

2-2-3 Post-implementation stage of development studies

In this section, impacts, sustainability in the process of utilizing the results of development studies, and sustainability of the counterpart government in implementing the projects related to development studies will be verified to confirm the possibility of developing the projects proposed and established as a result of implementing development studies as described in the previous section.

(1) Impacts

Reflection into development policies

The results of the three development projects evaluated have been fully utilized as blue prints for pertinent areas by the Dept. of Public Works Dept. of Human Settlement and Regional Development since 2000. The feasibility of plans was studied, then plans were formulated for the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II. These projects have been used as the basic implementation policy for flood control and provision of water distribution systems in the lower-stream area of the Jeneberang River. Projects similar to those planned so far are going to be implemented.

Also, the feasibility of projects was studied, then plans were formulated in the Ujung Pandang Water Supply Development Project. These plans have subsequently been used as the basic implementation policy for water supply projects, and projects based on these plans have been implemented.

As stated in the sections on efficiency and the possibility of self-sustaining development, food control and water supply projects have been actively promoted throughout the implementation and post-implementation stages of development studies. The Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II have been promoted mainly by the Directorate General of Water Resources, Dept. of Public Works²⁰ and under direct management by local project offices. The Ujung Pandang Water Supply Development Project, has been promoted by the Directorate General of Human Settlement Cipta Karya, Dept. of Public Works²¹.

The related government organizations showed positive attitudes toward utilizing

²⁰ The Indonesian Government was reorganized, and this project is currently managed by the Directorate General of Rural Development, Dept. of Human Settlement and Regional Development.

²¹ The Indonesian Government was reorganized, and this project is currently managed by the Directorate General of Urban Development, Dept. of Human Settlement and Regional Development.

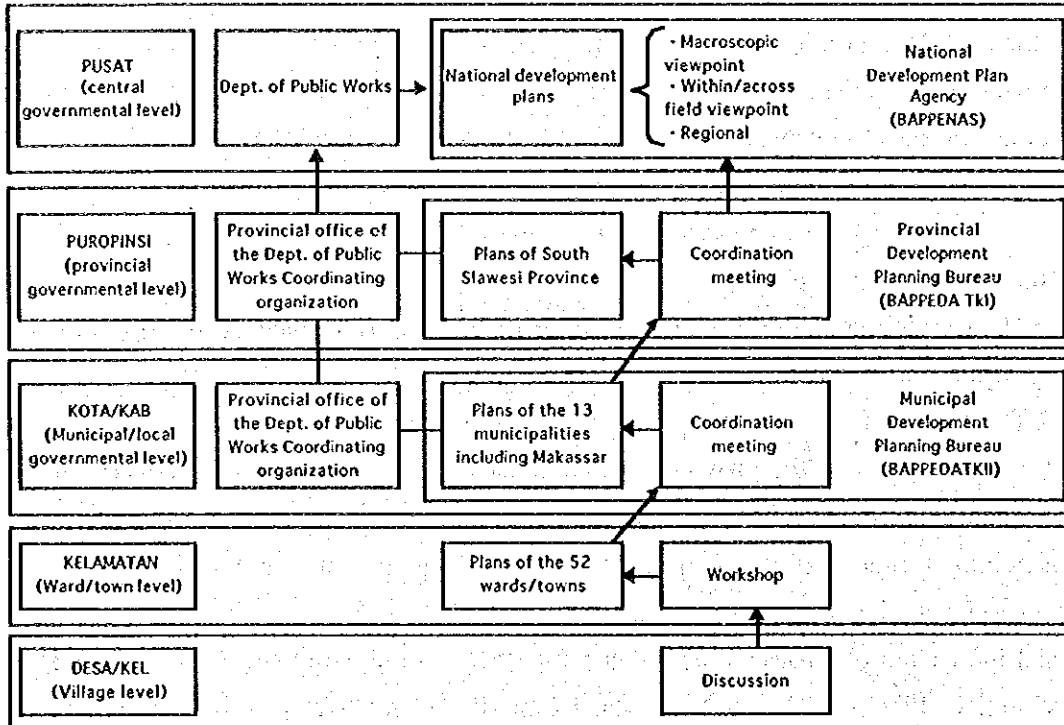
development studies from the beginning. The development studies were thus implemented on the assumption that the results of development studies will be utilized, rather than on the assumption that the measures for utilization would be taken by the related organizations after the completion of development studies. Therefore, the results of development studies were used to the maximum extent by the Dept. Of Public Works from the viewpoint of reflecting the development study results into the development policy, through there are some external factors such as fund procurement by the Indonesian Government.

Utilization of plans on local levels

The development study results have also significantly influenced the development policy of local governments on provincial and municipal levels.

The Development Planning Bureau BAPPEDA of Indonesia is participating in the formulation of plans on the provincial and municipal levels. The plans that cover multiple municipalities are managed by the Development Planning Bureau on the provincial level; plans within a municipality are managed by the Development Planning Bureau on the municipal level. Thus, the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II are managed by the Southern Sulawesi Regional Development Planning Bureau, and the Ujung Pandang Water Supply Development Project is managed by the Makassar Municipal Development Planning Bureau.

Figure 2-2-1. Relationships Between National Development Plans and Development Plans on the Provincial and Municipal Levels



In all three development projects evaluated, officials of the provincial or municipal development planning bureau participated as members of the counterpart team in the implementation stage. Therefore, the plans were well understood by the provincial and municipal development planning bureaus. The plans generated from the development projects evaluated thus influenced the development policy on the provincial and municipal levels.

Development into the next-phase development studies and forming of projects

Projects proposed as a result of development studies will be presented by the Development Planning Bureau BAPPEDA of the pertinent department on the provincial or municipal level. When the Development Planning Bureau of the central government BAPPENAS has approved such a plan, government funds will be assigned to implement it. Furthermore, each department prepares a proposal and submits it to the Development

Planning Bureau, BAPPENAS. It is then recorded in the blue book ²², and a request will be submitted to the donor organization. After the proposal is approved by the donor organization, funds will be assured for the next-phase development studies and for developing projects. The three development projects evaluated here developed into next-phase development studies and project formation after completing these processes.

Next-phase development studies

In some cases, the next-phase development study is a detailed design as a preliminary stage for developing a project. In the Jeneberang River repair project and the Bili Bili dam construction project proposed from the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II, detailed design ²³ was implemented by funds from OECF (currently JBIC); the Jeneberang River repair project and the Bili Bili multipurpose dam construction project were then implemented. In addition, detailed design of the First-term project first and second phases (proposed out of the Ujung Pandang Water Supply Development Project) was implemented first by funds from the OECF, then the Ujung Pandang water supply facilities project was implemented.

Table 2-2-6. Next-phase Development Studies Implemented Based on the Results of Development Studies

Target name	Project name	Description	Year completed	Fund
Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II	Jeneberang River Repair Project ES	Detailed design implemented to repair the Jeneberang River as a prerequisite for forming a project	1984	OECF
	Bili Bili multipurpose dam construction project ES	Detailed design implemented for constructing the Bili Bili dam as a prerequisite for forming a project	1988	OECF
Ujung Pandang Water Supply Development Project	Ujung Pang Dang water supply project	Detailed design for the First-term plan, First-phase plan, detailed design for improvement project	1989	OECF
	Part of Ujung Pang Dang water supply improvement project	Detailed design for the First-term plan Second-phase plan D/D of the Sonbaopu filtration plant	1993	OECF
	Master Plan and Improved Management of Water Supply Through Public, Private Partnership in Greater Makassar	Master Plan for Improved Management of the Water Supply Through Public, Private Partnership in Greater Makassar	Started on 1999	IBRD

The above detailed designs are next-phase development studies that are directly related to the projects generated by development studies. In addition, some next-phase

²² This means the record of projects with higher priorities called the List of Projects and Technical Assistance Proposals, which is usually called the blue book.

²³ This is called ES = Engineering service in JBIC.

development studies are indirectly related to the projects proposed. As an example, one development study combines the master plans of the water supply project for the peripheral area of Makassar and the project for the improved management of water supply operations that was commenced using funds from IBRD. For that case, the inception report was just completed at the end of 1990. Furthermore, this case focuses on improving management, an aspect not covered by the three development projects to be implemented by Japan. Under the present conditions, almost all plans generated from the development studies implemented by Japan have been formed into projects. This case can thus be considered a kind of next-phase development study.

Forming into projects

With regard to forming projects, all plans generated from the three development projects evaluated have been recorded in the blue book of the BAPPENAS and most of them have been formed into projects by OECF funds.

Plans generated from the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II were formed into projects through OECF funds after their scope of project and details was further filtered through detailed design; most of them have already been completed.

Also, all plans generated from the Ujung Pandang Water Supply Development Project that were examined and proposed in F/S have been formed into projects. OEDF funds were used to construct filtration plants and provide water supply and distribution facilities, and Indonesian Government funds were used to improve filtration plants.

Table 2-2-7. JBIC Items Formed Into Projects in Connection with Development Studies

Project	JBIC items formed into projects in connection with development studies	Loan contract date
<p>Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II</p>	<p>Emergent Jeneberang River Flood Control Project</p>	<p>1985</p>
	<p>Pang Pang River Development Project</p>	<p>1992</p>
	<p>Bili Bili Multipurpose Dam Construction Project 1</p>	<p>1990</p>
	<p>Bili Bili Multipurpose Dam Construction Project 2</p>	<p>1992</p>
	<p>Bili Bili Multipurpose Dam Construction Project 3</p>	<p>1994</p>
	<p>Power Generation Project on the Multipurpose Dam</p>	<p>1996</p>
	<p>Bili Bili irrigation project</p>	<p>1996</p>
<p>Ujung Pang Dang Water Supply Development Project</p>	<p>Ujung Pang Dang Water Supply Facilities Improvement Project</p>	<p>1988</p>
	<p>Ujung Pang Dang Water Supply Project</p>	<p>1993</p>

Plans generated from development studies and the items formed into projects are summarized below.

Table 2-2-8. Lower Jeneberang River Flood Control Project

Projects generated from development studies		Results of the projects implemented in reference to development study results	Year completed	Source of funds
Overall flood control project				
Flood control project on the Jeneberang River	Jeneberang River will be repaired and Bili Bili dam will be constructed to adjust the assumed flow rate of the Jeneberang River (3,700 m ³ /sec on assumption of large floods on every 50 years to 2,500 m ³ /sec.	Will be covered in the reservoir and dam construction project in Phase II.	1998	OECS/ Government of Indonesia
Drainage system improvement project	Drainage requires pumping because the outer water level of the drainage is higher than the minimum ground level. Therefore, drainage pumps and water gates will be installed, drainage systems will be repaired, land will be purchased, and houses will be moved.	Pang Pang River Improvement Project. Improvement of Pang Pang River, 11.2 km; Santang drainage, 1.4 km; Permainans drainage, 1.5 km; Gowa drainage, 27 km; Bridges, 10; Adjustment pond, adjusting capacity of 1.3million m ³ ; pump facility, 2 m ³ /sec x 3.	To be completed by the end of 2000.	OECS/ Government of Indonesia
Emergency flood control projects to be given higher priorities based on the overall flood control project				
Flood control project on the Jeneberang River	Repair the Jeneberang River to adjust the assumed flow rate of the Jeneberang River of 2,500 m ³ /sec on assumption of large floods on every 10 years to 2,100 m ³ /sec.	Will be covered in the flood control project in Phase II.	1993	OECS/ Government of Indonesia
Drainage system improvement project	Repair and excavate drainage systems, install bulkheads, and replace bridges to improve the drainage system.	Panampu drainage, 4,940 m; Jpegaya drainage, 6,570 m; Sirijala drainage, 2,370 m; pavement of drainage wall protection, 13,870 m; bridges, 23; pedestrian bridges, 12; water gates 2; under-drain	1993	OECS/ Government of Indonesia

