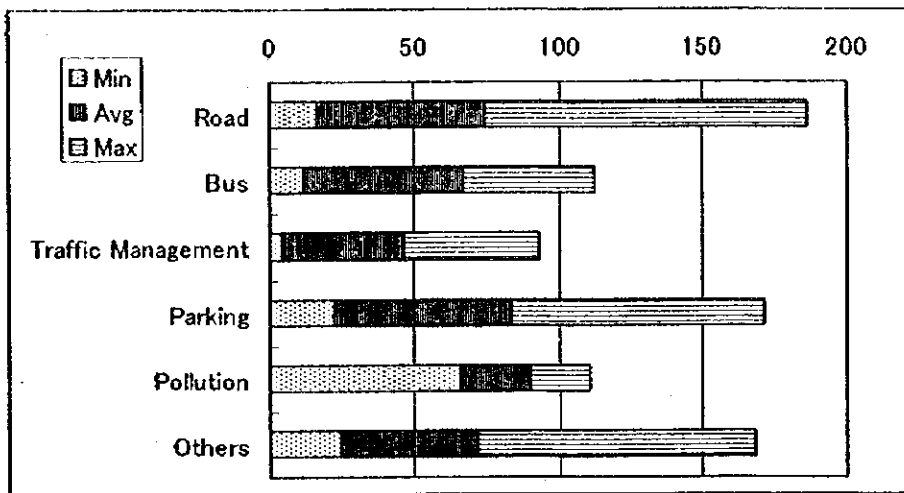


Fig. 7-4-3 Answers on Transport Related Issues by Category

Fig. 7-4-4 shows the answered numbers by item. The figures are divided into two parts. The left side shows the answered numbers who are willing to pay to solve these problems and the right side shows the numbers who think these are problems however, they will accept these problems if they should pay to solve them problems. As a result, the tendencies of both answers are not so much different.

Among the items, the issue on "road paved by empedelado" has the highest. About 28.5% of the interviewees answered that this is one of the five most serious problems at present. The second highest is the issue on "lack of control by Municipal Traffic Police", followed by "lack of parking in Micro Centro". About 25.7% of the interviewees remarked on these issues. The fourth highest is "inundated road", and these 4 items are especially high among the 47 items.

The first and the fourth issues have a close relationship with the "frentista" system, whereby the residents along the roads should contribute to the pavement of the roads in front of their houses. Many of the people would not agree to pave the roads in front of their houses because of expected increase of traffic flow and payment obligation, however the interview shows that they would drive their cars on the paved roads in other areas. Most of the roads in the study area were paved by this system. The concessionaires who are involved in the paving works in

fragments do not install storm water drainage along the roads to minimize the pavement cost and because there is no drainage system to be connected to from the newly paved area. Therefore, a regional pavement program will be required to solve these two issues and the present regulation on "frentista" system should be modified.

The second issue requires the coordination of traffic polices in each municipality, which needs unified regulations on traffic control and management, and a co-operative system for drivers' licensing, number plate issuance and renovation, collection of fines, etc. The third issue requires a policy decision to support of parking facilities development or to discourage car using from enterly the Micro-Centro.

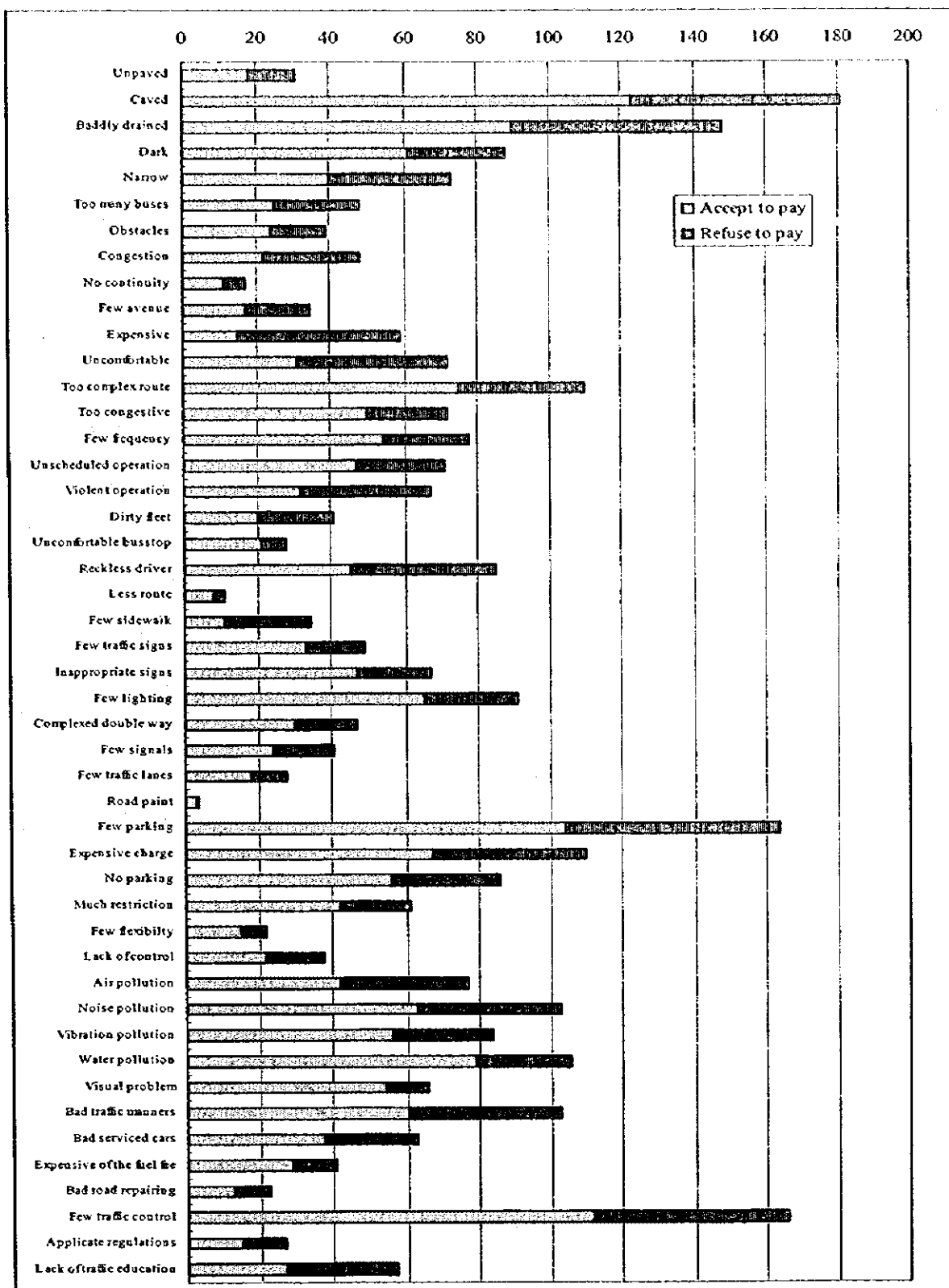


Fig. 7-4-4 Answers on Transport Related Issues by Item

Chapter 8 Review of the Previous Master Plan "CETA84"

8.1 Projection and Actual Result

(1) Population

Population in the Metropolitan Area has grown at a faster pace than projected in the previous Master Plan "CETA84". In 1992, the population was already higher by 6% than the projected one and thereafter, even though the growth rate slowed down, the actual population increase has still been higher than the projected. Population in 1998 was estimated at 1,457,237 which already exceeds the population projected for year 2000 of 1,452,360.

Table 8-1-1 Population Actual and Forecast in CETA84

	1992	1998	2000	Annual Average Growth Rate
Estimated in CETA84	1,141,320	1,367,570*	1,452,360	3.06
Actual Population	1,210,586	1,457,237	1,550,190*	3.14

Note: * Interpolated or extrapolated using projected or actual data

Fig.8-1-1 and Table 8-1-1 present population growth rate and compare the projected and actual population by municipality. As apparently seen in the figure, population growth occurred less than expected in Asunción and its adjacent areas such as Fernando de la Mora and Lambaré and more than forecasted in the peripheral municipalities of the Metropolitan Area.

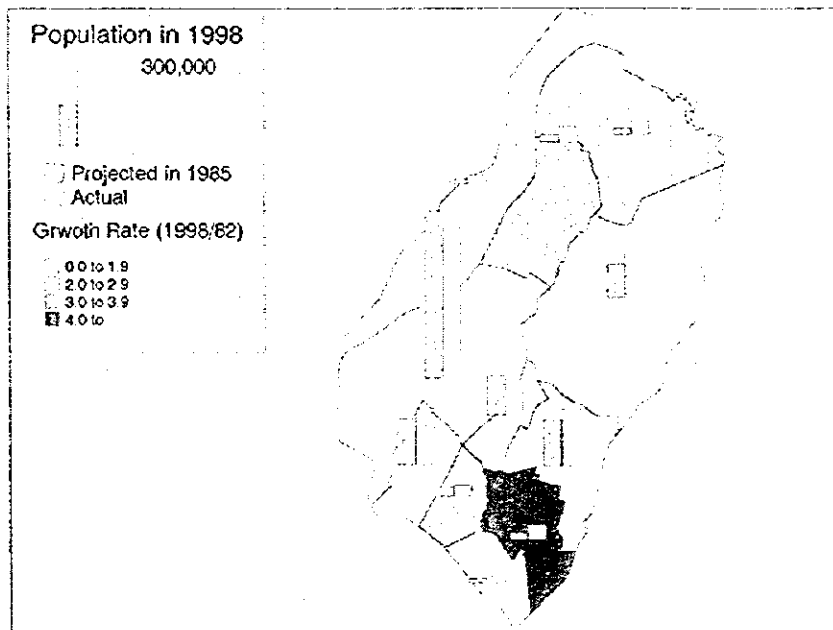


Fig. 8-1-1 Population Growth by Municipality during 1982-1998

Table 8-1-2 Actual and Projected Population by Municipality

Municipality year	Actual Population			Projected in CETA84		Growth Rate(times)	
	1982	(A)1992	(B)1998	(C)1992	(D)1998	(A)/(C)	(B)/(D)
Asuncion	454,881	529,049	553,999	558,000	615,870	0.948	0.900
Fdo.de la Mora	66,597	102,822	131,381	115,490	145,200	0.890	0.905
Lambare	67,168	107,702	140,295	137,820	171,440	0.781	0.818
Limpio	16,036	38,415	51,121	20,420	23,990	1.881	2.131
Luque	64,288	126,105	165,079	96,010	125,210	1.313	1.318
M.R.Alonso	14,636	42,514	55,216	22,130	30,810	1.921	1.792
Nemby	11,994	42,026	54,679	21,500	28,660	1.955	1.908
San Antonio	8,293	16,161	21,519	11,280	15,290	1.433	1.407
San Lorenzo	74,552	144,983	208,414	122,160	167,080	1.187	1.247
Villa Elisa	12,038	32,289	41,729	21,040	31,850	1.535	1.310
Villa Hayes	19,875	28,520	33,805	15,470	19,210	1.844	1.760
Total	810,358	1,210,586	1,457,237	1,141,320	1,374,610	1.061	1.060

(2) Trip Generation

Total trips actually generated in 1998 already exceeds the estimate for year 2000 made by CETA84. Especially, demand for private mode has increased far beyond the projection by 1.4 times, while demand for buses has increased moderately reaching only 80% of the projection for year 2000. As a result, current modal composition of private and public modes becomes almost half and half. This change in modal composition accelerates traffic congestion.

Table 8-1-3 Actual and Estimated Trip Generation

Mode	(A) Actual in 1998		(B) Estimated for 2000		(A)/(B) (times)
	Trips	%	Trips	%	
Private Mode	1,138,954	49.5	813,823	36.0	1.40
Public Mode(Bus)	1,162,748	50.5	1,446,343	64.0	0.80
Total	2,301,702	100.0	2,260,166	100.0	1.02

(3) Traffic Volume

Traffic volume surveyed in 1998 has already exceeded the volume projected for 2000 by CETA84. The excess over the projected volume is particularly significant in the cordon line traffic which means that the traffic to/from outside of the Metropolitan Area has increased much more than expected.

