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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

STATE SECRETARIAT OF PLANNING AND GENERAL COORDINATION, PARANÁ STATE, THE FEDERATIVE REPUBLIC OF BRAZIL

THE MASTER PLAN STUDY ON

THE UTILIZATION OF WATER RESOURCES IN PARANA STATE

IN

THE FEDERATIVE REPUBLIC OF BRAZIL

FINAL REPORT

MAIN REPORT II Master plán for iguaçu river başın



December, 1995

Yachiyo Engincering Co., Lid. Tokyo, Japan

and

Nippon Koei Co., Ltd. Tokyo, Japan

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Cost Estimate is Based on The Price Level of August, 1994, According to The Following Exchange Rate.

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US\$ 1.00 == ¥ 98.87 (as of August, 1994)

PREFACE

In response to a request from the Government of the Federative Republic of Brazil, the Government of Japan decided to conduct a study on the Master Plan for the Utilization of Water Resources in Paraná State and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Brazil a study team headed by Mr. Yoshio Nakagawa, Yachiyo Engineering Co., Ltd., and composed of staff members of Yachiyo Engineering Co., Ltd. and Nippon Koei Co., Ltd. (5 times between March 1994 and October 1995).

The team held discussions with the officials concerned of the Government of Brazil, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Federative Republic of Brazil for their close cooperation extended to the team.

December, 1995

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Kimio Fujita President Japan International Cooperation Agency

Mr. Kimio Fujita President Japan International Cooperation Agency Tokyo, Japan

Letter of Transmittal

Dear Mr. Fujita,

We are pleased to submit to you the Master Plan report on the Utilization of Water Resources in Paraná State in the Federative Republic of Brazil. This report presents a strategy over the state on water environment, which includes not only comprehensive surface and underground resources development for various types of water use but also environmental facets of water, such as flood, quality of river water, soil erosion, ecosystem, forest, etc., as well as a Master Plan for improvement of water environment in selected two pilot river basins.

In the Master Plan for the pilot river basins, projects and recommendations are embodied towards the year of 2015 for sectors of water supply, hydro-electric generation, flood control, water quality control and sewerage development, soil erosion control, ecosystem conservation, forest preservation, water environment management, and institutional improvement. Urgent implementation of studies to follow this Master Plan Study is also proposed in the report.

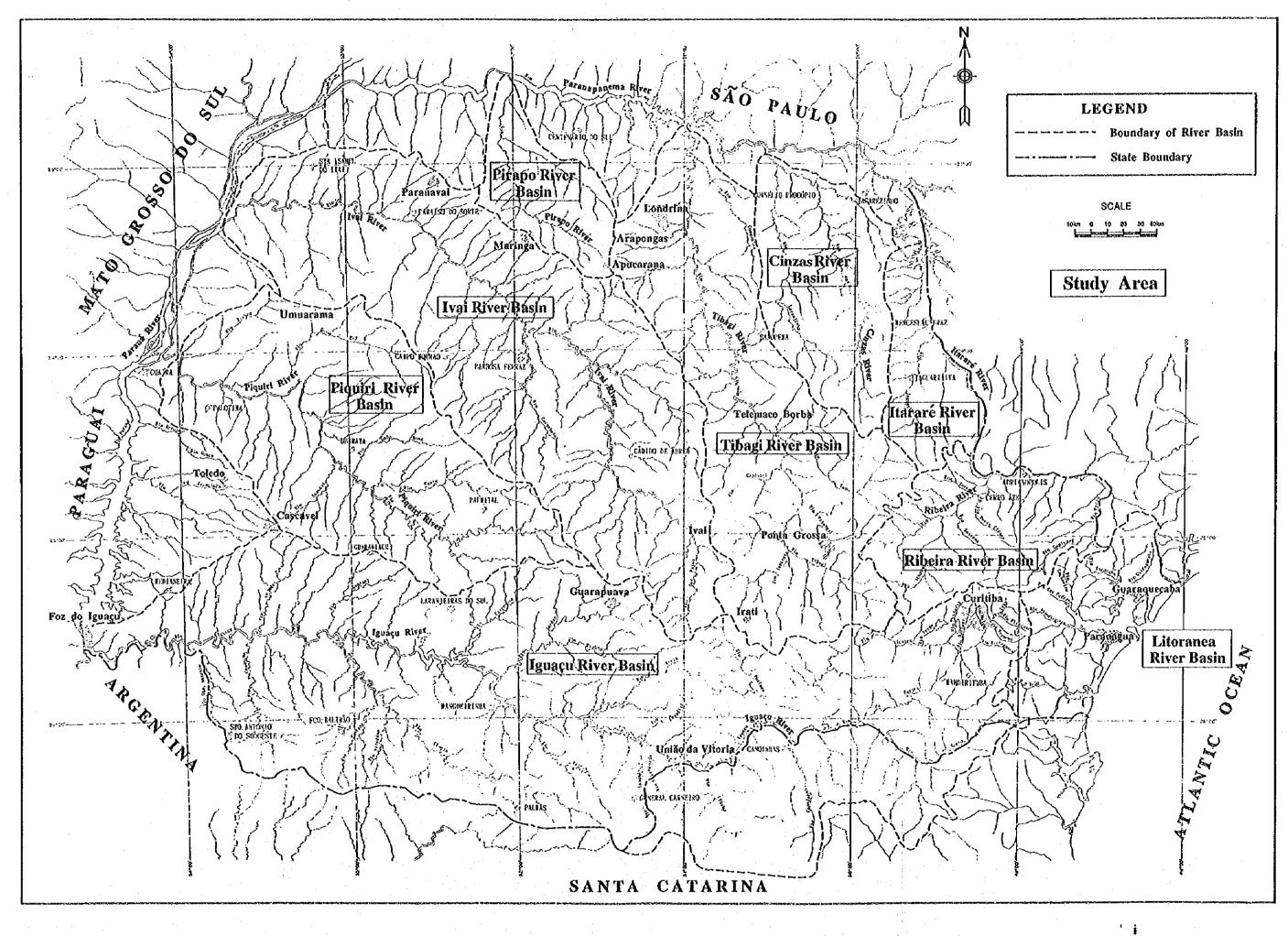
It would be a great honor for us that the result of the study would contribute to socio-economic development of Paraná State and to closer friendship between Japan and the Federative Republic of Brazil.

We wish to take this opportunity to express our sincerest gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Construction, the Hokkaido Development Agency, the Embassy of Japan in Brazil and the General Consulate of Japan at Curitiba. We also wish to express our deepest gratitude to the State Secretariat of Planning and General Coordination and other authorities concerned of Paraná State as well as those of the Federative Republic of Brazil for close cooperation and assistance extended to us.

Very truly yours,

Yoshio Nakagawa

CTeam Leader The Master Plan Study on the Utilization of Water Resources in Paraná State in the Federative Republic of Brazil



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1. EXECUTIVE SUMMARY

2. MAIN REPORT

- I. Strategy for Paraná State
- II. Master Plan for Iguaçu River Basin
- III. Master Plan for Tibagi River Basin

3. SECTORAL REPORT

- A. Socio-economy
- B. Meteorology, Hydrology and Surface Water Resources
- C. Hydrogeology and Groundwater Resources
- D. Domestic and Industrial Water
- E. Agriculture
- F. Hydroelectric Power Generation
- G. Water Utilization Plan
- H. Flood Control
- I. Water Quality and Sewerage
- J. Soil Erosion and Forest
- K. Ecology
- L. Water Environment Management
- M. Institution
- N. Cost Estimate, and Economic and Financial Assessment

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List of Abbreviation

CEPA	: State Commission for Agricultural Planning
the Article and	Comissão Estadual de Planejamento Agrícola
COMEC	: Coordination of the Metropolitan Area of Curitiba Coordenação da Região Metropolitana de Curitiba
CONAMA	: National Council of Environment Conselho Nacional do Meio Ambiente
COPATI	: Inter Municipal Concessionaire for the Environmental Protection of the Tibagi River Basin
an an an Arthur Anna Anna Anna Anna Anna Anna	Consórcio Intermunicipal para a Proteção Ambiental de Bacia do Rio Tibagi
COPEL	: Energy Company of the State of Paraná Companhia Pananaense de Energia
CORPRERI	: Permanent Regional Commission Against Floods in the Iguaçu River Comissão Regional Permanente Contra as Cheias do Rio Iguaçu
DAGRI	: Agricultural Operation Department Departamento Operacional da Agricultura
DEPEC	: Livestock Department Departamento de Pecuária
DERAL	: Economy Department Departamento de Economia
DNAEE	: National Department of Water and Electric Energy Departamento Nacional de Águas e Energia Elétrica
ELETROBRAS	: Brazilian Central Electric Joint-stock Company Centrais Elétricas Brasileiras S.A.
ELETROSUL	: Electric Center of the South Centrais Elétricas do Sul do Brasil S.A.
EMATER	: Paraná State Technical Assistance and Rural Extension Company Empresa Paranaense de Assistência Técnica e Extensão Rural
EMBRAPA	: Brazilian Agriculture and Livestock Research Company Empresa Brasileira de Pesquisa Agropecuária

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FAMEPAR	: Institute for Municipal Assistance of Paraná State Instituto de Assistência aos Municípios do Estado do Paraná
FAO	 Food and Agriculture Organization Fundo das Nações Unidas para Alimentação e Agricultura
IAP	: Environmental Institute of Paraná Instituto Ambiental do Paraná
IAPAR	: Agricultural Research Institute of Paraná Instituto Agronômico do Paraná
IBAMA	: Brazilian Institute of Environment and Renewable Natural Resources Instituto Brasileiro do Meio Ambiente e de Recursos Naturais
IBDF	Renováveis : Brazilian Forest Development Institute (current IBAMA) Instituto Brasileiro de Desenvolvimento Florestal
IBGE	: Brazilian Institute of Geography and Statistic Instituto Brasileiro de Geografia e Estatística
IPARDES	: Economic and Social Development Institute of the State of Paraná Instituto Paranaense de Desenvolvimento Econômico Social
JICA	: Japan International Cooperation Agency Agência de Cooperação Internacional do Japão
MERCOSUL	: South Common Market in Brazil, Argentina, Uruguay and Paraguay Merca do Cone Sul
MINEROPAR	: Paraná State Mineral Company Minerais do Paraná S/A
PROSAM	: Environmental Sanitation Program for Curitiba Metropolitan Region Programa de Sancamento de Região Metropolitan de Curitiba
SANEPAR	: Sanitation Company of the State of Paraná Companhia de Saneamento do Paraná
SEAB	: State Secretariat of Agriculture and Supply Secretaria de Estado da Agricultura e do Abastecimento
SEDU	: State Secretariat of Urban Development Secretaria de Estado do Desenvolvimento Urbano
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SEFA	: State Secretariat for Treasury
	Secretaria de Estado da Fazenda
SEID	: State Secretariat for Industry, Commerce and Economic Development Secretaria de Estado da Indústria, Comércio e do Desenvolvimento Econômico
SEMA	: State Secretariat of Environment
	Secretaria de Estado do Meio Ambiente
SEPL	: State Secretariat of Planning and General Coordination
	Secretaria de Estado do Planejamento e Coordenação Geral
SETR	: State Secretariat of Transport
	Secretaria de Estado dos Transportes
SIMEPAR	: Meteorological System of Paraná
	Sistema Meteorológico do Paraná
SETI	: State Secretariat of Science, Technology and Higher Education
	Secretaria de Estado da Ciência, Technologia e Ensino Superior
SUCEAM	: Superintendency of Erosion Control and Environmental Sanitation
	Superintendência do Controle de Erosão e Saneamento Ambiental
SUREHMA	: Superintendency of Water Resources and Environment
	Superintendência dos Recursos Hidricos e Méio Ambriente
UEL	: State University of Londrina
	Universidade Estadual de Londrina
UNDP	: United Nation Development Program
· ·	Programa das Nações Unidas para o Desenvolvimento

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CHAPTER 1 INTRODUCTION

1.1 Background of Study

The state of Paraná is located in the south of Brazil and has an area of approximately 200 thousand km^2 , equivalent to 87% of Japan's main island, Honshu, and a population of about 8.5 million inhabitants. Regarding economy, north and north-castern Brazil are not well developed, while about 80% of the economy, including the agricultural and industrial sectors, is concentrated in eastern and southern Brazil. The state of Paraná is one of the wealthiest states in Brazil together with Rio De Janeiro and Sao Paulo.

Agriculture was the main sector in the state of Paraná; however, agro-industry, chemical industry, paper industry etc. have been expanding around urban areas in line with the industrialization policy of the state government. This expansion of industry has promoted a concentration of population around large cities, such as Curitiba, Londrina, Maringa, Cascavel and Ponta Grossa causing shortages of domestic and industrial water. In addition, water pollution due to sewage and waste water from factories has become an important issue and the turbidity of river water has been increased by soil erosion on the large plateau.

The topography of Paraná is mainly plateau and most cities and agricultural lands are located on the plateau. Since the major rivers flow in valleys eroding the plateau, it is popular to utilize the smaller tributary rivers which flow on the plateau, or groundwater, for city and agriculture use. As a result, it has tended to be difficult to distribute enough water to each sector, despite the fact that rainfall is quite plentiful.

To account for the situation described above, the state of Paraná urgently needs to formulate a Master Plan for the utilization of water resources with a target year of 2015, including countermeasures for environmental issues such as water pollution, soil erosion, flood mitigation, etc.

With this situations as a background, the Government of the Federative Republic of Brazil requested technical cooperation related to the Master Plan Study on the Utilization of Water Resources in Paraná State (hereinafter referred to as the "Study") from the Government of Japan in August, 1993. The importance of the Study had been realized through the environmental Joint-Programming (JP) carried out as a part of JP between the two governments to find and establish a project which is necessary and worthwhile. In compliance with the request, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Study Team headed by Mr. Koichi UZUKA in October, 1993, and the Scope of Work and Minutes of Meeting were agreed among the Governor of Paraná state, Secretary of State Secretariat of Urban Development (SEDU), Executive Director of Brazilian Cooperation Agency, Secretary of State Secretariat of Planning and General Coordination (SEPL), Secretary of State Secretariat of Environment (SEMA) and the leader of the Preparatory Study Team. With these agreements, a study team headed by Mr. Yoshio NAKAGAWA (Study Team) commenced the Study at the middle of March 1994.

1.2 Implementation of the Study

The objectives of the Study are as follows:

- 1) To formulate a Master Plan for the utilization of water resources, which contributes to urban, industrial, agricultural, hydropower development and environment conservation, in Paraná state aiming at the target year of 2015.
- 2) To promote technology transfer to the Brazilian counterparts during the Study.

The area covered by the Study is the whole of the state of Paraná as shown in Figure at frontispiece and consists of 11 main river basins.

The Study was divided into three phases as follows:

- Phases I: To determine the methodology to formulate a Master Plan considering not only utilization of water resources but also environmental conservation in river basins, such as flood control, water quality improvement, ecosystem preservation, soil erosion control, etc.
- Phase II: Based on the above mentioned methodology, to formulate the Strategy regarding utilization of water resources and environmental conservation in river basins in Paraná state and select pilot river basin(s) for the Master Plan considering importance and urgency of water utilization and environmental issues.

Phase III: To formulate the Master Plan for the selected pilot river basin(s).

After Phase II, two pilot basins, Iguaçu river basin and Tibagi river basin, were selected for the Master Plan Study in Phase III.

This report, Main Report II, deals with the Master Plan Study for the Iguaçu river basin.

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CHAPTER 2 SUMMARY OF MATER PLAN

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The summary of the Master Plan for the Iguaçu river basin is as shown in Table-2.1.

	Cost	Implementation Schedule					
Contents of Master Plan			10° US\$	Present - 2000	2001 - 2005	2006 - 2010	2011 2015
		·		1111	1111		
.Water Supply			962.40				
 Domestic and Industrial Water 			957.80	· · ·			
	Development	Development					
Area of Project	Water (m/day)	Method				· ·	
1) Large Urban Areas: Population mor	a then 100,000 in 3	015	819.10				÷.,
(a) Curitiba Metropolitan Area	625,000	.015	760.00		·		
Well Stage I	111,000	29 wells	110.60				
Well Stage II	103.000	27 wells	157.90				
Irai Dam	121,000	Dam	137.90		19925-25353-21028		
Piraquara II Dam	65,000	Dam	60.40			-	
Praguara in Dani Pequeno Dam	69,000	Dam	78.50		-		
Alto Miringuava Dam	52,000	Dam	96.90	1		10.00 M	
Cotia Despique Dam	104,000	Dam	120.30				
(b) Cascavel	104,000	Dan	38.90		'		
(b) Cascaver San Jose River I	13.000	Direct Intake					· · .
San Jose River I	13,000		7.10		8.17.2.29.59.697.31		
Well Stage I	16,000	9 wells	17.70				
Well Stage II	10,000	l well	7.00	· · ·			
(c) Foz do Iguacu	10,000	1 100	11.10				
Parana River I	30.000	Direct Intake	3.70	-			
Parana River I	30,000	Direct Intake	3.70		-		
Parana River III	30,000	Direct Intake	3.70			4.754 million 38cm 435-00	
(d) Guarapuava	50,000	Dattimake	9.10			,	
Bananas River 1	13.000	Direct Intake	4.60				
Bananas River II		Direct intake	4.50		600000000	-	
2) Medium Urban Areas: Population n	,		35.80				
(a) Francisco Beltrao	1010 Bian 00,000 h		4,70				
Marrecas River 1	10.000	Direct lotake	2.40	-CS:XX >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>			
Marrecas River II		Direct Intake	2.30		last television and Ann		
(b) Pato Branco			1.00			÷	· • .
Chopim River	10.000	Direct Intake	9.10	an Castron Marchine			
(c) Medianeira	,						
Weil	11,000	i well	4,30	and the second secon			
(d) Dols Vizinhos		- · • • •					·
Chopim River	12.000	Direct Intake	9.10				
(e) Palmas	,			· · ·		199	
Caldeiras River	6.000	Direct Intake	4.90				
(f) Uniao da Vitoria							
Iguacu River	3,000	Direct Intake	3.70				
· · · · · · · · · · · · · · · · · · ·		Direct Intake &				· ·	
3) Other 76 Urban Areas	72,000	Wells	102.90	THE ATAMINES	-		
2) Agricultural Water Supply	•••••						
Whole River Basin	33.000	Direct Intake	4.60			-	

Table-2.1 (1) Summary of Master Plan for Iguaçu River Basin

	4	Desease	2001 -	2006 -	hedule 6 - 2011	
Contants of Mantas Dian	10 ⁴ US\$	Present • 2000	2001 - 2005	2005	2015	
Contents of Master Plan	10.022	hit	1111	TTTT	1111	
	97.00					
Flood Control	97.00		1.11		1	
Non-structural Measures (Zoning, FFWS", Evacuation, Proofing		1.1			1 ·	
Operation Rule) for Curitiba Metropolitan Area, Sao Mateus do Sul,	N.A		108.0000000000000	Series and the series of the s	anter manaza	
Porto Amazonas, Reboucas, Guarapuava, Uniao da Vitoria, Rio Negro,	1	1 · · · ·	1		1 · · ·	
Foz do Iguacu, Capanema		1		1	1 ⁻	
) Structural Measures	97.00	. I			1 N 12	
			1	· ·		
1) Curitiba Metropolitan Area			4			
(a) Continuation of PROSAM (Channel, Landscape Restoration,	(34.30)		₽ , =!			
Park, Resettlement etc.)						
(b) Extension of PROSAM	N.A			1		
Channel Excavation	1	CONSTRUCTION OF THE	1. S. S.	Constant.	1. S	
Dams with Flood Control Function	1.14	I I		Services credition bear	\$m386m30977	
2) Sao Mateus do Sul		1		1	1	
Dike System with a Sluice	i 11.10	1			1 .	
3) Unizo da Vitoria	$z_{i} = z_{i}$	· · ·	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1	
Dike System (L=17 km, H=5m) with Stuices	85.90			11.2	1	
Sewerage Treatment	344.00	1		I		
(1) Development of Sewerage System			1	1.2.2	1 1	
Area Sewerage Treatment Volume (m²/day)	1		[· ·		1.1.1	
(a) Curitiba Metropolitan Area 420,000	294.00		-	-		
(b)Cascavel 45,000	50.00					
Soil Erosion Control	143.90			t	1	
	43.10			1 1		
	43.10			<u> </u>	L	
(2) Non Tillage 7,520 km ³		1		J		
(3) Improvement of Farm Road 21,560 km	32,30	1]		
(4) Maintenance of Farm Road	33.00	1	APPROX PROFESSION	T.	1	
(5) Agronomic Measures and Soil Management	N.A				[
Ecosystem Conservation	8.63	1				
(1) Preservation Program	5.33	1		1 · · ·	1	
1) Fish Population Inventory	0.90	I .	*****		1	
2) Fish Population Dynamics	0.50		CONTRACTOR OF THE OWNER		-	
3) Endemic Fish Population	0.50	-				
4) Reservoir Fish Assessment	2.60				-	
5) Management Plan for Conservation	0.03	Company and the second	1 ·		1.15	
6) Serra Baitaca Preservation	0.60	-	-	-		
7) Eng. Bley Preservation	0.20		-			
8) Biodiversity Institute	N.A.					
(2) Environmental Education Program	0.90		I i		1 .	
1) Water Environment Education	0.90			John The Market		
(3) Monitoring Program	2.40		·			
() Bioindicator Monitoring	1.30	1	L	L		
	0.70			L		
2) River Margin Vegetation	· · · · ·	I		I.	Γ	
3) Sand Fly Monitoring	0,40	1		1	1	
Afforestation	168.00	4	l · · ·		1	
(1) Afforestation for Conservation of the Water Environment: 900 km ³	33.00)		C REALT CONSIDERING	400000000	
(2) Commercial Afforestation: 1,900 km ²	135.00			-		
Establishment of Monitoring System	2.13		†	1.000	1	
(1) Completion of SIMEPAR's System	(35.00)		l s serve	100	1.25	
(2) Strengthening of Monitoring System	0.19			in the second second	ater ten to vert	
(2) Strengthening of Montioring System 1) 4 Meteorological Observations	0.03					
	1 .		1	1.1.1.4	100	
2) 103 rainfall gauges	0.16		1 1 - K - K		1.	
(3) Provision of 11 Stream Gauges	0.11		1 . 1 .			
(4) Integrated Monitoring System for Surface and Subsurface Water	1.43) POROTS MARGINARSON		T	1	
Resources în Curitiba Area	· ·		1 · · · ·		1	
1) 5 Stream Gauges	0.05				- ·	
2) 17 Boreholes in the Karst	0.41	1 · · · ·	I I	1	1	
2) 20 Possbalas in the Gualizanticka	0.34	۱. I	1	1	1.1	
3) 20 Boreholes in the Guabiroutuba	1 6.0	d	I	1.	1	
4) 44 Borcholes in the Other Urban Areas	0.63	51 - C				
4) 44 Boreholes in the Other Urban Areas	0.83			harman	-	
		,				