Table 2-2-9. Jeneberang River Flood Control Project Phase II

Projects generated from development studies		Results of the projects implemented in reference to development study results	Year completed	Source of funds
Reservoir and dam construction project:				
A dam with an effective capacity of 304 x 106 m ³ will be constructed to provide flood control on the middle Jeneberang River and secure water sources.				
For water storage	Of the effective capacity of 304x10 ⁶ m ³ , 258 x 10 ⁶ m ³ will be used for city and industrial water.	Dam rock-fill type Central dam - Head, 73 m from the base; height of the top, 106 m EL; width of the top, 10 m. Left wing dam - Head, 46 m from the base; height of the top, 106 m EL; width of the top, 10 m. Right wing dam - Head, 52 m from the base; height of the top, 106 m EL; width of the top, 10 m. Discharge facility - Discharge capacity, 2,000 m ³ /sec; height, 91.8 m EL; width of the top, 14 m; water gate, 2 units Water-intake facility slide type - normal water level, 99.5 m	1998	OECF/ Government of Indonesia
For flood control	Of the effective capacity of 304x10 ⁶ m ³ , 46 x 10 ⁶ m ³ will be used for flood adjustment.	Water storage Water storage area, 354.4 km ² ; flooding water level, 103 m EL; normal water level, 99.5 m; storage capacity, 375,000,000 m ³ ; flood adjustment capacity: 41,000,000 m ³ ; water supply capacity: city water 35,000,000 m ³ ; irrigation water 210,000,000 m ³ .		
Flood adjustment project				
The assumed flow rate of the Jeneberang River of 3,700 m ³ /sec on assumption of large floods on every 50 years will be adjusted to 2,300 m ³ /sec.				
River expansion project upstream and downstream of the Sang Minasa bridge	The river will be widened from the river-mouth to 20 km upstream to limit the flow rate downstream from the Sang Minasa bridge to 2,300 m ³ /sec and the upstream to 1,300 m ³ /sec assuming large floods every eight years.	Dredging		
Construction of the Garashi discharge channel	The course of the Garashi River, which joins the Jeneberang River near the River-mouth, will be changed by constructing a discharge channel so that it flows directly into the sea.	Construction of the Garashi discharge channel: 1,100 m		
Elevation of roads	The road with an extension of 3,000 m, which passes between the Jeneberang River and the city, will be elevated to prevent submersion.	Elevation of the Maino road: 460 m	1993	OECF/ Government of Indonesia
Provision of drainage	Drainage will be provided for 3,000 m on the right bank and 9,000 m on the left bank downstream of the Sang Minasa bridge.	Drainage: A total of 7,110 m		
Provision of riverside facilities	River walls, water-breaks, and bases will be paved to assure the safety of riverside areas.	Pavement of river wall: High-water wall, 6,480 m, low water wall, 6,350 m; bank, 20 km; bases, 2; water breaks, 43; pier for protecting the river mouth, 300 m; bridge, 1; bridge base		
Water supply				
Water-intake facility	A water-intake facility will be constructed to assure 2,300 l/sec of water supply from the Bili Bili dam.	Construction of the water-intake facility	1998	OECF/ Government of Indonesia
Water pipeline	A 25km, 1.5m diameter water pipeline will be installed from the Bili Bili dam to the filtration plant.	Water pipeline: 16 km from the Bili Bili dam to the Sorbaopa filtration plant		
Irrigation system				
Irrigation systems will be installed to prevent the shortage of irrigation water during the dry season so that 19,200 ha of the 24,000 ha irrigated during the rainy season can be irrigated during the dry season as well.				
Bili Bili system (5,000ha)	A channel connecting the water-intake port with the existing irrigation channel and water-intake port will be constructed and related facilities will be improved.	Construction of the Bili Bili dam, Bisua dam, and Bisua irrigation channel; improvement of the Kaspiri dam and Bili Bili irrigation channel.	To be completed by the end of 2000	OECF/ Government of Indonesia
Kaspiri system (19,000ha)	A total length of 2,500 m of narrow channel and related facilities will be improved.			
Hydraulic power generation				
Power generating facility	A power plant with a power generation capacity of 11,200 kW will be constructed.	Conduit, water gate, turbine, converter, transmission line	To be completed by the end of 2000	OECF/ Government of Indonesia
Power transmission lines	15-km, 30-kV power transmission lines will be installed.			

Table 2-2-10. Ujung Pangdang Water Supply Development Project

M/P

Projects generated from development studies		Results of the projects implemented in reference to development study results	Year completed	Source of funds
First-term project up to 1995 Water source: Surface water of the Malos River and Jeneberang River				
Water-intake and water pipeline facilities	<p>The existing Malos water pipeline from the Rekopanchin water-intake port to the Panaikan filtration plant, particularly the water pipeline near Panaikan, where 30% of the water transported is lost, will be repaired.</p> <p>The height of the Bili Bili water-intake dam will be increased to facilitate water intake.</p> <p>A water-intake facility to enable water intake of 1,000 l/sec will be constructed in the Bili Bili irrigation water pipeline.</p> <p>A 20.5km long, 1,100mm diameter water pipeline will be constructed between the Bili Bili water-intake dam and the newly constructed Mangasa filtration plant.</p>	Refer to the table of F/S because feasibility is examined in F/S.		
Filtration plant	<p>(First phase)</p> <p>Repair and improve the Ratorangi filtration plant.</p> <p>Increase the filtration capacity of the Panaikan filtration plant.</p> <p>Construction the Mangasa filtration plant with a capacity of 500 l/sec.</p> <p>(Second phase)</p> <p>Increase the Mangasa filtration plant capacity to 1,000 l/sec.</p>	Refer to the table of F/S because feasibility is examined in F/S.		
Water supply and distribution facilities	<p>(First phase)</p> <p>Replace 5,600 private tap meters and 55km of water distribution pipe.</p> <p>Construct 4,000 m³ water distribution ponds.</p> <p>Install three 170kW water distribution pumps.</p> <p>Installation 115km of main and branch water distribution pipes.</p> <p>Install 1,800 public taps and 80 fire hydrants.</p> <p>Install 40,000 private tap meters.</p> <p>(Second phase)</p> <p>Construct 4,000 m³ water distribution ponds.</p> <p>Install two 340kW water distribution pumps.</p> <p>Installation 111km of main and branch water distribution pipes.</p> <p>Installation 100 public taps and 30 fire hydrants.</p> <p>Install 12,000 private tap meters.</p>	Refer to the table of F/S because feasibility is examined in F/S.		
Second-term project up to 2005 Water source: Surface water of the Malos River and Jeneberang River				
Water-intake facility	Construct a 3,000l/sec water-intake facility downstream of the Bili Bili dam.	Will be covered by the water supply plan out of the Jeneberang River Flood Control Project Phase II.		
Water pipeline facility	<p>Construct a 1,350mm x 2.9 km water pipeline from the Bili Bili dam to the water-intake well near the irrigation channel.</p> <p>Construct 900 mm x 20.5 km water pipeline from the water-intake well to the Mangasa filtration plant.</p>	Will be covered by the water supply plan out of the Jeneberang River Flood Control Project Phase II.		
Filtration plant	<p>(First phase)</p> <p>Increase the Mangasa filtration plant capacity to 2,000 l/sec.</p> <p>(Second phase)</p> <p>Increase the Mangasa filtration plant capacity to 3,000 l/sec.</p>	Not yet implemented.		
Water supply and distribution facilities	<p>(First phase)</p> <p>Construct 7,500m³ water distribution ponds.</p> <p>Install two 340kW water distribution pumps.</p> <p>Install 142km of main and branch water distribution pipes.</p> <p>Install 100 public taps 100 and 40 fire hydrants.</p> <p>Install 31,000 private tap meters.</p> <p>(Second phase)</p> <p>Construct 7,500 m³ water distribution ponds.</p> <p>Install two 340kW water distribution pumps.</p> <p>Install 84km of main and branch water distribution pipes.</p> <p>Install 100 public taps and 30 fire hydrants.</p> <p>Install 37,000 private tap meters.</p>	Not yet implemented		

(First-term projects from F/S-M/P)

Projects generated from development studies		Results of the projects implemented in reference to development study results	Year completed	Source of funds
New construction/expansion				
Bili Bili water-intake dam	First phase - Achieve a water-intake capacity of 500 l/sec. Second phase - Achieve a water-intake capacity of 1000 l/sec.	Will be covered by the water supply plan out of the Jeneberang River Flood Control Project Phase II.		
Construction of the Mangasa filtration plant	First phase - Achieve a filtration capacity of 0.52 m ³ /sec. Second phase - Achieve a filtration capacity of 1.03 m ³ /sec.	Construct the new Sorbaopu filtration plant. Moved from Mangasa to Sorbaopu, where soil conditions are suitable. Filtration capacity: 1000 l/sec.	2000	OECF/ Government of Indonesia
Repair/improvement				
Malos water pipeline	Repair the existing Malos water pipeline from the Rekopanchin water-intake port to the Panaikan filtration plant, particularly near Panaikan, where 30% of water transported is lost.	Install fences along 4 km in the down stream area.	1993	OECF/ Government of Indonesia
Ratorangi filtration plant	Replace the filtration sand, install flow rate meters, and repair the alumina sulfate injecting facility to keep the Ratorangi filtration plant (constructed in the 1920s and planned to be abandoned when the Mangasa filtration plant is completed in the target year of the First-term project 1995) in a state where it can provide a sufficient water supply until it is abandoned.	Replace filtration sand, install flow rate meters, and repair the alumina sulfate injecting facility.		
Panaikan filtration plant	The 500l/sec filtration facility that will be completed in 1987 will be further expanded to a capacity of 600 l/sec. Water-water sludge, which has so far been discharged to nearby streams, will be reused.	Enhance chemical injecting facilities and install sedimentation basins.		
Water distribution pipe network and water taps	Replace aging water distribution pipes installed more than 50 years ago that are leaking and decreasing the flow and water quality due to deposits. Only 11% of the water taps have meters; of these, 20% have failed. Meters of these taps must therefore be installed.	Trunk pipe: 17,000 m Branch pipe: 140,000 m Water distribution equipment meters: 18,000		

Effects of implemented projects on the subject area

i) Flood adjustment

Projects implemented have significantly affected flood control. Improved flood control achieved through the Bili Bili dam and river repair projects, which were generated from development studies, has surely prevented flooding of the Jeneberang River since the completion of these projects.

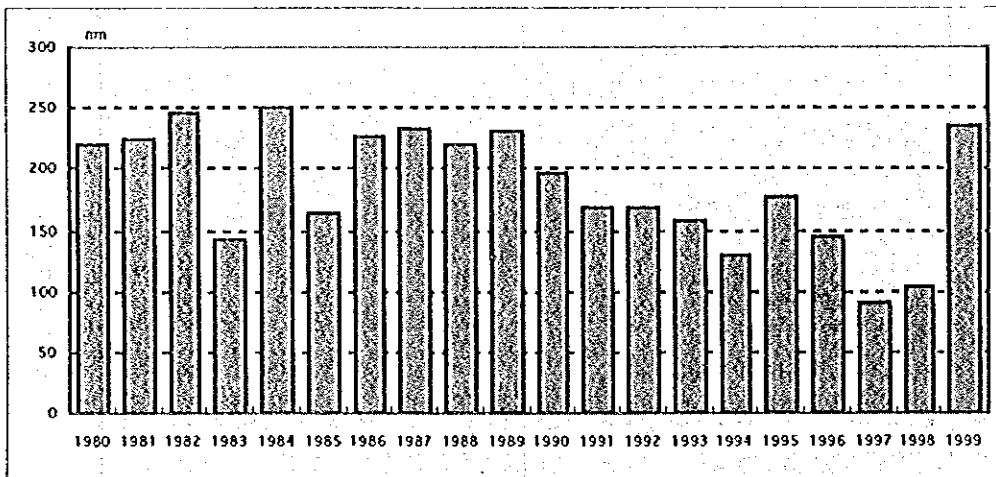
Two relatively large flood disasters occurred during the past 25 years partially because of flooding of the Jeneberang River. The first was the flood in Jan. 1976, which immersed 20 km² of immersion due to the flooding from the Jeneberang River near Sangminasa. The next was the flood in Jan. 1986, which immersed 7 km² due to flooding of the lower Jeneberang River near Tanglupatonpo.

Table 2-2-11. Flooding in the Lower Jeneberang River in 1976 and 1986

Flood	Rainfall	Immersed area	Cause
Jan. 1976	276 mm	20 km ²	Heavy rainfall and flooding from the Jeneberang River near Sangminasa.
Jan. 1986	205 mm	7 km ²	Heavy rainfall and flooding from the Jeneberang River near Tanglupatonpo.

Though rainfall exceeding the maximum daily rainfall in 1986 has been observed since then, particularly after the completion of flood control work on the Jeneberang River, no flooding from the Jeneberang River has occurred.

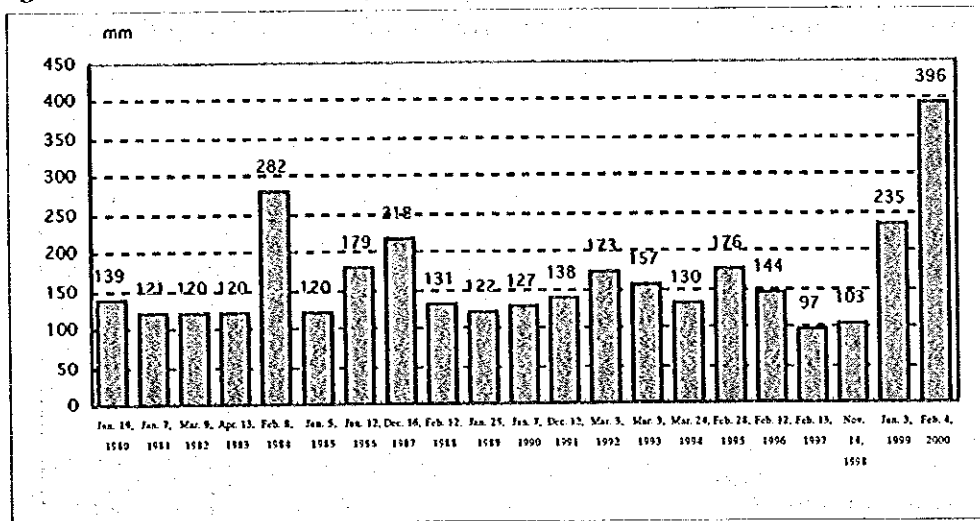
Figure 2-2-2. Maximum Daily Rainfall in the Lower Jeneberang River 1980 to 99



However, flood control on the Jeneberang River alone cannot prevent immersion damages downstream of the Jeneberang River. To mitigate immersion damage, it is also necessary to enhance the drainage from the inner water area to the outer water area in order to accommodate heavy rainfall. In particular, the ground level of Makassar City is relatively low, so it is subject not only to flooding but also vulnerable to tidal influences.