**Table 8-1-4 Comparison of Actual and Projected Traffic on Screen and Cordon Line
(Vehicle/day)**

	Screen line	Cordon line
(A)Actual Traffic Volume	297,894	51,776
(B)Projected for 2000 by "CETA84"	259,835	21,529
(A)/(B)	1.15	2.40

(4) Bus Operation

Major bus operation data gathered in 1998 are compared with the ones projected for year 2000 by CETA84 as shown in Table 8-1-5. Concerning service indicators such as operation frequency and fleet size, the forecast by CETA84 proved right while bus lines and operating distances increased more than expected due to rapid expansion of the urban area. Passenger density in terms of average number of passengers per vehicle-kilometer which was forecast at 2.2 persons is less than 2 persons actually. The figure will affect the financial conditions of bus business.

Table 8-1-5 Comparison of Actual and Projected Bus Operation

Item	Unit	Actual in 1998	Projected for 2000 by "CETA84"
No. of Bus Lines	Lines	58	41
Av. Operating Distance	Km	51.2	47.5
Total Daily Operation	Veh./day	8,107	8,685
Bus Fleet	Vehicles	2,350	2,398
Passengers /(Bus-km)	Pax/veh.-km	1.86	2.23

Note: Projection is in the case of "trend-pattern"

8.2 Summary of Urban Transport Master Plan (CETA84)

(1) Economic Projections and Traffic Demand Forecast

CETA84 estimated various socioeconomic indicators based on the assumption that the Paraguayan economy would grow at 6.5% annually as projected by the Government of Paraguay. As a result, it was predicted that the traffic demand in the Asuncion metropolitan area in 2000 would increase by 1.73 times from 1984 in terms of the number of trips generated and attracted.

(2) Road Improvement Plan

Table 8-2-1 shows a list of proposed road improvements. Among them, the inter-city roads are outside Asuncion and thus under the control of MOPC. Most of the proposed improvements of the intra-city roads are asphalt pavements of gravel roads. It was assumed that the implementation scheme was to be the Frentista system where contractors would get permits (concessions) from municipalities and collect financial sources from roadside residents.

Table 8-2-1 Proposed Road Improvement Plan

Projects	Unit	Quantity
Inter-city roads	Km	108.21
Intra-city trunk roads	Km	56.23
Intra-city streets	Km	67.34
Subtotal	Km	231.78
Signalization of intersections	Locations	23
Signalization and improvements of intersections	Locations	28
Subtotal	Locations	51

(3) Public Transport Plan

(3) Public Transport Plan

Bus routes, the main mode of public transport, were to be restructured in order to improve the bus efficiency.

Table 8-2-2 Public Transport Improvement Plan

Items	Unit	Trend in 2000	Proposed in 2000
Number of routes	Routes	41	28
Average route length	Km	8.9	9.0
Passengers without transfer	Passengers/day	920,976	1,154,144
Passengers with one transfer	Passengers/day	426,303	195,242
Passengers with two transfers	Passengers/day	2,107	0
Average daily operation frequency	Times/day	8,685	9,030
Number of buses needed	Vehicles	2,398	2,559
Passengers per route km	Passengers/vehicle-km	2.23	2.08

Although an introduction of trolley buses was considered, it was concluded that the project would not be feasible. This was due to little economic efficiency gain from the conversion from diesel buses and the high financial costs (trolley buses were roughly 5 times more expensive than diesel buses in Japan and twice in Brazil).

(4) Improvement Plan for Urban Transport Network

Within Micro Centro, the following plans were proposed

Table 8-2-3 Proposed Projects in Micro Centro

Items	Unit	Effects or Quantities	
		Trend in 2000	Proposed in 2000
Traffic Regulations Reforms (Passenger vehicle-km)	1,000 vehicles-km	170	164
(Bus vehicles-km)	1,000 vehicles-km	280	3,280
New Transit Mall	Km		1.8
Walkway Widening	Km		43.8
New Signal Installation	Locations		46
New Signs and Road Markings	Locations		120
New Parking Lots	Lots		11,804

(5) Economic Evaluation of Road Projects

The total capital investment of the Master Plan was estimated to be about Gs55 billion (1985-price), and the total benefit generated from savings in vehicle operating costs would be greater. The cash flow analysis from 1986 to 2000 showed that the internal rate of return would be 37.1% and the benefit-cost ratio (B/C) 2.7 with an interest rate of 12%, which indicated that the proposed projects would be economically feasible. Moreover, the benefit generated by the restructuring of bus routes accounted for about 11% of the total.

Furthermore, other effects of the Master Plan implementation included savings in foreign currency spending from less fuel use and job creation from new road projects.

8.3 Achievement and Issues of Transport Project Implementation

(1) Project Implementation by Domestic Finance

Table 8-3-1 shows urban transportation projects implemented since 1991, by domestic finance. They are limited to small-scale projects and traffic management projects which do not need huge amounts of investment.

Table 8-3-1 Urban Transport Projects since 1991 by Domestic Finance

Project Category	Project
Traffic Improvement in Micro-Centro	<ul style="list-style-type: none"> • Traffic Management to designate Av. Brasil as a distributor for traffic from/to Micro-Centro, with modification of one way system and on-street parking restriction • Construction of Parking Facility under Plaza de Heroe by BOT Scheme • Entrusting inspection and fare collection of on-street parking to the private sector • Improvement of Tacuari Intersection • Introduction of transit mall on Calle Palma (after a test period, limited to weekends) • Encouraging off-street parking by raising on-street parking charge
Arterial Improvement	<ul style="list-style-type: none"> • Widening of Av. Fernando de la Mora to 4 lanes (for approx. 400 m.) • Widening of Av. Proceres de Mayo to 4 lanes (for approx. 100 m.) • Widening of Av. General Santos to 4 lanes (for approx. 500 m.) • Improvement of major intersection by channelization
Others	<ul style="list-style-type: none"> • Planning of Transport Network Plan (PDUA) through review and modification of CETA84 during 1994-95

(2) Projects by International Cooperation

Table 8-3-2 shows transport projects implemented with international or bilateral cooperation. Most projects by the World Bank and the Inter-American Development Bank (IDB) are road construction or improvement located in the suburban area or outside Asunción City, except the project of Paseo Costanera which aims mainly at flood prevention and land development in a flood prone area in the Asunción Bay.

Table 8-3-2 Projects by International Cooperation

Project	Cooperation Agency	Description
Widening of Av. M. Lynch	World Bank	WB loan is committed but not implemented yet due to the coordination with MOPC
Construction of Paseo Costanera	IDB	The project was planned in 1995 by Direccion de Desarrollo Urbano, CEPA and FLACAM and requesting finance by IDB.
Construction of San Lorenzo Bypass	IDB	Planned as a MOPC project
Inter-urban Road Improvement	OECD(Japan)	Exchange of Notes (E/N) in 1996 for a road package including Villarica - Paraguari road, for which F/S was made by JICA in 1995.

8.4 Planning Issues to CETA98

As for the transportation plans for the Asunción Metropolitan Area, the Asunción Municipal Government conducted with the cooperation of JICA, the Master Plan Study in 1986 (CETA84) targeting at year 2000, followed by a feasibility study in 1988. However, most of their recommendations have not been implemented, partly due to the governmental and administrative changes which occurred immediately after those Studies. As stated before, the social and economic conditions concerning population, car ownership and their distribution have changed more drastically than forecasted in those Studies. Consequently, the projects and recommendations in those studies have to be reviewed and revised based on up-dated information.

The Municipal Government is carrying on various transport projects such as widening of a ring road, construction of coastal road, improvement of major intersections and centralization of traffic signal control at the traffic control center with its own budget and financial cooperation by a international agencies. However, those projects are not necessarily functioning completely due to lack of proper planning studies based on the actual social and economic conditions. Proper feasibility studies are essential for more effective use of limited investment funds.

Based on this background, this study, CETA98 would pay special attention to the following issues in the course of the Study.

(1) To incorporate changes in socio-economic conditions and transport demand

The previous CETA84 failed to foresee present population distribution and car ownership with high accuracy while it forecast total population and total number of trips more exactly. Low density urbanization expanded toward the suburbs more extensively than expected, supported by the progress of motorization. In this Study, therefore, future car ownership should be forecast paying more attention to it as a focal factor.

Transportation demand shows a remarkable trend to increase, especially in the northern corridor. Accordingly, Av. Transchaco will need some measures to strengthen its function.

(2) To fully utilize existing transport stock

More effective use of existing stock of transport facilities should be considered as a measure for achieving significant results with small investment. The government has to look for the possibility of a less costly development method for configuration of the hierarchic road system (such as trunk road, distributor and local road) and also for planning public transport axes by designating selected roads as exclusive bus roads or bus priority roads.

(3) To expand and upgrade public transport capacities from a long-term perspective

Traffic by private cars has been increased rapidly depending on the capacity of the road network which somehow kept above the demand. However, urban traffic in the Metropolitan Area has almost reached saturation level and significant expansion of network capacity is hardly expected due to social and financial constraints. At such a stage, effective utilization of public transport should be the focus of urban transport planning. Even though current bus transport provides passengers with better services than expected in CETA84, it cannot, seemingly, slow down the increase of passenger cars. Therefore, transport demand management will become a

more important part of transport policy to encourage people to use public transport instead of using private cars.

Currently, public transport in the Asunción Metropolitan Area depends only on buses. Sooner or later, however, a mass transit system will be needed to cope with continuously increasing demand. Also taking this point into account, improvement plans for public transport should be developed.

(4) To improve financing and legal scheme

Financial resources for transport facilities in Asunción are the budgets of the Municipality and AGA which are approximately 2.5 million US dollars each per annum. They are not enough to carry out a large-scale project. Consequently, it is essential for project implementation to create new resources and establish new financial schemes as well as to utilize effectively foreign aid by such agencies as World Bank, IDB and OECF.

On the other hand, it is also important to formulate a plan within an available fund, based on the urgent necessities and economic efficiencies of projects.

(5) To establish sustainable institutions for urban transport development

There are several agencies responsible for construction and management of transport facilities and traffic control, such as Transport Division of the Municipality and AGA, MOPC and Road Police of the National Government. They are not necessarily well coordinated and then should be properly integrated functionally.

After completion of the Feasibility Study in 1988, scopes and investment amounts of the F/S projects were reviewed and examined by the Public Works Division of the Municipality under the direction of a new Mayor elected in 1991. That examination, however, was not completed effectively, mainly because the new administration body did not take over sufficient information especially on demand for and effects of the projects from the previous body and in addition, the new body lacked sufficient facilities with enough capacity for project evaluation. Therefore, this Study aims to establish a system to review and evaluate transport projects in the relevant organizations, as well as to re-evaluate projects planned or proposed in the past.

Chapter 9 Future Socio-Economic Frame Works

9.1 Population

9.1.1 Population in Paraguay

According to the population estimate by National Census and Statistics Office of Paraguay, the annual population growth rate, which recorded the highest rate of 3.2% in the 1985 - 1990 period, will decrease gradually, and will be 2.7% in the 1990 - 1995 period, 2.6%, 2.5%, 2.3%, 2.0% and 1.8% in the succeeding 5 years periods. The population in 2005 and 2015 will be 6,215,948 and 7,773,091 respectively and the growth factors based on 1995 population will be 1.29 and 1.61 times respectively (see Fig.9-1-1).

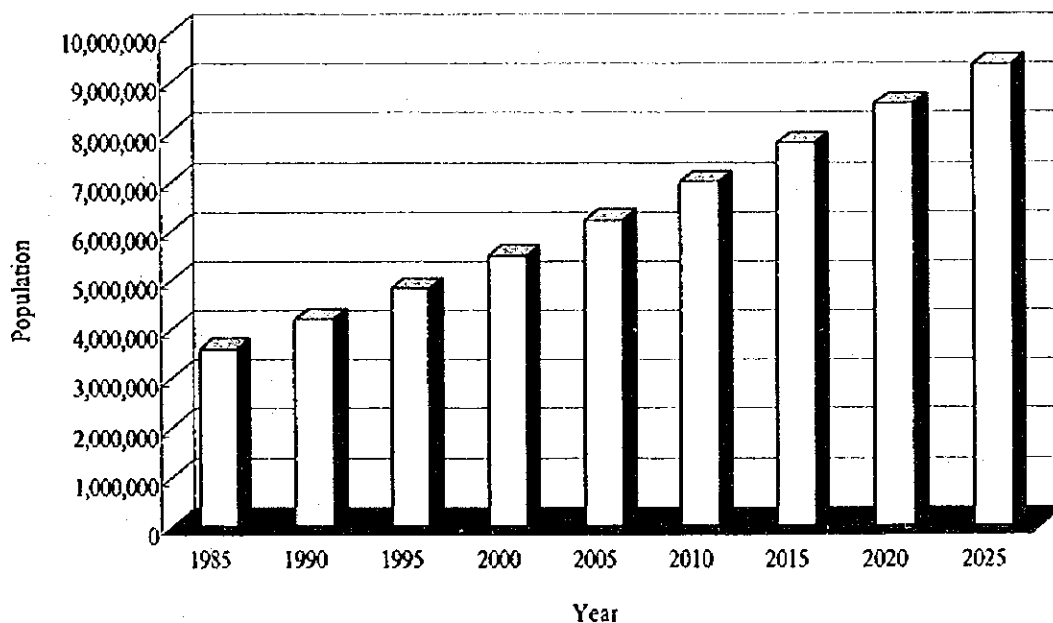


Fig. 9-1-1 Estimated Population in Paraguay

Table 9-1-1 Annual Population Growth Rate

Year	1985	1990	1995	2000	2005	2010	2015	2020	2025
Population	3,608,726	4,218,732	4,828,476	5,496,450	6,215,948	6,980,323	7,773,091	8,570,322	9,355,222
Annual Growth Rate (%)	-	3.2	2.7	2.6	2.5	2.3	2.2	2.0	1.8

9.1.2 Population in Asunción Metropolitan Area

Fig.9-1-2 shows the past trend of the population concentration to the metropolitan area. The population share of the metropolitan area was 22.3% in 1962, it increased rapidly to 25.7% in 1972 and has been increasing to 26.7% in 1982, and 27.2% in 1992. However, the recent increase rates show a slow down tendency and the 5 years increase rate has been decreasing from 3.4% to 1.0% and 0.5%.