Table-2.1 (2) Summary of Master Plan for Iguaçu River Basin

	Cost	Implementation Schedule				
		Present -	2001 -	2006 -	2011	
Contents of Master Plan	10 ⁴ US\$	2000	2005	2010	201:	
 Institutional Improvement Program Organizational Strengthening through Implementation of the Current Re-Organization Strengthening Groundwater Management Enhancement in the Enforcement of Environmental Regulations Legal Arrangement for the Control of Soil, Sand and Stone Taking in river areas Cost Recovery of Water Environment Management Promotion of Residents Participation through Information Publication 	N.A.		to b	e continue	ed	
 (7) Introduction of River Basin Management and Establishment of Competent Entities (8) Promotion of Coordination for Comprehensive Management (9) Establishment of Public Hearing System into the Water Granting Procedure (10) Comprehensive Water Quality Management by River Basin (11) Enhanced Administration of Water Resources Development (12) Water Pricing and Charging for Optimal Water Allocation and Demand Control 	N.A.					
Sub Total	1,726					
Hydropower		- A				
3-stations, Total Installation Capacity: 1,400 MW	and the second second	*****	**************************************			
Grand Total	2,920			· ·	L	

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Table-2.1 (3) Summary of Master Plan for Iguaçu River Basin

(1) Price level in August 1994 is applied with the exchange rate 1 US\$ - 0.89 R\$.
 (2) Costs for continuation of PROSAM and SIMEPAR's System are not included in the total.

CHAPTER 3 NATURAL AND SOCIO-ECONOMIC BACKGROUND

3.1 Topography

The area of Iguaçu River Basin is bordered by the Coastal Mountains in the east, the Paraná River in the west, the ridges passing through Cascavel and Guarapuava in the north, and the Branches of Santa Catarina State in the south. The topographic features of it are generally characterized by the following three areas from east to northwest (Figure-3.1):

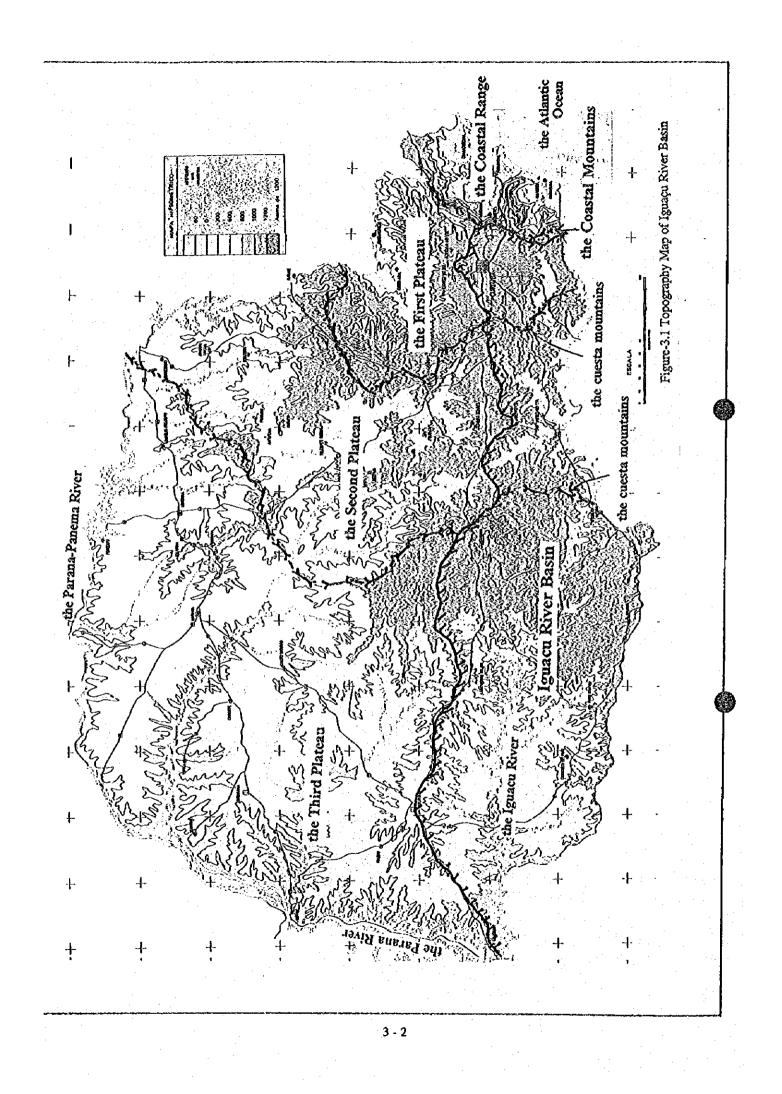
- the First Plateau
- the Second Plateau
- the Third Plateau

The First Plateau consists of the upland planes such as Curitiba City and hills with gentle gradients, and it is restricted to the Coastal Mountains in the east and the cuesta mountains in the west and/or northwest. The upland planes are ranging in altitude from 800 to 1,000 m and the cuesta mountains show the inclination of the geological formations trending to the west. The river system in this area which is composed of the Iguaçu River, the Negro River and the tributataries are mainly flowing into the Paraná River from the east to the west.

The Second Plateau consists of the planes and hills with gentle gradients ranging in altitude from 600 to 1,000 m. It is restricted to two cuesta mountains in the east and the west. In this Plateau the river system is mainly composed of the Iguaçu River and the Negro River.

The Third Plateau consists of the planes and hills ranging in altitude from 300 to 800 m. It is restricted to the cuesta mountains in the east and the Paraná River in the west. The hills in this Plateau are generally steeper than the hills of the other plateaus.





3.2 Meteorology

3.2.1 Rainfall

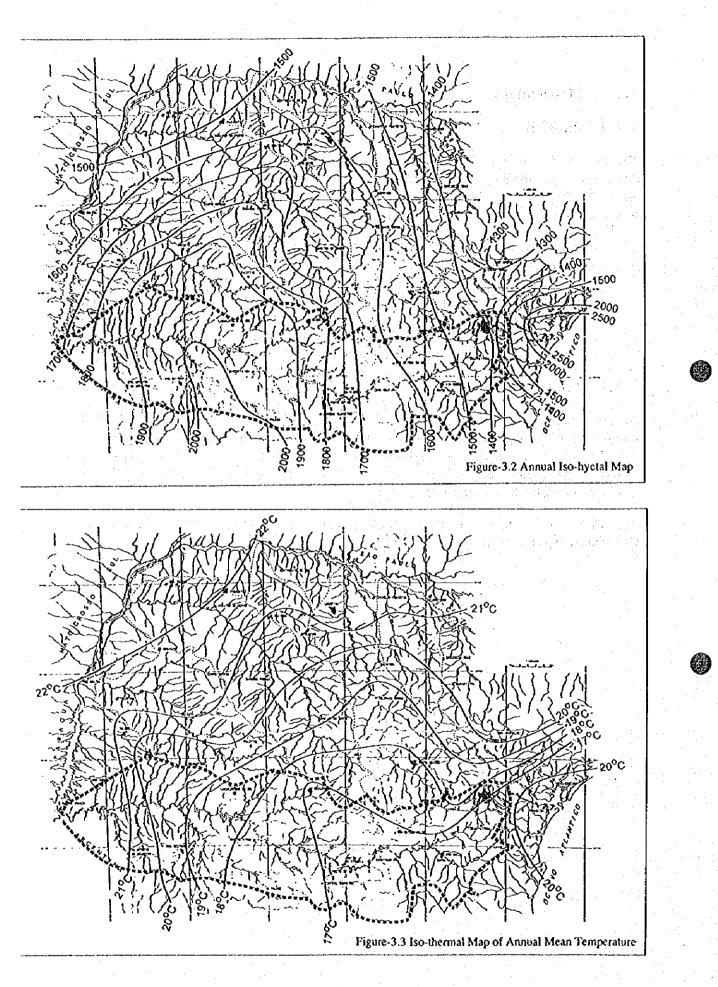
The rainfall data in Iguaçu river basin has been measured with different agencies and different observation periods by stations. Using the last 20 years annual mean rainfall data, an Iso-hyetal map was developed as shown in Figure-3.2. In Iguaçu river basin, the following rain characteristics can be observed;

- a) The region including Curitiba at the western side of the coast mountains range has the lowest annual rainfall.
- b) The middle Iguaçu river basin including Palmas has second highest annual rainfall volume in Paraná because of high altitude between 1100 m and 1200 m, and annual rainfall volume has a tendency to decrease from the middle Iguaçu river basin toward the lower Iguaçu river basin.

3.2.2 Temperature

Annual mean temperature in Paraná State has generally range between 16°C and 22°C throughout the year. Figure-3.3 shows Iso-thermal map of annual mean temperature, and annual temperature in both upper and middle Iguaçu river basins with a mean of 1,000 m altitude is an constant annual mean temperature between 17°C and 18°C. Annual temperature increase toward the lower Iguaçu river basin.

According to collected data in Paraná State, minimum temperature -6.8°C at Palmas and Guarapuava was recorded during the recent 20 years.



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3.3 Hydrology

3.3.1 Runoff Analysis

Based on the river flow data for the last 20 years period (1974-1993), daily discharge at each discharge reference point were determined, and the missing daily discharge were determined by monthly discharge correlation analysis among the stations.

The flow regime shows the annual condition using the calculated daily discharge at a certain hydrological station and shall be indicated by the daily discharge and number of exceeded days. The annual flow regime of each selected stations in the Study area shows as follows;

- High Discharge (95th daily discharge from the greatest)
- Normal Discharge (185th daily discharge from the greatest)
- Low Discharge (275th daily discharge from the greatest)
- Drought Discharge (355th daily discharge from the greatest)

The flow regime is commonly used to find the fluctuation in the daily discharge, and utilized for determining the potential water characteristics in Japan.

The flow regime computed by station was adapted for 20 years period (1974-1993), and mean value of the 95th, 185th, 275th and 355th daily discharge for the last 20 years period were calculated. The results of mean flow regime for the last 20 years period are summarized in Table-3.1.

Basin	River	No.	St. No.	St.Name	Area	Daily Discharge (m3/sec)				
					(km2)	95 day	185 day	275 day	355 day	
tarare	Jaguarialya	1		Tamandua	1,822	33.86	23.56	18.13	13.0	
Cinzas	Cinzas	2	84-360-000		2,015		25.11	18.09	12.2	
		3	64-370-000		5,622		50.03	34.18	22.3	
Tibagi	Tibagi	4	64-444-000		4,450		64.61	40.56	24.8	
-	A STATE AND	5	64-465-000		8,946		132.92	87.08	51.8	
		6		Barra Rib.des Antas	15,600		230.94	153.34	95.2	
		7	64-507-011	Jataizinho (Extendido)	21,955		312.46	211.73	128.	
Pirapo	Pirapo	8		Vila Silva Jardim	4,627	79.54	61.38	49.43	37.1	
val	lval	_9		Tereza Cristina	3,572			21.57	10.9	
		0		Porto Espanhol	8,600		115.48	67.89	37.2	
	1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	_11		Porto Bananelras	24,200		311.65	199.13	120.4	
1.	1. A.	12		Porto Paraiso do Norte	28,427		381.95	262.71	173.0	
		13		Novo Porto Taguara	34,432	777.78	491.69	355.97	246.	
Piquiri	Piquiri	14		Porto Guarani	4,223		60,39		16.0	
		15		Ponte do Piquiri	11,303	345.65	188.73	111.87	65.	
	5 1 3 5 1 C	16		Porto Formosa	17,500		315.78	219.41	143.3	
	19 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	17		Balsa do Santa Maria	20,982		368.49	262.97	172.	
guacu	Iguacu	18		Fazendinha	110		1.86	1.29	O .(
- · ·	-57 S. 2 4 S	19	65-025-000		2,304		35.78		12.	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	20		Porto Amazonas	3,662		49.48			
· · ·	法自己的 网络小	21		Sao Mateus do Sul	8,065	136,44	78.47	<u> </u>		
	· · · ·	22		Uniao da Viloria	24 211	656.67	365.42	232.03	131.	
		23		Salto Osorio	45,824		829.86	532,17	262.	
		24		Salto Cataratas	67,317		1126.20	792.05	436.	
	Negro	25	65-175-000		7,970		112.64	76.21	49.	
<u>`</u> .	Timbo	26	65-260-000	Foz do Cachoelra	693	22.90	12.47	7.92	4.	
1 A.	Jordao	27		Santa Clara	3,913	128.17	77.18	49.67	28.	
e de la composición d	ChopIm	28	65-960-000	Aquas do Vere	6,696		131.11	78.13	40.	
Ribeira .	Ribelra	-29		Capela do Ribeira	7,262		101.75	86.87	72.8	
litoranea	Nhundiaquara	30			217	14.43	8.04	4.86	2.	
	Marumbl	31	82-195-002	Morretes	53	5.02	2.77	1.61	0.1	

Table-3.1 Flow Regime (mean values for the last 20 years period (1974 - 1993))

3.3.2 Runoff Ratio

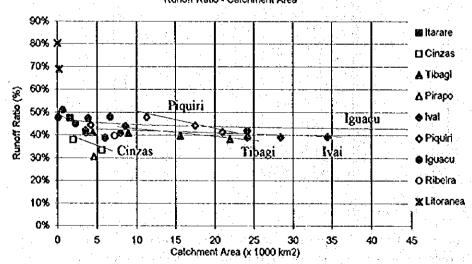
Using the annual rainfall depth and annual surface runoff over the same catchment area, surface runoff volume and surface runoff ratio by stations were shown in Table-3.2 and Figure-3.4. The runoff ratio of main stream and main tributaries are 43 % and 47 % respectively with a mean of 44 %.

Table-3.2 Summary of Mean Annual Surface Runoff Ratio

Basin	River	No.	SI. No.	St Name	Area	Rainfall	Runoff	Balance	Runoff
				an an an ar tha	(km2)	(mm/yeər)	(mm/year)		Ratio
tarace	Jaguariaiva	1	64-242-000	Tamandua	1,622	1335.4	632.4	703.0	0.4
Cinzas	Cinzas	2	64-360-000		2,015	1491.3	565.8	925.4	0.3
		3	64-370-000	Andira	5,622	1440.3	480.5	959.8	0.3
Tibagi	Tibagi	4	64-444-000	Uvala	4,450	1560.2	640.7	919.4	0.4
		5	64-465-000	Tibagi	8,948	1565.7	639,8	925.9	0.4
19 - C	1.1.1.1.1.1.1	6	64-491-000	Barra Rib das Anlas	15,600	1569.7	622.3	947.4	0.4
		7	64-507-011	Jataizinho (Extendido)	21 955	1537.6	604.9	982.6	0.3
Pirapo	Pirapo	8	64-550-000	Vila Silva Jardim	4.627	1615.2	492.7	1122.4	0.3
val	Ival	9	64-625-000	Tereza Cristina	3 572	1694.5	715.8	978.6	0.4
		10	64-645-000	Porto Espanhol	8,600	1659.9	729.7	930.3	0.4
		11	64-675-002	Porto Bananeiras	24,200	1665.1	648.9	1016.2	0.3
		12	64-685-000	Porto Paraiso do Norte	28,427	1657.6	646.9	1010.7	0.3
		13	64-693-000	Novo Porto Taquara	34,432	1642,2	645.1	997.1	0.
Piquiri	Piquiri	14	64-771-500	Porto Guarani	4,223	1928.9	855.6	1073.2	0,4
••••		15	64-795-000	Ponte do Piquín	11,303	1936.9	926.2	1010.8	0.4
		16		Porto Formosa	17,500	1865.1	823.7	1041.4	0.4
1. J. A. S.	· ·	17	64-830-000	Balsa do Santa Maria	20,982	1843.0		1079.4	0.4
guacu	lavacu	18	65-010-000	Fazendinha	110	1557.3	741.2	816.0	0.4
		19	65-025-000	Gualuvira	2,304	1416.5	634.8	781.8	0.4
	1 A.	20		Porto Amazonas	3,662	1445.9	591.8	854.0	0.4
		21	65-060-000	Sao Mateus do Sul	6,065	1483.6	574.8	908.8	0.
		22	65-310-000	Uniao da Vitoria	24,211	1584.2	663.8	920.4	0.4
. :		23	65-895-002	Salto Osorio	45,824	1725.5	765.3	960.3	0,4
		24	65-993-000	Salto Cataratas	67,317	1502.9	724.7	1078.3	0.4
· · · · ·	Negro	25	65-175-000	Oivisa	7,970	1515.9		899.0	, 0 .4
	Timbo	26	65-260-000	Foz do Cachoeira	693	1738.7	884.9	853.7	0.5
	Jordao	27	65-825-000	Santa Clara	3,913	1893.4	895.8	997.6	0.
	Chopim	28	65-960-000	Aguas do Vere	6,696	2003.2	953.8	1044.4	0.4
Ribeira	Ribeira	29	81-200-000	Capela do Ribeira	7,252	1378.1	545.8	832.3	0.4
Litoranea		30	82-170-000		217) 2531.7	1745.5	792.2	0.0
	Marumbi	31	82-195-002		53) 3300.0	2646.9	653.1	0.0
Mean		a see and		All Basins		1723.9	787.9	936.0	46
			1997 - 1997 -			100%	45%	54%	
		-		Basins except for Litorar	ea Area	1641.5	690.8	950.7	42
	Desits crospitor citutatica rea					100%	42%	58%	

(Simulation Period: 1974 - 1993, 20 Years)

Note : ") : It was determined by using an existing Iso-hyetal Map (COPEL)



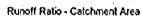


Figure-3.4 Relations between Catchment Area and Runoff Ratio

3.4 Geology and Hydrogeology

Iguaçu River Basin and the neighbor areas of the basin are chiefly occupied by Precambrian (composed of Archean and Proterozoic) metamorphic rocks intruded by granitic intrusive rocks ranging Precambrian-Paleozoic age, and sedimentary rocks of Paleozoic to Cenozoic with Mesozoic volcanics as shown in Figure-3.5.

Precambrian occupies the most upper part of the Iguaçu River consisting of Curitiba Metropolitan Area which is almost the same area as the First Plateau in the Iguaçu river Basin. Paleozoic occupies the Second Plateau and the upper area of the Iguaçu River Basin. Mesozoic occupies the Third Plateau. Cenozoic formations are overlying on the Precambrian in Curitiba Metropolitan Area. The sequences of geology are overlapping from the east to the west in order of age from Paleozoic to Mesozoic. The overlapping trends to incline gently in monoclinic structure from the east to the west.