Drainage channels and pump facilities are being constructed on the Pang Pang River to enhance the ability of Makassar City to drain water to outer areas. After their completion, they can be expected to further mitigate immersion damage and to facilitate flood control on the Jeneberang River.

Figure 2-2-3. Maximum Daily Rainfall in Makassar City



Ujung Pandang Observation Point Data

As a recent example, the downstream area of the Jeneberang River suffered from a heavy rainfall in February 2000. Rainfall of 396mm was measured in Makassar City; this was the largest rainfall in several tens of years. Though some immersion damages occurred due to rainwater, flooding from the Jeneberang River was successfully prevented due to the flood control measures implemented on the Bili Bili dam. The flow rate of river water was estimated to be 3,000 m³/sec without the Bili Bili dam flood control measures²⁴ but was 1,400 m³/sec with the dam flood control measures implemented, so no rivers flooded. Flooding from the Jeneberang River probably would have been inevitable if the flood control measures of the dam had not been implemented, and it can be easily imagined that the immersion damage in that case would have been quite serious.

ii) Water supply

Improved pure water supply capacity through construction of filtration plants

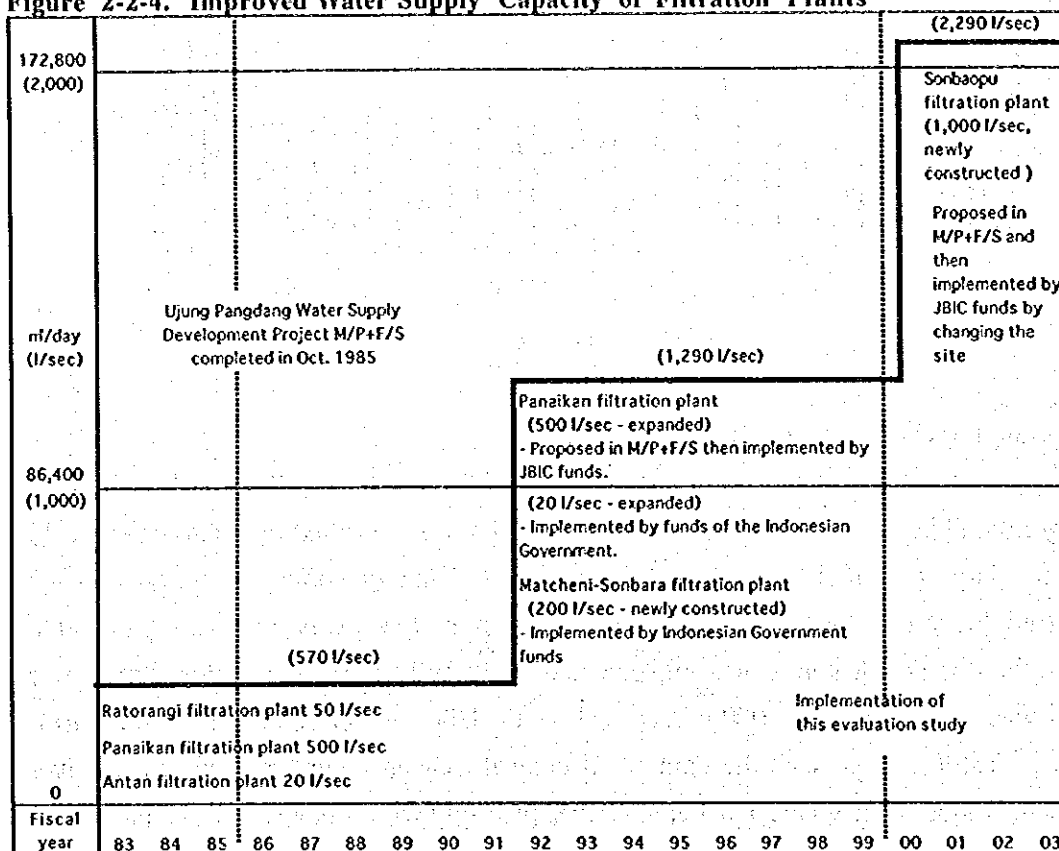
In the Ujung Pandang Water Supply Development Project, the Panaikan filtration plant expansion project and the Mangaza filtration plant construction project were proposed to improve filtration capacity in Makassar City. The Panaikan filtration plant expansion project was implemented with funds of the Central Government of Indonesia, and the Mangaza filtration plant construction project, by funds of the OECF (currently JBIC) by changing the site to Sonba Opu.

Furthermore, apart from these projects, the Antan and Matcheni-Sonbara filtration

²⁴ Estimation by a local expert.

plants were constructed using funds of the Indonesian Government. As a result, the pure water supply capacity in Makassar City was improved from 577 l/sec during development studies to 2,900 l/sec.

Figure 2-2-4. Improved Water Supply Capacity of Filtration Plants



Reference data: PDAM Ujung Pangdang, Chronological Study and Implementation of Ujung Pangdang Water Supply Development.

Reducing the volume of non-revenue water: Reducing treatment loss

Providing filtration plants developed from implementation of projects from the Ujung Pangdang Water Supply Development Project has reduced the volume of non-revenue water caused by treatment loss.

Table 2-2-12. Ratio of non-revenue water to the total water production (%)

		91	92	93	94	95	96	97	98
Non-revenue water	Treatment Loss	13	12	15	18	12	9	9	9
	Distribution/Billing Loss	47	43	44	41	28	30	26	44
Revenue water		40	45	41	41	60	61	65	47

Issue : Montgomery Watson, "Master Pplan and Improved Management of Water Supply Through Public, Private Partnership in Greater Makassar" , 1999 .

It is noteworthy that the treatment loss has been decreasing since 1994 as shown in the table above, probably because the Matcheni-Sonbara filtration plant with a filtration capacity of 200 l/sec was constructed in 1994. New construction of filtration plants not only increases the water supply but also reduces the ratio of treatment loss to the total water produced in the city.

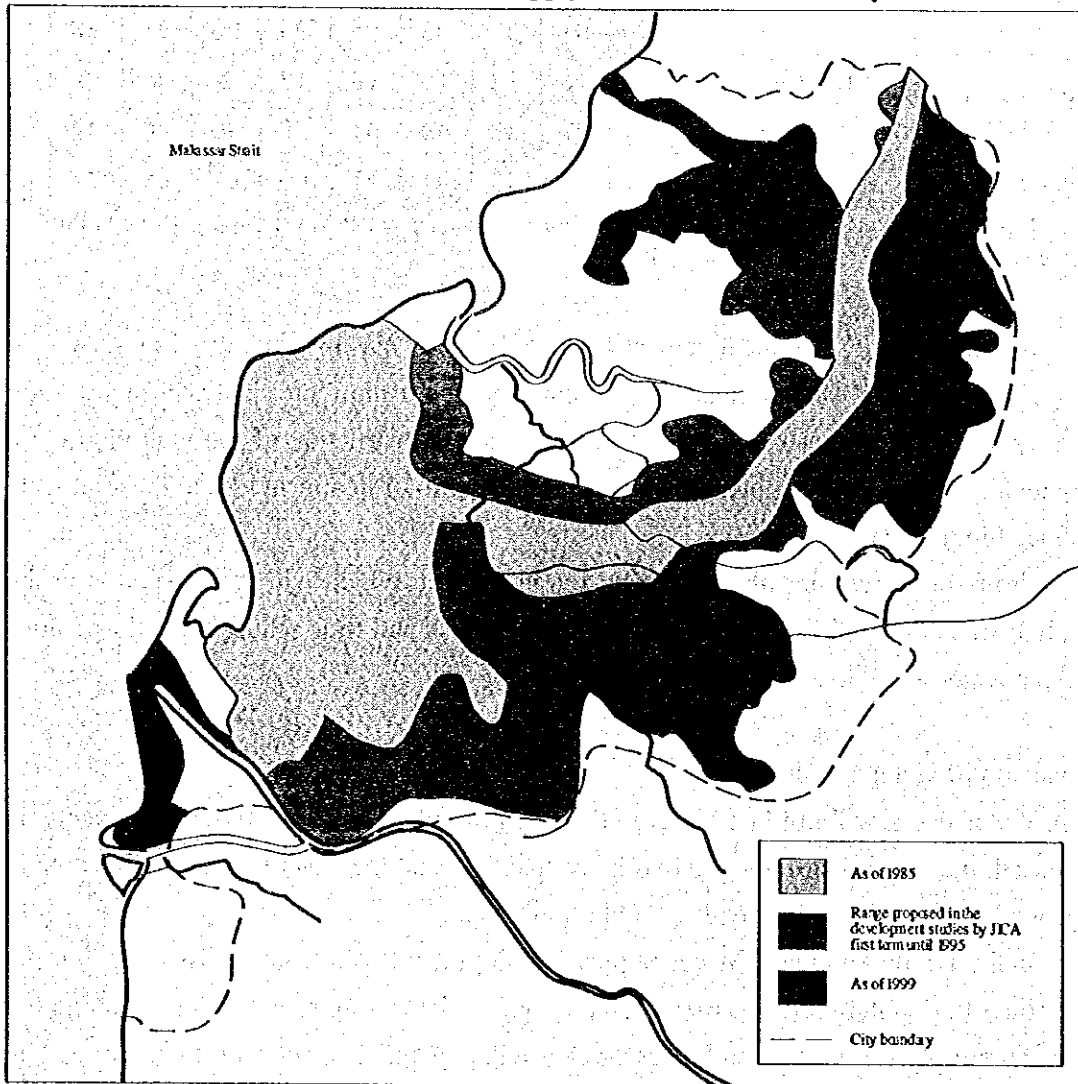
From this viewpoint, the Sonbaopu filtration plant, which will start operation in the first half of 2000, will further reduce the treatment loss and thus reduce the ratio of non-revenue water to the total water produced.

Expansion of water supply area

Water users will not benefit from the water supply unless the filtration capacity is increased, the water distribution network is expanded, and the water supply service area is expanded such as through providing public water taps.

In the Ujung Pandang Water Supply Development Project, it was assumed that the water distribution network was expanded through implementing proposed projects and that the water supply service area in Makassar City will expands from 40 km² to ???km². The proposed projects were implemented using funds from the Government of Indonesia and from JBIC and provided water distribution pipes. At the time of evaluation, the actual service area (95km²) already exceeded the area to be covered by the proposed projects. The figure below shows the expansion of water supply service are on the map.

Figure 2-2-5. Expansion of the Water Supply Area in Makassar City



Increase in population requiring water supply service and the percentage receiving service

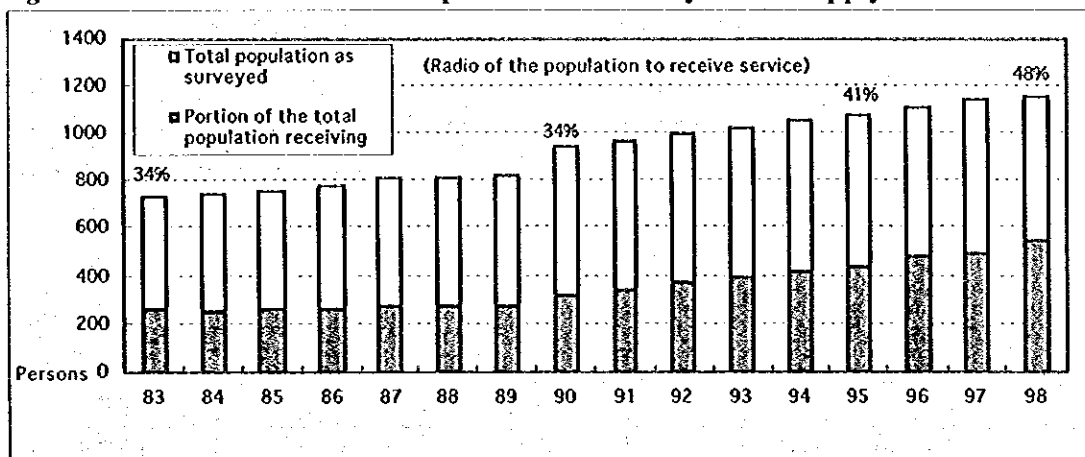
In the report on the Ujung Pandang Water Supply Development Project, 34% of the population received water supply service in Makassar City as of 1983. In comparison, 48% received water supply service as of 1998²⁵. The number of people receiving water supply service thus increased from 262,000 in 1983 to 549,000 in 1998.

Filtration plants and an expanded water distribution network, provided through projects proposed in the Ujung Pang Dang Water Supply Development Project, have contributed

²⁵ Surveyed by the MCI P.T. Mitrapacific Consulindo International.

significantly to the increases in the population to receive water supply service and the percentage of the population receiving such service.