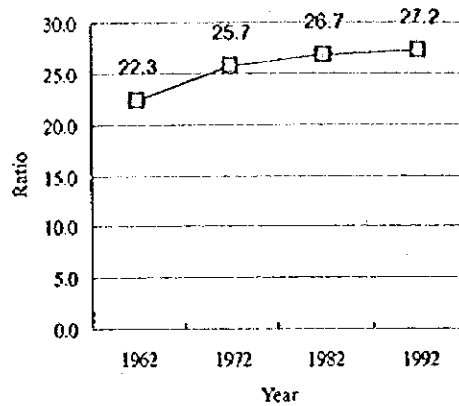


Fig. 9-1-2 Population Concentration in the Metropolitan Area

Fig.9-1-3 shows the population estimate in the metropolitan area by the National Census and Statistics Office of Paraguay. The population increase in the estimate is higher than the national average, and the population and the shares of the metropolitan area are 1,791,000 and 28.8% in 2005, and 2,054,000 and 29.4% in 2010. The population increase and the population shares are too high comparing with the past trend.

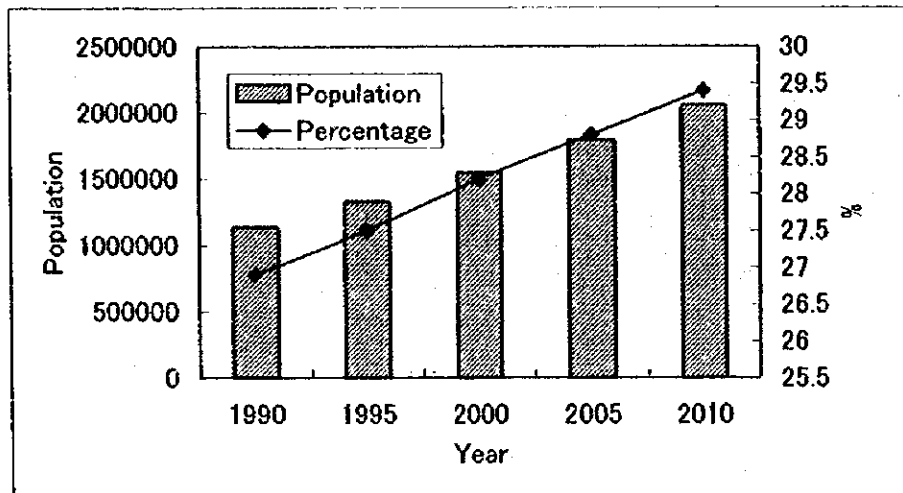


Fig. 9-1-3 Estimated Population by National Census and Statistics Office

Table 9-1-2 Population Increase Rate and Population Share

	1990	1990 1995	1995 2000	2000 2005	2005 2010
Population	1,136,883	1,329,057	1,548,317	1,791,235	2,054,049
Annual Growth Rate (%)		3.2	3.1	3.0	2.8
Percentage in respect to Paraguay Total (%)	26.9	27.5	28.2	28.8	29.4

The population share of the metropolitan area was 26.9% in 1990, however the past trend shows that the population concentration has stopped increasing. The population concentration seems to be caused mostly by these seeking jobs and if the job opportunity in the metropolitan area increases, the population concentration will continue. However, Paraguay borders with Brazil and Argentine, and such businesses as trade, finance and tourism are influenced by the foreign exchange rates with these two large countries and it directly affects the economy of Asunción

metropolitan area. In Paraguay, there is no local industry protection policy and the import/export taxes are lower than in the neighboring countries, therefore the national economy largely depends on a trade in foreign goods including goods for local consumption were imported and the large part of imported goods were re-exported to the neighboring countries. The Paraguay economy will be affected by the commencement of MERCOSUR in 2006, therefore, the population share of the metropolitan area in this study will take these factors into consideration.

The study assumes that the population concentration increase rate will decrease gradually. The population concentration increase between 1995 to 2000 is assumed at 0.5%, and 0.4%, 0.3% and 0.2% for the succeeding 5 years periods from 2000 to 2015. The forecast results are given in Table 9-1-3. The population in the metropolitan area will exceed 2 million by the year 2010, and will reach 2.25 million in the year 2015, which is more than 2 times the 1990 population of 1.13 million.

Table 9-1-3 Population in Metropolitan Area and Share

	1990	1995	2000	2005	2010	2015
Population	1,136,883	1,329,057	1,539,000	1,765,000	2,003,000	2,246,000
Total Annual Growth Rate (%)		3.2	3.0	2.8	2.6	2.3
Population of Country	4,218,732	4,828,476	5,496,450	6,215,948	6,980,323	7,773,091
Percentage in respect to Country Total (%)	26.9	27.5	28.0	28.4	28.7	28.9

9.1.3 Forecast of Age Structure and Economically Active Person (PEA)

According to the forecast of the age structure by the National Census and Statistics Office, the share of the young age group (less than 15 years old) will decrease, and consequently the share of the working population will increase. Also the share biased in favor of females will be improved slightly. Table 9-1-4 shows the shares of age groups and males in the population which was adjusted to the figures in Table 9-1-3.

Table 9-1-4 Population Forecast by Age Group and Gender in Metropolitan Area

Age Group	1998	2005	2015
0-14	500,783 (34.4)	588,244 (33.3)	688,186 (30.6)
15-64	889,918 (61.1)	1,098,192 (62.2)	1,448,872 (64.5)
65-	66,535 (4.6)	78,564 (4.5)	108,942 (4.9)
Total	1,457,236 (100.0)	1,765,000 (100.0)	2,246,000 (100.0)
Male/Female	0.926	0.937	0.951

Table 9-1-5 shows the forecast of PEA in the metropolitan area. The National Census and Statistics Office forecast the increase of the population more the 10 years old based on the change of age structure shown in Table 9-1-4, and the slightly increased PEA share in the population aged 10 years or more. In the study, the PEA was estimated based on the forecast of National Census and Statistics Office, with adjustment of the total population shown in Table 9-1-3. The PEA in 2015 will increase to 957,000 from 587,000 in 1998.

Table 9-1-5 PEA Forecast

	1998	2005	2015
Total Population	1,457,200	1,765,000	2,246,000
More than 10 years old	1,113,300	1,370,100	1,787,000
Active Population Rate	52.7	53.0	53.6
PEA	587,200	726,700	957,800

9.2 Forecast of GRDP and Employment in Asunción Metropolitan Area

9.2.1 GDP and GRDP Forecast

The regression formula of GDP, developed in chapter 2, gives an annual growth rate of 3.5%, and future GDP of 1,520 billion Gs. and 2,144.1 billion Gs. in terms of 1982 fixed price in 2005 and 2015 respectively. The GDP by industrial sector was forecast applying the regression formulas by sector and the totals in each year were adjusted to the figures, which were forecast separately. The results are shown in Table 9-2-1.

Table 9-2-1 GDP Forecast

SECTOR	Year			Annual Growing Rate Tax (%)	
	1998	2005	2015	1998/2005	2005/2015
Total PIB	1,194,700	1,520,000	2,144,100	3.50	3.50
Primary Sector	312,875	392,830	541,327	3.30	3.26
Secondary Sector	236,181	272,836	333,792	2.08	2.04
Tertiary Sector	645,644	854,334	1,268,981	4.08	4.04

The future GRDP of Asunción metropolitan area was estimated in a similar manner to the estimate of 1998 GRDP, based on the assumption that GRDP will change in proportion with the population concentration in the metropolitan area.

Future GRDP share in the metropolitan area = 1998 GRDP share x future population share / 1998 population share

The forecast result is shown in Table 9-2-2, and GRDP is estimated at 697,700 million Gs. or 45.9% and 1,001,300 million Gs. or 46.7% in 2005 and 2015 respectively,

Table 9-2-2 Future GRDP in Metropolitan Area
(In millions of constant Guaraníes 1982)

Year	PRB	Annual Growth Rate (%)
1984	319,284	-
1998	536,420	3.78
2005	697,680	3.83
2015	1,001,295	3.68

9.2.2 Future Employment by Industrial Sector

The total employment in the metropolitan area was estimated from GRDP divided by productivity. The productivity was calculated at 1,057,100 Gs. in 1998. The future productivity in Asunción metropolitan area was assumed to increase in proportion with the national average

productivity increase. The estimated GRDP, the productivity and PEA are given in Table 9-2-3.

Table 9-2-3 Future PEA

Year	PRB (In millions of constant Guaraníes 1982)	PRB per capita (In constant Guaraníes 1982)	Busy PEA (People)
1998	536,420	1,057,100	507,500
2005	697,680	1,094,700	637,300
2015	1,001,295	1,149,200	871,300

The employment in the primary sector will decrease in accordance with urbanization, and is assumed to decrease in the urban area passed on 1992-1998, 90% of that in 1998, 80% in 2005, 70% in 2015, and in the rural area as 90% in 2005 and 80% in 2015.

Manufacturing industries will not be located so much in Asunción metropolitan area in future because of the decentralization policy, while construction industries will expand their activities for residents' construction, road and other infrastructure development, and public and private building construction in accordance with expansion of the urbanization. Therefore, the employment in the secondary sector was estimated assuming that the employment in the manufacturing and mining industries will not change, and that in the construction industries will increase in proportion with the population increase.

The tertiary employment was estimated subtracting the employment in primary and secondary sectors from the total employment. Employment in commercial businesses was estimated, based on the share in 1992 census, by assuming 30% of employment in the tertiary sector will work in the commercial area.

Table 9-2-4 Employment Forecast

	1998	2005	2015	Annual Growth Rate (%)	
				1998/2005	2005/2015
Total occupied PEA	507,500	637,300	871,300	3.58	3.44
Primary Sector	11,833	10,578	9,323	-1.59	-1.25
Secondary Sector	143,576	173,850	221,166	2.77	2.44
Tertiary Sector	352,091	452,872	640,811	3.66	3.53

9.3 Car Ownership Forecast

The car ownership in Asunción metropolitan area in terms of vehicles per 1,000 inhabitants was estimated by the logarithm regression equation for the past 5 years records from 1992 to 1996. For car ownership, private cars are counted and trucks are excluded.