There are seven aquifers in the area of the Iguaçu River Basin as described below:

(1) the "Karst"

This aquifer consist of carbonate rocks intercalated with non-carbonate semi-schists of Precambrian intruded by dorelite dikes. It occurs in an area of about 3,480 km².

(2) Crystalline Rocks

This aquifer is composed of open fractures in granitic rocks and metamorphic rocks in the age from Precambrian to Cambrian. It is exposed in about 7,540 km² of the area.

(3) Lower to Middle Paleozoic

This Aquifer is composed of Castro Group and Paraná Group and it is exposed in about 7,150 km² of the narrow area.

(4) Middle to Upper Paleozoic

This aquifer is composed of Itarare Group and Guata Group and it is exposed in about 17,400 km² of the area.

(5) Late Paleozoic

This aquifer is composed of Passa Dois Group with partial porous media and it is exposed in about 17,400 km² of the area.

(6) Mesozoic

1) Botucatu Formation

This aquifer is overlain by Serra Geral Formation within the Third Plateau, and then the distribution of it expands to the neighbor states and countries. Botucatu Formation composed of high permeable sandstones (effective porosity ; ≥ 25 %) and the high permeable sandstones form better and bigger reservoirs in the Paraná River Basin.

2) Serra Geral Formation south

The lithology of this aquifer is composed of basalt lavas intercalated with sandstone lenses and the aquifer is exposed in about 32,000 km².

3) Serra Geral Formation north

The lithology of this aquifer is same as Serra Geral Formation south, and the aquifer is exposed in the surroundings of Cascavel and about $1,900 \text{ km}^2$ of the area within this pilot basin

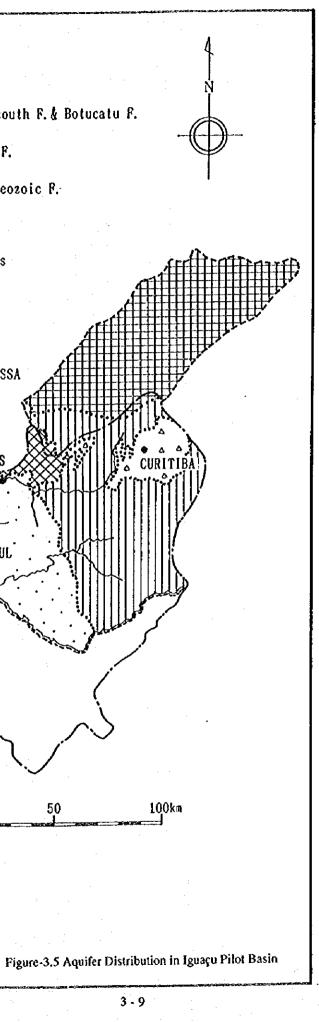
(7) Cenozoic

Guabirotuba Formation

The reservoirs of this aquifer is restricted to Curitiba Metropolitan Area (about $1,130 \text{ km}^2$), and the reservoirs are composed of porous media of sandstones and conglomerates in the lower horizon of Guabirotuba Formation.

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LEGEND $\begin{bmatrix} V, V \\ V, V \end{bmatrix}$ Serra Geral F. south F. & Botucatu F. 3 Basin Boundary Upper Paleozoic F. Boundary of Study Area Upper-Middle Paleozoic P. Furnas F. Crystalline Rocks Karst F. Guabirotuba F. CASCAVE • Ponta grossa ARANJBIRAS DO SUL PORTO AMAZONAS Rio Jordao MATEUS DO SUL UNIAO DA VI<u>TORI</u> Rio Negro



3.5 Landuse

SANEPAR conducted the GIS computation based on IAP satellite imagery analysis (1990 & 1994) in order to identify the landuse in Iguaçu river basin. The result is shown in Table-3.3.

	e de la francé de la sec	li ser si si si	11. 11	<u>, 1992 (1997)</u>			· · · · · · · · · · · · · · · · · · ·			
•		Total Area	Swamp	Sand Bank		2nd		Pasture		
		(km²)	(%)	(%)	Forest (%)	Veg.(%)	Ref. (%)	(%)	Crop (%)	Others (%)
	Iguacu river basin	55,320	_		14.3	27.0	1.7	17.6	37.9	1.5
	Parana State	197,880	0.1	0.2	9.0	26.0	3.2	23.1	37.6	0.8

Table-3.3 Landuse in Iguaçu River Basin

2nd Veg.: Secondary Vegetation, Ref.: Reforestation Area of Iguacu river basin is only within Parana state.

建立动物 计工作 经公司经济 计注意分析

Source: SANEPAR GIS Computation based on IAP Satellite Imagery Analysis (1990 & 1994)

 $37.9 \% (21,000 \text{ km}^2)$ and $17.6 \% (9,700 \text{ km}^2)$ of Iguaçu river basin are currently utilized as crop land and pasture, while the state average is 37.6 % and 23.1 %, respectively. More than half of the river basin area is used for agriculture spreading all over the basin. 28 % of crop land and 21 % of pasture in the state belongs to Iguaçu river basin.

Natural forest and reforestation in Iguaçu river basin cover 14.3 % (7,900 km²) and 1.7 % (900 km²) of its area, respectively. The total area of natural forest in the state is approximately 17,800 km² and 44.4 % of them belongs to Iguaçu river basin. The natural forest is mainly located in the coastal mountain range, the upstream end, and the downstream of the basin. In contrast to the preservation of natural forest, the area of reforestation is limited.

Secondary vegetation where the natural bush grows after some use, such as slash and burn farming, extends 27 % (14,900 km²) of the river basin area. The proper landuse of this area is recommended, for example conversion into reforestation, preservation of native vegetation and so on. It spreads over the basin; however it is more concentrated in the upstream of Iguacu river basin, around Lapa and Palmeira regions.

The satellite imagery analysis is based on the data of 1989 and 1990. Since this is the most recent landuse available, it was adopted throughout the study assuming that the current landuse does not vary from the one in 1990.

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3.6 Socio-Economy

3.6.1 Regional Unit and Zoning of the Study

According to the regional unit of collected data concerning the socio-economic area, it was decided to use the municipalities as a regional unit. Therefore, the zoning lines for the Study should be drawn following the boundary lines of the municipalities. However, as the Study should be made by river basin, it was decided to use the following criteria for inclusion (or exclusion) of municipalities that straddle other river basins, in the zoning of the Study:

- All municipalities that have their urban center located within the river basin, regardless if only a part of the urban area is inside the river basin, were included in the zoning.
- If the urban center of the municipality is not included in this basin, but there is a chance that this municipality will start to use a small river that belongs to this river basin in the future, the municipality is included in the zoning.

In the case of only a small part of the rural area of the municipality, approximately less than 10% of total area, be included in this river basin, the municipality is excluded of the zoning.

The recommendation of the Counterpart Team was considered as to the inclusion of municipalities in the zoning, in accordance to the criteria, such as water supply system of undertakers.

0.711

The zoning for this river basin is composed of 101 municipalities, and is presented in Figure-3.6.

3.6.2 Population per Municipality

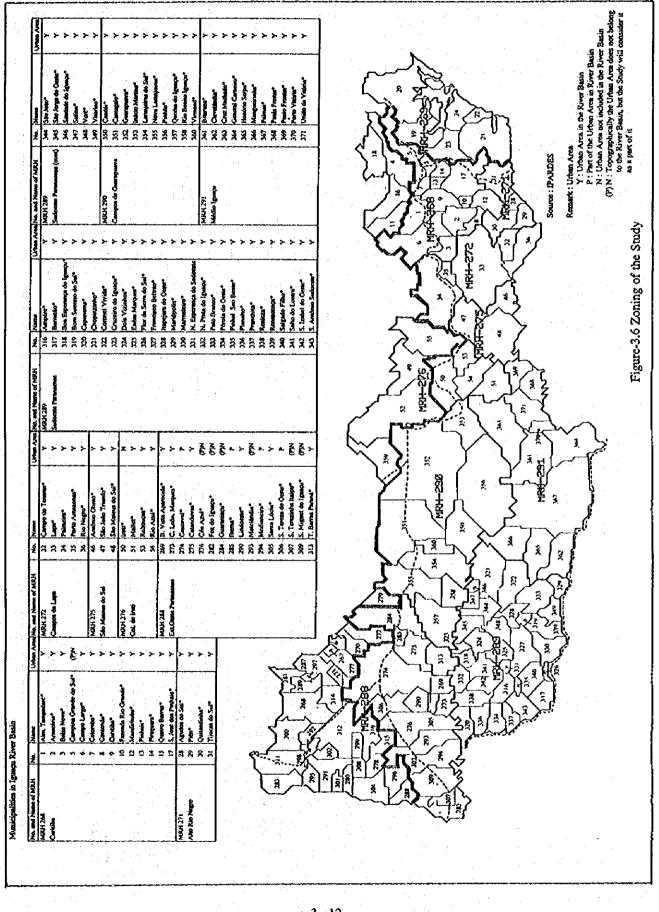
Based on the census of 1970, 1980 and 1991, issued by IBGB and provided by IPARDES, the population per Municipality, in each year, of the 101 municipalities that compose the Study's zoning area are shown in Table-3.4 (1), Table-3.4 (2) and Table-3.4 (3) divided per MRH (Homogeneous Micro-Regions) - refer to Main Report I for data concerning population per MRH. It is important to say that some municipalities have been created recently and, therefore, these new municipalities do not have the number of inhabitants included in the table mentioned above.

3.6.3 Gross Regional Domestic Product (GRDP) per Municipality

Based on the estimated GRDP per MRH (Table-5.10 of Main Report I), on the data of Financial Economic Statistics - 74/85, 86/87, 88/89 issued by SEFA and on the Municipalities' Participation Fund - Preliminary Indexes - 95, issued by SEFA, the GRDP of the 101 municipalities from the years of 1981 to 1991 was estimated and is shown in Table-3.5 (1), Table-3.5(2) and Table-3.5(3).

3.6.4 GRDP by Secondary Sector per Municipality

GRDP by Secondary Sector per Municipality, during the year of 1981 to 1991, was estimated based on the same data mentioned above, while this estimation was presented in the Sectorial Report Vol. A.



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	No. and Name of		Population 1970			Population 1980			Population 1991	
of MRH	-91	Urban	Rural	Total	Urban	Rural	Total	Urban	Rura	Iotal
	No. Name								100 644	Vo VVV C
MRH 268	TOTAL of MRH	656,469	164,764	821,233	1,325,275	165,611	1,440,626	757/121	c/c,c71	3
Curitiba	1 Alm. Tamandarc	4,288	110,11	15,299	27,063	7,105	34,168	59,080	7,079	66,159
	2 Araucária	5,473	11.644	11.117	27,128	7,671	34,799	54,262	7,627	61,889
	3 Baisa Nova	1234	3,470	4,704	1,262	4,026	5,288	2,430	5,085	7,515
	5 Campina G. do Sul	319	7.572	7,891	3,783	6,015	9,798	12,722	6,621	<u>6</u>
	6 Campo Largo	15.927	18,478	34,405	37,401	17,438	54,839	53,892	18,631	72,523
	7 Colombo	1.092	18,166	19.258	54.979	7,902	62,881	110,273	7,494	11
	g. Contenda	1,122	6.102	7.224	3,498	4,058	7.556	4,823	4,118	8,941
	o Curitiha	584.481	24.545	609.026	1.024.975	1	1.024.975	1,315,035	•	1,315,035
-	10 Branda Dia Canda				1		Ī	1	!	
	10 Mandichiba	772	0 677	11 036	7.216	8.236	15.452	26.237	12,099	38,336
••••			0110	27.76	KN 077	0 712	70.640	327 10	15 444.	106 882
	14 ruraquara	C11,21		1000			V14 V	0 123	220 1	
	15 Quarto Barras	1,105	1067	000 ⁴	545°	17.4	107.05	111 000	16.402	
	17 S. José dos Pinhais	C/ 4.12	64071	94,124	00'90	000°C1		102 TIL		
	Sub-Total of Municipalities of Basin	649,995	150,410	/82,403	K7C,0VC,1	117'00	10×10XC-1	017000'T	010404	
	Sub-Total of Municipalities not of Basin	6,476	29,354	35,830	16,746	27,140	43,886	26,956	21,997	48.95
MIRH 271	ITOTAL OF MICH	2,529	26,959	29,488	3,327	28,246	31,573	5,958	32,505	38,463
A Rio Nerro	28 Aondos do Sul	167	4 665	5.432	653	4,547	5,200	611	5,297	8
	29 Pičn	131	5224	5,355	262	5,728	5,990	1,432	6,313	7,745
	20 Outrandinha	1.242	0.611	10,853	1.587	10.804	12,391	2,476	11,942	14
	31 Tiucas do Sul	389	7.459	7.848	825	7,167	7,992	1.271	8,953	2
	Sub-Total of Municipalities of Basin	2.529	26,959	29,488	3.327	28,246	31,573	5,958	32,503	38 463
	Sub-Total of Municipalities not of Basin	0	þ	ö	þ	0	0	6	b	
MRH 272		34,492	43.417	606.77	24,843	42,862	87,705	28,986	45,345	104,333
Campos da l'ana	22 Campo do Tenente	040	3471	4.411	1.039	2.806	3.865	2,043	3,198	5.241
the second second second	23 I and	10 566	21 556	22,122	14 774	20.647	35,021	19.472	20.678	40,150
	24 Palmeira	0	0	0	0	0	0	0		
	35 Porto Amazonas	2.180	052	2.910	1 900	1 008	2.908	2.393	1.186	3.579
	36 Rio Neoro	12.677	5.759	18,436	15.838	5,838	21,676	20,200	6,115	26,315
•	Nih-Total of Municipalities of Basin	26.363	31,516	57.879	35171	30,299	63.470	44.108	31.177	75,285
	Sub-Total of Municipalities not of Basin	8.129	10611	20,030	11.672	12.563	24,235	14,878	14,168	2
MRH 275	· (TOTAL of MRH	7,492	33.616	41.108	13.682	30,894	44.576	19,375	33,816	53,191
São Mateus do Sul	46 Anthrio Olinto	210	6.967	1111	321	6,436	6,789	- 618	7,115	
	47 São João Triunfo	1.163	9.133	10,296	.899 1	8,914	10,813	2,830	9490	12,320
•	48 São Mateus do Sul	6119	17,516	23,635	11,430	15,544	26,974	15,927	17,211	33,138
-	Nub-Total of Municipalities of Basin	7,492	33,616	41.108	13.682	30,894	44,576	- 19 375 -	33,816	161.53
: •••	Nub-Total of Municipalities not of Basin	0	D	0	b	þ	0	0	0	
MRH 276	TOTAL of MRH	36.598	98,159	134.757	49.976	98.491	148,467	69 230	102,442	171 672
Col Insti	50 Irati	0	0	0	0	0	0	0	0	.
	51 Mailer	2.605	7.345	9.950	3.249	6.798	10.047	5.528	6,280	11.808
	C2 Debourse	1 028	8,003	11 130	3,834	7 081	10.915	5.396	7.552	12.948
		977 L	2001	1890	2 519	\$ 170	089 01	3.206	\$ 200	12.406
	C. F. Total of Missional State of Darie	7410	CYC 34	172 02	0702	070 00	157.12	14 130	22 032	27.162
	DUCE 1 OLD MUNICIPALITIES OF DASH	1.417	74007	10/*/0	21044	C+	TCOTO	ACT 12.4	40000	5

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 Table-3.4 (2) Population per Municipality in 1970, 1980 and 1991/Iguaçu River Basin