Figure 2-2-6. Transition of the Population Covered by Water Supply



Based on survey by Montgomery Watson.

However, the improved pure water supply capacity and developed water distribution pipe network do not directly increase the population receiving water supply service and the ratio of such population. Actually, potential beneficiaries in the area where water distribution pipe network is provided are given the opportunity to connect to the water supply but do not always do so.

According to a survey by consultant firm Montgomery Watson in 1999, there are 262,037 households in the district under the control the Makassar Water Supply Public Corporation, 23% of which (67,363 households) are connected to a water distribution pipe. Furthermore, a survey on Willingness to Connect found that 35% of population wants to connect immediately and that 36.3% want to connect later on (3.8% did not respond). These figures seem to suggest that citizens of Makassar City are not willing to connect to water supply. Furthermore, over 65% stated they did not want to connect because it is too expensive to connect and water rates are too high²⁶.

“Willingness to Connect” also correlates with the income of candidate beneficiaries,

²⁶ During the 1980s, when the Ujung Pandang Water Supply Development Project was being implemented, few were aware of the concept of Willingness of Connect. Furthermore, it would be difficult to predict the “Willingness to Connect” now after more than 10 years have passed.

so the rate of connection should improve in pace with the increasing income level in the Makassar district.

Increased water supply and demand volumes

According to the data of the Makassar City Water Supply Public Corporation, water production increased from 631 l/sec to 1,334 l/sec from 1990 to 1998. At the same time, demand for supply water increased from 285 l/sec to 632 l/sec. In this case, the difference between the water produced and demand for water supply represents the volume of non-revenue water because the demand for water supply is the volume of supply water that the PDAM was able to sell²⁷.

Table 2-2-13. Water Produced by the Makassar City Water Supply Public Corporation PDAM and Demand for Water Supply

	90	95	98
Water produced (l/sec)	631	927	1334
Demand for water supply (l/sec)	285	552	632

Figures are based on PDAM data.

Increased pure water supplying capacity and an expanded water distribution pipe network also contributed to the increases in water produced and water supply demand. Added filtration plants and an expanded water distribution pipe network increased the number of people accommodated by water supply services. This also increased the opportunities for candidate beneficiaries to connect to the water supply.

However, demand for water supply largely depends on the will of candidate beneficiaries to connect to water supply. The stronger the will of the candidate beneficiaries becomes, therefore, the greater the demand for water supply will become and thus the beneficiaries of water supply will increase.

²⁷ Here, we assume that Non-revenue water = Water produced - Revenue water. The difference between Water produced and Revenue water includes the Treatment Loss, leakage, and non-paid water.

(2) Sustainability in the post-implementation stage of development studies

Sustainability in utilizing the results of development studies in the post-implementation stage

As previously described, most proposals generated from the three development projects in this evaluation study became projects funded by the central government or by JBIC. For proposals generated from development studies to become projects, a suitable structure must be provided. Most of the studies in the three development projects of this evaluation study became projects because, as described above, a structure for utilizing development studies had been provided in the Dept. of Public Works as the counterpart organization and positive efforts were made.

For the plans generated from development studies to become projects funded by the government, a proposal must be submitted to BAPPENAS so these projects can be incorporated into the national annual budget by the pertinent governmental department or local government. Such proposals are examined for conformity with the basic principles in the national 5-year plan REPELITA, development policy, national objectives, and policies for each field and region. They are then summarized in the draft of the national annual budget and examined together with proposals submitted by other departments²⁸. Such projects will ultimately transit to the implementation stage after the People's Representative Assembly has passed the national yearly budget.

For proposals to become projects funded by JBIC and other overseas donor organizations, the proposals must be submitted by the pertinent governmental department and recorded on the BAPPENAS blue book. Projects will be subjected to further detailed examination by the Dept. of Finance, and BAPPENAS will ultimately issue a request for funds to the liaison desk of each participating country.

In this process, the Dept. of Public Works, which drafted the proposal for implementing projects, made positive efforts to form projects, enabling projects to secure the funds for implementation. Ultimately, most of the proposals generated from development studies were utilized in forming projects.

²⁸ According to BAPPENAS, the efforts to align the REPELITA and the draft national budget began after the transition to the current sixth five-year plan. Therefore, the alignment between the national budget and development projects was probably lower 15 to 20 years ago, when the proposals generated from development studies began to be utilized for forming projects, than at present.

Sustainability of the counterpart government in projects related to development studies

The projects developed from the proposals generated from the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II include those projects that are still in progress, such as the Bili Bili Irrigation Project and Power Generation Project on the Multipurpose Dam. The Secretary Office for the Jeneberang Project was established in the Directorate General of Rural Development, Dept. of Human Settlement and Regional Development (formerly the Directorate General of Water Resources, Dept. of Public Works) as the counterpart organization to manage the progress of implemented projects. The Secretary Office includes a few members of the counterpart team that participated in the development studies. These persons are still involved in implementing projects, so the technology and knowledge transfers during the development studies are being handed down.

Except for the Sonbaopu filtration plant, which will start operating by the end of 2000, all projects developed from the proposals generated from the F/S portion of the Ujung Pandang Water Supply Development Project have been completed and are now being operated and managed by the Makassar City Water Supply Public Corporation, PDAM-KMUP. The Makassar City Water Supply Public Corporation was established in 1976 as a government water supply company and has been managing the water supply in Makassar City ever since. Details of this development project have been fed back from time to time since the implementation stage, so liaisons with the Dept. of Public Works seem to have been sufficiently maintained.

2-2-4 Conclusions

The three development projects considered in this evaluation study can be judged to be generally successful based on examination of the implementation stage of development studies, the system during implementation, and utilization after the implementation of development studies and the utilizing system.

In the implementation stage, all of the three development projects considered in this evaluation study reflected the needs of that time, so their implementation was timely. Development studies for the Lower Jeneberang River Flood Control Project and Jeneberang River Flood Control Project Phase II were implemented because the necessity of flood control was high; development studies for the Ujung Pandang Water Supply Development Project were implemented because the demand for water supply was expected to increase.

It was impossible to obtain sufficient information sources to judge how effectively the development studies were conducted because the projects evaluated were implemented from the end of the 1970s to the mid-1980s, some 15 to 20 years earlier. However, members of the counterpart team at that time remember that there were no problems in communication between the Japanese and Indonesian teams and that the counterpart team participated positively in development studies, in spite of the many years that had passed since then. However, the credibility of this information is low due to the small number of persons contacted.

Furthermore, development studies were implemented efficiently because a system for fully utilizing the results of development studies from the implementation stage to the post-implementation stage was initiated by the Dept. of Public Works (currently the Dept. of Human Settlement and Regional Development) as the counterpart organization at that time.

Also, plans proposed during the implementation stage of development studies were fully utilized in the post-implementation stage, and, as a result, the expansion of food control and water supply was significantly influenced throughout the whole area.

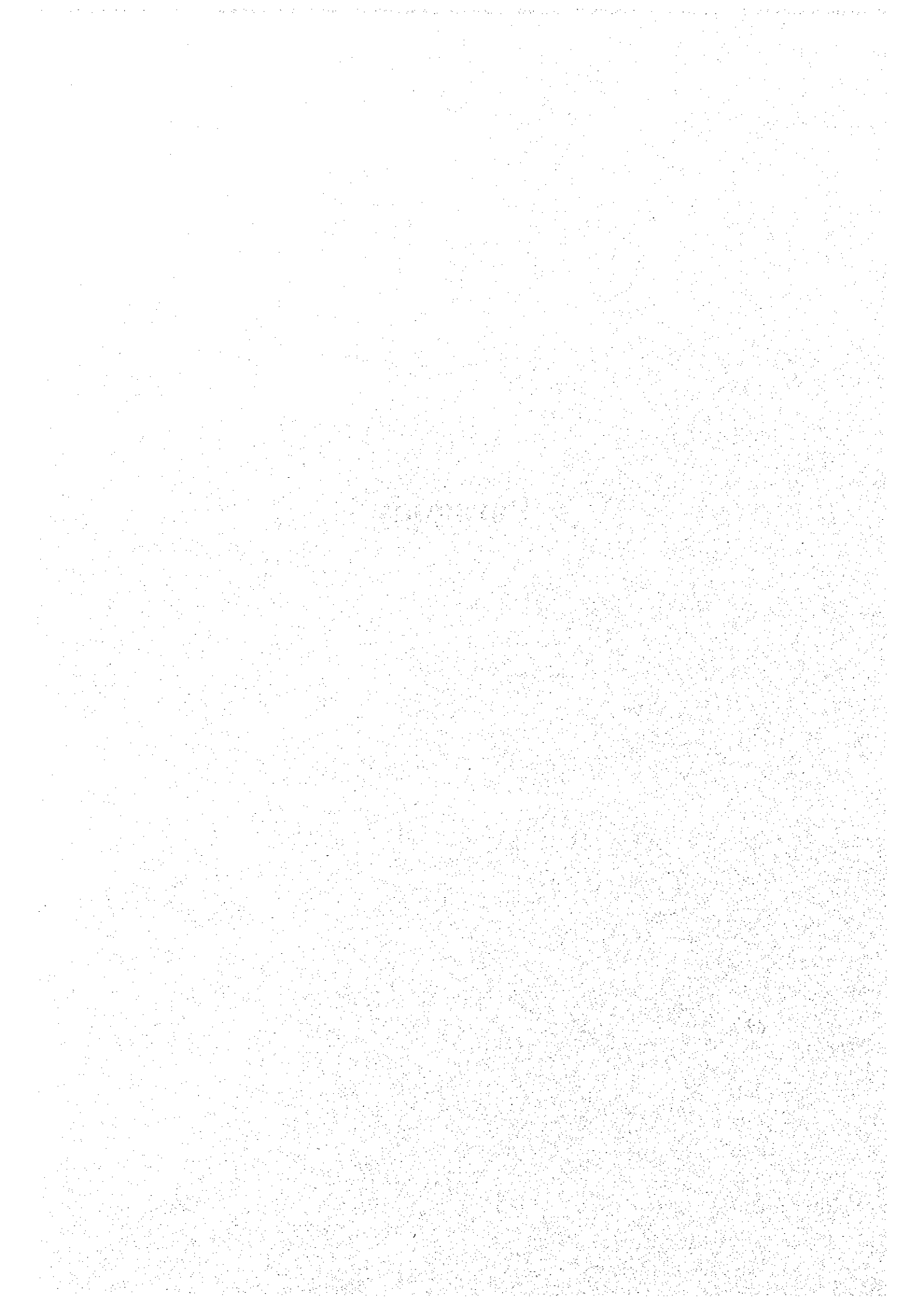
Proposals generated from development studies served as blue prints for policies on flood control and water resource development in the lower stream area of the Jeneberang river and for providing water supply facilities for Makassar City. Furthermore, most of the proposed plans developed into next-generation development studies and projects.

Flood control projects implemented for the Jeneberang river prevented rivers from

flooding, even though the heaviest rain in several decades fell in 2000. Furthermore, the enhanced water supply improved the water supply receiving rate because providing filtration plants and expanding the water distribution pipe networks increased the pure water supply capacity.

An appropriate system for utilizing development studies was provided and survey results were smoothly tied to utilization in the post-implementation stage due to the positive measures taken by the Ministry of Public Projects, which had been the counterpart organization for the three projects evaluated since the implementation stage. Furthermore, this Ministry initiated various administrative processes and efforts to secure funds for developing proposals generated from development studies into projects.

Paraguay



2-3 Paraguay

Table 2-3-1. Projects Evaluated in Paraguay

Project	Field	Type of study	Period of implementation	Counterpart organization in the recipient country
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area	Transport/urban traffic	M/P	Aug. 1984 to Aug. 1986	Asuncion Municipal Office
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area	Transport/urban traffic	F/S	Sept. 1978 to Oct. 1988	Asuncion Municipal Office
National Transport Master Plan	Transport/traffic in general	M/P	Mar. 1990 to Jan. 1992	Dept. of Public Works and Communications
La Colmena Highway (follow-up)	Transport/roads	Others (follow-up)	Sept. 1976 to Jan. 1977	Road Bureau, Dept. of Civil Engineering and Communications

2-3-1 Background of the implementation of development studies

(1) Social and economic background

Paraguay is an inland country located near the center of the South American continent and surrounded by the three countries of Brazil, Argentina, and Bolivia. The economy of this country basically consists of agricultural, stock-farming, and forestry industries and the export of their products; 40% of the working population is engaged in either agricultural, stock-farming, or forestry industries. Though agricultural products in Paraguay consisted for a long time mainly of perennial crops such as mate and coffee, arable land was expanded through farmland reform by the Agricultural Village Welfare Bureau established in 1963; the production of raw cotton, soy beans, and wheat increased rapidly with increasing worldwide demand, the national production plan, and other factors after the 1970s. Rivers are the primary means for domestic transport in this country; when the Provision of local roads to connect farmers and the port was delayed, agricultural products from rural areas could not be shipped. Development studies on La Colmena Highway (follow-up) and the National Transport Master Plan were implemented to cope with these farming problems.