The car ownership by zone in terms of cars per household was estimated based on the increase of car ownership in the metropolitan area, population increase by zone, and population increase in the metropolitan area. The estimation formula is given below;

Car ownership by zone = 1992 car ownership by zone x car ownership increase in the metropolitan area x (population increase by zone / population increase in the metropolitan area)^{1/2}

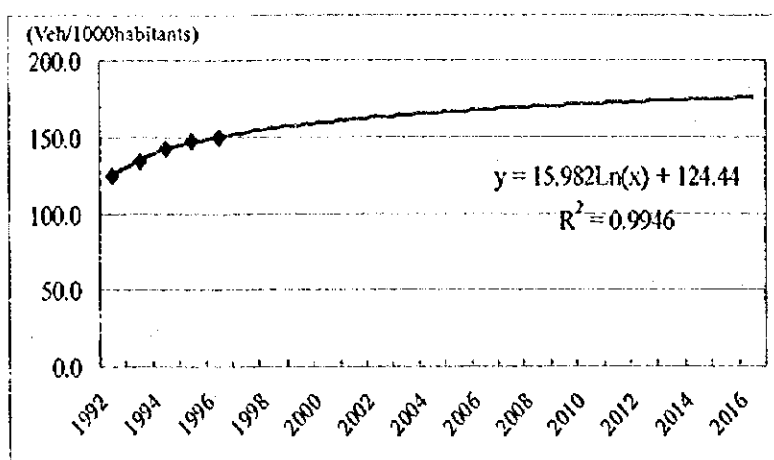


Fig. 9-3-1 Trend of Car Ownership

9.4 Land Use Plan

9.4.1 Planning Policy and Alternatives

(1) Land Use Trend and Issues

The future population forecast in accordance with the past trend is shown in Table 9-4-1. The annual increase rate of the whole metropolitan area is about 3.0%, while that of San Lorenzo, Limpio, San Antonio, Lambaré, and Nemby are more than 3.0%.

Table 9-4-1 Population Forecast based on Past Trend

	Year			Annual Growth Rate (%)	
	1998	2005	2015	2005/1998	2015/2005
Asunción	553,999	568,284	564,072	0.36	-0.07
Fdo. de la Mora	131,381	167,169	220,925	3.50	2.83
Lambaré	140,295	182,517	248,624	3.83	3.14
Limpio	51,121	67,932	96,169	4.15	3.54
Luque	165,079	214,831	291,829	3.83	3.11
M.R. Alonso	55,216	71,161	95,189	3.69	2.95
Nemby	54,679	70,531	95,047	3.70	3.03
San Antonio	21,519	28,474	39,696	4.08	3.38
San Lorenzo	208,414	301,466	478,337	5.41	4.72
Villa Elisa	41,729	53,497	71,153	3.61	2.89
Villa Hayes	33,805	39,138	44,959	2.11	1.40
Total	1,457,237	1,765,000	2,246,000	2.78	2.44

Table 9-4-2 shows the demand for new residential area and the demand and supply balance of residential area in 2015, based on the population by city estimated by the past trend, and the existing residential area. If the existing residential area maintains the present population density and agricultural and vacant land is developed for the new residential area, the demand for new residential area will amount to about 15,000 ha in the metropolitan area, which means about 70% of available land will turn into residential area, however, there is no available land in Fdo. de la Mora, Lambaré, Nemby, M.R. Alonso, San Antonio, San Lorenzo, and Villa Elisa, where the population density in the existing residential area will increase.

Table 9-4-2 Demand and Supply Balance of New Residential Area

	Residential Area (ha)	Population in 1998 (per.)	Population Density in Residential Area (per/ha)	Population in 2015 (per.)	Increase Population (per.)	Demand for New Residential Area (ha)	Available Land (ha)	Demand & Supply Balance (ha)
Asunción	7,756	553,999	71.4	564,072	10,073	141	633	492
Fdo de la Mora	1,929	131,381	68.1	220,925	89,544	1,315	10	-1,305
Lambaré	1,928	140,295	72.8	248,624	108,329	1,489	71	-1,418
Limpio	628	51,121	81.4	96,169	45,048	553	6,802	6,249
Luque	2,620	165,079	63.0	291,829	126,750	2,012	10,474	8,462
M.R. Alonso	1,917	55,216	28.8	95,189	39,973	1,388	1,277	-111
Nemby	1,692	54,679	32.3	95,047	40,368	1,249	788	-461
San Antonio	1,351	21,519	15.9	39,696	18,177	1,141	493	-648
San Lorenzo	3,968	208,414	52.5	478,337	269,923	5,139	936	-4,203
Villa Elisa	1,341	41,729	31.1	71,153	29,424	946	182	-764
Total	25,130	1,423,432	56.6	2,201,041	777,609	15,372	21,666	6,294

Note: 1. Residential area includes industrial, commercial and residential areas.

2. Demand for New Residential Area = Increase population / Population density in the present residential area

3. Available Land includes Open space and Farming.

The foreseeable problems on the future land use based on the past trend are;

- The high population increase will continue, and consequently, the land purchase in the metropolitan area will become difficult, and the residential area will expand to outside the metropolitan area, where vacant land is available.
- The development cost of infrastructure, including various urban facilities, public transport facilities, etc. for the sub urban residential area will become a huge amount, and the situation that capital expenditure required will be beyond the capacity for residential area development, might occur.
- Various business and commercial facilities will be established in the sub-urban area, in accordance with the population expansion, and consequently the present commercial activities in Micro-Centro will decline. In the sub urban area, various commercial and business facilities will be established in residential areas, and the living environment will deteriorate due to the mixed land use and the intrusion of business and commercial traffic in the residential area.

Taking these problems into consideration, the main issues on land use are summarized as follows;

- A) Provision of medium – high rise housings
- B) Introduction of land use control in the existing built-up area
- C) Establishment of a land development policy for the undeveloped land
- D) Introduction of guidelines for the land purchase

9.4.2 Land Use Alternatives

The urban structure of Asunción metropolitan area is represented by low density urbanization caused by the more rapid expansion of the residential area than expected, and the expansion corridors include Luque, San Lorenzo, and Capiatá beyond the border of the metropolitan area. This situation might be caused by lack of sufficient land to absorb this population increase in the already built-up area of Asunción, Fdo de la Mora, and Lambaré, by the relocation of major facilities to the suburbs, and by the diffusion of private car use. Therefore, the future urban structure of Asunción metropolitan area should be discussed taking the following two points

into consideration;

- Tendency of major facilities locations
- Tendency of residential area development

(1) Tendency of major facilities locations

Almost all the functions, except for industries have been concentrated in Micro-Centro, and they started to relocate to the suburbs in the 1980's to alleviate excessive concentration. In the 1980's, among others, the Central Bank, the wholesale market (Mercado de Abasto), the long distance bus terminal, the Asunción city hall, a part of the Ministry of Communication and Public Works was relocated. Recently various urban activities and large scale shopping centers mainly for private car users are located along the main radial roads of Av. España, Av. Mcal. López, Av. E. Ayala and Av. Fdo. de la Mora. This tendency will accelerate the urban structure change from the centralization pattern in Micro Centro to a dispersed pattern with multi-cores, however, it might cause a more rapid population increase in the sub urban area than expected. If the population continues to grow and there is no available space in Micro-Centro, the facilities for public services and commercial activities will have to expand and will be located in the sub-urban area.

(2) Tendency of Residential Area Development

In the Asunción metropolitan area, more rapid low density urbanization than expected has expanded to the sub urban area, however, this expansion will have limitations, because the population distribution has a relationship with economic activities. The limit of urbanization will be at a distance where the commuting time will be about 30min. – 1 hour. Therefore, in Asunción metropolitan area, where no urban rail system is available, road development will affect the development tendency of residential area. The rapid population increase in Villa Elisa and Ñemby was caused by recent road development.

In the study, the 3 land use alternatives, A: Dispersion patter, B: Radiation pattern, and C: Cluster Pattern, are established combining the above two factors, and their concepts are given in Fig. 9-4-1.

A: Dispersion Pattern

This pattern is most similar to the present tendency. The present commercial and business activities are located from Micro-Centro along the main radial roads of Av. E. Ayala, Av. Mcal. López, Av. España and Av. Fdo. de la Mora. These areas are reaching saturation and other lower density areas such as the area along Av. Artigas – M.R. Alonso – Limpio, and the areas between main radial roads, will be commercialized. In the dispersion pattern, urbanization and commercialization will disperse in all directions, and a low density continuous urban area will be formed. Circular road development will be inevitable to meet traffic demand in all directions, and the present concentration of buses to Micro-Centro will be reviewed and the establishment of transfer terminals will be required.

B. Radiation Pattern

The urbanization will expand along the main radial roads. As a result of the expanding urbanization along the main roads, the traffic in a specific direction will increase and the development of wide radial road will be inevitable to serve the demand. The present public

transport system by buses will not be able to serve the demand in the near future, and other high capacity public transport will be required.

C. Cluster Pattern

This pattern introduces strategic development along a specific corridor and allows the dispersion pattern to other areas depending on the characteristics of the areas. The area along Av. E. Ayala is selected as a strategic development corridor. In the strategic corridor, high density urbanization is assumed for a certain width, and in other areas, the dispersion pattern, with low density but with a slightly higher density area avoiding excessive concentration, is applied. This pattern requires a ladder pattern road network surrounding the strategic corridor.

Table 9-4-3 shows the population distribution of the 3 alternative land uses. In the dispersion pattern, the population increase in such sub urban and low density cities as Limpio, Luque, M.R. Alonso, San Antonio and Villa Hayes is remarkable. In the cluster pattern, the population density in the present high density area will farther increase, and the difference of the population density from other areas will be grater. The radiation pattern shows results that are intermediate to the dispersion and the cluster patterns.

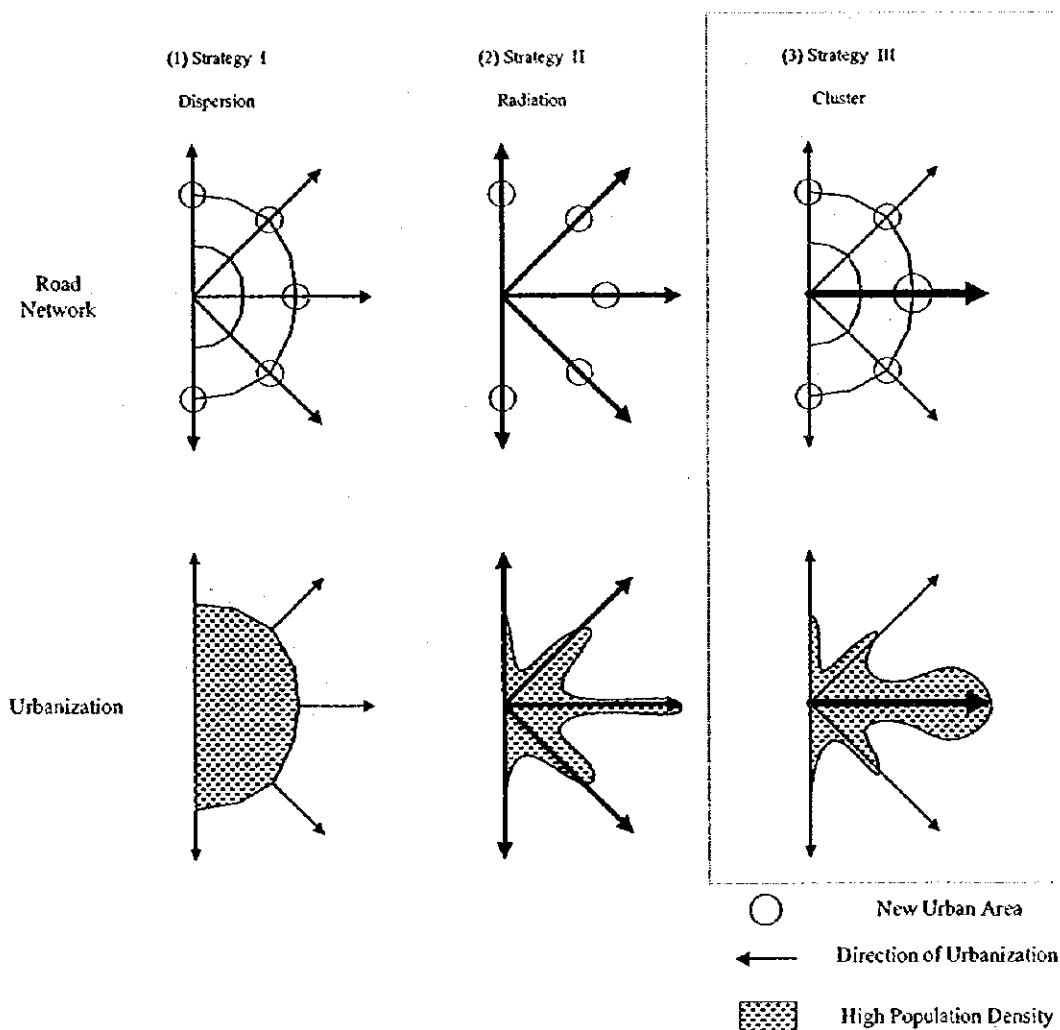


Fig. 9-4-1 Land Use Alternatives

Table 9-4-3 Alternative Future Population Distribution

A: Dispersion Pattern

	Year 1998	Year 2015		Year 2015	Year 2015
	Present	Population	Density	- Year 1998	/ Year 1998
Asunción	553,999	591,979	50.4	37,980	1.07
Fdo.de la Mora	131,381	131,981	64.3	600	1.00
Lambaré	140,295	144,555	65.8	4,260	1.03
Limpio	51,121	148,064	13.3	96,943	2.90
Luque	165,079	439,463	28.8	274,384	2.66
M.R.Alonso	55,216	141,989	39.1	86,773	2.57
Nemby	54,679	142,226	53.1	87,547	2.60
San Antonio	21,519	60,705	28.8	39,186	2.82
San Lorenzo	208,414	294,240	52.1	85,826	1.41
Villa Elisa	41,729	91,380	53.1	49,651	2.19
Villa Hayes	33,805	59,418	4.3	25,613	1.76
Total	1,457,237	2,246,000	31.2	788,763	1.54

Note. The population is assumed to be absorbed with the population density of 60 persons/ha in both the existing built-up area and the available land.