 No. and Name
 No. and Name of

pality Name TOTAL of MRH 288 Name C. Leon, Marques C. Leon, Marques For do Iguacu Terra Mardadia Mardadia Mardadia Mardadia Mardadia Mardadia Mardadia Mardadia S. Tereza do Oeste S. Tereza do Sul ToToT Municipalities not of Basin T. Barracio B. Esper. Iguacu B. Esper. Iguacu B. Esper. Iguacu Connet Virinhos Endas Marques Endas Marques Endas Marques Endas Marques Endas Marques Endas Marques Flor da Serra do Sul Francisco Beltrado Narnéfoits Marmétoits Narado Iguacu Narado Iguacu Narado Iguacu Narado Iguacu	8 8 8	Rural 602,916 59,805 54,960 23,535 19,036 13,819 25,097 23,054 23,055 23,054 23,055 23,057 23,055 23,055 23,055 23,057 24,057 24	Total 752,432 23,256 23,256 23,219 33,966 23,519 33,966 24,561 31,142 31,142 33,5682 25,242 25,242 31,142 31,142 31,142 33,5682 446,360	Urban 484,504 484,504 10,317 123,698 3,625 11,754 101,330 7,567 7,577 7,577 7,577 7,577 7,577 7,577 7,577 7,577 7,577 7,577 7,5777 7,57777 7,577777777	Rural 476.205 39,761 39,761 27,706 13,690 34,991	Total 960,709	Urban 728,448	Rural	Total 1.016.481
No. Name COTAL of MRH 288 TOTAL of MRH 288 273 C. Loon, Marques 273 C. Loon, Marques 273 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 276 Ccu Azul 288 Couraniaçu 288 Foor do Iguaçu 288 Couraniaçu 288 Matelándia 288 Couraniaçu 288 Matelándia 290 Lindoeste 290 Lindoeste 290 S. Miguel do Iguaçu 305 S. Tereza do Ocste 307 S. Tereza do Courania 305 S. Miguel do Iguaçu 307 S. Tereza do Sult 306 S. Tereza do Sult 307 S. Tereza do Sult 307 S. Tereza do Sult 307 S. Tereza do Sult 308 S. Miguel do Iguaçu 307 S. Tereza do Sult 309 S. Miguel do Sult 307 S. Tereza do Sult 301 T. Barras Paraná 307 S. Tereza do Sult 302 Carnerio 308 S. Creace 317 Barras Paraná 308 S. Suberce 318 B. Esper. Iguaçu 308 S. Creace 318 B. Esper. Iguaçu 308 S. Cruaceiro do Sult 320 Carnerio Selfardia 328 Cornerio Selfardia 321 Chopinzinhos 328 Cruaceiros Beltráo 323 Cruacioso Beltráo 328 Marcídosi 324 Narriopois		602,916 54,960 54,960 23,5335 19,036 13,819 23,097 23,097 21,910 23,064 23,066 23,066 23,066 23,509 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,5000 23,50000 23,50000 23,5000000000000000000000000000000000000	752,432 23,256 89,921 25,726 23,219 33,966 33,966 33,966 33,966 31,142 31,142 31,142 33,5682 33,5682 446,750 446,750	484,504 10,317 123,698 11,754 11,754 10,330 7,567 7,767 7,567 7,777 7,777 7,7777 7,77777777	1 - E - E - E - E - E - E - E - E - E -	960,709	728,448		1.016.481
TOTAL of MRH 288 I Paranaentse 269 B. Visia Aparecida 274 Cascavel 275 Catantuvas 275 Cent Azul 276 Cent Azul 288 For do Iguaçu 288 Cuaraniaçu 288 For do Iguaçu 288 Cuaraniaçu 288 For do Iguaçu 288 Cuaraniaçu 288 Cuaraniaçu 288 Cuaraniaçu 288 For do Iguaçu 288 Cuaraniaçu 288 For do Iguaçu 288 Cuaraniaçu 288 Cuaraniaçu 305 Saria Lúcia 305 Saria Lúcia 306 S. Tereza do Ceste 307 S. Tereza paraná 307 S. Tereza hanc 313 T. Barracío 313 T. Barracío 313 B. Esper: Iguacu 313 S. Chopinzinho 313 B. Esper: Iguacu 313 B. Suco 328 Coronel Vivida 328 Coronel Vivida 329 Coronel Vivida 328 Coronel Vivida 320 Capanerma 328 Coronel Vivida 328 Fistorisco Beltráo 328 Mariópolis 329 Mariópolis 330 Nerra do Sul		602,916 54,966 54,966 19,036 13,819 23,097 23,097 23,895 23,895 23,895 23,605 10,894 10,894	752,432 23,256 89,921 25,726 25,726 23,561 33,645 33,645 31,142 31,142 31,142 31,142 33,565 24,561 31,142 3	484,504 10,317 123,698 3,625 11,754 101,754 101,754 101,754 10,016 24,375 24,375 24,375 281 305,565	1 - E - E - E - E - E - E - E - E - E -	960,709	728,448		1.016.481
269 B. Vista Aparecida 273 C. Leôn. Marques 274 Cascavel 275 Catanduvas 275 Catanduvas 275 Catanduvas 275 Catanduvas 286 For do Iguaçu 288 Dema 288 Dema 288 Dema 288 Dema 299 Medianeira 305 Santa Luicia 305 S. Terezinha Itaipu 305 S. Terezinha Itaipu 305 S. Terezinha Itaipu 305 S. Terezinha Itaipu 305 S. Miguel do Iguaçu 305 S. Miguel do Iguaçu 313 T. Barras Paranà 305 S. Miguel do Iguaçu 313 T. Barras Paranà 315 Ampére 317 Barras do Sul 320 Capanema 321 Chopinzinho 322 Chopinzinho 323 Curceiro do Iguaçu 324 Dois Vizinhos 324 Dois Vizinhos 328 Haroisco Belirado 328 Hores Marques 328 For da Serra do Sul 320 Marreléois 330 Marreléois 331 N. Espera. Sudoeste 332 N. Prata do Iguaçu		19,805 54,960 19,805 13,0356 13,819 23,895 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 24,966 25,097 25,097 24,966 25,097 20,097 20,0000 20,0000 20,0000000000	23,256 89,921 25,726 25,726 23,566 24,561 31,142 31,142 30,682 33,569 24,561 31,142 31,142 33,569 446,750	10,317 123,698 8,625 11,754 101,330 7,567 10,016 24,3755 24,3755 24,3755 24,3755 24,37555 24,375555 24,3755	30,506 39,761 27,706 13,690 34,991	•		288,033	
273 C. León, Marques 274 Cascavel 275 Catanduvas 276 Cetu Azul 288 Guarantaçu 288 Guarantaçu 288 Guarantaçu 288 Berna 290 Lindoeste 290 Lindoeste 290 Santa Lucia 306 S. Tereza do Oeste 307 S. Tereza do Oeste 307 S. Tereza do Oeste 307 S. Tereza do Oeste 307 S. Tereza do Caste 307 S. Tereza do Sul 313 T. Barracko 313 T. Barracko 313 T. Barracko 313 B. Esper. Iguaçu 313 B. Esper. Iguaçu 322 Cononel Yurida 323 Cruzeiro do Iguaçu 323 Fior da Serra do Sul 323 Fior da Serra do Sul 323 Fior da Serra do Sul 323 Marmetorio 331 N. Espera. Sudoeste 332 N. Fraza do Iguaçu 333 Pato Branco		19,805 54,960 19,036 19,036 13,819 25,097 25,097 23,895 23,895 23,895 23,57121 23,5752 23,5752 23,5752 23,5752 23,5752 23,5752 23,5752 23,5752 23,5752 23,5752 23,5755 23,5755 23,5755 23,5755 23,5755 23,5755 24,5757 24,5757 24,5757 24,5757 25,57577 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,5757 25,57577 25,57577 25,575777 25,5757777777777	23,256 89,921 25,726 25,776 23,966 33,966 24,561 31,142 31	10,317 123,698 8,625 11,754 101,330 7,567 7,577 7,567 7,577 7,577 7,577 7,577 7,577 7,577 7,577 7,5777 7,57777 7,577777777	30,506 39,761 27,706 13,690 34,991	1	3,228	7,142	10,370
274 Cascavel 275 Catanduvas 275 Catanduvas 276 Ceu Azul 287 Guaranizçu 288 Bouranizçu 288 Bouranizçu 288 Bouranizçu 288 Bouranizçu 288 Bouranizçu 288 Borma 289 Kindeste 290 S. Terezza do Ocsite 305 S. Terezza do Ocsite 306 S. Terezza do Ocsite 307 S. Terezza do Sul 308 S. Miguel do Iguaçu 317 Barraso 318 B. Espert Iguaçu 317 Barraso 318 B. Succeso do Sul 320 Chopinizrinho 321 Chopinizrinho 322 Cronzeiro do Iguaçu 323 Francisco Beltrão 324 Dois Vizinhos 325 Entes Marques		54,960 23,535 19,036 13,819 25,097 23,895 23,895 23,895 23,57121 23,65203 366,203 366,203	89,921 25,726 25,726 23,219 33,966 28,649 31,142 31	123,698 8,625 11,754 10,1,530 7,567 7,567 7,567 7,567 7,567 7,881 7,881 7,881	39,761 27,706 13,690 34,991	40,823	7,783	10,060	17,843
275 Catanduvas 276 Ceu Azul 286 Ceu Azul 288 Demai 288 Demai 288 Demai 288 Demai 288 Demai 290 Lindoeste 290 S. Tereza do Ocste 305 S. Tereza do Ocste 305 S. Tereza do Ocste 307 S. Tereza do Lajou 307 S. Tereza do Ceste 307 S. Tereza do Lajou 307 S. Tereza do Sul 307 S. Tereza do Sul 317 Barneto 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 319 B. Succeso do Sul 317 Barneto 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 319 B. Succeso do Sul 322 Cruzeiro do Iguaçu 323 Francisco Beltrão 328 Foro Vizinhos 328 Foro Vizinhos 328 Foro Vizinhos 328 Foro Vizinhos 329 Marrelerio 331 N. Fara do Iguaçu 331 N. Fara do Iguaçu 332 N. Frata do Iguaçu 333 Pato Branco		23,535 19,036 13,819 25,097 25,097 23,895 23,895 23,895 23,895 23,5721 23,65203 366,203 366,203	25,726 23,219 23,219 28,649 24,561 31,142 31	8,625 11.754 101.330 7,567 7,567 7,567 7,567 7,567 7,881	27,706 13,690 34,991	163,459	177.766	15,224	192,990
276 Ceu Azul 228 Fox do Iguaçu 288 Bourantiqu 296 S. Tereza do Oeste 305 S. Miguel do Iguaqu 305 S. Miguel do Iguaqu 305 S. Miguel do Iguaqu 306 S. Tereza do Sul 307 S. Tereza do Sul 308 B. Esper. Iguaqu 317 Barracto 318 B. Esper. Iguaqu 319 Sub-Florado Sul 310 B. Succeso do Sul 321 Chopinzinho 322 Chuzino do Iguaqu 323 Connel Vivida 324 Dois Vizinhos 323 Bois Vizinhos 324 Dois Vizinhos 323 Mareleiro 323 <th></th> <th>19,036 13,819 25,097 21,910 21,910 23,895 23,064 23,064 10,894 10,894</th> <th>23,219 33,966 28,649 24,561 31,142 305,682 446,750 446,750</th> <th>11,754 101,330 7,567 7,567 24,375 24,375 24,375 7,881 305,565</th> <th>13,690 34,991 24,001</th> <th>36,331</th> <th>3,712</th> <th>6,109</th> <th>9,821</th>		19,036 13,819 25,097 21,910 21,910 23,895 23,064 23,064 10,894 10,894	23,219 33,966 28,649 24,561 31,142 305,682 446,750 446,750	11,754 101,330 7,567 7,567 24,375 24,375 24,375 7,881 305,565	13,690 34,991 24,001	36,331	3,712	6,109	9,821
 282 For do Iguaçu 284 Guaraniaçu 285 Brema 286 Guaraniaçu 289 Matelândia 299 Lindoeste 298 Matelândia 298 Matelândia 206 S. Tereza do Oeste 305 S. Terezinha Itaipu 306 S. Tereza do Oeste 307 S. Terezinha Itaipu 308 S. Miguel do Iguaçu 313 T. Barras Paranà 308 S. Miguel do Iguaçu 313 T. Barras Paranà 315 Ampére 315 Ampére 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 319 B. Succsso do Sul 320 Capanema 321 Chopinzinho 322 Coronel Vivida 323 Francisco Beltrão 324 Dois Vizinhos 325 Fior da Serra do Sul 327 Francisco Beltrão 338 I. Esper. Sudoeste 339 Marroleito 331 N. Fasera do Iguaçu 331 N. Fasera do Iguaçu 332 N. Frata do Iguaçu 333 Para do Iguaçu 333 Para do Iguaçu 333 Para do Iguaçu 333 N. Frata do Iguaçu 333 Para do Iguaçu 333 Para branco 		13,819 25,097 21,910 23,084 23,084 23,084 23,084 10,894 10,894	33,966 28,649 24,561 31,142 305,682 305,682 446,750 446,750	101,330 7,567 10,016 24,375 24,375 7,881 7,881	34,991 24,901	25,444	5,831	4,755	10.586
 284 Guarantaçu 288 Brema 289 Lindoeste 299 Matelândia 298 Mediancira 296 Mediancira 206 Sarra Lúcin 306 S. Tereza do Oeste 307 S. Tereza do Oeste 308 S. Miguel do Iguacu 309 S. Miguel do Iguacu 315 Tronicipalities not of Basin 315 Troni Y Mamper 317 Barracão 318 B. Esper. Iguacu 318 B. Esper. Iguacu 319 B. Successo do Sul 319 B. Successo do Sul 320 Capanema 321 Chopinzinho 322 Coronel Vivida 323 Francisco Beltrão 324 Dois Vizinhos 325 Fierá S Marques 326 Fior da Serra do Sul 327 Francisco Beltrão 338 I. Esper. Sudoeste 339 Marnelerio 331 N. Fasta do Iguacu 331 N. Fasta do Iguacu 332 N. Frata do Iguacu 333 Pato Branco 		25,097 21,910 23,895 23,895 23,895 23,605 377,795 366,203 366,203	28,649 24,561 31,142 31,142 305,682 446,750 446,750	7,567 10,016 24,375 24,375 		136.321	186.385	3.738	190,123
235 lberna 239 Lindoeste 230 Lindoeste 230 S. Sarra Lucia 306 S. Terezina Itajou 306 S. Terezina Atajou 306 S. Miguel do Iguacu 307 S. Terezina Atajou 308 S. Miguel do Iguacu 308 S. Miguel do Iguacu 309 S. Miguel do Iguacu 305 Starra do Numicipalities not of Basin 305 Municipalities not of Basin 305 Municipalities not of Basin 305 Starra do Sul 317 Barracio 318 B. Esper. Iguacu 318 B. Esper. Iguacu 319 S. Successo do Sul 320 Capanema 321 Chopinzinho 322 Coroneir do Iguacu 322 Findisco Beltrado 323 Fior da Serra do Sul 322 Fior da Serra do Sul 323 Marribolis 323 Marreleiro 331 N. Espera. Sudoeste 332 N. Frata do Iguacu 333 Pato Branco		21,910 23,895 23,895 23,895 23,054 225,121 366,203 366,203	24,561 31,142 31,142 305,682 305,682 446,750 446,750	10,016 24,375 24,375 	70-207	34.468	8.623	17,389	26.012
 290 Lindocste 293 Mateländia 294 Medianetra 306 S. Tereza do Ocste 305 S. Tereza do Ocste 307 S. Tereza do Ocste 307 S. Tereza do Ocste 307 S. Tereza do Caste 307 S. Tereza do Caste 308 S. Tereza do Lajapu 313 T. Barras Paraná 315 Ampeiro 318 Esper. Iguaçu 318 B. Esper. Iguaçu 318 B. Esper. Iguaçu 319 B. Succsso do Sul 320 Capanema 321 Chopinizinho 322 Cruzeiro do Iguaçu 323 Francisco Beltrão 324 Dois Vizinhos 325 Endas Marques 326 Flor da Serra do Sul 327 Francisco Beltrão 328 Instratus 328 Instratus 329 Marmeleiro 331 N. Fasta do Iguaçu 331 N. Fasta do Iguaçu 332 N. Frata do Iguaçu 333 Pato Branco 		21,910 23,895 23,895 23,064 23,064 377,795 366,203 366,203	24,561 31,142 31,142 25,242 305,682 446,750 446,750	10,016 24,375 7,881 305,565		1	3 705	2311	6.106
 293 Matelándia 294 Mediancira 306 Sarra Lúcio 305 Sarra Lúcio 305 Sarra Lúcio 305 S. Tereza do Ocste 307 S. Tereza do Ocste 308 S. Tereza do Sur 309 S. Margel do Iguaçu 313 T. Barra Paraná 314 B. Barracao 317 Barracao 318 B. Esper, Iguaçu 319 B. Succeso do Sul 319 B. Succeso do Sul 320 B. Succeso do Sul 321 Chopinzinho 322 Coronel Vivida 323 Flor da Serra do Sul 324 Dois Vizinhos 325 Endes Marques 326 Flor da Serra do Sul 327 Francisco Beltrato 338 Marrefeiro 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 		21,910 23,895 23,895 23,004 23,004 377,795 366,203 366,203	24,561 31,142 25,242 25,242 305,682 446,750 446,750	10,016 24,375 7,881 305,565	1		938	5.939	6.877
 294 Medianeria 295 Santa Lúcia 305 Santa Lúcia 306 S. Tereza do Oeste 309 S. Niguel do Iguaçu 309 S. Niguel do Iguaçu 3013 T. Barras Paraná 3014 TOTAL of MRH 5015 Ampére 317 Barracão 318 B. Esper, Iguaçu 319 B. Jucas do Sul 319 B. Jucaçu 320 Capanema 321 Coronel Vivida 322 Coronel Vivida 323 Flori do Iguaçu 324 Dois Vizinhos 325 Enéas Marques 326 Flor da Sera do Sul 327 Francisco Beltrão 328 Itapejara do Oeste 329 Marneleiro 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 331 N. Fapara do Iguaçu 		23,895 23,895 23,064 23,064 377,795 366,203 10,894	31,142 25,242 305,682 446,750 446,360	24,375	23.410	33.426	10.385	6.944	17 329
 305 Santa Lucia 306 S. Tereza do Oeste 307 S. Terezinha Itaipu 308 S. Miguel do Iguacu 309 S. Miguel do Iguacu 313 T. Barras Paraná Sub-Fordo of Municipalities not of Basin Sub-Fordo of Municipalities not of Basin Sub-Fordo of Municipalities not of Basin 313 Ampére 313 B. Esper. Iguacu 314 Dois Vizinhos 324 Dois Vizinhos 325 Enéas Marques 326 Flor da Serra do Sul 327 Francisco Beltrão 328 Itapejara do Oeste 328 Itapejara do Oeste 329 Mariopolis 331 N. Espera. Sudoeste 332 N. Frata do Iguacu 333 Para branco 		23.064 23.064 225.121 377.795 366.203 10,894	25,242 305,682 446,750 446,360	7,881	74 986	195.05	20.22	500 0	599 XL
 306 S. Tereza do Oeste 307 S. Tereza do Oeste 307 S. Tereza do Oeste 308 S. Miguel do Iguacu 308 S. Miguel do Iguacu 305 S. Miguel do Iguacu 315 Total of Municipalities not of Basin 318 B. Esper. Iguacu 319 B. Successo do Sul 320 Capanema 321 Chopinzinhos 322 Coronei voi Iguacu 323 Flori da Serra do Sul 324 Dois Vizinhos 325 Flori da Serra do Sul 326 Flori da Serra do Sul 327 Francisco Beltrão 328 Inversa 328 Inversa 330 Marribolis 331 N. Fapera do Iguacu 331 N. Fran do Iguacu 332 N. Fran do Iguacu 333 Pato Branco 		23.064 23.064 377.795 366.203 10,894	25.242 25.242 305.682 446.750 446.360	7,881	20114		1		
 307 S. Terezinha Itajou 308 S. Miguel do Iguaçu 308 S. Miguel do Iguaçu 309 S. Miguel do Iguaçu 309 S. Miguel do Iguaçu 315 Ampére 315 Ampére 317 Barracio 318 B. Esper. Iguaçu 319 B. Successo do Sul 320 Capanema 321 Chopinzinho 322 Cromel do Iguaçu 322 Enéas Marques 325 Enéas Marques 326 Flori da Serra do Sul 327 Francisco Beltrão 328 Inserias do Sul 329 Marnelerio 331 N. Espert. Sudoeste 332 N. Frata do Iguaçu 331 N. Fapera Sudoeste 332 N. Frata do Iguaçu 		23.064 23.064 377.795 366.203 10,894	25,242 305,682 446,750 446,360	7,881			2 2 0.7	110 0	0 I Y
 308 S. Miguel do Iguaçu 313 T. Barras Paraná Sub-Total of Municipalities of Basin Sub-Total of Municipalities not of Basin Sub-Total of Municipalities not of Basin 313 Ampére 320 Copanena 321 Chopinzinho 322 Coronel Vivida 323 Cruzeiro do Iguaçu 323 Cruzeiro do Iguaçu 324 Dois Vizinhos 325 Endas Marques 326 Flor da Serra do Sul 327 Francisco Belrtalo 328 In N. Espera. Sudoeste 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 333 Pato Branco 		23,064 225,121 377,795 366,203 10,894	25,242 305.682 446,750 446,360	7,881		İ	11 665	1107	
 313 [1, Barras Parané Sub-Total of Municipalities not of Basin Sub-Total of Municipalities not of Basin Sub-Total of Municipalities not of Basin 101AL of MiRH 315 Ampere 317 Barracao 318 B. Esper, Iguaçu 319 B. Succsso do Sul 319 B. Succsso do Sul 320 B. Succsso do Sul 321 Chopinstano 322 Coronel Vivida 323 Cruzeiro do Iguaçu 323 Flor da Serra do Sul 324 Dois Vizinhos 325 Endas Marques 326 Flor da Serra do Sul 327 Francisco Beltrato 328 Itarjorar do Ocste 329 Marrefeiro 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 333 Pato Branco 		225,121 225,121 377,795 366,203 10,894	305.682 305.682 446,750 446,360	, , 001 305.563	226.26			7 070	
 Sub-Total of Municipalities of Basin Sub-Total of Municipalities not of Basin Sub-Total of Muricipalities not of Basin Sub-Total of Muricipalities not of Basin Sub-Total of Muricipalities not of Basin Sub-Total of Muricipalities Sub-Total of Supartical Sub-Total Supervisional Supervisional Supervisional Supervisional Supervisional Supervisional Supervisional Supartical Sub-Total Supervisional Supartical Supartical of Supartical Supartical Supervisional Supervisi	-	225,121 377,795 366,203 10,894	305,682 446,750 446,360	305.563	000007	1 + 7 + 7	C// NT		17/ 47
Sub-Flotal of Municipalities of basin Sub-Flotal of Municipalities not of basin Sub-Flotal of Municipalities not of basin 315 Ampere 317 Barnacio 318 B. Esper. Iguacu 319 B. Success of Sul 320 Capanema 321 Chopinzinho 322 Cromei Vivida 323 Francisco Beltralo 324 Dois Vizinhos 325 Flot da Serra do Sul 326 Flot da Serra do Sul 327 Francisco Beltralo 328 Ilor da Serra do Sul 329 Mariópolis 320 Mariópolis 331 N. Fasta do Iguacu 331 N. Fasta do Iguacu 332 N. Prata do Iguacu 333 Parato		225,121 377,795 366,203 10,894	305.682 446,750 446,360	505.565	1		4,104	10,8/8	14,982
Sub-Ford of Municipalities not of Basin 107AL of MiXH 318 Barnedo 318 B. Esper. Iguaçu 319 B. Buesca 319 B. Successo do Sul 320 Capanema 321 Chopinzinho 323 Cruzeiro do Iguaçu 323 Cruzeiro do Iguaçu 324 Dois Vizinhos 324 Dois Vizinhos 325 Endas Marques 325 Endas Marques 326 For da Serra do Sul 328 Tarpeira do Oestic 329 Marneleiro 331 N. Espera. Sudoestic 332 N. Frata do Iguaçu 333 Para do Iguaçu		377,795 366,203 10,894	446,750 446,360		248,317	553,880	464,629	111,693	576,322
1017AL of MRRH319 Ampére319 Ampére317 Barracdo318 B. Esper. Iguaçu319 B. Esper. Iguaçu319 B. Esper. Iguaçu319 Copanera320 Copanera321 Chopinzinho322 Coronel Vivida323 Cruzeiro do Iguaçu324 Dois Vizinhos325 Endas Marques326 Flor da Serra do Sul327 Francisco Beltrão328 Itanéoolis329 Marnéleiro331 N. Espera. Sudoeste333 Paraco333 Paraco333 Paraco333 Paraco334 Distanco		366,203 10,894	446,360	178,941	227,888	406,829	260,591	169,198	429,789
 315 Ampere 317 Barracalo 318 B. Esper. Iguaçu 319 B. Succsso do Sul 319 B. Succsso do Sul 320 Capanerma 321 Chopinzinho 323 Cruzeiro do Iguaçu 323 Cruzeiro do Iguaçu 323 Cruzeiro do Iguaçu 323 Flor da Serra do Sul 324 Dois Vizinhos 325 Enéas Marques 325 Flor da Serra do Sul 326 Flor da Serra do Sul 327 Francisco Beltralo 328 Itancisco Beltralo 328 Marriépoits 330 Marriépoits 331 N. Espera. Sudoeste 332 N. Frara do Iguaçu 333 Paraco 		10,894	286.61	166,906	354,343	521.249	225.666	252,460	478,126
 317 Barracao 318 B. Esper. Iguaçu 319 B. Sucesso do Sul 320 Capanema 321 Chopinzinho 323 Chopinzinho 323 Cruzein o Iguaçu 324 Dois Vizinhos 325 Enéas Marques 326 Fior da Serra do Sul 327 Francisco Beltrão 328 Itapejara do Oeste 328 Itapejara do Oeste 328 Marriôpolis 330 Marrelerio 331 N. Espera. Sudoeste 332 N. Frata do Iguaçu 333 Prata do Iguaçu 333 Prata do Iguaçu 333 Prata do Iguaçu 	765.7		1047 01	5:012	10.611	15,623	6.037	7.176	13.213
B. Esper. Iguaçu B. Succeso do Sul Capanema Capanema Chopinzinho Curzeiro do Iguaçu Corionel Virida Dois Vizinhos Encas Marques Fior da Serra do Sul Francisco Beltrão Itapejara do Ocete Marneleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	2,065	14,140	16,205	2,704	15,441	18,145	4,491	10,201	14.692
B. Successo do Sul Capanema Chopinziaho Chopinziaho Coronel Vivida Dois Vizinhos Flor da Serra do Sul Francisco Beltrão Itapejara do Oeste Marméleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	l	I	l	1	1	1	1	1	1
Capanema Chopinzinho Chuzeiro do Iguaçu Coronel Vivida Dois Vizinhos Enéas Marques Flor da Serra do Sul francisco Beltrão francisco Beltrão Marrópolis Marrópolis Marrocio N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	1	1	1	I	1	1	1	ł	1
Chopinzinho Cruzeiro do Iguaçu Coronel Vivida Dois Vizinhos Enéas Marques Flor da Serra do Sul Francisco Beltrão Francisco Beltrão Maroleiro Marmeleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	3.733	17.984	21.717	7.708	18.075	25.783	7.936	11.432	19.368
Cruzeiro do Iguaçu Coronel Vivida Dois Vizinhos Enéas Marques Flor da Serra do Sul Francisco Beltrão Francisco Beltrão Marricipolis Marreleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	2377	24,665	27.042	7.681	27,494	35.175	8.282	16.305	24.587
Coronel Vivida Dois Vizinhos Enčas Marques Flor da Serra do Sul Francisco Beltrão Itapéjara do Oeste Marméleito N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	: ;	I	l	1	1	I		1	
Dois Vizinhos Enéas Marques Fior da Serra do Sul Francisco Beltrão Itapejara do Oeste Marméleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	3.587	18.826	22,413	10.144	16.808	26.952	025 01	12.801	25.140
Entáss Marques Fior da Serra do Sul Francisco Beltrão Itapópara do Ocento Marméleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	4.149	33,004	37,153	12.286	30,186	42.472	22.202	18.065	40.267
Flor da Serra do Sul Francisco Beltrão Itapejara do Oeste Marricpolis Marmeleiro N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	1,175	12,707	13.882	1.721	12.556	14.277	2115	10.281	12.396
Francisco Beltrão Itapejara do Oeste Marnélopolis Marmeleiro N. Espera. Sudoeste N. Prata do Iguacu Pato Branco	I	1	1	1	I	Ī	1	1	1
Itapejara do Oeste Marrícipolis Marmeleiro N. Espera. Sudoeste N. Prata do Iguacu Pato Branco	13,413	23,394	36,807	28,289	20,473	48,762	45,622	15,650	61,272
Mariópolis Marmeleiro N. Espera. Sudoeste N. Prata do Iguacu Pato Branco	2,130	7,945	10,075	3,066	7,037	10,103	3,909	5,136	9,045
Mamcleito N. Espera. Sudoeste N. Prata do Iguacu Prato Branco	1,850	5,016	6,866	2,314	3,889	6,203	2,855	3,425	6,280
N. Espera. Sudoeste N. Prata do Iguaçu Pato Branco	1,991	10,660	12,651	3,265	11,113	14.378	5,763	11,350	17,113
N. Prata do Iguaçu Pato Branco	I	1	1	l	1	Ī	1	1	1
Pato Branco	1	I	1	I	ł	I	4.171	7.444	11.615
	15,420	18,388	33,808	31,470	14,467	45,937	43,406	12,269	\$5.675
	1,483	13,790	15.273	2,961	13,727	16,638	3,234	9,021	12,255
ao Bento	• #	1	1	•]	ł	1	•	1	1
336 Planaito 2,217	2,217	.14,978	17.195	3.650	16,631	20,281	4,075	11,017	15.092
	 	1	I	1	•	1	2,609	5,995	8,604
338 Realeza 3.313	3,313	13,424	16,737	8,744	12,951	21,695	9,300	7,846	17.146
339 Renascença	1,665	7,615	9,280	2.103	5.800	7,903	2,161	5,385	7.546