The most important industry after agricultural, stock-farming, and forestry industries is the service industry, which accounts for more than 25% of the GDP. The Asuncion Metropolis is the center of the service industry. The population of that city is 500,000, accounting for about 10% of the total population of the country; since the agricultural products produced in rural areas must be brought into Asuncion to be exported, the populace (including those who travel to the metropolitan area on business) greatly exceeds 500,000. This increase in population in urban areas leads to traffic congestion, which in turn hinders the development of the service industry.

(2) Background of the implementation of targets

a) La Colmena Highway (follow-up)

The subject area of this development study is an agricultural village area established in 1936 by Japanese immigrants; the size of the settlement site is 11,000 ha. In the implementation stage of this development study, 70 households of Japanese immigrants and 450 households of Paraguayans were living there and were successfully replacing low-income crops with high-income crops under the initiative of the La Colmena Agricultural Cooperative, which they established in 1984.

The subject road of this development study is the road between Acahay and La Colmena (28 km), which is a branch of national Route No 1, the trunk road that connects Asuncion City and Encarnacion, with an extension of 370 km. This dirt road was constructed in 1965 by banking soil excavated from both sides; there was a problem in that the drain ditches were always filled with dirt and sand in the lower regions and the road was submerged with each rainfall. Moreover, the road soil is red silt, which turns to mud during rainfall, and thus traffic had to be diverted for 80 to 100 days per year. In this development study, the feasibility of formulating a project through cooperation with loans from Japan was examined by performing a review of the related data, calculating the project cost, and assessing the economic effects.

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

The subject area of this development study was the Asuncion Metropolitan Area, which has a population of 858,000 (as of 1984). The GDP in the Asuncion Metropolitan Area at the same point in time was 319 billion Guarani, accounting for 43% of the GDP of the whole country. Thus, the Asuncion Metropolitan Area is the social and economic center of this country. Since this trend was predicted to increase, it was necessary to take measures to prevent concentration of the population and industries in the metropolitan area. A comprehensive master plan covering urban transport system in the Asuncion Metropolitan Area with a target year of 2000 was formulated for the development study on the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P), and included a financial plan. Detailed investigations were implemented for the development study on the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) in terms of expanding and improving M. Estigarribia Ave./Ayala Ave. as well as comprehensive traffic improvements in the Centro district. These were

selected as priority projects in the development study on the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P).

c) National Transport Master Plan

The number of automobiles in Paraguay increased fourfold during the decade from 1980 to 1990. Foreign trade also increased more than threefold in tonnage, and thus demand for transportation increased remarkably in both domestic and international markets. Transport costs must be reduced for an inland country like Paraguay to compete in the international market. Therefore the new government, which was established in February 1989, decided to implement a development study on a National Transport Master Plan. Analysis of the present transportation infrastructure, predictions of demand, establishment of policies and plans, evaluations, and formulation of investment plans were examined in this development study.

(3) Results of implementing development studies

Plans were established in all of the four projects evaluated such that the recipient country could agree according to the objectives at the beginning of the development studies. The outlines and contents examined in the feasibility studies for the plans established in each development study are described below.

a) La Colmena Highway (follow-up)

The F/S on the road between Acahay and La Colmena (28 km), which is a branch road of national road Route No. 1 (between Asuncion City and Encarnacion), was reviewed in this development study. The development study emphasized constructing a road with a two-layer surface, replacing eight bridges, and installing three box culverts.

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P)

Four broadly divided projects were established in this development study: the road network Provision plan, road improvement project, urban street plan, and public transportation plan.

A suburban trunk road network, roads between suburbs and the city, and semi-trunk road Projects were established in the road network provision plan to create a trunk road network in the city. The Ayala Ave.-R. Francia Ave. improvement project, the Espania Ave.-Santa Teresa Ave. improvement project, the Lambare-San Antonio road improvement

project, and an outerbelt road for the metropolitan area improvement project were established in the road improvement plan. In the urban street plan, plans to classify urban roads into those for use by pedestrians, automobiles, and buses were established. Reorganization of bus networks and bus-related facility plans (bus bay, dedicated bus lanes, and passenger transit facilities) were established in the public transportation plan.

c) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

In this feasibility study, which was implemented based on the results of studies of the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P), detailed studies, including demand predictions, were implemented on seven broadly divided project plans: (i) Improvement of M. Estigarribia Ave., (ii) Improvement of Ayala Ave. (expansion), (iii) Construction of an elevated bridge to connect Ayala Ave. and R. Francia Ave., (iv) Improvements to roads connected to R. Francia Ave., (v) Improvement of M. Lynch Ave. and repair of tributaries of the Itai River, (vi) Installation and repair of signals and designation of new parking areas in the central urban district, and (vii) Installation of a new bus terminal.

d) National Transport Master Plan (M/P)

Project plans for each sector of road, water transport/ports, railways, and airport/aviation, as well as short-term and long-term plans for projects to be implemented across multiple sectors, such as systems related to storage facilities/transportation and organizational reform, were established in this development study. The main projects proposed for each sector are described below.

Road sector

Plans to provide secondary national roads to connect existing national roads were established to create trunk road connections while respecting existing national roads. Furthermore, a national road provision plan, local road provision plan, new Amista bridge expansion plan, and project plan for constructing a new bridge between Santa. Tome and San. Volgya across the Uruguay River were established within the basic policy to create roads to connect the central cities of 207 counties in the country with the minimum necessary new trunk roads under direct control of the government.

Water transport/ports sector

Plans were established by recognizing that both the Paraguay and Parana rivers play

large roles as international corridors for import and export cargo and as a transport network for a large volume of domestic cargo. The primary projects proposed include the arrangement of the Vigetta Port as the base port for foreign trades, construction of regional bases for physical distributions, construction of oil distribution bases, improvement of the Paraguay River to maintain the waterway, improvement of the Parana River to maintain the waterway, and an increase in the number of ships.

Railway sector

Plans for the following priority projects were established: Improvement of railways in the peripheral areas of Asuncion, General Artigas-Encarnacion, Bigyalica- General Artigas, Ibakarai- Bigyalica, v. Encarnacion-San. Tome, arrangement of rolling stocks, and construction of a Nuebabarumila port line.

Airport/aviation sector

Projects were proposed and established in this sector to achieve a world-class international airport equipped with air traffic control facilities that could act as a hub in the South America continent, prepare local airports, increase the number of international routes to increase income in foreign currencies, expand the airports of local bases so that they can cope with the MERCOSUR policy, enhance the development of human resources to manage international aviation, and increase the efficiency of the funds invested. The primary projects proposed include (i) Provision of international airport facilities, (ii) Provision of local airport facilities, (iii) Provision of an air route network, and (iv) Provision and enhancement of the GSE.

Others

In addition to the above items, a domestic crop-exporting base plan, project plans for constructing storage facilities for the crop-exporting bases at free ports and on railways, plans for systems and organizations to enhance the planning and coordinating functions, provision of the territories of control, thorough management of information, and assurance of fund sources were established.

Outlines of the subjects examined in the feasibility studies for the plans established in each development study are summarized in the tables below.

Table 2-3-2. La Colmena Highway (follow-up)

Pavement work between Acahay and La Colmena	Pavement work of 28.5 km between Acahay and La Colmena
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Table 2-3-3. Transportation Facilities Improvement Project of Asuncion Metropolitan Area

Road network plan	Suburban trunk road network, roads between suburbs and the city, and semi-trunk road projects
Road improvement project	Ayala Ave.-R. Francia Ave. improvement project Espania Ave.-Santa Teresa Ave. improvement project Lambare-San Antonio road improvement project Improvement project for an outerbelt around the metropolitan area was established.
Urban street plan	Plans to classify urban roads into those for use by pedestrians, automobiles, and buses
Public transportation plan	Reorganization of bus networks and bus-related facility plans (bus bay, dedicated bus lanes, passenger transit facilities)

Table 2-3-4. Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

Improvement of the M. Estigarribia Ave.	Expansion to eight lanes and improvement
Improvement of Ayala Ave. (expansion)	Expansion to eight lanes and improvement, grade separation at four points (Kubicheck Ave., R. Argentina Ave., Victoria Ave., M. Lynch Ave.)
Construction of an elevated bridge to connect Ayala Ave.	Construction of a new four-lane elevated bridge
Improvement of roads connected to R. Francia Ave.	Expansion to six lanes and improvement
Improvement of M. Lynch Ave. and repair of tributaries of the Itai River	Expansion to four lanes and improvement, repair of tributaries of the Itai River
New installation and repair of signals and designation of new parking areas in the central urban district	Installation of signals of a multi-stage fixed-cycle control system, proposal of five candidate parking area sites (of which four sites are multi-story parking areas and one site is an underground parking area)
Installation of a new bus terminal	Installation of a new bus terminal with an area of 1.5 ha

Table 2-3-5. National Transport Master Plan (M/P)

Road	<p>Trunk road plan Local road plan New Amista bridge expansion plan Construction of a bridge between Santa. Tome and San. Volgya</p>
Water transport/ports	<p>Provision of the Vigetta Port as the base port for foreign trades Construction of regional bases for physical distributions Construction of oil distribution bases Improvement of Paraguay River to maintain the waterway Improvement of Parana River to maintain the waterway Increase in the number of ships</p>
Railway sector	<p>Improvement of railways in the peripheral areas of Asuncion General Artigas-Encarnacion Bigyalica- General Artigas Ibakarai- Bigyalica, v. Encarnacion-San. Tome Provision of rolling stocks Construction of a Nuebabarumila port line</p>
Airport/aviation sector	<p>Provision of international airport facilities Provision of local airport facilities Provision of an air route network Provision and enhancement of the GSE</p>
Storage facilities	<p>Domestic crop-exporting base plan Crop-exporting bases at free ports Crop-exporting bases on railways</p>
Reform of transportation-related systems and organizations	<p>Enhancement of planning and coordinating functions Provision of the territories of control Thorough management of information Assurance of fund sources</p>

2-3-2 Implementation stage of development studies

(1) Necessity of implementing development studies

The four projects evaluated in this study reflected the needs of the recipient country when the development studies were implemented, and the timing of implementation of the following studies was satisfactory.

a) La Colmena Highway (follow-up)

The following factors were set as priority targets with regard to land transportation in the National Economic and Social Development Plan in Paraguay (1977 to 1981):

- To continue to pursue materialistic and economic status in the country by expanding its roads.
- To extend the roads that can be traversed throughout the year and improve and expand repair work on existing roads.
- To enhance the infrastructure and improve the transportation systems for agriculture and forestry products by constructing and improving the trunk road network and the roads to principal markets, and to extend the small roads that lead to areas under development.
- To complete the strategies for planning/design, management, coordination, and evaluation of land transport systems.
- To establish, enhance, and promote a national plan for cargo and passenger transportation as a means of improving individual projects.

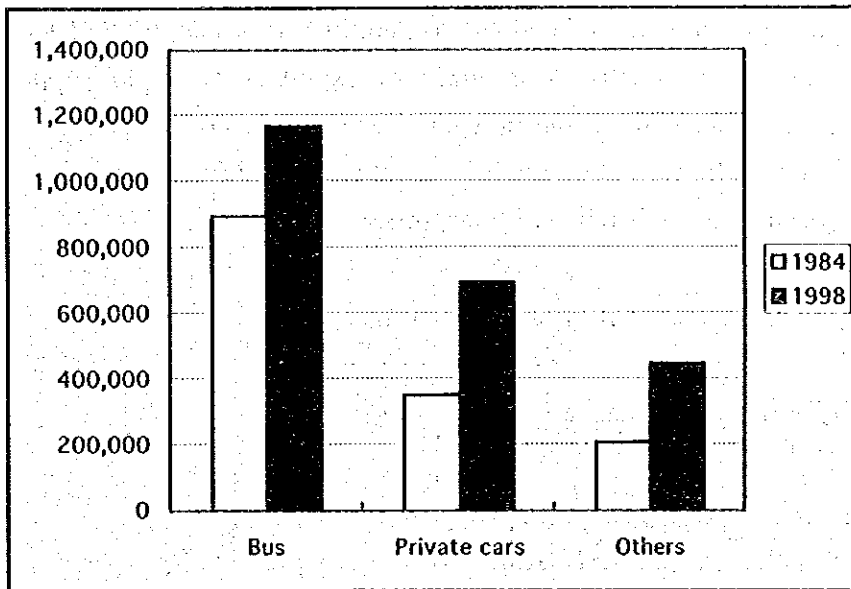
The development studies on the La Colmena Highway (follow-up) were implemented based on the above objectives, and the implementation timing was satisfactory.

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

These development studies were implemented when there was concern that the transport service level of Asuncion City would be unable to meet future demands for transportation since the Asuncion Metropolitan Area contributes heavily to the economy of Paraguay and the population and industries were becoming increasingly concentrated in the

metropolitan area. It was considered prudent under these circumstances to establish a plan for a systematic urban transportation system based on the future forecast and to take measures against the advancement of urbanization. Indeed, the traffic volume in the Asuncion Metropolitan Area increased during the period from 1984 to 1998, as shown in Fig. 2-3-1.