B: Radiation Pattern

	Year 1998	Year 2015		Year 2015	Year 2015
	Present	Population	Density	- Year 1998	/ Year 1998
Asunción	553,999	601,954	51.3	47,955	1.09
Fdo.de la Mora	131,381	155,120	75.5	23,739	1.18
Lambaré	140,295	159,920	72.8	19,625	1.14
Limpio	51,121	124,941	11.2	73,820	2.44
Luque	165,079	374,015	24.5	208,936	2.27
M.R.Alonso	55,216	121,291	33.4	66,075	2.20
Nemby	54,679	121,344	45.3	66,665	2.22
San Antonio	21,519	51,358	24.4	29,839	2.39
San Lorenzo	208,414	392,320	69.4	183,906	1.88
Villa Elisa	41,729	90,429	52.5	48,700	2.17
Villa Hayes	33,805	53,309	3.9	19,504	1.58
Total	1,457,237	2,246,000	31.2	788,763	1.54

Note. The population is assumed to be absorbed with the population density of 80 persons/ha in both the existing built-up area and the available land.

C: Cluster Pattern

	Year 1998	Year 2015		Year 2015	Year 2015
	Present	Population	Density	- Year 1998	/ Year 1998
Asunción	553,999	593,577	50.6	39,578	1.07
Fdo.de la Mora	131,381	155,120	75.5	23,739	1.18
Lambaré	140,295	159,920	72.8	19,625	1.14
Limpio	51,121	112,046	10.0	60,925	2.19
Luque	165,079	337,519	22.1	172,440	2.04
M.R.Alonso	55,216	109,749	30.2	54,533	1.99
Nemby	54,679	109,699	41.0	55,020	2.01
San Antonio	21,519	46,146	21.9	24,627	2.14
San Lorenzo	208,414	490,400	86.8	281,986	2.35
Villa Elisa	41,729	81,922	47.6	40,193	1.96
Villa Hayes	33,805	49,902	3.6	16,097	1.48
Total	1,457,237	2,246,000	31.2	788,763	1.54

Note. The population is estimated based on the following assumptions on population density by city.

Asunción, San Lorenzo	100 persons/ha
Fdo.de la Mora, Lambaré, Limpio, Luque	80 persons/ha
Others	60 persons/ha

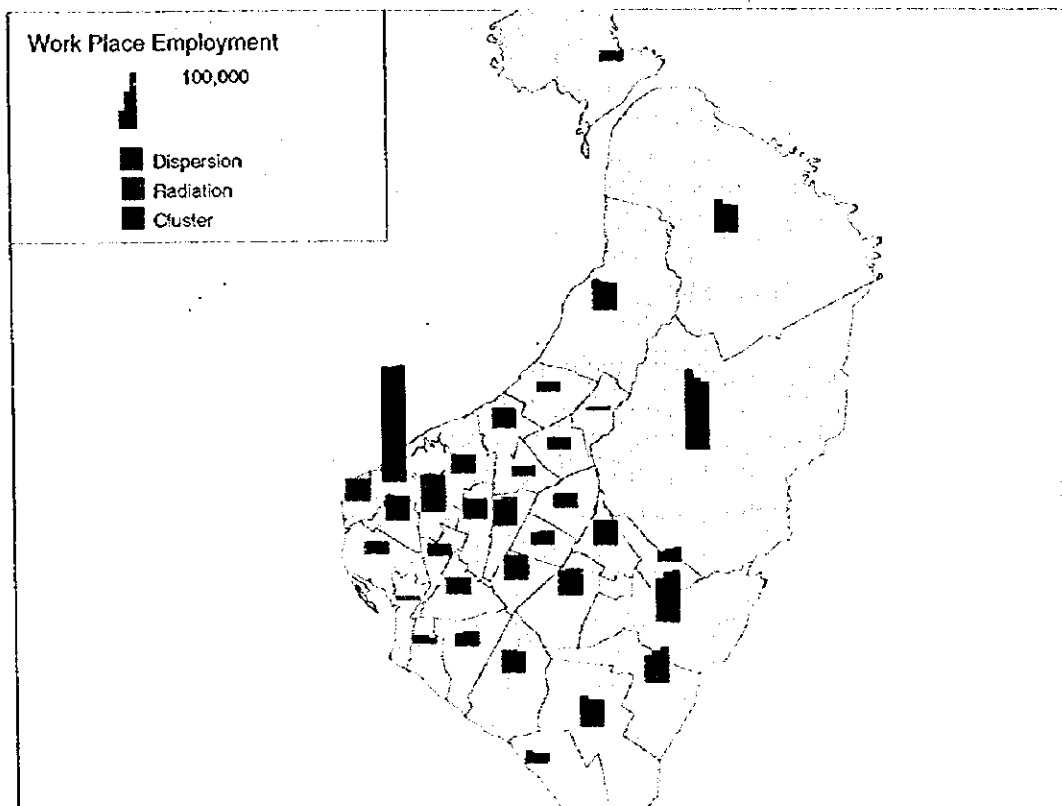


Fig. 9-4-2 Alternative Future Population Distribution

9.4.3 Evaluation of Alternative Land Use

(1) Aspects from Land Use

The present land use has the tendency to expand and disperse to the sub urban area along the main radial roads, and alternative B is the most similar to this pattern. Alternative A, which is the dispersion pattern requires a huge amount of infrastructure development cost, therefore, it is evaluated lowest.

The trip length in alternative B, whereby the urbanization will expand along main radial roads, will be longer and it will cause the dispersion of commercial and business activities, therefore its evaluation points are low from the view-point of activation of Micro-Centro. Also the evaluation points of alternative A, which is the dispersion pattern, are low. Only alternative C, strategic corridor pattern, has high evaluation points, because the urban functions can be shared strategically in Micro-Centro and in the area along the main corridor.

If the urban functions are dispersed, the traffic demand will increase and demand for road development and bus services, etc. will increase. Also, in accordance with the expansion of the dispersed urbanization, the area required water supply, sewerage, electricity, telecommunication, public services and other infrastructure for the urban transport system will expand, and the area lacking these services will grow. Alternative C has the highest evaluation points from the view-point of provision of public services.

(2) Aspects from Transportation

The average trip length in alternative B, where urbanization will expand along the main radial roads, will be the longest, followed by alternatives C and A.

To lead the land use as alternative A, the road network should be developed to provide the same level of services in all the areas, and the development cost will be the highest. In other alternatives, the traffic demand will concentrate to the specific arterial, however, alternative C will have the least development cost because of a higher concentration of the traffic.

In accordance with the expansion of urbanization, the area or the direction where the present public transport network can not provide adequate service will grow, therefore, the re-routing of the present public transport network will become necessary. The alternative A, dispersion pattern, will require re-routing and establishment of bus terminals, and alternatives B and C may require the introduction of other public transit with grater transport efficiency than the present bus services. The demand with high density on a single direction is desirable for the introduction of new transit, therefore, alternative C has the highest evaluation points.

The evaluation points are shown in Table 9-4-4, and the alternative C has the highest points from the view-points of land use and transport.

Table 9-4-4 Evaluation of Land Use Alternatives

	A	B	C
1. Land Use			
▪ Current Land Use Tendency	E	R	B
▪ Activation of Urban Activities	B	R	E
▪ Provision of public Services	R	B	E
2. Transportation Planning			
▪ Average Trip Length	E	R	B
▪ Road Development	R	B	E
▪ Public Transport Development	R	R	E

Obs.: E: Excellent B: Good R: Regular

9.4.4 Proposed Land Use

(1) Population Distribution

The population by zone was estimated extrapolating the trend between 1982 and 1992 to the 1998 population and by adjusting to the total population by city and to the total of the metropolitan area. In Asunción city the following is specially taken into consideration;

The trend of the population increase in Asunción city shows that the population increases up to a population density of 100 people/ha and afterwards it tends to decrease, therefore the maximum population density by zone was limited to 100 people/ha.

The excess population of a zone, where the density is 100/ha, is assumed to be absorbed by the adjacent zones. The total of the population by zone was adjusted to the total population of Asunción.

The implementation of Waterfront (Franja Costera) Project, which was planned by Asunción City, is suspended at present because of lack of a source of funds, however, as a part of the project, the provision of public housing to those who live in inundated areas along Asunción Bay is inevitable from the view-point of humanity and taking the necessary any countermeasures. Also from the view-point of the urban structure, the project will provide an opportunity to solve urban problems related to population, transportation, and so on. Therefore, this study will include a part of a project on the population distribution plan as an alternative, which assumes a new urban area with 10,000 population at Tablada Nueva (Zone 66), where the population in 1998 was 5,018.

(2) Work Place Base Employment

The work place base employment was estimated in the same manner as the total employment in the metropolitan area. The employment by zone was adjusted to the total employment in the metropolitan area.

(3) Residence Based Student

The residence based students was estimated based on 1998 figures and population increase rate by zone, and the change of the population share in the age group of 5 – 24 by zone.

Students by zone = 1998 Students by zone x population increase by zone x change of population share in the age group of 5 – 24 by zone

(4) School Base Student

a Primary – High School

The school based students were estimated in proportion to the population increase by zone, however, in the case of Asunción, there are several zones where no students are observed, so the students were allocated in proportion with the 1998 figures.

b. Institute and University

The total students were allocated in proportion with the 1998 figures.

Table 9-4-5 Future Students

Año 2005

Año 2015

	Resident	School Base Student					Resident	School Base Student			
	Base Student	Primary High School	Institute	University	Total		Base Student	Primary High School	Institute	University	Total
Asunción	130,472	160,438	7,338	21,387	189,163	Asunción	127,943	162,704	9,634	28,078	200,416
Lambaré	44,157	20,663	0	0	20,663	Lambaré	42,605	18,274	0	0	18,274
Fdo.de la Mora	39,898	29,950	563	0	30,513	Fdo.de la Mora	38,372	29,313	739	0	30,052
Luque	62,625	52,076	928	75	53,079	Luque	92,256	72,305	1,218	98	73,621
M.R.Alonso	21,351	15,158	39	0	15,197	M.R.Alonso	31,046	21,497	52	0	21,549
Villa Hayes	11,241	9,813	129	44	9,986	Villa Hayes	13,509	11,483	169	58	11,710
Limpio	20,339	17,475	0	0	17,475	Limpio	31,382	24,820	0	0	24,820
San Lorenzo	86,090	66,431	549	14,343	81,323	San Lorenzo	119,563	97,049	721	18,831	116,601
Nemby	19,967	18,134	68	0	18,202	Nemby	29,351	24,586	89	0	24,675
San Antonio	7,928	5,985	38	0	6,023	San Antonio	11,976	8,916	50	0	8,966
Villa Elisa	15,348	11,700	0	0	11,700	Villa Elisa	22,153	16,365	0	0	16,365
Total	459,416	407,823	9,652	35,849	453,324	Total	560,156	487,312	12,672	47,065	547,049