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No. Name State of Loners 2.254 21,448 7,083 arts 341 (Sate of Loners 2.254 20,154 1,448 7,083 arts 5 Antion of Loners 2.254 20,154 3,706 3,411 343 (Sub of concret 4,811 2,322 13,722 15,444 3,706 343 (Sub of concret 2,450 11,722 13,722 15,444 3,706 345 (Nutricipatities of Sateri 0,177 26,454 26,553 9,100 346 (Nutricipatities of Sateri 0,115 6,427 7,522 2,066 346 (Nutricipatities of Sateri 0,115 6,427 7,522 2,066 346 (Nutricipatities of Sateri 0,115 6,427 7,522 2,066 346 (Nutricipatities of Sateri 0,115 5,453 3,106 10,000 351 (Canarguava 351 (Canarguava 3,192 13,550 11,273 12,242 353 (Canarguava 351 (Canarguava 3,192 11,35,401 13,501 11,242 353 (Cana	of MIRH	·	Orban	Rural	Total	Orban	Rural	Total	Orban	Kurai	Total
0 440 Salgeon Fillso 1,230 1,244 1,210 1,244 1,210 1,244 1,210 1,244 1,210 1,244 1,210 2,205 2,205 2,205 2,205		No. Name									
Anticact 31 Salo of Lortra 2.24 20,134 31,448 7,033 342 S. Tabriel do Ocste 2,542 20,134 31,448 7,033 342 S. Tabriel do Ocste 2,560 9,476 12,036 3,906 345 Stao Jorge do Ocste 2,560 9,476 12,036 3,906 345 Stao Jorge do Ocste 2,560 9,476 12,036 3,906 345 Stao Jorge do Ocste 2,560 9,476 12,036 3,906 345 Verterino 1,035 1,627 7,622 2,096 345 Verterino 1,195 6,427 7,622 2,096 345 Verterino 1,195 6,427 7,622 2,096 345 Carangiuas 0,1137 0,110 0,0 0 0 351 Carangiuas 0,1133 0,113 0,110 0,138,911 1,1353 1,1353 1,1233 1,12,423 1,12,423 1,12,423 1,12,423 1,12,423<	MRH 289 (cont.)	340 Salgado Filho	\$85	11,420	12,305	1,583	13,954	15,537	2,062	11,767	13,829
3-21 S. Ambrino Sudocerte 2,542 12,560 14,901 4,411 3-45 S. Anthonio Sudocerte 2,552 9,475 12,036 3,980 3-45 S. Anthonio Sudocerte 2,556 9,476 12,036 3,980 3-45 S. Anthonio Sudocerte 2,556 9,476 12,036 3,980 3-45 S. Anthonio Sudocerte 2,556 9,476 12,036 3,980 3-45 S. Anthonio Sudocerte 1,195 11,627 12,703 1,036 3-45 S. Anthonio Sudocerte 1,195 1,177 16,627 2,066 3-45 Viercie 1,107 A. Anthonio Sudocerte 2,157 3,06 1,805 3-45 Viercie 1,107 A. Anthonio Sudocerte 2,124 12,702 2,066 3-45 Viercie 1,107 A. Anthonio Sudocerte 3,124 13,563 13,050 3-45 Chararplanka 4,3,244 5,594 3,257 3,065 12,695 3-55 Chararplanka 5,394 3,257 3,663 13,695 12,695 3-55 Chararplanka 5,394 3,257 3,9641 2,1265 3-55 Chararplanka 5,394 3,257 3,9651 2,1265 3-55 Chararplanka 5,394 3,257 3,9651 2,1265 3-55 Chararplanka	Sudoeste Paranaense	341 Salto do Lontra	2,254	29,194	31,448	7,083	27,166	34,249	4 624	9,673	14.297
343 S. Aruñolo Sudocete 9,057 24,456 25,533 9,124 344 S. Angolo Souto do Ceste 2,560 1,772 15,454 3,706 345 S. Andade Go Fganqu 2,560 1,772 15,454 3,706 346 S. Andade Go Fganqu 2,500 1,772 15,454 3,706 347 Sulina 348 Sundate Go Fganqu 2,500 1,627 2,006 348 Subret Goal To Manierpalities of Basin 0,17 366,207 7,622 2,006 349 Vincinio 8,115 5,427 7,622 2,006 349 Vincinio 8,115 5,427 7,622 2,006 349 Vincinio 8,115 5,658 110,903 3995 349 Vincinio 3,115 5,658 110,903 3995 351 Camepauva 3,51 Camepauva 3,51 Camepauva 3,52 Camepauva 3,124 353 Roudo Gando 3,326 3,326 3,956 2,095 354 Laranjeiras do Sul 5,394 3,325 3,9651 2,1242 355 Roudo Gando Gaudo Camebalities of Basin 5,394 3,3257 3,9651 2,1242 356 Laranjeiras do Sul 5,394 3,3257 3,9651 2,1272 357 Roudo Gaudo Laranjeiras 5,312 1,12721 1,		342 S. Izabel do Oeste	2,542	12,361	14,903	4,411	11,575	15,986	4,647	7,863	12,510
344 Sao João 344 Sao João 3,706 3,476 12,036 3,706 345 Saujánge do Japaqu 345 Saujáne do Japaqu 345 Vortio 348 Vortio 1,052 11,627 12,036 3,980 345 Vortio 348 Vortio 1,105 1,157 3,662,203 4,667 3,060 348 Vortio 349 Vortio 1,101 AL of NGUH 80,137 3,662,203 4,667 3,600 348 Vortio 349 Vortio 80,137 3,662,203 4,667 3,600 348 Vorti 351 Campauva 3,51 Campauva 3,51 Campauva 3,56 3,951 353 Constraguta 3,51 Campauva 4,3,246 7,637 3,063 353 Nova Lampianas 3,122 17,164 2,0,356 12,722 355 Nova Lampianas 3,126 17,164 2,0,356 12,722 355 Nova Lampianas 3,176 17,164 2,0,356 12,722		343 S Antônio Sudoeste	4,987	24,546	29,533	9,124	26,070	35,194	8,992	11,298	20,290
345 Sao Jorge do Creete 2,560 9,476 12,036 3,980 347 Subtact do Tgaaqu 1,082 11,657 12,706 1,805 348 Verten 1,082 11,657 12,706 1,805 348 Verten 1,082 11,657 12,706 1,805 349 Virten 1,082 11,657 7,622 2,096 348 Verten 1,015 5,6427 7,652 2,006 348 Verten 1,015 5,6427 7,652 106,096 348 Verten 1,015 5,662,03 466,763 106,096 348 Verten 1,016 5,6427 136,01 106,096 355 Granzpalo 5,71 135,403 106,096 138,931 355 Granzpalo 5,334 33,257 39,661 21,252 355 Nova Laranjeiras do Sul 6,394 33,257 39,661 21,252 355 Nova Laranjeiras do Sul 6,394 33,257 39,661 21,252 355 Nova Laranjeiras do Sul 5,394 33,257 39,661 21,279 355 Nova Laranjeiras do Sul 5,394 33,257 39,661 21,279 355 Nova Laranjeiras do Sul 5,394 33,257 39,661 21,279 355 Nova Laranjeiras do Sul<		344 São João	1,732	13,722	15,454	3,706	13,386	17,092	4,775	8,886	13.661
346 Savdarde do Iguaçu		345 São Jorge do Ocste	2,560	9,476	12,036	3,980	9,736	13,716	3,847	6,474	10.321
347 Sulina 1,022 1,127 1,2705 1,805 348 Vriterie 1,195 6,427 7,623 2,096 348 Vriterie 1,195 6,427 7,623 106,096 348 Vriterie 1,195 5,6427 7,633 138,931 349 Vriterie 80,137 366,530 446,536 166,996 346 Constrategilo 80,137 35,503 138,933 138,933 351 Currangilics of Nationspatifies of Nations 37,243 138,933 138,933 138,933 353 Currangelo 43,264 6,568 7,647 2,056 2,1242 354 Laranjeiras do Sul 6,394 33,2257 39,6511 2,1242 2,1242 355 Index on Iguacu 3,132 11,2733 2,1242 2,1242 355 Index on Iguacu 5,324 13,556 1,1349 2,1242 356 Index on Iguacu 5,324 13,556 1,12721 1,12721 </td <th>·</th> <th>346 Saudade do Iguacu</th> <td>1</td> <td>I</td> <td>1</td> <td>J</td> <td>1</td> <td>1</td> <td> </td> <td>1</td> <td>I</td>	·	346 Saudade do Iguacu	1	I	1	J	1	1	 	1	I
343 Vert Sub-Total Sub-		347 Sulina	1	1	ł		•		351	4 271	1000 2
349 Vitorino 1,195 6,477 7,622 2,006 Sub-Total of Municipalities not of Basin 80,157 366,203 445,360 166,006 Sub-Total of Municipalities not of Basin 80,157 366,203 445,360 166,006 Starbard of Municipalities not of Basin 547 7,622 2,006 Starbard of Municipalities not of Basin 547 7,622 2,006 Starbard of Municipalities not of Basin 547 7,622 2,006 Starbard of Municipalities not of Basin 573 561 2,053 561 Starbard of Municipalities not of Basin 5,194 33,27 39,651 2,122 Starbard of Runci 5,394 33,27 39,651 2,1790 Starbard of Starbard 5,394 33,27 39,651 2,199 Starbard of Starbard 5,394 33,27 39,651 2,199 Starbard of Starbard 5,394 10,675 11,273 12,282 Starbard of Starbard 5,310 13,540 17,543 Starbard of Starbard Star		248 Verè	1.082	11 627	12,709	1 805	10.468	12 272	2.657	7 555	0101
Sub-Total of Municipalities of Basin 30,157 366,205 446,360 166,966 0		349 Vitorino	1.195	6,427	7.622	2.096	4.729	6.825	2.604	3 874	6 478
Superfortal of Numicipalities not of Basin 0 <th0< th=""> 0 0 0</th0<>		Sub-Total of Municipalities of Basin	80,157	366,203	446,360	166,906	354,343	521.249	225,666	252,460	478.126
IOLAL of MGH 54,227 135,403 138,931 Jaraphuava 351 Cantagoin - <t< td=""><th></th><th>Sub-Total of Municipalities not of Basin</th><td>0</td><td>0</td><td>0</td><td>0</td><td>þ</td><td>0</td><td>0</td><td>0</td><td>0</td></t<>		Sub-Total of Municipalities not of Basin	0	0	0	0	þ	0	0	0	0
Jacapuava 3550 (Cambolio)	MIKH 290	TOTAL of MKH	54,427	135,403	058'681	156,351	157,905	296,836	176,072	157,602	333,672
351 Cantargalo	Campos de Guarapuava	350 Candos	1	I	Ī	I	1	Ī	i	I	1
352 Guararpurva 43,264 67,639 110,903 89,951 353 Indeio Martins 979 6.668 7,647 2,065 355 Nova Laranjeiras do Sul 6,394 33,257 39,651 2,065 355 Nova Laranjeiras do Sul 5,394 33,257 39,651 2,1242 355 Nova Laranjeiras 3,192 17,164 20,356 12,729 355 Numori 3,192 17,164 20,356 12,729 355 Numoripatites of of Basin 5,404 13,540 138,951 355 Numoripatites of of Basin 5,424 13,540 17,897 355 Cheveltandia 8,212 5,424 13,540 1,789 355 Cheveltandia 8,212 5,424 13,640 1,772 355 Cheveltandia 8,212 5,424 13,540 1,772		351 Cantagalo		1	1	ł	1	1	5,690	19,807	25,497
355 Inácio Martíns 979 6.668 7,647 2,065 354 33,257 39,651 21,242 355 Nova Laranjeiras do Sul 6,394 33,257 39,651 21,242 355 Nova Laranjeiras do Sul 5,394 33,257 39,651 21,242 355 Nova Laranjeiras do Sul 5,394 33,257 39,651 21,242 355 Nova Laranjeiras 3,192 11,273 12,242 355 Norico Iguacu 5,98 10,675 11,273 12,225 355 Nitmond 530 Virmond 540 05 06,05 11,27212 11,273 12,8931 541 540 135,66 11,3949 552 Claurina 8,212 5,424 13,566 11,949 553 Claurina 1,454 7,670 9,107 3,448 555 S56 Manguerinina 1,454 7,670 9,107 3,448 565 Manguerinina 1,454 7,670 9,107 3,448 565 Manguerinina 1,188		352 Guarapuava	43,264	67,639	110,903	89,951	68,636	158,587	116,210	43,424	159,634
354 33.257 39,651 21.242 355 Priva Laranjeiras do Sul 6,394 33.257 39,651 21.242 356 Prinhdo 357 Quedas do Iguaçu 5,99 10,675 11.273 12.885 357 Quedas do Iguaçu 5,81 0,675 11.273 12.885 358 Rio Municipalities not of Basin 5,427 135,403 185,850 138,951 350 Virmond 5,427 135,403 185,850 138,951 350 Nuncipalities not of Basin 0 0 0 0 360 Virmond 21/243 7,403 13,650 11,949 355 Checkandia 2,134 7,670 9,104 3,448 366 Checkandia 1,1434 7,670 9,104 3,448 365 Checkandia 1,138 14,242 1,5430 2,975 366 Mangucinha 6,810 2,975 6,810 2,975 366 Checkandia 1,188 14,242 1,5430 2,975 366 Checkandia 1,188 14,242 1,5430 2,975 366 Paulo Frontin 2,670 1,3540 1,730 <		353 Inácio Martins	646	6.668	7,647	2,063	8,396	10,459	2,513	11,263	13.776
355 Nova Laranjeiras 3.192 17,164 20,356 12,790 357 Quedas do iguaçu 598 10,675 11,273 12,885 358 Rio Bonito Iguaçu 598 10,675 11,273 12,885 358 Sito Bonito Iguaçu 54,427 135,407 138,991 12,893 360 Virmond - - - - - 555 Chord of Municipalities not of Basin 54,427 135,407 138,991 360 Brauna 0 0 0 0 0 361 Brauna 1,01AL of MXH 47,336 5,424 13,636 11,949 362 Crevelandia 8,212 5,424 13,636 11,782 363 Constrol 807 6,003 6,810 2,975 365 Franciro 807 6,003 6,811 1,782 365 Franciro 807 6,003 6,811 1,783 366 Paulo Frontin 1,188 14,242 1,5,430 2,975 367 Palmas 5,670 15,430 2,975 5,915 366 Paulo Frontin 2,698 4,107 2,695 6,465		354 Laranjeiras do Sul	6,394	33,257	39,651	21,242	41,591	62,833	21,994	32,108	54,102
356 Pinhão 3,192 17,164 20,356 12,790 357 Quedas do Iguaçu 598 10,675 11,273 12,885 358 Rio Bonito Iguaçu 598 10,675 11,273 12,885 358 Rio Bonito Iguaçu 54,427 135,403 189,830 138,991 350 Vírmond 560 Vírmond 54,427 135,403 189,830 138,991 350 Sub-Total of Municipalities of Basin 54,427 135,403 189,830 138,991 350 Educatado 561 Bituruna 17,014 47,336 13,636 11,949 350 Curvelandia 1,733 13,540 11,949 563 351 Curvelandia 8,212 5,424 13,636 11,949 355 Curvelandia 8,212 5,424 13,636 11,949 356 Honótio Serpa 1,188 14,242 13,636 11,949 355 Curvelandia 8,07 6,003 6,810 2,975 356 Honótio Serpa 1,188 14,242 13,636 11,949 356 Honótio Serpa 1,188 14,242 2,975 5,975 366 Paula Freitas 588 4,107 4,695 6,46 371 Unido da Vitória 2,980 6,770 2,975 5,316		355 Nova Laranjeitas	1	I	T	1	1	I	1	ł	1
357 Quedas do Iguaçu 598 10,675 11,273 12,885 358 Rio Bonito Iguaçu - - - - - 358 Rio Bonito Iguaçu - - - - - 358 Rio Bonito Iguaçu - - - - - 358 Rio Bonito Iguaçu - - - - - 350 Virmond - - - - - - 350 Numerpalities of Basin 54,421 135,403 138,339 - - 350 Britunia 1701 Au 47,336 7670 127,212 77,337 362 Cueretândia 8,212 5,424 13,636 11,949 363 Cruz Machado 653 12,907 13,560 17,722 366 Rental Carneiro 807 6,003 6,810 2,975 366 Rental Freitas 566 Routin Scripa 1,188 14,242 15,430 2,975 367 Palmas 568 Paulo Frontin 6,83 2,421 3,164 1,509 371 Unibo da Vitoria 2,683 6,455 6,45 5,316 1,732 368 Paulo Frontin 683 2,421 3,106 1,509 371 Unibo da Vitoria 683 2,42		356 Pinhão	3,192	17,164	20,356	12,790	20,665	33,455	10,666	24,344	35,010
358 Rio Bonito Iguaçu -		357 Quedas do Iguaçu	598 [°]	10,675	11,273	12,885	18,617	31,502	16,155	15,354	31.509
360 Virmond	•	358 Rio Bonito Iguaçu	1	i	1	•	I	1	1	1	I
Sub-Total of Municipalities not of Basin S4,421 135,403 185,330 138,331 Sub-Total of Municipalities not of Basin 0 0 0 0 0 Sub-Total of Municipalities not of Basin 0 0 0 0 0 Sub-Total of Municipalities not of Basin 47,336 79,876 127,212 77,337 Sol Bituruna 563 12,307 9703 5,424 13,560 1,769 Sol Chronic Alachado 653 12,907 13,560 1,782 Sol Sol Manuscrintha 1,188 14,242 13,560 1,782 Sol Manuscrintha 1,188 14,242 15,430 2,975 Sol Palmas 568 Paula Freitus 790 4,522 5,312 994 Sol Porto Vitoria 683 2,421 3,106 1,509 55516 Sol Paula Freitus 770 4,522 5,312 994 Sol Paula Freitus 27,980 6,770 25,516 Sol Paula Freitus 27,980 6,770 25,516 </td <th></th> <th>360) Virmond</th> <td>I</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>!</td> <td>1</td> <td>. 1</td> <td>1</td>		360) Virmond	I	1	1	1	1	!	1	. 1	1
Sub-Total of Municipalities not of Basin 0 0 0 0 1:01AL of MiXH 1:01AL of MiXH 47.336 79.876 127/212 77.837 561 Bituruna 562 Circreladia 8.212 5.424 13.656 11.949 565 Cruc Machado 653 12.907 13.560 1.782 565 Khonico Serpa 1,188 14.242 15.430 2.975 566 Manuscinaha 1,188 14.242 15.430 2.975 566 Manuscinaha 1,188 14.242 15.430 2.975 567 Palmas 568 Paula Freitus 588 4,107 4,695 646 568 Paula Freitus 790 4,522 5,312 994 571 Utiabo da Vitoria 683 2,421 3,104 1,572 567 Palmas 568 Paula Freitus 790 4,522 5,312 994 571 Utiabo da Vitoria 683 2,421 3,104 1,570 571 Utiabo da Vitoria 22,980 6,770 29,750 35,516 571 Utiabo da Vitoria 22,980 6,770 29,750 35,516 571 Utiabo da Vitoria 21,05 1,570 35,516 571 Utiabo da Vitoria 27,980 6,770 29,750 3	· ·	Sub-Iotal of Municipalities of Basin	54,427	135,403	058'681	138,931	157,905	296,836	822,671	146,300	319,528
I: OTAL of MXCH 47,336 79,876 127,212 77,837 561 Bituruna 562 Clevelandia 1,434 7,670 9,106 3,448 562 Clevelandia 8,212 5,424 13,656 11,949 563 Floridia 8,212 5,424 13,656 11,949 565 Hondrio Scripa 807 6,003 6,810 2,975 366 Manguerinha 1,188 14,242 15,430 2,975 366 Manguerinha 1,188 14,242 15,430 2,975 366 Paula Freites 588 4,107 4,695 646 367 Palmas 790 4,522 5,312 994 370 Porto Vitoria 683 2,421 3,106 1,509 371 União da Vitoria 22,980 6,770 29,750 35,516 500 Porto Vitoria 22,980 6,770 29,750 35,516 501 União da Vitoria 22,980 6,770 29,750 35,516 501 União da Vitoria 21,356 1,509 35,516 502 I Oral of Municipalitics not of Basin 0 0 0 0 503 I UNI I HA XIN 057 I I VITOR 0 0 0	- -	Sub-Total of Municipalities not of Basin	0	0	0	0	0	ò	2,844	11,302	14.146
501 Bituruna 1,434 7,670 9,103 3,428 362 Clevelandia 8,212 5,424 13,636 11,949 363 Cruz Machado 6,53 12,907 13,560 1,782 365 Honório Scrpa 6,10 6,003 6,810 2,975 365 Honório Scrpa 1,188 14,242 15,430 2,975 366 Manucrinha 1,188 14,242 2,915 646 367 Palmas 10,001 15,810 2,575 994 368 Paula Freitas 588 4,107 4,695 646 369 Paulo Frontin 583 2,421 3,106 1,509 370 Porto Vitória 22,980 6,770 26,736 994 371 Unido da Vitória 22,980 6,770 26,736 35,516 504 15,701 7,336 1,509 35,516 994 371 Unido da Vitória 22,980 6,770 26,756 35,516 504 1,336 1,506 35,516 1,509 371 Unido da Vitória 22,980 6,770 26,756 35,516 504 504 7,336 </td <th>NKH 291</th> <th>TOTAL STARFA</th> <td>47,336</td> <td>79,876</td> <td>212721</td> <td>77,837</td> <td>79,866</td> <td>157,703</td> <td>102,446</td> <td>76,187</td> <td>178,633</td>	NKH 291	TOTAL STARFA	47,336	79,876	212721	77,837	79,866	157,703	102,446	76,187	178,633
362 Clevelåndia 8.212 5.424 13,636 11,949 363 Cruz Machado 653 12,907 13,566 1,782 365 General Carneiro 807 6,003 6,810 2,975 365 Honório Serpa 1,188 14,242 1,782 366 Mangueririnha 1,188 14,242 15,810 2,975 367 Palmas 588 4,107 4,695 646 367 Palmas 790 4,522 5,311 16,772 368 Paulo Frontin 588 4,107 4,695 646 371 União da Vitória 683 2,421 3,106 1,509 371 União da Vitória 22,980 6,770 29,750 35,516 371 União da Vitória 22,980 6,770 29,750 35,516 370 Porto Vitória 22,980 6,770 29,750 35,516 371 União da Vitória 22,980 6,770 29,750 35,516 370 Fourio of Basin 0 0 0 0	Médio Iguaçu	361 Bituruna	1,434	7,670	201.0	3,448	8,267	11,715.	5,575	7,277	12.852
365 Cruz Machado 653 12,907 13,560 1,782 364 General Carneiro 807 6,003 6,810 2,975 365 Mangueririnha 1,188 14,242 15,810 2,975 365 Mangueririnha 1,188 14,242 15,810 2,975 366 Paula Freitas 5,811 16,752 5,811 16,752 367 Paulas 5,810 2,811 16,752 5,312 368 Paula Freitas 588 4,107 4,695 646 369 Paulo Frontin 6,83 2,421 3,104 1,509 371 União da Vitória 683 2,421 3,104 1,509 371 União da Vitória 22,980 6,770 29,750 35,516 371 União da Vitória 22,980 6,770 29,750 35,516 5ub-Ioal of Municipalities not of Basin 0 0 0 0 0		362 Cicvelandia	8,212	5,424	13,636	11,949	4,839	16,788	13,347	4,710	18.057
364 General Carneiro 807 6,003 6,810 2,975 365 Honoiro Serpa - - - - - 365 Manguerinha 1,188 14,242 15,430 2,975 366 Manguerinha 1,188 14,242 15,732 1 368 Paula Frentas 790 4,107 4,695 646 369 Paula Frentas 790 4,522 5,312 16,732 369 Paula Frentas 790 4,522 5,312 994 370 Porto Vitória 683 2,421 3,104 1,509 371 União da Vitória 22,980 6,770 29,750 35,516 5ub-Iosal of Municipalities of Basin 47,336 79,876 127/212 77,337 5ub-Iosal of Municipalities of Basin 0 0 0 0 0		363 Cruz Machado	653	12,907	13,560	1,782	13,359	15,141	2,473	14,095	16,568
365 [Honório Serpa	•••	364 General Cameiro	807	6,003	6,810	2,975	6,000	8,975	6.078	5,209	11,287
366 [Manguerinha] 1,188 14,242 15,430 2,286 1 367 Palmas 10,001 15,810 25,811 16,732 1 367 Paula Freitas 588 4,107 4,695 646 368 Paula Freitas 588 4,107 4,695 646 368 Paula Freitas 588 4,107 4,695 646 360 Porto Vitória 683 2,421 3,104 1,509 371 União da Vitória 683 2,421 3,104 1,509 Sub-Ioal of Municipalities of Basin 47,336 79,876 1,509 35,516 Sub-Ioal of Municipalities not of Basin 0		365 Honório Serpa	1	1	1	1	1	T	1	ł	1,
367 Palmas 10,001 15,810 25,811 16,732 1 368 Paulo Frentas 588 4,107 4,695 646 369 Paulo Frontin 790 4,522 5,312 994 370 Potro Vitoria 683 2,421 3,104 1,509 371 União da Vitoria 22,980 6,770 29,516 35,516 Sub-Iotal of Municipalities of Basin 47,336 79,876 127,212 77,837 Sub-Iotal of Municipalities not of Basin 0 0 0 0 0 0		366 Mangucirinha	1,188	14,242	15,430	2,286	18,871	21,157	4,982	20,622	25,604
368 Paula Freitas 588 4,107 4,695 646 369 Paulo Frontin 790 4,522 5,312 994 370 Porto Vitoria 683 2,421 3,104 1,509 371 União da Vitória 22,980 6,770 29,516 35,516 Sub-Iotal of Municipalities of Basin 47,336 79,876 127,212 77,837 7 Sub-Iotal of Municipalities not of Basin 0		367 Palmas	10,001	15,810	25,811	16,732	14,144	30,876	24,890	10,372	35.262
369 Paulo Frontin 790 4,522 5,312 994 370 Porto Vitória 683 2,421 3,104 1,509 371 União da Vitória 683 2,421 3,104 1,509 371 União da Vitória 22,980 6,770 29,750 35,516 Sub-Ioal of Municipalities of Basin 47,356 79,876 17,837 7 Sub-Ioal of Municipalities not of Basin 0<		368 Paula Freitas	588	4,107	4,695	848 848	3,875	4,521	1,473	3,192	4,665
370 Porto Vitória 683 2,421 3,104 1,509 371 União da Vitória 22,980 6,770 29,750 35,516 Sub-Ioad of Municipalities of Basin 47,336 79,876 127,212 77,837 Sub-Ioad of Municipalities not of Basin 0 0 0 0 0 0		369 Paulo Frontin	190	4,522	5,312	766	4,378	5,372	1,573	4,985	6.558
371 [União da Vitória 22,980 6,770 29,750 35,516 Sub-Flotal of Municipalities of Basin 47,336 79,876 127,212 77,837 7 ISDE-Total of Municipalities not of Basin 055,77 0 0 0 0 0 0 0 0		370 Porto Vitoria	83	2,421	3,104	1,509	2,018	3,527	1,854	1,918	3,772
Sub-Lotal of Municipalities of Basin 41,336 79,876 127,212 77,857 Sub-Lotal of Municipalities not of Basin 0, 0, 0, 0, 0, 0 THEY OF THE RAYIN 2018 2010 05,821 055,777 1057,446 7012,7937 2018,7500		371 União da Vitória	22,980	6,770	29,750	35.516	4,115	39,631	40,201	3,807	44,008
Sub-Total of Municipalities not of Basin 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Sub-Total of Municipalities of Basin	47,336	79,876	1212121	77,857	79,866	157,703	102,446	76,187	178,633
TIES OF THE RASIN			0	0	0	0	0 .	ō	0	0	0
2201121 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 21012 2	TOTAL OF MUNICIPALI	THES OF THE BASIN	926,277	1.057,446	2,013,723	2,057,548	1,040,130	3,097,678	2,899,816	808.746	3.708.562