Figure 2-3-1. Changes in the Number of Trips²⁷ by Each Type of Transport in the Asuncion Metropolitan Area



Source: Asuncion Municipal Office

One objective of the National Development Plan 1985/1989 published in November 1985 was to achieve a growth rate at a yearly mean of 6.1% during the period of the plan and 6.5% during the latter half of the plan by expanding exports and increasing agricultural production and agricultural product processing industries. It was expected that tertiary industries, including finance, commerce, and administration, would grow significantly in accordance with this plan. It was therefore necessary to position the metropolitan area as the core of such growth.

c) National Transport Master Plan

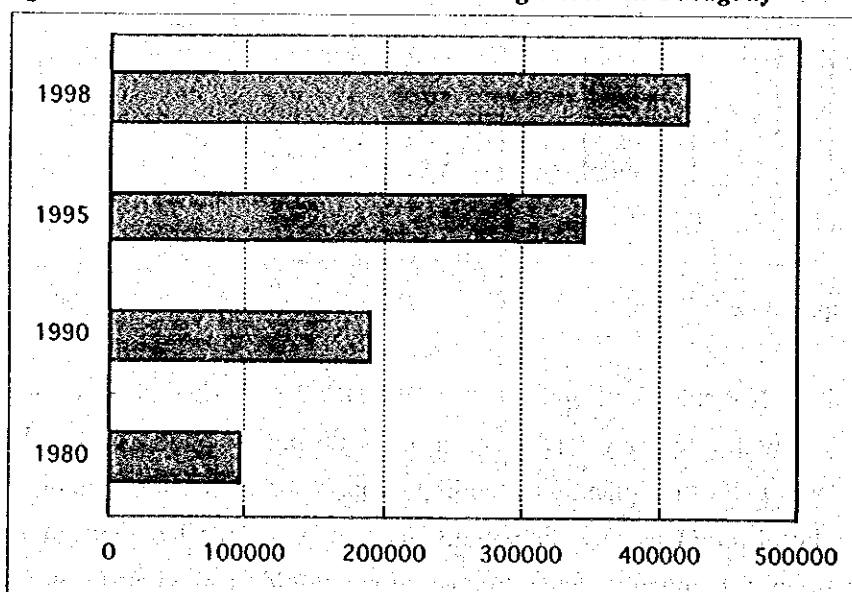
Motorization advances in Paraguay in the 1980s (see Fig. 2-3-2) and demand for transportation grew rapidly both within and outside of the country. However, provision of

²⁷ Number of trips indicates the volume of traffic to and from Asuncion City.

a transportation infrastructure, comprised of roads, ports, and railways, lagged the demand at that time. The lack of a transport infrastructure severely restricted the development of the country, expansion of production, and promotion of international trade.

Furthermore, the development policy for the transport sector of the economic development plan launched in 1989 indicated that, in order for an inland country like Paraguay to provide price-competitive products to international markets, reduction of transport costs is vital and the prompt provision of a transportation infrastructure was essential and urgently required. Therefore, it was necessary to establish a national transport master plan with priorities placed on the following five elements: (i) development of local areas and promotion of industries, (ii) enhancement of export corridors to support promotion of exports, (iii) reduction of transport costs and energy consumption, (iv) medium- to long-term policies for transports and investment plans, and (v) enhancement of the organization and system of administration of transports.

Figure 2-3-2. Trends in Automobiles Registered in Paraguay



Source: Paraguay Statistical Yearbook

(2) Cooperation between the survey team and the counterpart team

a) La Colmena Highway (follow-up)

This development study was implemented as a follow-up study with a small number of persons (a two-member team) over a short period (21 days (of which eight days were spent on the actual survey)). By eliminating unnecessary studies through close

communication between the survey team and counterpart team, it was ultimately possible to present high-quality study results in the final report that meet the needs of the recipient country. Furthermore, the survey team prepared a survey operation plan to select the range of study in advance by reviewing the F/S report on the subject, a practice instigated by a private American company in 1970. This preparation work led to efficient implementation of the studies.

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

Efforts to implement more efficient studies were made, wherein the Transportation Plan for Asuncion City²⁸ prepared by the Government of Brazil in 1984 and Asuncion Development Plan²⁹ prepared by the World Bank in 1985 were referenced to avoid duplication in the study contents. Furthermore, the JICA survey team maintained ongoing mutual understanding among counterparts in the Dept. of Public Works and Communications by meeting with them periodically.

During the development studies for the master plan, not only did the counterpart team master the use of computer software through OJT, but seven members of the counterpart team also received training in transport-related civil engineering technology, and urban transportation project monitoring techniques as well as land use plans.

c) National Transport Master Plan (M/P)

An official of the Dept. of Public Works and Communications in charge of development studies related that good communication was maintained between the survey team and the Dept. of Public Works and Communications in the implementation stage of the development studies and appraised the survey team as excellent in terms of technical ability and quality. Furthermore, the survey team made efforts to increase understanding of the development studies among related officials by holding seminars on detailed analyses of the transportation sector and transportation plans while the development studies progressed. Techniques for setting transport fares were transferred to two officials, and several officials visited Japan for one month to train in transport planning technology and to learn data collection techniques.

²⁸ In this report, with a subject planning period of 1985 to 2001, examinations into improving the public transportation system of Asuncion City are performed and introduction of a trolley bus system is proposed.

²⁹ In this report, a structural plan for land use and roads in Asuncion City as well as important projects for implementation of that plan are presented based on the population by 2000.

Table 2-3-6. Transfer of Technology in Paraguay

Project		Technology transferred
La Colmena Highway (follow-up)	Others (follow-up)	
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area	M/P	<ul style="list-style-type: none"> • Method of using computer software through OJT • Acceptance of trainees (7), transport-related civil engineering, urban transport, project monitoring, land use plan • Transport planning
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area	F/S	<ul style="list-style-type: none"> • Transfer of computer technology through OJT • Improved understanding of urban transport through training of the counterpart
National Transport Master Plan	M/P	<ul style="list-style-type: none"> • Transport fare computing techniques through OJT • Acceptance of trainees, data collecting techniques

(3) Provision of a system for the government of the recipient country to utilize the results of development studies

a) La Colmena Highway (follow-up)

The projects proposed out of this development study item were implemented promptly by enthusiastic supporters of the Secretaria Tecnica de Planificacion, Japanese residents in La Colmena City, the Japanese Embassy in Paraguay, and the Asuncion Branch of the Japan International Cooperation Agency as well as the La Colmena Municipal Office as the implementation organization. Furthermore, since this development study was implemented from the beginning on the proposition that projects should be implemented by financial aid from Japan, the structure of the counterpart government for utilizing development study had been prepared in the implementation stage.

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

A steering committee chaired by the manager of the Urban Planning Bureau was organized in Paraguay as the structure to implement development studies, along with the Asuncion Municipal Office as the implementation organization for development studies, in order to establish a system to facilitate the guidance, judgment, and cooperation necessary for studies and planning on each administrative and technical level. Thus, involvement of many governmental institutes, including the Dept. of Public Works and Communications, in the implementation stage of the development studies not only brought a broad awareness

of the studies but also was vital in promoting the ongoing development of projects, even through difficult periods such as during political changes.

c) National Transport Master Plan

Surveys on the actual status of transportation were implemented for this development study. A forecast of demand, establishment of policies and plans, evaluations, and establishment of investment plans were then implemented using a database containing both the survey results and existing statistics. The database was configured by considering the transfers of technology, such as collaboration between the JICA survey team and the implementation organization, so that data could be renewed continuously by the government of the recipient country after completion of the development studies. A steering committee was also organized in Paraguay to implement the development studies. The committee was composed of representatives of the Dept. of Public Works, Secretaria Tecnica de Planificacion, Dept. of Agriculture and Pasturage, Dept. of Defense, Port and Shipping Agency, National Railway Public Corporation, National Mercantile Marine, Airport Management & Operation Public Corporation, and the Paraguay-Brazil Joint Committee. Thus, the development studies were implemented jointly by not only the implementation organization but also related institutes in the implementation stage, which led to sustainable forming of plans into projects.

2-3-3 Post-implementation stage of development studies

(1) Impacts

Reflection in development policies

The results of development studies of all four projects evaluated in this study were utilized effectively as the policy of each implementation organization and are still being utilized.

After completion of the development studies, the results of La Colmena Highway (follow-up) were immediately formed into projects that contribute to the development of agriculture, which was the main objective of the development plan at that time. Furthermore, pavement work on La Colmena-Paraguari road, an extension of this project, is presently in the planning stage, and a high priority was given to this project in the fiscal 2000 plan of the Dept. of Public Works.

Formulation of projects from the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) was once considered difficult due to the reorganization of the municipal government that arose from the change of the mayor during the coup d'etat in 1989 and subsequent inflation and fluctuations of the exchange rate³⁰. However, continued efforts of the relevant governmental organizations to formulate projects resulted in a review of the costs computed for this project by JICA. The National Transport Master Plan (M/P) is still referred to as the blueprint for the transportation plans of this country, and the proposals from this development study are always considered when implementing individual traffic and transportation projects. In addition, each section of the road plan proposed from this development study item was classified as a short-term portion until 1995, medium-term portion until 2000, and long-term portion until 2010 by the decision of the cabinet of this country, and they are used as standards for requesting aid.

Development into next-phase development studies and forming of projects

In Paraguay, the Secretaria Tecnica de Planificacion summarizes requests, implements development studies, and evaluates projects related to aid. Furthermore, each department of the government has a section in charge of technical cooperation, and the Secretaria Tecnica de Planificacion determines the priority of individual projects for the

³⁰ US\$1 = GS1,150 in 1992, US\$1 = GS2,500 in 1998

five-year plan of this country while consulting with other departments of the government. The four projects evaluated in this study were developed into next-phase development studies or formulated into projects following these procedures.

Next-phase development studies

Among the four projects evaluated in this study, the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P), Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S), and National Transport Master Plan were developed into next-phase development studies. The La Colmena Highway (follow-up) was formed into a project without requiring next-phase development studies. The Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) was implemented from the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) by JICA one year after the completion of the development study. The Paraguayan Government submitted a request for F/S follow-up studies for the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) to JICA in June 1997, and the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (follow-up study) was implemented during the ten months from July 1998 to Oct. 1999. The project plans in this follow-up study will contribute to a smooth transportation system in the Asuncion Metropolitan Area; improvements in the transportation environment in the Asuncion Metropolitan Area are mainly based on reviews of the existing M/P and F/S. However, while Studies for National Roads No. 2 and No. 7 Improvement Plans (F/S) from the National Transport Master Plan are implemented by JICA, it is also planned to update studies in the transport infrastructure section of the Studies for the Transition of Paraguay to the Market Economy Support Plan.

Table 2-3-7. Next-phase Development Studies Implemented based on the Results of Development Studies

Project	Item	Description	Year of completion	Source of funds
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P)	Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)	Detailed studies based on demand forecast for expanding and improving M. Estigarribia Ave./Ayala Ave./R. Francia Ave. and comprehensive improvement of traffic in the Centro district, which were selected as priority projects from the development study on the existing M/P.	1988	JICA
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)	Transportation Facilities Improvement Project of the Asuncion Metropolitan Area follow-up studies	Establishment of such project plans will contribute to a smooth transportation system in the Asuncion Metropolitan Area; improvements to the transportation environment in the Asuncion Metropolitan Area are established mainly based on a review of the existing M/P and F/S.	1999	JICA
National Transport Master Plan	Studies for National Roads No. 2 and No. 7 Improvement Plan (F/S)	Feasibility study on the improvement plan to meet transportation demands by 2010 for the 169 km section between San. Lorenz and Kaaguas of national roads No. 2 and No. 7 to improve the transportation capacity and the efficiency of the physical distribution to deal with the increase in traffic volume.	1999	JICA
	Studies for the Transition to Market Economy Support Plan	Studies to examine and analyze the competitive power, including the potential of each industry, and examine and present policies to promote multi-polarization and industrialization of agriculture. This will precipitate economic growth through the promotion of exports to assure the economic independence and development of Paraguay under changing economic environments arising from the liberalization of markets within the area as a result of participation in MERCOSUR.	1999	JICA

According to information from the site, the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) was also utilized as reference data for the urban environment development project of UNDP.

Forming into projects

Among the four projects evaluated in this study, all or part of the plans generated from the three projects La Colmena Highway (follow-up), Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S), and National Transport Master Plan were formed into projects.

A loan contract of 1,850 million yen was concluded by the OECF (currently JBIC) for the La Colmena Highway (follow-up) in September 1977, the month the studies were completed, and the proposed plan was formed into a project. Work commenced in April 1979; the pavement project between Acahay and Colmena, which had been proposed in this development study item, was wholly implemented as planned and was completed in April 1982.

It was intended that the priority projects proposed from the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) would be implemented by loans from Japan when the development studies were completed. However, due to changes such as the coup d'etat in 1989 and the reorganization of the municipal government

after the change of mayor, grants of loans from Japan were temporarily postponed due to the decreased project-implementing ability (loan repayment ability) of the Asuncion Municipal Government (counterpart organization). It is notable that projects such as the expansion of the circular road (M. Lynch Ave. Expansion Work), improvement of the main intersections, construction of a new bus terminal, and centralized control of signals from the transportation control center have already commenced through original funds of the Asuncion Municipal Government, loans from the World Bank, and other financial resources.