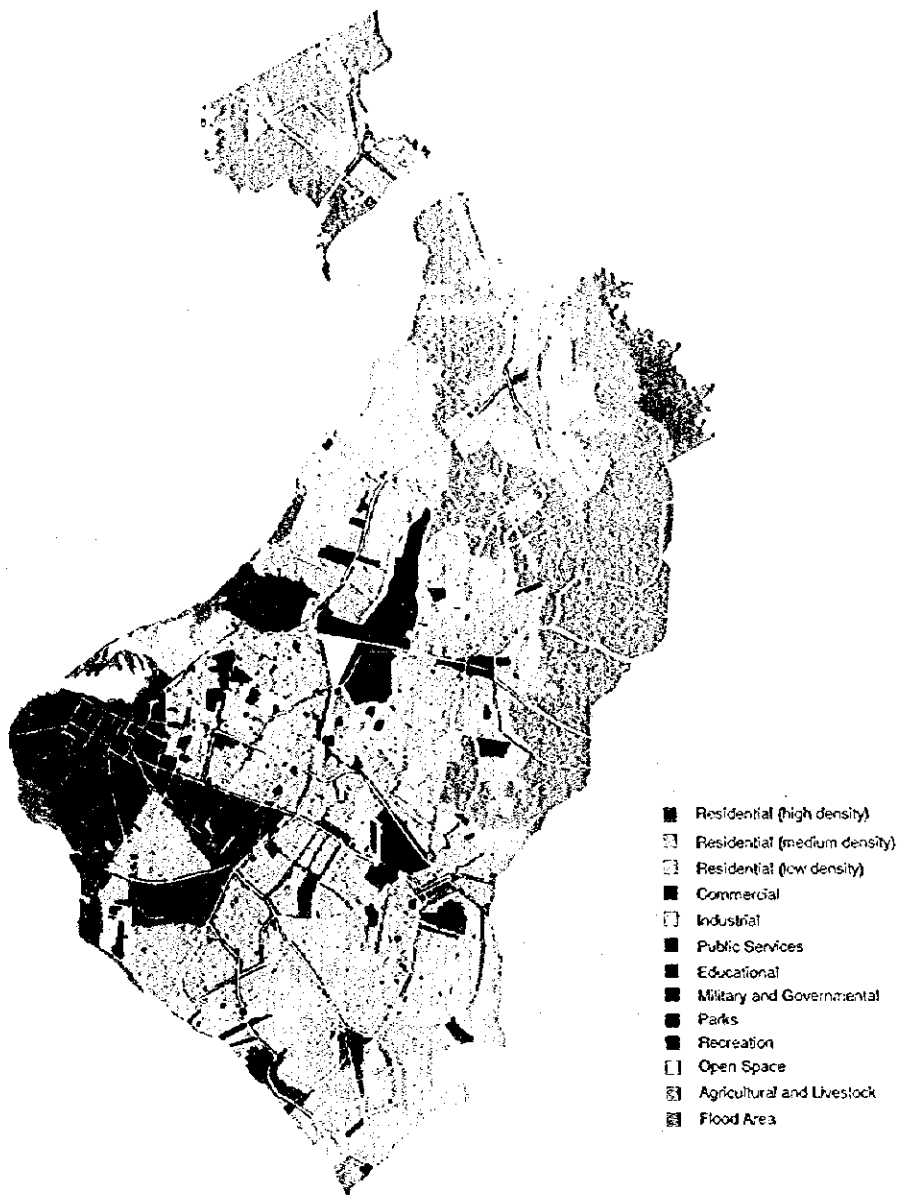


Fig. 9-4-3 Future Land Use Plan

Table 9-4-6 Socioeconomic Indicators in 1998

ZONA No.	Name	Population	Cars Properties	Students			School people				Workers				Total	(Commerce)
				Properties	School	Institutions	University	Total	Elementary	High School	Tertiary	Elementary	High School	Tertiary		
1.	Santo Domingo	3,069	71.5	680	0	0	4,500	4,500	4,500	48	139	1,575	1,762	386		
2.	Mcal. López	6,840	73.3	1,315	0	0	0	0	0	80	266	6,899	7,245	1,430		
3.	Gral. José E. Díaz	7,490	46.4	1,223	0	0	0	0	0	37	367	7,196	7,600	671		
4.	Las Mercedes	5,702	65.1	1,063	3,237	317	1,399	3,693	301	85	301	2,947	3,333	684		
5.	San Roque	7,916	46.7	1,213	46.7	1,213	231	251	251	82	412	9,530	10,024	2,401		
6.	Mburucay	8,302	64.1	1,576	9,847	169	0	10,016	50	356	2,035	2,441	589			
7.	Villa Morra	4,675	62.8	978	0	0	0	0	0	51	325	6,934	7,310	2,941		
8.	Tembetarí	3,782	55.7	745	0	0	0	0	0	20	258	3,268	3,545	947		
9.	La Encarnación	5,195	40.3	963	16,680	1,233	3,400	21,313	52	296	41,477	41,825	4,488			
10.	Los Laureles	4,396	60.2	1,036	5,913	1,146	0	7,059	29	281	2,587	2,896	1,207			
11.	Ciudad Nueva	10,670	46.4	1,906	16,732	420	0	17,152	65	629	2,969	3,663	532			
12.	San Cristóbal	8,024	60.3	1,855	8,596	0	0	8,596	59	472	2,788	3,319	844			
13.	Recolea	11,551	59.3	2,328	9,769	181	0	9,950	95	696	4,929	5,720	967			
14.	Catedral	4,571	39.9	617	0	0	6,302	6,302	32	193	30,689	30,915	3,866			
15.	Manorí	2,478	72.7	567	0	0	0	0	0	13	98	656	766	200		
16.	Virgen Del Huerto	5,844	56.3	1,270	0	0	0	0	0	32	433	1,367	1,832	430		
17.	Cañada de Ybyray	2,909	49.8	582	0	0	0	0	0	25	209	1,629	1,864	461		
18.	Mcal. Estigarribia	9,307	58.0	2,046	0	0	0	0	0	89	586	2,958	3,634	621		
19.	Carméllitas	6,400	57.7	1,565	6,369	331	0	6,700	33	362	1,422	1,817	409			
20.	Silvino Pettrossi	13,353	40.2	2,686	0	0	0	0	0	62	911	11,758	12,731	10,967		
21.	Pinozá	7,492	41.2	1,398	0	0	0	0	0	25	538	3,215	3,778	965		
22.	Vista Alegre	14,046	44.2	2,926	0	0	0	0	0	50	1,070	2,260	3,381	654		
23.	Nazareth	8,164	42.7	1,856	0	0	0	0	0	37	596	3,216	3,849	1,282		
24.	Pirizal	5,093	47.7	1,256	0	0	0	0	0	22	407	1,501	1,930	402		
25.	Panamby Reis	3,218	43.5	743	0	0	0	0	0	10	220	316	545	140		
26.	Ycua San	8,024	53.3	1,745	0	0	0	0	0	48	605	1,272	1,924	654		
27.	San Antonio	11,807	37.3	2,505	0	0	0	0	0	43	928	4,250	5,221	1,032		
28.	Tacumbú	14,059	41.4	3,080	15,453	550	0	16,003	42	1,049	3,526	4,617	880			
29.	San Vicente	16,314	44.1	3,618	8,444	434	0	8,878	49	1,310	3,597	4,956	1,609			
30.	Bernardino Caballero	7,726	36.0	1,654	0	0	0	0	0	53	586	2,180	2,819	567		
31.	Carlos Antonio López	15,116	44.7	3,279	0	0	0	0	0	68	1,133	2,860	4,060	1,169		
32.	Madame Lynch	9,399	51.7	2,375	5,144	0	0	5,144	52	666	2,299	3,017	975			
33.	Dr. Gaspar R. de Francia	13,241	31.5	2,336	0	0	0	0	0	104	881	5,677	6,662	1,327		
34.	Hipódromo	9,546	41.8	2,271	0	0	0	0	0	29	686	3,830	4,545	1,062		
35.	Obrero	22,971	34.7	5,395	0	0	0	0	0	58	1,958	5,681	7,697	2,316		
36.	Santa Rosa	2,158	36.2	469	0	0	0	0	0	11	184	366	561	331		
37.	Santísima Trinidad	5,153	38.5	1,237	0	0	0	0	0	14	377	7,803	8,195	903		
38.	San Jorge	5,233	42.5	1,198	0	0	0	0	0	38	446	1,551	2,035	437		
39.	Itay	3,053	54.5	813	0	0	0	0	0	18	218	301	537	133		
40.	Luis A. De Herrera	6,316	41.7	1,461	0	0	0	0	0	11	512	1,644	2,167	418		
41.	Mburucuyá	9,556	42.4	2,542	0	0	0	0	0	25	738	1,407	2,171	647		
42.	Sajonia	2,351	39.8	423	5,820	0	780	6,570	9	128	7,369	7,506	427			
43.	Panamby Vera	3,223	35.5	726	0	0	0	0	0	8	259	474	741	179		
44.	Jara	14,997	35.1	3,459	0	0	0	0	0	63	1,517	4,323	5,904	854		
45.	Villa Aurelia	11,034	37.5	2,481	0	0	0	0	0	32	1,052	2,940	4,025	823		

46.	Nu Guazú	32	62.4	15	0	0	0	0	0	0	2	195	197	66
47.	San Pablo	25,284	32.2	6,064	0	0	0	0	0	0	2,301	5,848	8,223	2,042
48.	Itá Pyrá Punta	3,521	28.9	892	0	0	1,352	0	0	0	436	446	899	197
49.	Loma Pyta	5,727	26.7	1,404	3,437	22	0	0	0	0	405	2,213	2,635	298
50.	Virgen de la Asunción	11,247	25.8	2,794	0	0	0	0	0	0	1,270	1,685	2,987	631
51.	Bella Vista	5,085	31.5	1,188	0	0	0	0	0	0	485	503	1,020	221
52.	Gral. Andrés Rodríguez	7,153	27.6	1,957	0	0	0	0	0	0	591	1,253	1,862	369
53.	Terminal	4,938	26.2	1,179	16,772	916	0	0	0	0	612	4,978	5,436	659
54.	Santa Ana	6,506	33.5	1,753	0	0	0	0	0	0	439	1,923	2,374	1,383
55.	Salvador del Mundo	4,318	26.3	996	0	0	0	0	0	0	581	1,321	1,910	290
56.	Santa María	5,201	23.1	1,286	0	0	0	0	0	0	1,081	2,408	3,514	716
57.	Republicano	12,284	27.5	3,221	0	0	0	0	0	0	3,102	3,990	7,121	1,637
58.	Roberto L. Petit	28,584	16.5	7,176	0	0	0	0	0	0	30	2,408	3,514	716
59.	Virgen de Fátima	6,451	16.6	1,719	0	0	0	0	0	0	15	834	675	1,525
60.	Itá Enramada	4,116	25.8	1,099	1,089	0	0	0	0	0	313	694	1,081	337
61.	De las Residentas	14,376	15.9	4,002	0	0	0	0	0	0	1,531	1,992	3,549	752
62.	Zeballos Cúo	2,305	13.6	740	7,410	0	0	0	0	0	159	396	606	100
63.	Botánico	8,897	12.1	2,508	0	0	0	0	0	0	877	3,007	3,959	815
64.	San Blas	3,520	19.5	1,014	0	0	0	0	0	0	391	293	701	250
65.	Ricardo Brugada	9,176	5.9	2,415	0	0	0	0	0	0	888	859	1,777	435
66.	Tablada Nueva	5,018	12.9	1,346	8,506	223	0	0	0	0	657	1,895	2,583	491
67.	Bañado Tacumbú	4,097	16.0	790	0	0	0	0	0	0	253	353	630	178
68.	San Rafael	8,303	10.6	2,243	0	0	0	0	0	0	1,041	733	1,819	361
69.	San Felipe	4,997	13.9	1,320	0	0	0	0	0	0	364	1,540	1,933	615
70.	Bañado	1,095	2.9	321	6,113	30	0	0	0	0	160	256	420	48
71.	Banco San Miguel	0	0.0	0	0	0	0	0	0	0	0	28	28	0
ASUNCIÓN (1-71)														
72.	Lambaré Norte	53,997	37.9	126,899	155,331	5,972	17,404	178,707	2,660	44,877	260,249	307,786	69,095	0
73.	Lambaré Oeste	53,744	45.8	14,276	6,866	0	0	6,866	88	4,593	10,213	14,895	3,194	0
74.	Lambaré Este	18,733	40.9	5,054	4,120	0	0	4,120	58	1,476	4,453	5,987	1,686	0
LAMBARÉ (72-74)														
75.	Fdo.de la Mora Sur	140,296	40.6	39,104	16,481	0	0	16,481	311	11,741	22,172	34,224	8,509	0
76.	Fdo.de la Mora Norte	53,271	36.1	13,872	8,583	458	0	9,041	158	4,412	15,123	19,693	4,537	0
FDO. DE LA MORA (75-76)														
77.	Luque	131,381	32.2	34,253	24,891	458	0	25,349	153	6,791	14,941	21,885	5,546	0
78.	M.R.Aonso	165,079	28.0	47,230	40,182	755	61	40,998	1,762	19,402	25,255	46,419	9,855	0
79.	Villa Hayes	55,216	28.4	16,211	11,338	32	0	11,370	428	8,086	9,658	18,172	3,563	0
80.	Limpio	33,805	9.0	9,600	8,484	105	36	8,625	3,759	2,716	3,519	9,994	1,770	0
81.	San Lorenzo Norte	51,121	9.9	15,003	13,471	0	0	13,471	770	8,443	8,219	17,432	2,715	0
82.	San Lorenzo Central	44,260	11.9	12,935	12,521	0	0	12,521	284	4,955	5,276	10,495	2,083	0
83.	San Lorenzo Sur	83,963	20.2	22,615	22,260	447	11,672	34,379	255	7,130	25,452	32,837	6,292	0
SAN LORRENZO (81-83)														
84.	Nemby	80,191	11.7	22,695	9,739	0	0	9,739	475	8,197	11,461	20,135	4,568	0
85.	San Antonio	208,414	15.2	58,245	44,520	447	11,672	56,639	1,014	20,262	42,188	63,464	12,944	0
86.	Villa Elisa	54,679	11.5	15,104	14,337	55	0	14,392	389	8,485	8,568	17,442	3,007	0
AREA METROPOLITANA (1-86)														
		21,519	35.2	5,896	4,328	31	0	4,359	226	3,123	3,298	6,647	1,139	0
		41,729	33.6	11,724	8,878	0	0	8,878	203	5,084	9,255	14,542	4,102	0
		1,457,236	31.7	379,269	342,241	7,855	29,173	379,268	11,833	143,422	422,445	577,700	126,734	0