Source: Census of 1970, 1980 and 1991 / IBGE, IPARDES Remark: Municipalities without number of population had not been created until the respective year : Figure of Irati/MRH 276 and Palmeira/MRH 272 are listed in Tibagi River Basin

	Table - 3.5 (1) GRDP per Municipality in 1981, 1983, 1985, 1987, 1989 and 1991 / Iguaçu River Basin	
	661	
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	1989	
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No. and Name of						F					1 USU		1001	
MXM	Municipanty		Tox		202		1700		1961		1707		1221	
	No. Name	*	CON MILION	%	USS million		UN DUINOD	%	CON TILLION	_	COS multion	%+/ State	% / MKH	and NO
MRH 268	TOTAL of MRH	100:00	5,437,50	100.00	5,936.60	100.00	5,789.10	100.00	8,317.40		9,379,30	36.72205	100.00	076
Curialbo	I Am. Tamandare	450	20.14	0.42	24.95	0.52	30.34	0.41	34,11	0.58	54.19	0.16895	0:40	f
	2 Araucária	39,09	2,125.52	38.00	2,255,68	30.67	1,775.63	22.81	1,896.89	18.22	1,708.96	7.10329	19.34	1,791.80
	3 Balsa Nova	0.67	36.46	0.67	39.72	0.58	33.81	0.48	39.62	0.81	75.64	0.34736	0.95	87.63
	5 Campina G. do Sul	0.14	7.40	0.11	6.79	0.13	7,68	0.24	19.80	0.31	29.49	0.13114	0.36	33.08
	6 Campo Larzo	2.94	159.74	2.20	130.64	2.89	167.09	3.43	285.37	4.07	381.59	1.02403	2.79	258.31
•	7 Colombo	1.18	64.02	0.95	56.60	1.15	66.70	1.42	117.86	1.52	142.36	0.52668	1.43	1 1
	8. Contenda	0.22	12.09	0.18	10.81	0.25	14.47	0.18	14.74	0.15	13.89	0.06847	0.19	1
	olOmetra	48.77	2 649.06	51.18	3 038 44	54.60	3,160,50	61-83	5 142 50	63.43	0.77.00	23.14956	10 59	5 23
	17 Mandahaba	410	160	0 11	7.7%	0,0	12.11	0 18	14.76	0.71	20 1.4	0.04258	51.0	72.01
•	13 Winhaw	8	8	000	000	80	80	80	000	8	000	0.60487	8	• E
			75.69	0.85	CE 05	8	60.42	381	156.73		1.7.60	100/070	Ş	
		190	21.19		A DX	140	20.55		26.75		12.14	0.10260	120	• <
	10 Fire Pio Canda	000	000	80	000	80	80	8	w o		e e	0.03257	010	
	17 C. Took dor Dinhois		140.66	1	161.51	170	11.11		280.42		20.005	10000	610	2.222
			2 10-2		2222	0.50	- center	Ĩ	210210	٢				
	SHOULD BE AND THE SHOULD BE DESCRIPTION OF DESCRIPTION		SC-TATC	10 11	C7'010'-			1	C1.7U1.0			701/1/00		
	Subtotal of Municipalities not of Basin	2,68	145.92	.2.13	55.021	2.70	150.45		278/1	·		0.93123	- 2.54	234.5
MRH 271	TOTAL of MRH	100.00	17.50	100.00	15.90	100.00	21.70	~	21:00	8		0.13076	100,00	32.9
Alto Rio Negro	28 Agudos do Sul	¥.8	67 1	60 11	1.76	8.96	1.94		1.79	L		0.01055	207	
	29 79.60	20.02	5.12	37.14	5.9	35.86	7,78		7.45			0.03971	30.37	<u>, 14</u>
	30 Quitandinha	43.58	7.63	28.93	4,60	33.38	7.24	÷.,	4.89			0.02957	22.62	7.4
	31 Tijucas do Sul	18.65	3.26	22.84	3.63	21.80	4.73		6.87			0.05093	38.95	12.8
	Subtotal of Municipalities of Basin	100.00	17.50	100.00	15.90	r	21.70	E	21.00			0,13076	100.00	m
	Subtotal of Municipalities not of Basin	00:0	00:0	00:0	00:0	00.0	00:0	00.0	00.0	80.0	0.00	0,0000	00:0	0.0
MRH 272	TOTAL of NRH	100:00	164.30	100.00	151.20	E	187.40	100.00	214.50	1	ŀ	1.08390	100.00	17
Cambos da Lana	32 Campo do Tenente		181	10.1	1.53		2.99	321	335			0.02356	217	
	33 Lana	21.32	35.03	24.48	37.01	ñ	56.75	20.95	44.94			0.26275	24.24	9
	35 Porto Amazonas	12.0	1.17	0.77	1.16		1.39	13	2.63			0.01544	142	
	36 Rio Nego	46.71	76.74	48.47	73.28		71,51	42.01	11.06			0.49132	45.33	9.21
	Subtoral of Municipalities of Basin	69.86	8/ 3/1	11.11	86711	ſ	133.14	65:75	241.04			0.79307	11.67	Ř
	Subtoral of Municipalities not of Basin	30.14	49.52	25.28	1828	28.95	5426	24.23	73.46			029083	2020	
NRH 275	TOTAL of MRH	100.001	36.30	100.00	28.40	100.001	5120	100:00	51.40	100.00	04.101	0.26584	100.00	Ĩ
S. Mateus do Sul	46 Antônio Olinto	0.0	12.1		231	8	3.77	5	123			0,01351	5.08	
	47 Sho Joho Triunfo	13.99	5.08	14.82	4.21	11.85	6.07	12.24	6.29			0.02851	10.72	11.2
	48 São Mateus do Sul	76.88	27.91	77.05	21.88	80.79	41.36	79.19	40.70			0.22382	84,19	
	Subtotal of Municipalities of Basin	100.001	36.30	100.00	28:40	100.00	3120	100:00	51.40	<u> </u>		0.26584	100:00	67.04
	Subtotal of Municipalities not of Basin	00.00	00.0	000	00.0	000	0.00	0.00	00.0		00:0	0.00	000	0.0
MRH 276	TOTAL of MRH	100:001	126.70	100.00	111.70	100,00	160.90	100:001	02.571	100:00	191.70	87926.0	100,001	3 661
Col. Irati	50 trat	00'0	0.00	0.0	0.00	0,00	0:00	000	00.0		00:0	0:00000	0.00	0.0
•	51 Mailet	9.60	12.17	13.41	14.97	13.24	21.30	16.67	28.87		33.27	0.06537	8 23	16.45
	53 Rebouças	7.60	6.63	S.43	6.07	9.52	15.32	7.67	13.28		15.49	0.04631	5.84	11.61
	54 Rio Azul	9.83	12.45	9.26	10.34	6.46	10.40	5.63	9.74		10.94	0.04575	5.77	
	Subtotal of Municipalities of Basin	27.03	34.25	28.10	31.38	77.67	707/7	16.62	51'80	31.14	59:40	0.15745	98'61	Ê
	Subtotal of Municipalities not of Basin	72.97	92.45	94. IL	80.32	70.78	113.85	20.07	121.30	68.86	132.00	962120	39.50	F
			And a second sec	The second se	The second					_				