The OECF (currently JBIC) of Japan granted loans twice to the Road Provision Project portion of the National Transport Master Plan, once in 1990 and again in 1998. Road re-pavement work exceeding 360 km was completed for Road Project II in 1990, and there are plans to subsequently proceed with road repair and re-pavement work and bridge expansion work over an extension of 617 km for the Road Project, the contract for which was concluded in 1998, to improve the conditions of trunk roads. In addition, some proposed plans for roads have been or are being implemented as projects through funds from the counterpart country. Among the projects for storage facilities, projects for providing a free crop export base and domestic crop export base are being implemented through the initiative of the private sector.

Table 2-3-8. Projects Proposed as a Result of Development Studies and Items Formed Into Projects

	Description of projects proposed from development studies	Items formed into projects	Description	Year of completion	Source of funds
La Colmena Highway (follow-up)	Pavement work over 28.5 km between Acahay and Colmena	<ul style="list-style-type: none"> Road improvement projects between La Colmena and Acahay 	Pavement work over 28.5 km between Acahay and Colmena	1982	OECF
Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)	<p>Improvement of M. Estigarribia Ave. Improvement of Ayala Ave. (expansion) Construction of an elevated bridge to connect Ayala Ave. and R. Francia Ave. Improvement of roads that connect to R. Francia Ave.</p> <p>Improvement of M. Lynch Ave. and repair of tributaries of the Itai River New installation and repair of signals and designation of new parking areas in the central urban district. Installation of a new bus terminal.</p>	<ul style="list-style-type: none"> Expansion of the circular road (M. Lynch Ave. Expansion Work) Construction of coastal roads Improvements to main intersections Centralized control of signals from the transportation control center 	Details are unknown.	Details are unknown.	Budget of Asuncion Municipal Government, World Bank
National Transport Master Plan	<p><Roads> National road Provision plan Local road Provision plan New Amista bridge expansion plan Construction of a new bridge between Santa. Tome and San. Volgya</p>	<ul style="list-style-type: none"> Road Provision project (I) Road Provision project (II) 	<ul style="list-style-type: none"> Road re-pavement work over 360 km Repair of roads over three sections in the southeastern part of Asuncion (a total extension of 121.1 km), re-pavement of the deteriorated existing pavement over five sections of national road in the eastern area (a total extension of 496 km), mainly of the existing bridge section of national road No. 1 Details are unknown. 	1998	OECF OECF
	Water transport/ports, railways, airport/aviation, storage facilities, reform of transport-related systems and organizations	<ul style="list-style-type: none"> National roads No. 2, 3, 5, and 6.	..	..	BID, FONPLATA
		Not yet commenced.	..	..	..

Economic and social impacts on the relevant areas from the projects implemented

a) La Colmena Highway (follow-up)

① Increased convenience and efficiency for local inhabitants and increase in shipments of agricultural products

The travel time between Acahay and La Colmena has been significantly reduced by the implementation of this project. Although the road was closed for 80 days a year due to flooding before implementation of the project, this situation has been mitigated and users can now save travel time in increased comfort.

Furthermore, the shipment of agricultural products from the farmers along the La Colmena road as of 1987 was 1,573,812 kg, marking a significant increase compared with the 985,509 kg transported during the implementation stage of the development studies (see Table 2-3-9). The reason for this increase is that they can now efficiently transport a larger volume of agricultural products to the urban district due to the paved road. Furthermore, crops that previously could not be shipped due to quick deterioration of freshness, such as cucumbers and peach plums, can now be shipped, as well as conventional agricultural products such as raw cotton, wine, and onions. Therefore, this project contributed significantly to the diversification of agricultural products in La Colmena City and to the further development of the agricultural industry in that city.

Table 2-3-9. Volumes and Prices of Agricultural Products Shipped From La Colmena City (1977, 1987)

	1977		1987	
	Shipment volume (kg)	Shipment value (US\$)	Shipment volume (kg)	Shipment value (US\$)
Raw cotton	205,684	188,991.14	42,351	27,098.58
Wine	432,955	136,976.43	441,441	292,103.18
Onions	194,874	25,191.40	134,290	28,761.24
Tomatoes	95,958	24,894.84	392,035	109,306.00
Potatoes	47,687	11,009.76	18,115	9,513.68
Silk	9,351	22,742.28	..	..
Grapes	..	..	357,035	179,363.42
Natural honey	..	..	179	300,107.91
Cultured honey	..	..	8,444	32,051.96
Cucumbers	..	..	101,917	36,334.39
Peach plums	..	..	78,005	71,809.18
Total	986,509	409,805.85	1,573,812	1,086,449.54

Source: Cooperativa Agro Industrial La Colmena Ltda. (La Colmena Cooperative)

1977: Average Exchange Rate: US\$ 1 = Gs. 126

1987: Average Exchange Rate: US\$ 1 = Gs 300

② Increased importance of La Colmena to the area

As road transportation to La Colmena has improved, the neighboring farmers have begun to deliver agricultural products to La Colmena first and then ship those products to the urban districts. The role of La Colmena City as a hub in the area to amass agricultural products was therefore further enhanced by the implementation of this project.

③ Improved access to public facilities

The poor pavement on the road prior to implementation of this project made it difficult for the inhabitants of La Colmena City to access their public facilities, such as schools and hospitals. For example, since there is no large hospital in La Colmena City, patients must be transported to a neighboring city in cases of emergency; prior to implementation of the project, the poor pavement frequently prevented patients from being transported. At present, not only has the road been paved through this project, but the use of an ambulance supplied by aid from Japan has made it possible to rapidly transport emergency cases to the large hospital in Paraguari City.

The number of elementary school pupils has increased from 20 to 30 just after the foundation of the school to 2,000 at present. The number of pupils who come from peripheral areas to attend school in La Colmena City has increased along with the increase in the population of this city.

Furthermore, students in this city can now attend the national university in Paraguari

City every day over a distance of 65 km. Completion of this project has thus facilitated access to higher education. Education is an important factor in economic development, and therefore this project has contributed greatly to the social and economic development of La Colmena City as well as stabilizing and improving the living standards of local inhabitants.

④ Exchanges with neighboring cities

Before the road was paved, 30 passengers traveled between La Colmena City and Asuncion City. This increased substantially to 360 by 1999, partially due to the operation of public buses. Furthermore, exchanges with Ciuda del Este, which is a prosperous commercial city located alongside the border with Brazil, have also increased.

Table 2-3-10. Passengers Traveling from La Colmena to Other Major Cities and Number of Persons Registering Automobiles

	1977	1999
Passengers/day (between La Colmena and Asuncion)	30	360 (30 (per bus) x 12)
Passengers/day (between La Colmena and Ciuda del Este)	..	150 (30 (per bus) x 5)
Number of Persons who registered their automobiles in La Colmena City	5	500

Source: Municipality of La Colmena

b) Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S)

① Improved traffic efficiency as a result of pavement and expansion of roads

The total extent of paved roads in the Asuncion Metropolitan Area was 253 km in 1982; as work proceeded according to the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P), roads with a total extension of 90.35 km were newly paved or expanded from 1986 to 1999.³¹ Though traffic efficiency was poor in the past and there were problems with traffic safety due to narrow parkways leading into intersections, the transportation rate in the metropolitan area has been improved by this pavement and expansion work.

**Table 2-3-11. Extension of Paved Roads According to the Master Plan
(Roads paved from 1996 to 1999)**

No	Type of works and Street Names	Lanes	Road Tranches and Names	MP*	Kms.
1	Widening Transchaco Ave.	4	L. Presidente to Desv. o Puente Remanso	Yes	8.50
2	Widening Gral Santos Ave.	4	25 de Mayo to Avda. Fdo. De la Mora	Yes	1.18
3	Widening and Equipment of Medicos del Chaco Ave.	4	Eusebio Ayala to Avda. Fdo. de la Mora	Yes	1.98
4	Widening Proceres de Mayo Ave.	4	Rodríguez de Francia to Gral. Santos	Yes	1.02
5	Widening South Access	4	Asunción to Emby	Yes	8.00
6	Opening and Equipment of Sta. Teresa Ave.	4	Aviadores del Chaco to Madame Lynch	Yes	1.85
7	Equipment of Santa Teresa Ave.	2	Madame Lynch to Asunción Limits	Yes	0.40
8	Widening and Equipment of Santa Teresa Ave.	4	Limits of Asunción to Mcal. López	Yes	1.37
9	Widening Mcal. Estigarribia Ave.	6	Madame Lynch to San Lorenzo	Yes	6.07
10	Pavement of Artigas Ave.	3	España to Gral. Santos	Yes	1.64
11	Widening to Da Marzo Ave.	4	Gral. Santos to Cacique Lambare	Yes	1.85
12	Widening Madame Lynch and Defensores del Chaco Avenues	4	Fdo. De la Mora to Avda. Transchaco	Yes	10.00
13	Widening and Equipment of Cacique Lambare Ave.	4	Fdo de la Mora to Avda. Perón	Yes	4.09
14	Widening and Equipment of Bruno Guagliari Ave.	4	Fdo. De la Mora to Ifo. Da Marzo	Yes	2.00
15	Pavement for Perú Avenue	3	Rodríguez de Francia to Jos. F. Bogado	Yes	0.97
16	Pavement for La Victoria Ave. (South)	2	Eusebio Ayala to Avda. Fdo. de la Mora	Yes	1.25
17	Widening and equipment of Stma. Trinidad Ave.	4	Sacramento to Artigas	Yes	0.50
18	Widening Eusebio Ayala Ave.	6	Petrossi to Choferes del Chaco	Yes	3.00
19	Widening Gral. Aquino Ave.	4	Autopista to Ciudad de Luque	Yes	7.00
20	Opening and Equipment of Est. Unidos Ave.	4	Rodríguez de Francia to It. Ybatí	Yes	2.43
21	Bridge over Eusebio Ayala and Madame Lynch Avenues	**	In progress	Yes	
22	Bridge over Defensores del Chaco and Fdo. De la Mora Avenues	**	Concluded	Yes	
23	Bridge over Madame Lynch and Mcal. López Avenues	**	In progress	Yes	
24	Pavement for Lambare-San Antonio	2		Yes	14.85
25	Pavement Emby-Petropar	2		*	2.65
26	Pavement Luque-San Lorenzo	2		*	7.95
	Total Kms.				90.35

*MP. Projected in the Master Plan (CETA)

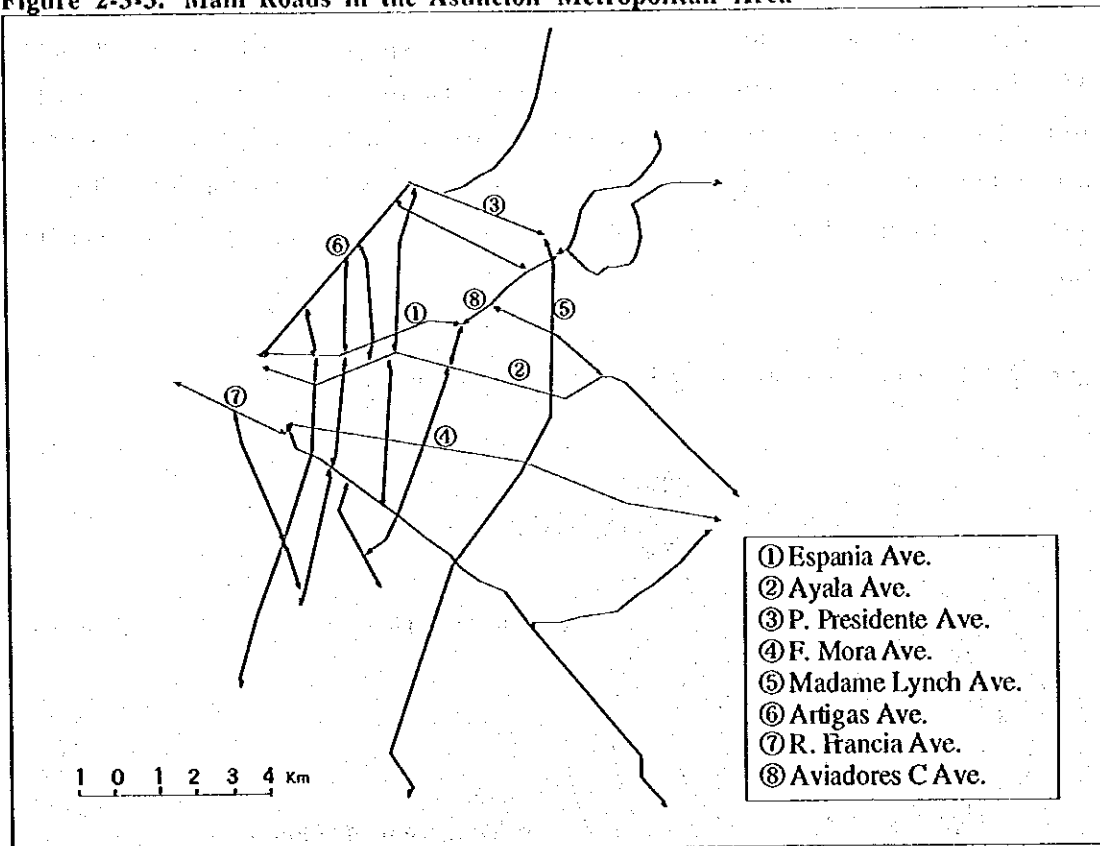
** Part of the 8th Land Transportation Project (South and North Accesses to Asunción)

Paved streets in Asunción did only cover 20% of all existing roads in 1984, increasing to 35% in 1997.