Table 9-4-7 Socioeconomic Indicators in 2005

ZONA No.	Name	Population	Cars Property	Students			School students				Workers				Total	(Commerce)
				School	Institutions	University	School	Elementary	High School	Tertiary	School	Elementary	High School	Tertiary		
1.	Santo Domingo	3,350	72.7	729	0	0	5,530	5,530	0	42	141	2,081	2,264	500		
2.	Mcal. López	6,894	71.6	1,302	0	0	0	0	0	71	267	9,127	9,465	1,849		
3.	Gral. José E. Díaz	7,574	45.5	1,214	0	0	0	0	0	33	367	9,517	9,917	827		
4.	Las Mercedes	5,766	63.7	1,055	3,343	390	1,711	3,904	171	73	301	3,856	4,232	862		
5.	San Roque	7,937	45.5	1,194	0	0	308	308	0	75	412	12,631	13,116	3,135		
6.	Mburucao	8,549	63.3	1,594	10,171	208	0	10,378	0	45	358	2,604	3,007	716		
7.	Villa Morra	4,628	60.8	951	0	0	0	0	0	46	324	9,203	9,573	3,889		
8.	Tembetary	3,778	54.2	731	0	0	0	0	0	18	258	4,312	4,587	1,230		
9.	La Encarnación	5,220	39.3	950	17,228	1,515	4,178	22,922	0	46	296	55,462	55,804	5,959		
10.	Los Laureles	4,527	59.5	1,048	6,107	1,408	0	7,516	0	26	282	3,401	3,708	1,578		
11.	Ciudad Nueva	10,675	45.2	1,873	17,282	516	0	17,798	0	58	629	3,796	4,483	604		
12.	San Cristóbal	8,497	60.4	1,929	8,879	0	0	8,879	0	53	479	3,636	4,167	1,072		
13.	Recoleta	11,648	57.9	2,305	10,090	222	0	10,313	0	85	697	6,414	7,196	1,183		
14.	Catedral	4,593	38.9	609	0	0	7,744	7,744	0	29	193	41,025	41,247	5,132		
15.	Manorá	2,705	73.9	608	0	0	0	0	0	11	100	854	965	254		
16.	Virgen Del Huerto	6,086	55.9	1,299	0	0	0	0	0	29	437	1,751	2,217	529		
17.	Cañada de Ybarray	3,176	50.6	624	0	0	0	0	0	22	216	2,154	2,392	601		
18.	Mcal. Estigambía	9,670	57.5	2,087	0	0	0	0	0	79	593	3,833	4,506	1,023		
19.	Carmelitas	6,986	58.7	1,677	6,578	407	0	6,985	0	30	373	1,843	2,245	511		
20.	Silvio Petrossi	13,567	39.4	2,680	0	0	0	0	0	55	914	15,538	16,507	14,562		
21.	Pinoza	7,648	40.5	1,401	0	0	0	0	0	22	540	4,191	4,753	1,224		
22.	Vista Alegre	14,212	43.3	2,907	0	0	0	0	0	45	1,074	2,802	3,921	741		
23.	Nazareth	8,260	41.8	1,844	0	0	0	0	0	33	598	4,176	4,807	1,639		
24.	Pinzal	5,289	47.3	1,280	0	0	0	0	0	19	410	1,940	2,370	496		
25.	Panamby Reta	3,402	43.5	771	0	0	0	0	0	9	223	383	615	164		
26.	Ycaia Sati	8,497	53.4	1,815	0	0	0	0	0	42	615	1,605	2,262	818		
27.	San Antonio	11,671	36.1	2,432	0	0	0	0	0	38	925	5,481	6,444	1,255		
28.	Tacumbú	14,159	40.4	3,046	15,961	676	0	16,637	0	38	1,050	4,492	5,580	1,041		
29.	San Vicente	16,674	43.4	3,631	8,722	533	0	9,255	0	43	1,318	4,571	5,931	2,006		
30.	Bernardino Caballero	7,730	35.0	1,625	0	0	0	0	0	47	586	2,789	3,422	681		
31.	Carlos Antonio López	15,232	43.7	3,244	0	0	0	0	0	60	1,135	3,584	4,779	1,418		
32.	Madame Lynch	10,260	52.6	2,546	5,313	0	0	5,313	0	46	690	2,989	3,725	1,252		
33.	Dr. Gaspar R. de Francia	13,088	30.5	2,267	0	0	0	0	0	93	879	7,367	8,338	1,635		
34.	Hipódromo	10,188	42.0	2,380	0	0	0	0	0	26	701	5,020	5,746	1,356		
35.	Obrero	23,164	33.9	5,342	0	0	0	0	0	51	1,963	7,235	9,249	2,878		
36.	Santa Rosa	2,247	36.0	480	0	0	0	0	0	10	186	461	657	425		
37.	Santísima Trinidad	5,625	39.1	1,326	0	0	0	0	0	13	388	10,401	10,802	1,179		
38.	San Jorge	5,542	42.5	1,246	0	0	0	0	0	34	457	2,013	2,503	547		
39.	Itay	3,253	54.6	845	0	0	0	0	0	16	222	366	605	155		
40.	Luis A. De Herrera	6,689	41.8	1,519	0	0	0	0	0	10	522	2,125	2,656	514		
41.	Mburucuyá	10,432	43.1	2,725	0	0	0	0	0	22	764	1,793	2,579	812		
42.	Sajonia	2,324	38.5	410	6,011	0	922	6,933	0	8	127	9,827	9,962	547		
43.	Panamby Verd	3,551	36.2	785	0	0	0	0	0	7	267	607	882	223		
44.	Jara	15,257	34.5	3,455	0	0	0	0	0	36	1,525	5,557	7,138	1,004		

45.	Villa Aurelia	11,401	37.1	2,518	0	0	0	0	0	29	1,063	3,781	4,872	1,007
46.	Niá Guazú	35	63.7	16	0	0	0	0	0	0	2	260	262	88
47.	San Pablo	26,984	32.4	6,355	0	0	0	0	0	66	2,359	7,540	9,965	2,559
48.	Itá Pytá Punta	3,481	27.9	866	0	1,661	1,661	0	0	14	435	535	985	226
49.	Loma Pyta	6,252	27.2	1,505	3,550	0	0	0	0	15	421	2,909	3,346	366
50.	Virgen de la Asunción	12,017	26.0	2,931	0	0	0	0	0	28	1,300	2,129	3,456	767
51.	Bella Vista	5,295	31.3	1,215	0	0	0	0	0	29	493	604	1,126	255
52.	Gral. Andrés Rodríguez	7,808	28.1	2,098	0	0	0	0	0	16	613	1,610	2,238	453
53.	Terminal	5,270	26.3	1,236	17,323	1,126	0	18,449	0	6	464	6,610	7,080	849
54.	Santa Ana	7,526	35.1	1,991	0	0	0	0	0	9	662	1,703	2,373	647
55.	Salvador del Mundo	4,714	26.7	1,068	0	0	0	0	0	11	456	2,534	3,001	1,827
56.	Santa María	5,501	23.1	1,336	0	0	0	0	0	7	592	1,705	2,304	350
57.	Republicano	14,210	28.8	3,659	0	0	0	0	0	22	1,164	3,172	4,357	927
58.	Roberto L. Petit	30,043	16.3	7,406	0	0	0	0	0	26	3,174	4,976	8,177	1,973
59.	Virgen de Fátima	6,952	16.8	1,819	0	0	0	0	0	14	857	836	1,706	334
60.	Itá Enramada	4,657	26.7	1,221	1,125	0	0	1,125	0	66	328	903	1,297	435
61.	De las Residentas	15,693	16.2	4,289	0	0	0	0	0	23	1,594	2,530	4,147	924
62.	Zaballos Cúe	2,516	13.8	794	7,654	0	0	7,654	0	46	166	508	679	121
63.	Botánico	9,712	12.3	2,688	0	0	0	0	0	66	910	3,942	4,913	1,041
64.	San Blas	3,842	19.8	1,087	0	0	0	0	0	15	407	358	781	315
65.	Ricardo Brugada	9,220	5.7	2,383	0	0	0	0	0	26	890	999	1,915	491
66.	Tablada Nueva	5,197	12.8	1,369	8,786	274	0	9,060	0	28	666	2,467	3,161	615
67.	Bañado Tacumbú	4,101	15.6	777	0	0	0	0	0	22	253	403	678	197
68.	San Rafael	9,064	10.8	2,405	0	0	0	0	0	40	1,092	902	2,034	436
69.	San Felipe	5,083	13.6	1,319	0	872	872	0	0	26	367	1,985	2,378	778
70.	Bañado	1,189	2.9	342	6,314	37	0	6,351	0	3	169	332	504	57
71.	Banco San Miguel	0	0	0	0	0	0	0	0	0	0	38	38	0
ASUNCION (1-71)		577,965	37.7	130,472	160,438	7,338	21,387	189,163	2,365	45,699	341,079	389,143	88,062	
72.	Lambaré Norte	53,744	44.5	14,090	6,867	0	0	6,867	0	78	4,593	12,769	17,441	3,731
73.	Lambaré Oeste	22,980	44.1	6,120	5,025	0	0	5,025	0	51	1,606	5,987	7,644	2,273
74.	Lambaré Este	83,196	39.2	23,947	8,771	0	0	8,771	0	147	6,212	10,136	16,495	4,910
LAMBARÉ (72-74)		159,920	42.2	44,157	20,663	0	0	20,663	277	12,412	28,892	41,581	10,914	
75.	Fdo.de la Mora Sur	74,160	41.4	19,058	13,034	563	0	13,597	0	140	5,093	21,026	26,259	6,540
76.	Fdo.de la Mora Norte	80,960	29.4	20,840	16,915	0	0	16,915	0	136	6,882	18,915	25,933	6,772
FDO. DE LA MORA (75-76)		155,120	34.1	39,898	29,950	563	0	30,512	276	11,975	39,942	52,192	13,312	
77.	Luque	220,897	31.5	62,623	52,076	928	75	53,079	1,578	1,578	23,018	35,502	60,098	14,206
78.	M.R.Alonso	73,142	31.8	21,351	15,158	39	0	15,197	381	381	9,806	13,436	23,623	5,073
79.	Villa Hayes	40,041	9.5	11,241	9,813	129	44	9,986	3,380	3,380	2,978	4,641	10,998	2,260
80.	Limpio	69,909	11.3	20,339	17,475	0	0	17,475	690	690	10,556	11,648	22,894	4,021
81.	San Lorenzo Norte	66,097	14.2	19,119	17,174	0	0	17,174	253	253	6,412	8,066	14,751	3,390
82.	San Lorenzo Central	125,388	24.0	33,427	31,087	549	14,343	45,980	226	226	8,595	35,985	45,060	9,566
83.	San Lorenzo Sur	119,755	13.9	33,544	18,169	0	0	18,169	422	422	10,580	17,162	28,164	7,206
SAN LORENZO (81-83)		311,240	18.1	86,090	66,431	549	14,343	81,323	902	25,841	61,213	87,955	20,162	
84.	Nemby	72,496	12.8	19,967	18,134	68	0	18,201	348	348	10,429	11,976	22,754	4,329
85.	San Antonio	29,297	40.0	7,928	5,985	38	0	6,023	203	203	3,716	4,676	8,594	1,681
86.	Villa Elisa	54,974	37.6	15,348	11,700	0	0	11,700	180	180	6,082	12,750	19,012	5,705
AREA METROPOLITANA (1-86)		1,765,001	33.9	459,416	407,822	9,652	35,849	453,323	10,578	162,511	565,754	738,844	169,726	