Total Total <t< th=""><th></th><th></th><th>F</th><th></th><th>guaçu River</th><th>1989 and 1991 / Iguaçu River Basın</th><th></th><th>1, 1983, 198</th><th>Table - 3.5 (2) GRDP per Municipality in 1981, 1983, 1985, 1987,</th></t<>			F		guaçu River	1989 and 1991 / Iguaçu River Basın		1, 1983, 198	Table - 3.5 (2) GRDP per Municipality in 1981, 1983, 1985, 1987,
NG NG<	1661	1 6861	AK 1987		1 1985	198.5	1 1981		No. and Name of Menoineline
MIT Virtue Merican Incom 17330 123300 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 12330 123300 123300 123300 12330	milion	× US\$ million	USS million	million		ß	S multion	8	No. Name
99/11 7/201 6/201 <th< th=""><th>16,46638 10</th><th></th><th>5</th><th></th><th>100.00</th><th>Γ</th><th>1,875.90</th><th>100.0</th><th>TOTAL of MRH</th></th<>	16,46638 10		5		100.00	Γ	1,875.90	100.0	TOTAL of MRH
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Till Channelsen Till Chane			•	•			32.79		
TCI Constant TCI Constant<	620771				_		384.41	20.5	274 Cascavel
Type Type <th< td=""><td>0.05698</td><td></td><td></td><td></td><td></td><td></td><td>41.46</td><td>.</td><td>275 Catanduvas</td></th<>	0.05698						41.46	.	275 Catanduvas
Zie Greno ignaci. 7.47 1400 5.90 14.77 5.4 10.44 7.17 14.00 5.90 14.77 5.4 10.47 7.47 14.00 5.90 10.47 7.47 14.07 14.07 14.07 14.04 10.00 <th< td=""><td>0.17173</td><td></td><td>-</td><td>÷ .</td><td></td><td></td><td>39.82</td><td></td><td>276 Céu Azul</td></th<>	0.17173		-	÷ .			39.82		276 Céu Azul
28 Commentant 0.00	8.62572	. *					140.00	4 	282 For to Iguaçu
250 Indexen 200 000 <th< td=""><td>0.08286</td><td></td><td></td><td></td><td></td><td></td><td>0.0</td><td>00</td><td>284 Guaraniaçu</td></th<>	0.08286						0.0	00	284 Guaraniaçu
200 Ludoenee 0.00	67700						800	00	285 Ibema
22) Montandia 2.05 6.74 2.41 6.674 2.41 6.74 2.41 6.74 2.43 6.74 2.44 6.75 7.24 0.70 0.12460 05 (San Luis) 050	0.01479						000	0.0	290 Lindoeste
200 Summaria 201 Modeline 201 Modeline<	0,12039						49.74	5.6	293 Matelândia
305 Same Listen 0.00							28.36	4.7	294 Modiancira
300 S. Threas do Ocease 0.00 0.	06110.0			,	. 1			00	305 Santa Lúcia
307 S. Tereraha lingto 0.00 1.97 33.17 1.17 2.44 2.05 0.								00	306 S. Tereza do Oeste
1001 Migned for famer 132 62.24 12.5 44.7 74.50 65.3 12.3 10.75 0.105	0.05226			-			0.00	00	307 S. Terezinha Kaipu
J11 T. Barras Panelia 0,00 0,00 1,00 1,01 0,02 0,03 <th0,03< th=""> <th0,03< th=""> 0,03</th0,03<></th0,03<>	0.19222			•			62.28	50	309 S. Miguel do Iguacu
Subsend of Municipalitation of Hamin 4.77 EXXX 7.651 7.73 2.75 7.651 7.75 <th7.75< th=""> 7.75 7.75</th7.75<>	0.03648	0.32				•	0.0	00	313 T. Barras Paratá
Submain of Municipalities acc of Basin 32.3 10000 66.3 11.457.11 207.40 51.01 1.667.46 53.321 116 Municipalities acc of Basin 37.3 100.00 66.3 11.77 11.29 0.03 31.312 117 Number 11.77 11.29 0.04 0.00	01116/11	48.99					838,88	4	Subtotal of Municipalities of Basin
NOVAL.cf.X00H 100.00 655.39 100.00 555.30 100.00	4,83921	10.12				F	1,035.02	532	Subtoral of Municipalities not of Basin
116 Ampére 120 1370 137 132 132 132 132 133 0.003 0.00 0.003 <th0.003< th=""> 0.003 0.003</th0.003<>	3.15132	100.00			Г 1		05.383	100.0	TOTAL of MCH
317 Barrando 117 11.2% 0.04 0.05 5.26 0.62 4.28 0.93 8.01 0.01297 319 B. Esperanzia (gase) 0.00 0.0	0.06288	1.60			L		13.70	27	316 Ampére
318 Expernment function 000		0.93	-				11.59	5	317 Barracão
3191 B. Success to Ski 0.00 0.0	0.02204	800				1	000	00	318 B. Esperança Iguaçu
320 Capenena 4.93 32.38 5.24 31.11 4.29 33.74 2.86 2.36 2.51 2.11 321 Corpolatizable 4.92 32.31 4.82 33.64 9.90 16.47 116.57 322 Corrent of Virabos 323 Corrent of Virabos 4.91 33.75 4.97 37.64 1.77 116.57 8.10 70.15 323 Corrent of Virabos 8.94 38.77 10.53 6.2.56 1.28 10.07 1.47 116.65 8.10 70.15 325 Fartai Marques 1.53 10.05 1.19 7.06 1.77 12.30 1.57 12.06 0.00 326 Fartai Marques 1.53 10.05 1.19 7.06 1.73 12.34 1.84 116.47 325 Endai Marques 1.53 10.05 1.19 7.06 1.73 12.30 1.57 12.30 1.57 12.30 1.66 7.05 326 Fartai Sam do Sul 0.00 0.00 0.00 0.00 0.00 0.00 0.00 327 Francias Sam do Sul 1.51 2.92 17.33 2.41 18.96 1.84 12.46 328 Endairoi 2.33 1.64 17.33 2.41 18.96 1.87	÷	800					8	00	319 B. Sucesso do Sul
321 Coopingrinbo 4.92 32.31 4.87 35.60 13.44 116.57 322 Correntel Vividia 4.81 31.59 5.20 30.06 4.07 35.50 13.44 116.57 322 Correntel Vividia 4.81 31.59 5.20 30.06 0.00	0.07648	2.51				-	32.38	4.5	320 Capanema
322 Coronel Vivida 4.81 31.58 5.20 30.56 4.16 32.66 4.75 37.65 4.20 30.40 323 Curreiro do ĝrascu 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 324 Endes Merinhos 1.31 10.31 12.36 11.71 11.20 1.471 11.66 8.10 7.015 325 Endes Merinhos 1.33 10.00 0,00 0,00 0,00 0,00 0,00 0,00 326 Fbrer da Serra do Sul 17.31 12.34 12.34 12.36 1.46 1.46 1.46 327 Francisco Beltralo 1586 104.14 17.17 101.59 18.41 144.66 20.41 11.46 326 Marridoolis 2.2.0 15.11 2.92 17.33 2.41 18.56 11.46 12.44 328 Marridoolis 2.2.21 14.57 2.00 10.00 0.00 0.00 0.00 321 N. Faracisco Beltralo 15.86 10.43 17.17 101.59 18.81 14.67 1.46 12.44 323 Marridoolis 2.2.21 12.34 1.66 12.58	0.25072	13,44		1			32.31		321 Chopinzinho
323 Cruzeiro do Tgueçu 0,00		4.20					31.59		322 Coronel Vivida
324 Dois Virinhos 8.94 58.77 10.53 6.2.56 12.82 100.73 14.71 116.65 8.10 70.15 325 Endias Marques 1.53 10.05 1.19 7.06 1.77 112.20 1.24 9.02 325 Francisco Beltra 1.53 10.05 1.19 7.06 1.77 112.30 1.64 9.02 325 Francisco Beltra 1.53 10.44,14 17.17 101.99 18.41 14.46 9.02 0.00	0.06429	000					8.0	5	323 Chizeiro do Iguaçu
225 Enclast Marques 1.53 10.05 1.19 7.06 1.57 12.30 1.52 12.00 1.06 9.03 225 Francisco Beltrão 236 176 a 8.41 144.60 20.41 161.81 1901 164.68 227 Francisco Beltrão 1588 104.14 171.17 101.99 18.41 144.60 20.00 0.00 </td <td>0.51525</td> <td>8.10</td> <td></td> <td></td> <td></td> <td></td> <td>58.72</td> <td>58</td> <td>324 Dois Vizinhos</td>	0.51525	8.10					58.72	58	324 Dois Vizinhos
226 Fror da Sarra do Sul 0,00	0,03492	1.9		۰.			10.05	1	325 Encas Marques
227 Francisco Beltrão 15.86 104.14 17.17 101.99 18.41 144.66 20.41 161.81 1901 164.68 328 Rapejara do Oeste 2.30 15.11 2.92 17.33 2.41 18.96 1.85 14.67 1.44 12.44 320 Mariôpolis 2.22 14.57 2.08 12.34 1.64 12.88 1.65 13.45 330 Marnelairo 2.241 15.80 2.00 11.85 2.39 18.78 2.36 13.46 331 N. Expensiva Sudoest. 0,00 0,00 0,00 0,00 0,00 0,00 0,00 332 N. Frata do Iguacu 0,00 0,00 0,00 0,00 0,00 0,00 0,00 333 Perio Branco 0,00 0,00 0,00 0,00 0,00 0,00 0,00 334 Perio Branco 0,00 0,00 0,00 0,00 0,00 0,00 0,00 335 Prinal de Sto Branco 1,4,15 1,3,38 1,6,17 1,1,36 1,2,34 1,4,15 335 Prinal de Sto Branco 0,00 0,00 0,00 0,00 0,00 0,00 0,00	0.01523	000					0.0	<u> </u>	326 Flor da Serra do Sul
328 lapejara do Oeste 2.30 15.11 2.92 17.33 2.41 18.96 1.85 14.67 1.44 12.44 329 Maniopolis 320 Maniopolis 2.22 14.57 2.08 12.34 1.66 12.38 1.55 13.45 331 N. Expensive Sudvect 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 332 N. Prata do Jenecu 0.00 0.00 0.00 0.00 0.00 0.00 0.00 333 Pario Branco 14.19 13.36 10.57 15.40 12.56 12.54 15.45 334 Prefoid do Coste 1.90 0.00 0.00 0.00 0.00 0.00 0.00 0.00 335 Princip die Sto Bernic 1.61 15.46 1.54 1.54 1.57 1.159 335 Princid de Sto Bernic 0.00 0.00 0.00 0.00 0.00 0.00 335 Princid de Sto Bernic 0.00 1.71 10.16 1.2.45 1.2.72 1.199 337 Pranchia 2.56 2.54 2.56 2.56 2.56 2.56 2.56 338 Realeza 0.00 1.71 10.16 2.23 17.48 2.17 1.103 <td< td=""><td>0.50992</td><td>10.01</td><td></td><td></td><td>•</td><td></td><td>104:14</td><td>15.8</td><td>327 Francisco Beltrão</td></td<>	0.50992	10.01			•		104:14	15.8	327 Francisco Beltrão
320 Manicpolis 2.22 14.57 2.08 12.34 1.64 12.38 1.56 13.48 330 Manueleiro 331 N. Expensavea Sudoest. 0,00 </td <td>0.05214</td> <td>144</td> <td></td> <td></td> <td></td> <td></td> <td>115.11</td> <td>53</td> <td>328 Itaneiara do Oeste</td>	0.05214	144					115.11	53	328 Itaneiara do Oeste
330 Manueleins 2.41 15.80 2.00 11.85 2.39 18.78 2.26 17.34 1.87 16.17 331 N. Expensive Sudoest. 0,00 <t< td=""><td>0.04282</td><td>1.56</td><td></td><td>٠.</td><td></td><td></td><td>14.57</td><td>23</td><td>329 Mariópolis</td></t<>	0.04282	1.56		٠.			14.57	23	329 Mariópolis
331 N. Experimenta Sudoest. 0,00 <td>0.04887</td> <td>1.87</td> <td></td> <td></td> <td>· .</td> <td></td> <td>15.80</td> <td>4</td> <td>330 Marmelein</td>	0.04887	1.87			· .		15.80	4	330 Marmelein
332 N. Prata do fenecu 0,00 0,00 2.66 15.82 2.72 2.1.39 2.03 16.12 1.45 1.258 333 Patro Branco 334 Petrola do Ocente 14.19 93.16 12.63 75.01 13.08 102.75 15.40 122.07 16.39 141.93 334 Petrola do Ocente 1.96 12.85 1.61 9.56 1.80 14.15 1.11.96 1.08 9.37 335 Prinhal de São Berno 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 337 Pranchia 2.74 17.77 14.69 2.54 19.96 1.60 1.07 337 Pranchia 0,00 0.00 1.71 10.16 2.23 17.48 2.15 1.17 338 Realeza 5.98 39.24 4.51 2.681 3.83 30.06 3.43 2.720 2.64 2.28	0.01862	0,0					00.00	0.0	331 N. Esperanca Sudoest.
333 Parcolation 14,19 93,16 12.63 75.01 13.08 102.75 15.40 122.07 16.39 141.95 334 Previola do Ocerte 1.96 1.283 1.61 9.56 1.80 14.15 1.51 11.96 1.08 9.57 334 Previola do Ocerte 1.96 1.283 1.61 9.56 1.80 14.15 1.51 11.96 1.08 9.57 335 Prinhal de Sao Berno 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 337 Pranchia 2.74 17.97 2.47 14.69 2.54 19.96 1.60 12.77 11.03 337 Pranchia 0.00 1.71 10.16 2.23 17.48 2.15 1.127 11.03 337 Pranchia 0.00 1.71 10.16 2.23 17.48 2.12 1.103 338 Realeza 5.98 39.24 4.51 26.81 3.83 30.06 3.43 27.20 2.64 2.284	0.04314	1.45	•				0.00		
334 Petrola do Ocste 1.96 12.83 1.61 9.56 1.80 1.415 1.51 11.98 1.08 9.37 335 Princial do Ocste 1.96 12.81 1.61 9.56 1.80 14.15 1.51 11.98 1.08 9.37 335 Princial do Ocste 0.00	0.44132	01.91					21.20		
335 Primai do Sto Berrio 0.00 0.00 0.00 0.00 0.00 0.00 335 Primai de Sto Berrio 2.74 17.97 2.47 14.60 2.54 19.96 1.60 1.77 11.03 335 Primai de Sto Berrio 2.74 17.97 2.47 14.60 2.54 19.96 1.60 1.77 11.03 337 Pranchia 0.00 0.00 1.71 10.16 2.23 17.48 2.15 11.702 1.18 10.25 338 Realeza 5.98 39.24 4.51 2.681 3.83 30.06 3.43 2.720 2.64 2.284		1.06			-	•	20 61		
355 Primal de So Serito 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 17,91 17,92 12,72 12,72 11,03 337 Prancôita 0,00 0,00 1,71 10,16 2.23 17,48 2,15 11,03 338 Realeza 5,98 39,24 4,51 26,81 3,83 2,43 2,54 2,54 2,54	0.00100						12:02	3	
336 [Namelto 2.74 17.97 2.47 14.69 2.34 19.96 1.00 12.72 12.72 11.03 337 [Pranchita 0,00 0.00 1.71 10.16 2.23 17.48 2.15 17.02 1.18 10.25 338 [Realeza 5.98 39.24 4.51 26.81 3.83 30.06 3.43 27.20 2.64 22.84	00007.7	3					200	5	535 Printal de São Bento
337.[Pranchia 0,00 0.00] 1.71 10.16 2.23 17.48 2.15 17.02 1.18 10.25 338 238 39.24 4.51 26.81 3.83 30.06 3.43 27.20 2.64 22.84	0.04030	171						5	336 Planalto
238 Realeza 5.98 39.24 4.51 26.81 3.83 30.06 3.43 27.20 2.64 22.84		1.18	•				· ' .	00	337. Pranchita
	0,07918	2.6	•			2		5.5	338 Realeza
2.30 15.46 2.39 Renscence 15.45 15.46 14.08 2.60 15.46 2.39 18.76 2.00 15.45 15.45 0.06122	0.06122	1.78	• .	÷.,			:	2	339 Renascenca
	(10 be co								

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Table - 3.5 (3) GRDP per Municipality in 1981, 1983, 1985, 1987, 1989 and 1991 / Iguaçu River Basin

(Continuation)

No. and Name of No. and Name of Municipality MICH Nunicipality No. Name NLLH 2387 (cont.) 340 Safgado 1 342 Subado 4 343 Subado 4 345 Subado 6 345 Subado 7 345 S	. and rearce of unicipality XGO Salgardo Filho XGO Salgardo Filho XGO Salto do Lontra XGI Salto do Lontra XGI Salto do Ceste XGI Sa Jorge do Oeste XGI Sulta AS Sulta do Iguaçu XGI Sulta XGI Sulta XGI Vitorito	198 1.09 1.09	ti SS million	0 0 861	3 SS milion	361 861	is S million		987 USS milion	13	989 USS milion	%/ State	1991 %/ X02H _ U	SS million
232 (cont.)	lity ame diado Filho biado Filho bi babel do Oeste Antônio Sudoeste to Joso to Joso to Joso to Joso turdade do Iguaçu turdade do Iguaçu tina erô tiorino	198 1.09 1.09	S milion	2 2 7	SS million	% 0	S million		VS/ USS million	1 %	USS million	% / State	K/MRH U	SS million
	ame Ligado Filho Lizado Lontra Irabel do Oeste Antônio Sudoeste to João to Jorge do Oeste to Jose to Jana tradade do Iguaçu Lina erô trofino	1.09 0	SS million	0 %	SS multon	šn – %	S million	*	USS million	1 %	USS multion	% / State	V. MARH U	S5 mulhon
	Leado Filho Leado Filho Label do Ceste Amônio Sudoeste lo Joso lo Joso Lorge do Ceste udade do Iguacu Lina erè ricrino	60'1												
	uro do Lontra Izabel do Oeste Arriônio Sudoeste to Joso to Jorge do Oeste votade do Iguaçu utade do Iguaçu tina erè			0.87	5.19	0.82	6,47	£7.0	5.78	0.61	522	0.02061	0.65	210
	Irabel do Oeste Antônio Sudoeste to Joso to Jose do Oeste tudade do Iguaçu Lina erô tiorino	3.98	26.10	5.79	16.60	2.05	16.11	1.78	14.10	1.60	13.84	0.04248	1.35	10.72
	Antônio Sudoeste to João to Jorge do Oeste to Jarge do Iguaçu Lina erô itorino	2.03	13.34	2.17	12.86	2	19.19	1.67	13.24	1.78	15.44	0.05622	1,78	14.18
	to João to Torge do Oeste tudade do Iguaçu Litna etê itorino	۲ <u>5</u>	28.38	2.43	14,42	1.98	15.57	1.83	14.51	1.69	14.61	0.04472	1.42	11.28
	to Torge do Oeste vudade do Iguaçu Litna erd	3.13	20.56	3.09	18.35	2.67	21.00	3.07	24.32	3.13	27.09	0.09876	3,13	24.91
	udade do Iguaçu Lina erè itorino	327	21 46	233	13.85	5.8	16.22	1,96	15.57	5.75	49.77	0.14896	4.73	37.58
	Liina erd itorino	0.0	000	0000	00.00	0000	0.00	8.0	0.00	80	0.0	0.02532	080	629
	erè itorino	000	0.0	0000	0.00	0000	0.00	0.0	0.00	8	8.98	0.02814	0.39	7.10
	itorino	1.77	11.62	8	11.65	50	16.16	1.77	14.01	1.65	14.27	0.04416	1.40	11.14
		1.62	10.62	1.73	10.27	1.70	13.36	61.99	15.79	1.28	11.09	0.03593	1.14	9.06
	Subtotal of Municipalities of Basin	100.00	656.50	100.00	593.90	100.001	785.50	100.00	06:264	100.001	866.101	3,15132	100.00	794.92
	Subtoral of Municipalities not of Basin	0.00	00.0	0.0	0.00	0.0	0.00	0.00	00'0	00.0	00.0	0.00000	0.00	0.00
	TOTAL of MRH	100.00	423.10	100.00	396.10	100.001	470.50	100.001	01.170	100:00	909.50	3,26796	100:00	824.34
Campos de Guaranuava 350 Ca	Candon	0.00	0.00	0.00	0.00	0.00	0.00	00.0	00.0	00'0	00:0	027647	87.8	\$9.74
	351 Cantagalo	0.0	00.0	1.39	5.49	3.74	17.61	2,21	14.85	1.78	16.16	0.05682	1.74	14.33
352 G	352 Guaranuava	71.30	301.69	67.28	266.51	67.75	318.77	70,67	474.27	59.05	537.05	1.62612	49.76	410.19
353 Int	353 Inacio Martuns	3.02	17,71	2.12	8.40	2.07	9.75	19'1	10.82	0.97	8,86	0.03566	1.09	8.6
354 La	354 Laranieiras do Sul	9.95	42.09	9,41	37.27	8.59	40.44	6.82	45.74	15.87	144.33	0.22609	6.92	57.03
355 Nc	355 Nova Laranjeiras	0,0	0.0	0.0	0.0	0°0	0.00	8.0	0.0	000	0.00	0.03091	0.95	7.80
356 Pinhão	inhảo	8.09	34,21	7.76	30,73	10,07	47.40	9.59	64.37	7.47	67.92	0.33101	10.13	83.50
10/25C	357 Queetas de Iguaçu	7.64	32.34	10.27	40,69	8.55	40,23	6.36	46.03	12,48	113,50	0.37014	11.33	93.37
358 R	358 Rio Bonito do Iguaçu	00.0	0.00	0.0	0.0	00'0	0.00	0,00	8.0	0,0	8.0	0.19229	5.88	48.51
360 Vi	360 Virmond	0,0	80	0,0	0.0	8.0	0.00	80	0.0	80	0.0	0.01597	0,49	4.03
Subtoral o	Subtotal of Municipalities of Basin	100.00	423.10	8.8	383.59	97,04	456.38	95.35	641.23	95,84	871.67	2.828.9	86.54	713.41
Subtotal o	Subtotal of Municipalities not of Basin	0.00	0.00	2.97	11:77	2,85	13.42	133	25.62	4.09	11.15	0.10648	3.26	26.86
MRH 291 TC	TOTAL OFMEH	00:001	287.50	100.001	227.10	100.00	288.90	100.00	380.60	100.00	473.00	1.77866	100.00	448.67
Médio Iguaçu 361 Bit	561 Bituruna	6:00	17.51	5.07	11.52	11.1	13.78	4.86	18.51	11.05	12.22	0.26764	15.05	67.51
362 0	362 Clevelandia	14.38	41.35	19.94	45.28	20.79	20.02	12.69	48.31	11.87	56.13	0.22545	12.68	56.87
363 CC	363 Cruz Machado	2.33	6.69	2.11	4.79	2.98	8.61	2.61	9.92	8.36	39.56	0.22866	12.86	57,68
364 G	364 General Cameiro	4,14	11.90	5.60	12.72	21.7	20.66	6,97	26.54	90.9	28.66	0.08164	4,59	20.59
365 Hc	365 Hondrid Serpa	0.0	0.00	000	0.00	0,0	0.0	8	0.0	8	0.0	0.03617	2.03	9.12
366 M	366 Mangueirinha	14.30	41.11	13.78	31.29	15,15	43.71	14.78	56.25	8.8	42.36	0.11415	6.42	28,79
367 Palmas	almas	2 2	65.94	17.62	40.03	15.56	8.2	19,61	74.64	15.28	72.26	0.20869	11.73	52.64
368 Pa	368 Paula Freitas	1.05	3.03	1.19	2.70	0.96	2.79	1.47	5.59	0.93	4.41	0.01483	0.83	3.74
369 Pa	369 Paulo Frontin	1.30	3.74	1.59	3.61	1.76	5.09	1.55	5.91	8	6.60	0.02272	128	5.73
370 Po	370 Porto Vitória	1.51	4.35	1.46	3.32	125	3.62	141	5.37	1.76	32.8	0.04294	2.41	10,83
371 Uz	371 União da Vitôria	31.95	91.87	31.63	71.34	29.62	85.56	34.04	129.56	2.2	162.41	0.53577	30.12	135.15
Subtoral o	Subtoral of Municipalities of Basin	100.00	287.50	100:00	227.10	100.00	288.90	100,00	380.60	100.00	113.00	1.77866	100.00	448.67
Subtotal o	Subtotal of Municipalities not of Basin	0:00	0.00	0.00	0.00	000	00'0	0.00	00.0	0.00	0070	0.00	00,0	0.00
TOTAL OF THE MONICIPALITIES OF THE BASEN	S OF THE BASIN	ī	7.700.38	1	7,969,69	Ĩ	8294582	1	11276.01	Ī	13,276,38	Ī	I	14,253.94