Source: Municipality of Asunción

Madame Lynch Ave., which encircles the metropolitan area, was particularly congested due to the confluence of the traffic from national road No. 9 and traffic from Presidente Ave., but has been able to support efficient transportation since its expansion. Work on Ayala Ave., which was cited as a priority project together with Madame Lynch Ave., is now in progress. When this work is completed, the framework of the east-west axis and north-south axis of the metropolitan area will be set, and further improvements in traffic flow and efficiency can be expected over access roads from the peripheral areas to Asunción City. Figure 2-3-2 shows the locations of the main roads in the Asunción Metropolitan Area.

Figure 2-3-3. Main Roads in the Asuncion Metropolitan Area



② Improvement of safety

The signal processing system for the inflow portion of traffic was poor in Asuncion City during implementation of the master plan survey, and accidents related to buses, such as rear-end collisions and contact during passing, occurred frequently. Projects to improve the primary intersections and centralized control of signals from the transportation control center have since been implemented by funds from the World Bank and the budget of the municipal government, and accidents in urban districts have reportedly decreased in number through improved safety.

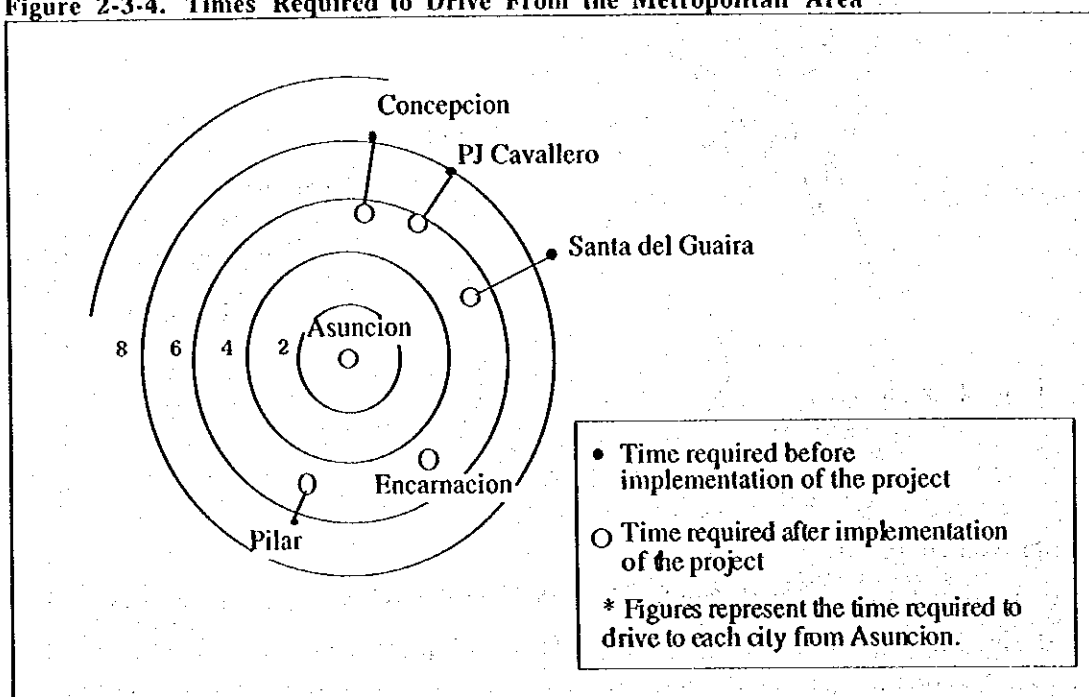
c) National Transport Master Plan

① Reduction of travel time over distances

Of the road-related projects proposed in the master plan, 75% were designed to improve existing roads and the remaining 25% to construct new roads. Therefore, the master plan does not serve to greatly reduce the time required to reach the metropolis of each province from Asuncion by car. However, there are some sections where providing a

road has a significant effect on reducing the driving time. For example, as shown in Fig. 2-3-4, the time required to drive from Asuncion to Concepcion, PJ Cavallero, and Santa del Guaira has been reduced by two hours since national road No. 3 was improved by IDB. Furthermore, when the projects for national road No. 4 and Riverside Road (Route No. 102) are implemented in the future, the time required to drive from Asuncion to Pilar is expected to be reduced from the present six hours and fifteen minutes to less than five hours.

Figure 2-3-4. Times Required to Drive From the Metropolitan Area



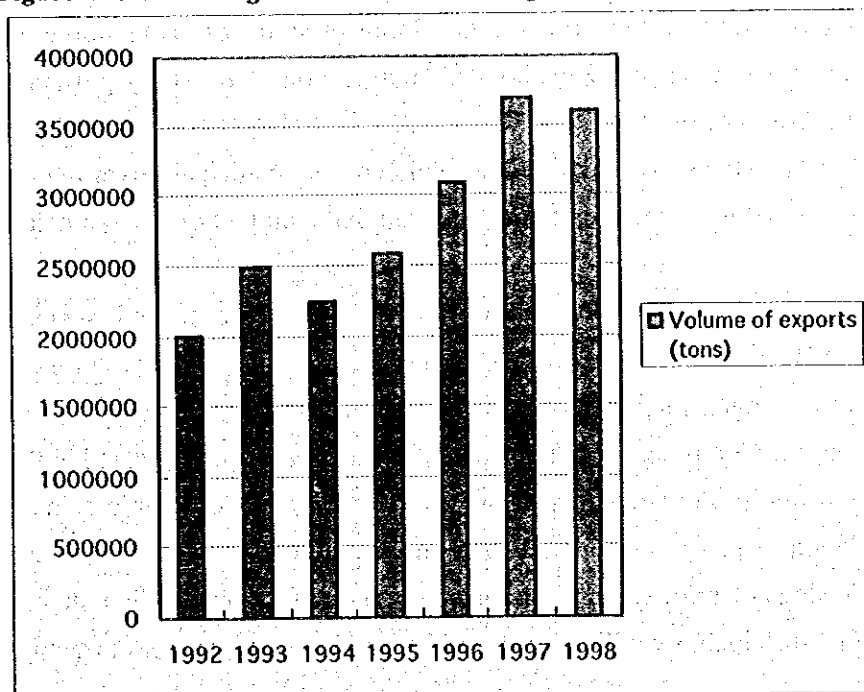
Source : Central Bank of Paraguay

② Promotion of foreign trade by provision of export-import corridors

Domestic cargo transport in this country is predominantly supported by roads, followed by railways and water transport. National roads No. 2 and No. 7 bear a particularly large volume of export-import cargo truck traffic, as well as the section of second-class road No. 109 between San Rafael del Parana and Ciuda del Este. Those roads are linked to export-import bases along the boundaries with other countries, and they are the main routes in Paraguay that contribute to the assurance of foreign currency income. Furthermore, as shown in the changes in volumes of transport in Paraguay from 1992 to 1998 (Fig. 2-3-5), the volume of exports of this country is increasing since completion of the development studies. In addition, road provision projects have had more significant effects on activating trade between areas since MERCOSUR (Southern South America

Common Market) commenced in 1995. Clearly, the activation of physical distribution by providing main trunk routes and bridges, which were promoted through support from OECF (currently JBIC) and other international organizations, has provided a substantial effect.

Figure 2-3-5. Changes in Volumes Transported in Paraguay (1992 to 1998)



Source: Central Bank of Paraguay

(2) Sustainability after implementation of development studies

Items to request aid are decided in Paraguay by the Secretaria Tecnica de Planificacion after consulting on priority items with the implementation departments. All or part of the plans proposed from the four projects evaluated in this study were developed into projects through funds from donors. It is thus apparent that the structure for forming development studies into projects has been completely established in the Secretaria Tecnica de Planificacion and the implementation departments. In addition, since the Secretaria Tecnica de Planificacion controls not only the preparations for development studies on items for requesting aid but also the evaluations after project completion, additional improvements to the implementation system after the development studies are completed can be expected in the future.

Sustainability of the forming of projects

After the pavement projects proposed in the La Colmena Highway (follow-up) were implemented by funds from the OECF, construction of bypass roads for Colmena Ave. and national roads No. 1 and No. 2 was planned. La Colmena City not only continued project management after completion of the proposed projects but also appealed to the Secretaria Tecnica de Planificacion regarding the necessity of additional projects. While most of the members of the counterpart team involved in the development study on Transportation Facilities Improvement of the Asuncion Metropolitan Area portion of the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) have departed due to the coup d'etat in 1989 and the subsequent reorganization of the municipal government, some of the projects proposed have been implemented through the budget of the Asuncion Municipal Government.

Sustainability of the National Transport Master Plan was in doubt because it seemed difficult to procure funds due to its large size, the plans arising from the development studies on this item were instigated in the form of the National Plan for Administration of Transports. In addition, the Comprehensive Transport Planning Department located in the section in charge of transport (OPIT) in the Dept. of Public Works and Communications is promoting the formulation of projects by undertaking any and all operations to formulate projects, including decisions of priority and monitoring. Opinions expressed in a survey at the site suggested that sustainability will be further enhanced if techniques for correcting and renewing the master plan according to the status after completion of the development studies are conveyed in the implementation stages of those studies.

Sustainability of technologies transferred

According to a member of the then-counterpart team that received transfers of technology in the implementation stage of development studies on Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) and National Transport Master Plan (M/P), the basic information regarding transport-related civil engineering and signals and transport planning that he was given through the development studies is still useful in his present job, even after more than ten years. However, there is a problem in that the data collected during the development studies are not well managed by the counterpart government, and very little was left at the time of the follow-up survey.

2-3-4 Conclusions

The four projects evaluated in this study can be generally assessed as successful because they met the needs in Paraguay during the implementation stage and post-implementation stage of the development studies.

The implementation stage of all projects reflected the needs at that time, and therefore implementation of the development studies was timely. Development studies for La Colmena Highway (follow-up) were implemented by applying the important objectives in the land transport area of the National Social and Economic Development Plan of Paraguay (1977 to 1981), and the development studies for the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) were implemented to cope with the increase in population and the concentration of industries in the metropolis. The development studies for National Transport Master Plan were implemented to handle motorization after 1980.

There was sufficient communication between the JICA survey team and the counterpart team. In addition, periodic meetings were held, seminars were conducted, and technology was transferred from the survey team to the counterpart team during the development studies on all four projects. These factors demonstrate that there was sufficient cooperation system between the survey team and the counterpart in the implementation stage.

To utilize the results of the development studies in their implementation stage, a system that enables providing necessary guidance, judgment, and cooperation on administrative and technical levels was created in the implementation stages of the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P) and Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S), National Transport Master Plan, and development studies by organizing a steering committee consisting of representatives of not only the execution organization but also other related institutes. Establishment of such a system not only enhances the understanding of and interest in the development studies among the members of the government but also plays an important role in the early development of plans into projects.

The results of the development studies of the four projects evaluated reflected the policies of the government at the post-implementation stage. Of the four targets, the

Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (M/P), Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S), and National Transport Master Plan were developed into next-stage development studies. In addition, all or part of the plans proposed from the projects La Colmena Highway (follow-up), Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S), and National Transport Master Plan were formed into projects.

La Colmena Highway (follow-up), a plan for which all portions were developed into projects, made a large social and economic contribution through advancements in convenience and efficiency for local inhabitants, enhancement of the importance of each region, and improved access to public facilities. Effects were observed from the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) in the improved ease of traffic through the paving and widening of roads and a decrease in traffic accidents in Asuncion City. Indirect impacts were confirmed from the National Transport Master Plan, as from other items, related to the reduced travel time over distances and promotion of foreign trade by providing import and export routes.

The sustainability of the development studies can be assessed from the standpoint of whether the internal system for developing plans into projects is adequate and whether the technologies transferred from the survey team during the implementation of the development studies are in effect in the counterpart country. Since most of the counterpart team members involved in the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area (F/S) development studies for the Transportation Facilities Improvement Project of the Asuncion Metropolitan Area left their positions due to the coup d'état in 1989 and the subsequent reorganization of the municipal administration, there was no sustained system. However, projects in the National Transport Master Plan (M/P) are being promoted as a national plan instigated by the administrator of the transport administration, and the Comprehensive Transport Planning Dept. in the Section in Charge of Transport (OPIT) of the Ministry of Public Projects and Communications, makes the decisions regarding priority as well performing comprehensive monitoring.

According to the counterpart members who received transfers of technology while implementing studies for The Transportation Facilities Improvement Project of Asuncion Metropolitan Area (M/P) and the National Transport Master Plan (M/P), the information regarding transport civil engineering and signals and transport planning, which they acquired through implementing these development studies, is still useful in their current jobs, even ten years after the completion of the studies. Sustainability can thus be judged to have been adequate.