Table 9-4-8 Socioeconomic Indicators in 2015

ZONA No.	Name	Population	Cars Properties	Students			School Students				Workers				Total	(Commerce)
				Institutions	University	Total	School	Institutions	University	Total	Elementary	High School	Tertiary	Total		
1.	Santo Domingo	3,569	71.1	740	0	0	7,260	7,260	37	143	2,999	3,179	698			
2.	Mcal. López	6,880	61.5	1,237	0	0	0	0	62	267	13,259	13,588	2,617			
3.	Gral. José E. Díaz	7,604	36.4	1,161	0	0	0	0	29	367	13,819	14,216	1,106			
4.	Las Mercedes	5,789	51.0	1,009	3,391	511	224	4,126	66	302	5,533	5,900	1,183			
5.	San Roque	7,872	42.1	1,127	0	0	405	405	64	411	18,384	18,860	4,492			
6.	Mburicao	8,508	56.2	1,510	10,314	273	0	10,587	39	358	3,616	4,013	924			
7.	Villa Morra	4,506	55.2	881	0	0	0	0	40	323	13,417	13,780	5,647			
8.	Tembetary	3,728	49.9	687	0	0	0	0	15	257	6,247	6,519	1,751			
9.	La Encarnación	5,193	36.5	900	17,472	1,989	5,485	24,946	41	296	81,483	81,819	8,690			
10.	Los Laureles	4,505	52.8	993	6,194	1,849	0	8,042	22	282	4,890	5,194	2,254			
11.	Ciudad Nueva	10,555	41.7	1,763	17,526	678	0	18,204	50	628	5,310	5,988	723			
12.	San Cristóbal	8,747	56.1	1,890	9,004	0	0	9,004	46	482	5,162	5,691	1,464			
13.	Recoleta	11,648	46.2	2,195	10,233	292	0	10,525	74	697	9,149	9,920	1,567			
14.	Catedral	4,570	36.1	577	0	0	10,167	10,167	25	193	60,254	60,472	7,683			
15.	Manorá	2,882	72.3	617	0	0	0	0	10	102	1,206	1,318	344			
16.	Virgen Del Huerto	6,142	50.5	1,248	0	0	0	0	25	438	2,431	2,894	691			
17.	Cañada de Ybrray	3,383	49.5	633	0	0	0	0	20	221	3,110	3,350	849			
18.	Mcal. Estigambía	9,731	51.8	2,000	0	0	0	0	69	594	5,406	6,070	1,365			
19.	Carmelitas	7,444	57.4	1,702	6,671	534	0	7,205	26	381	2,581	2,988	674			
20.	Silvio Pettinossi	13,713	31.8	2,579	0	0	0	0	48	916	22,542	23,506	2,135			
21.	Pinoza	7,780	32.9	1,357	0	0	0	0	20	542	5,989	6,550	1,695			
22.	Vista Alegre	14,255	37.4	2,776	0	0	0	0	39	1,075	3,775	4,889	880			
23.	Nazareth	8,286	36.1	1,761	0	0	0	0	29	598	5,942	6,570	2,290			
24.	Pirizal	5,317	42.6	1,225	0	0	0	0	17	411	2,726	3,154	653			
25.	Panamby Reta	3,495	40.3	754	0	0	0	0	8	225	488	721	195			
26.	Ycuta Sati	8,747	49.6	1,779	0	0	0	0	37	620	2,174	2,831	1,090			
27.	San Antonio	11,355	32.8	2,249	0	0	0	0	34	919	7,744	8,696	1,655			
28.	Tacumbú	15,105	36.1	3,094	16,187	887	0	17,074	33	1,066	6,347	7,446	1,374			
29.	San Vicente	16,993	35.3	3,523	8,845	700	0	9,545	38	1,324	6,341	7,704	2,722			
30.	Bernardino Caballero	7,642	32.3	1,529	0	0	0	0	41	584	3,904	4,528	881			
31.	Carlos Antonio López	15,217	37.6	3,086	0	0	0	0	53	1,135	4,894	6,081	1,859			
32.	Madame Lynch	10,932	51.5	2,582	5,388	0	0	5,388	41	709	4,206	4,956	1,727			
33.	Dr. Gaspar R. de Francia	12,711	27.7	2,096	0	0	0	0	81	873	10,480	11,435	2,189			
34.	Hipódromo	10,582	39.5	2,353	0	0	0	0	22	711	7,170	7,903	1,865			
35.	Obrero	23,135	31.5	5,079	0	0	0	0	45	1,962	10,068	12,075	3,888			
36.	Santa Rosa	2,268	32.5	461	0	0	0	0	8	187	624	820	594			
37.	Santísima Trinidad	5,993	38.3	1,345	0	0	0	0	11	396	15,201	15,608	1,672			
38.	San Jorge	5,705	39.5	1,221	0	0	0	0	29	462	2,840	3,331	731			
39.	Itay	3,328	50.6	828	0	0	0	0	14	225	467	706	186			
40.	Luis A. De Herrera	6,885	38.8	1,489	0	0	0	0	8	527	2,979	3,515	667			
41.	Mburucuyá	11,115	42.2	2,765	0	0	0	0	20	783	2,444	3,247	1,077			
42.	Sajonia	2,257	34.9	380	6,096	0	0	0	7	126	14,397	14,530	767			
43.	Panamby Verá	3,821	36.1	805	0	0	1,210	7,306	6	275	830	1,111	291			
44.	Jara	15,450	27.9	3,331	0	0	0	0	49	1,510	7,816	9,396	1,261			

45.	Villa Aurelia	11,394	33.1	2,396	0	0	0	0	0	0	25	1,063	5,279	6,367	1,312
46.	Nú Guazú	37	62.3	16	0	0	0	0	0	0	0	2	382	384	128
47.	San Pablo	28,030	31.4	6,285	0	0	0	0	0	0	57	2,395	10,523	12,975	3,422
48.	Itá Pyá Punta	3,381	25.3	801	0	0	2,181	0	0	0	13	432	692	1,137	275
49.	Loma Pyta	6,661	26.6	1,527	3,600	35	0	0	0	0	13	435	4,164	4,612	469
50.	Virgen de la Asunción	12,499	26.2	2,903	0	0	0	0	0	0	25	1,318	2,879	4,221	977
51.	Bella Vista	5,344	28.3	1,168	0	0	0	0	0	0	25	495	702	1,283	298
52.	Gral. Andrés Rodríguez	8,319	27.5	2,128	0	0	0	0	0	0	14	630	2,222	2,866	579
53.	Terminal	5,475	24.8	1,222	17,568	1,478	0	0	0	0	5	472	9,615	10,092	1,182
54.	Santa Ana	8,515	38.6	2,144	0	0	0	0	0	0	8	710	2,410	3,128	895
55.	Salvador del Mundo	5,022	26.2	1,083	0	0	0	0	0	0	10	469	3,640	4,120	2,636
56.	Santa María	5,654	24.4	1,307	0	0	0	0	0	0	6	598	2,387	2,991	642
57.	Republicano	16,076	30.8	3,941	0	0	0	0	0	0	19	1,244	4,488	5,750	1,256
58.	Roberto L. Pettit	30,655	15.5	7,195	0	0	0	0	0	0	23	3,205	6,633	9,861	2,490
59.	Virgen de Fátima	7,304	16.1	1,819	0	0	0	0	0	0	12	873	1,090	1,974	408
60.	Itá Enramada	5,154	28.0	1,287	1,141	0	0	0	0	0	57	342	1,259	1,658	598
61.	De las Residentas	16,721	15.9	4,351	0	0	0	0	0	0	20	1,643	3,428	5,092	1,183
62.	Zeballos Cué	2,681	13.5	805	7,762	0	0	0	0	0	40	171	700	911	150
63.	Botánico	10,348	12.1	2,727	0	0	0	0	0	0	58	935	5,619	6,613	1,422
64.	San Blas	4,094	19.4	1,103	0	0	0	0	0	0	13	420	455	888	420
65.	Ricardo Brugada	9,174	4.9	2,257	0	0	0	0	0	0	23	888	1,237	2,148	583
66.	Tablada Nueva	5,210	11.4	1,306	8,910	360	0	0	0	0	25	667	3,502	4,193	828
67.	Bañado Tacumbú	4,445	13.3	801	0	0	0	0	0	0	19	264	523	806	248
68.	San Rafael	9,657	10.6	2,439	0	0	0	0	0	0	35	1,131	1,157	2,324	539
69.	San Felipe	5,148	11.0	1,271	0	0	0	0	0	0	22	369	2,801	3,192	1,072
70.	Bañado	1,259	2.8	345	6,403	48	0	0	0	0	3	176	465	644	70
71.	Banco San Miguel	0	0	0	0	0	0	0	0	0	0	0	56	56	0
ASUNCION (1-71)		593,577	35.6	127,943	162,704	9,634	28,078	200,416	2,069	46,268	2,069	46,268	489,016	537,353	121,846
72.	Lambaré Norte	53,744	41.5	13,595	6,867	0	0	6,867	0	0	69	4,593	17,455	22,117	4,690
73.	Lambaré Oeste	22,980	41.2	5,905	3,049	0	0	3,049	0	0	45	1,606	7,309	8,960	2,443
74.	Lambaré Este	83,196	36.6	23,106	8,358	0	0	8,358	0	0	129	6,212	12,849	19,190	5,986
LAMBARÉ (72-74)		159,920	39.3	42,605	18,274	0	0	18,274	0	0	242	12,412	37,613	50,267	13,119
75.	Fdo de la Mora Sur	74,160	38.7	18,329	12,474	739	0	13,213	0	0	123	5,093	29,099	34,315	8,519
76.	Fdo de la Mora Norte	80,960	27.4	20,043	16,839	0	0	16,839	0	0	119	6,882	25,824	32,825	8,758
FDO. DE LA MORA (75-76)		155,120	31.8	38,372	29,313	739	0	30,052	0	0	242	11,975	54,923	67,140	17,277
77.	Luque	337,519	36.4	92,256	72,305	1,218	98	73,621	1,394	0	30,577	30,577	57,611	89,582	24,126
78.	M.R. Alonso	109,749	36.4	31,046	21,497	52	0	21,548	333	0	333	13,312	21,363	35,008	8,420
79.	Villa Hayes	49,902	9.9	13,509	11,483	169	58	11,710	3,000	0	3,994	6,752	13,146	3,280	0
80.	Limpio	112,046	13.3	31,382	24,820	0	0	24,820	610	0	15,286	19,327	35,223	7,228	0
81.	San Lorenzo Norte	77,500	14.3	19,118	18,713	0	0	18,713	221	0	6,573	11,290	18,084	4,641	0
82.	San Lorenzo Central	206,200	28.7	44,551	45,031	721	18,831	64,582	198	0	10,833	57,361	68,393	16,722	0
83.	San Lorenzo Sur	206,700	17.0	55,895	33,305	0	0	33,305	370	0	15,824	30,373	46,566	13,675	0
SAN LORENZO (81-83)		490,400	21.2	119,563	97,049	721	18,831	116,601	789	0	33,230	99,024	133,043	35,038	0
84.	Nemby	109,699	14.7	29,351	24,586	89	0	24,675	308	0	14,486	19,286	34,080	7,368	0
85.	San Antonio	46,146	46.8	11,976	8,916	50	0	8,966	179	0	5,003	7,721	12,903	2,977	0
86.	Villa Elisa	81,922	42.8	22,153	16,365	0	0	16,365	158	0	8,117	19,905	28,180	9,082	0
AREA METROPOLITANA (1-86)		2,246,000	35.7	560,157	487,311	12,672	47,065	547,048	9,323	47,065	194,060	832,542	1,035,925	249,703	0