Source : Estatistica Econômico Finance Economic Statistics) 74/85, 86/87, 82/89 - SEFA, Fundo de Participação dos Municípios - Índices Provisónos - 95 (Municipalities' Participation Fund -Preliminary Indexes - 95) - SEFA Remark : Figures of Irat/MCH 276 and Palmeira/MEH 272 are listed in Tibagi River Basin : In the figures of 1989 and 1991 was included the value of contribution of Hydropelectric Power Stations

CHAPTER 4 FUTURE SOCIO-ECONOMIC FRAMEWORK

4.1 Population Projection Per Municipality

The population projection per municipality was carried out based on the preliminary estimation by IPARDES for the years of 1993, 1995 and 2000 (estimated rural population, urban population and total population per municipality). However, new figures provided by IPARDES in 1995 were applied to the urban population of Mandirituba - MRH 268/Curitiba, Piên - MRH 271/A. Rio Negro and Cafelândia - MRH 288/Extr. Oeste Paranaense, and to the rural population of Foz do Iguaçu - MRH 288/Extr. Oeste Paranaense.

The projection for the target years was carried out by JICA Team, as follows: 1) the population of all municipalities of each MRH, which includes any of the municipalities belonging to the zoning, was estimated based on the trend of increase (or decrease) of the municipalities' population in 1993, 1995 and 2000, divided into urban population and rural population; 2) the total of urban and rural population of these municipalities was adjusted tentatively to the estimated urban and rural population of the MRH to which they belong; 3) finally, the municipalities of each MRH that are included by the zoning and, therefore, belong to the river basin, were separated from those that are not included in the river basin. The estimated population per municipality in 1993 by IPARDES and 2005 and 2015 by JICA Team are shown in Table-4.1 (1), Table-4.1 (2), Table-4.1 (3) and Table-4.1 (4).

4.2 Projection of Gross Regional Domestic Production (GRDP) per Municipality and GRDP by Secondary Sector per Municipality

4.2.1 GRDP per Municipality

GRDP per municipality in 1993 was estimated by the same method mentioned in Section-3.6.3, but by excluding the contribution of hydroclectric power stations of some municipalities. And the GRDP per Municipality for the target years 2005 and 2015 was estimated individually, based on the past trend of GRDP per municipality during the years of 1981 to 1991 (shown in Table-3.5 (1)/Table-3.5 (3)) also excluding the contribution of hydroelectric power stations of some municipalities in 1989 and 1991, and on 1993, by adjusting the estimated GRDP per MRH to the years to which they belong.

The estimated GRDP per Municipality of the 101 municipalities in 1993, 2005 and 2015 are shown in Table-4.2 (1) and Table-4.2 (2).

4.2.2 GRDP by Secondary Sector per Municipality

GRDP by Secondary Sector per Municipality in 1993, 2005 and 2015 was estimated using the same method mentioned in Section-4.2.1. This estimation, however, is presented in Section-5.2.

4.2.3 Future Socio-Economic Framework

Based on the population projection per municipality (shown in Table-4.1 (1)/Table-4.1 (4)), and GRDP projection per municipality in 1993, 2005 and 2015 (shown in Table-4.2 (1) and Table-4.2 (2)), the future socio-economic framework of this river basin can be estimated and

conceived through the classification of the 101 municipalities into four categories. There are three remarkable points, as follows:

- 1) 11 large size municipalities (classified in 1st and 2nd classes) will occupy approximately 80% of the total urban population and 81% of the GRDP of this river basin in 2015, respectively.
- 2) 24 large and medium size municipalities will occupy 91% of the urban population and 90% of the GRDP of this river basin in 2015, respectively.
- 3) 14 municipalities in Curitiba Metropolitan Area will share about 62% of the urban population and 68% of the GRDP of this river basin in 2015, respectively.

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The classification of these 101 municipalities with their participation, in percentage, in this river basin's urban population and GRDP in 1993, 2005 and 2015, are shown in Table-4.3.

Table-4.1 ((1) Projected Population per Municipality in 1993, 2005 and 2015, and Area per Municipality/ Iguaçu River Basin

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· · · · · · · · · · · · · · · · · · ·						ropulation				Ī	_ 4.		ENV.
No. and Name of MRH	No. and Name of Municipality		1993			2005						Total Area	Area unvolved
	No. Name		RURAL	TOIAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	Ara		%
MRH 268	Total of MRH	1,949,043	126,226	2,075,269	2.582.200	113,700	2,695,900	3,112,700	96,700	3 209 400	1	1	1
CURITIBA	1 Alm. Tamandare	65,600	7,045	72,645	121,910	6,530	128,440	169,730	6,230	175,960	۲	521.3	36.31
	2 Arsucaria	59,259	7.680	66.939	102.280	7.120	109,400	138,700	6,800	145,500	≻	503.7	100.001
· . ·	3 Balsa Nova	2,627	5,266	7,893	4,350	4,910	9,260	5,810	4,170	086'6	• ≻	321.9	99,32
· · ·	5 Campina Grande do Sul	15,192	6,750	21,942	40,100	5,870	45,970	61,440	4,980	66,420	Na	554.4	14.28
	6 CampoLargo	55,837	18,791	74,628	72,070	15,930	88,000	85,590	13,520	011.66	×	1,262.9	23.53
· · ·	7 Colombo	120,802	7,404	128,206	208,640	6,420	215,060	283,000	5,750	288,750	` ۲	189.6	67.29
	8 Contenda	4,925	4,118	9,043	6,000	3,850	9,850	6,890	3,690	10,580	۲.	2222	100.00
	9 Cunitiba	1,337,892.	0	1,337,892	1,546,490	0	1,546,490	1,717,150	•	1,717,150	Y	431.7	100.00
	10 Fazenda Rio Grande	26,498	3,401	29,899	76,310	3,760	80,070	119,160	3,190	122,350	X	110.9	10.00
	12 Mandintuba	4,669	9,452	14,121	6,700	9,460	16,160	8,410	8,030	16,440	۶	392.3	100.00
	13 Prinhais	75,045	3,843	78,888	102,520	4,490	107,010	125,690	3,810	129,500	×	98.2	100.00
	14 Piraquara	20,482	12,847	33,329	25,580	13,470	39,050	29,650	11,440	41,090	۲	171.9	100.00
- 	15 Quatro Barras	6 * 1*6	1,825	10,974	18,150	1.420	19,570	25,810	1,120	26,930	Y	183.2	\$4.32
	17 S. Jesé dos Pinhais	122,604	16,652	139,256	210,330	14,920	225,250	284,590	12,660	297,250	*	916.1	73.60
	Subtotal of Municipalities of Basin	1,920,581	105,074	2,025,655	2,541,430	98,150	2,639,580	3,061,620	85,390	3,147,010	1	1.	I
	Subtotal of Municipalities not of Basin	28,462	21,152	49,614	40,770	15,550	56,320	51,080	11,310	62,390	1	1	1
MRH 271	Total of MRH	6,081	33,468	39,549	9,100	36,200	45,300	11,200	36,100	47 300	1	1	1
A. RIO NEGRO	28 Agudos do Sul	752	5,451	6,203	740	5,890	6,630	98	5,870	6,510	۲	259.6	100.00
•	29 Pita	1541	6,464	8,005	3,420	6,830	10,250	4,770	6,820	11,590	×	261.7	100.00
	30 Quitandinha	2,508	12,239	14,747	3,310	12,950	16,260	3,910	12,910	16,820	×	419.4	100.00
	31 Tipucas do Sul	1,280	915.0	10,594	1,630	10,530	12,160	1,280	10,500	12,380	Y	678.9	62.25
-	Subtotal of Municipalities of Basin	6,081	33,468	39,549	0,100	36,200	45,300	11,200	36,100	47,300	1	1	1
	Subtotal of Municipalities not of Basin	0	0	0	•	0	0	•	0 2	0	1	1	1
MRH 272	Total of MRH	60,616	46,044	106,660	73,600	46,400	120,000	84,800	44,100	128,900	1	1	ł
C. DA LAPA	32 Campo do Tencate	2,243	3,276	912,2	3,900	3,530	7,430	5,310	3,510	8,820	≻	314.0	100.00
	33 Lapa	20,074	20,809	40,883	24,860	19,810	44,670	28,970	18,010	46,980	7	2,203.9	100.00
	34 .Palmetra	•	0	0	•	o	0	•	0	0	z	1,500.8	18.22
	35 Porto Amazonas	2,435	1,223	3,658	2,820	1,380	4,200	3,150	1,420	4,570	7	206.8	73.98
	36 Rio Negro	20,643	6.203	26,846	24,120	6,180	30,300	27,140	5,820	32,960	S	603.2	100.00
	Subtotal of Municipalities of Easin	45,395	31,511	76,906	55,700	30,900	86,600	64,570	28,760	93,330	1	1	1
-	Subtotal of Municipalities not of Basin	15,221	14,533	29,754	17,900	15,500	33,400	20,230	15,340	35,570	1	• 	<u> </u>
MRM 275	Total of MRH	20,122	34,552	54,674	26,300	35,000	61,300	31,500	33,100	64,600	ŀ	1	1
IS MATFUS DO SUI	46 Anthris Olinto	525	ayc L	7 0/17	041 1	100	8 510	1 490	7 000	101.9	>	2 (0)	00 00

Table-4.1 (2) Projected Population per Municipality in 1993, 2005 and 2015, and Area per Municipality/ Iguaçu River Basin

						Population							Yes.	
No. and Name of MRH	No. and Name of Municipality		1993			2005			2015		Crhan	Total Area	Area	Area unvolved
	No. Name	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	Area		X	Km²
MRH 275	47 São João Trunfo	2,958	649'6	12,637	4,060	009'6	13,660	5,000	8,940	01-01-01-01	λ,	712.2	59.43	1.807
C. DE PONTA GROSSA	48 Sho Mateus do Sul	16,489	17,605	34,094	21,120	18,010	39,130	25,010	17,160	42,170	×	1,332.8	100.00	1.332.8
Cont.	Subtotal of Municipalities of Basin	20,122	34,552	54,674	26,300	35,000	61,300	31 500	33,100	64,600	}	1	1	T.
	Subtotal of Municipalities not of Basin	0	0	0	•	•	0	0	0	0	ŀ	1	1	5
MRH 276	Total of MRH	71,821	103,597	175,418	90 ^{,400}	103,300	193,700	105,900	97,300	203,200		:		
Col. de IRATI	SO Itati	•	•	0	о	0	0	•	•	0	Z.	\$96.8	45.51	408.1
	51 Maliet	5,948	6,146	12,094	070'6	5,170	14,210	11,610	4,160	15 770	7	672.8	100.00	672.8
-		5,579	7,636	13,215	7,000	7,680	14,680	8,190	7,280	15,470	×	504.7	98.85	498.9
		3,260	9,426	12,636	3,710	10,090	13,800	4,090	10,010	14,100	×	642.6	100.00	642.6
	Subtotal of Municipalities of Basin	14,787	23,208	37,995	19,750	22,940	42,690	23,890	21,450	45,340		1	I	•
	Subtotal of Municipalities not of Basin	57,034	685.08	137,423	70,650	80,360	151,010	82,010	75,850	157,860	I		ł	•
MRH 288	Total of MRH	765,125	265,796	1,030,921	000"690"1	160,800	1,229,800	1,320,500	005 001	1,420,800	1		Î	
Ext. Oeste Paranaense	269 B. Vista Aparecida	3,140	7,020	10,160	2,770	6,210	8,980	2,430	5,230	7,660	×	2322	100.00	2222
	273 C. León. Marques	5,799	366'S	11,795	5,630	2,280	7,910	5,440	8	6,400	×	279.8	100.00	279.8
	274 Cascavel	185,746	14,184	199,930	250,280	9°020	259,300	303,280	5,890	309,170	A.	2,157.5	57.57	06.301,1
	275 Catanduvas	5,050	5,693	10,743	6,230	3,700	026 6	7,180	2,450	9,630	×	593.9	100.00	565
	276 Cen Azul	S,720	3,637	9,357	6,520	3,330	9,850	7,210	3,090	10,300	Z.E	1,185.0	60.67	937.2
•.	282 Foz do Iguaçu	204,365	3,738	208,103	353,920	1,020	354,940	479,380	330	479,710	N.C.	4 76.1	65.58	3122
	284 Guaraniaçu	7,965	12,965	20,930	9,500	9,120	12,620	10,720	6,470	17,190	N(E)	1,052.5	47.03	495
	285 Ibema	4,018	2,274	6.292	5,630	2,080	7,710	096'9	1,810	8,770	ዲ	151.7	61.79	148.3
	290 Lindoeste	847	5,472	612.9	480	3,250	3,730	28	2,000	2,290	≻.	273.2	100.00	2732
	293 Matelândia	8,529	١٢٥٦،	13,080	9,580	2,010	065"11	10,400	3 8	096,11	N(E)	611.4	98,37	601.4
	294 Medianeira	30,268	8,392	38,660	36,360	5,040	41,400	41,230	3,130	44,360	Å.	2664	11.11	621.1
	305 Santa Lúcia	1,874	2.725	4, 599	1,810	1,230	3,090	1,740	640	2,380	Υ	137.1	100.00	137.1
	306 S. Tereza do Oeste	072رز	2,571	5,941	3,900	1,470	5.370	4,320	032	5,200	<u>.</u>	423.3	\$5.64	2552
•	307 S. Terezuha Itaipu	12,189	2,329	14,518	16,410	1,490	17,900	083.61	970	20,250	N(a)	289.8	\$5.94	162.1
	309 S. Miguel do Iguaçu	10,321	104'6	19,722	12,850	4,390	17,240	14,900	2,210	17,110	N(E)	9972	45.70	455.7
	313 T. Barras Paraná	4,040	10,060	14,100	3,940	6.160	10,100	-3,830	3,890	7,720	Y	521.7	100.001	521.7
· ·	Subtotal of Municipalities of Basin	101,004	336'56	584,089	723,040	55,640	778,680	061'616	40,910	960,100	Ë,	1.	I	
	Subtotal of Municipalities not of Basin	271,884	164,788	436,672	343,190	98,950	442,140	401,310	59,390	460,700	Ì,	•	1	1
MRH 289	Total of MRH	235,122	238,203	473,325	305,400	162,100	467,500	366,300	93,500	459,800	l	•	1	1
Sudoeste Paranaense	316 Amptre	6,043	6,760	12,803	6.700	4,200	10,900	7,050	1,870	8,920	×	307.9	100.001	307.9
	317 Barracho	4,815	071*6	13,955	7,420	5,360	12,780	9,410	2,010	11,420	7	386.4	100.00	386.4
	218 Ros Fermines do Imiaci	541	170	1.25		A40.1	<	100	11.1.60	7 7 60	>	1010	00.001	140.4

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NO, and Name of MCA	No.	No. IName of Internationality No. Name	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RIRAL	TOTAL		1 OGAI ANCA		Area IDVOIVOD
MRH 289		319 Bom Sucesso do Sul	1,036	2,799	3,835	1,350	2,510	3,860	1,570	2.040	3,610	6	135.3		
Sudoeste Paranaense	320	Capanema	7,798	10,662	18,460	7,360	6,060	13,420	6,760	2,040	8,800	۲	403.9		
Cont.	321	Chopinžinho	8,437	11,159	19,596	6,790	7,380	17,170	10,640	3,800	14,440	۲ ه	992.5		
	322	Coronel Vivida	12,518	12,285	24,803	14,240	8,820	23,060	15,260	5,330	20,590	γ.	681.5	5 100.00	
	323	Cruzeiro do Iguaçu	2,045	3,136	5,181	3,400	1,930	5.330	4,460	1,160	5,620	۲. 0	99.6	6 100.00	0 96.6
4.	324	Dois Vizinhos	21,463	10,350	31,813	35,060	5,600	40,660	45,560	3,000	48,560	<u>ہ</u>	372.7	7 100.00	<u></u>
	325	Encas Marques	1,423	5,822	7,245	1,580	4,210	5,790	099'1	2,570	4,230	۲ 0	234.7	7 100.00	
	326	Flor da Serra do Suí	304	4,884	5,188	360	4,400	4,760	390	3,600	3,990	7	94.7	7 100.00	
	327	Francisco Beltrao	48,417	15,017	63,434	73,320	10,760	84,080	100,490	6,500	106,990	Y	696.7		· •
÷.	328	Itapejara do Oeste	3,962	4,903	8,865	4,600	3,350	7,950	5,000	1,850	6,850	γ.	246.0		
	329	Maniópolis	2,896	3,368	6,264	3,280	2,860	6,140	3,500	2,190	5,690	X	232.1		
-	330	Marmeleiro	6,197	9.225	15,422	9,870	065'6	19,260	12,700	8,530	21,230	<u>ک</u>	6.625	9 100.00	0 449.9
	331	N. Esperança do Sudoeste	713	4,730	5,443	820	4,430	5,250	8	3,750	4,650	۲ 0	176.9		
	332	N. Prata do Iguaçu	4,147	6,790	10,937	4,200	3,650	7,850	4,120	056'1	6,070	۲ ہ	333.0		
	333	Pato Branco	43,856	9,210	53,066	56,450	7,310	63,760	67,550	5,140	72,690	X	570.2	2 100.00	0 5702
2	334	Pérola do Oeste	3,219	8,454	11,673	3,280	5,050	8,330	3,240	2,030	5.27	۲ o	330.1	1 200.00	0 330.1
	335	Pinhal Sao Bento	ЪŽ	2,193	2,737	630	1,480	2,110	690	810	1.500	×	107.6	6 100.00	0 107.6
	336	Planalto	4,064	10,336	14,400	4,200	6,210	10,410	4,190	2,530	6,720	۲	337.1	1 100.00	0 337.1
	337.	Pranchita	2.729	5,579	8,308	3,750	3,200	6,950	4,500	1,120	5,620	×	297.1	1 100.00	1.792.0
	338	Realeza	9,173	7,231	16.404	8,980	4,150	13, 130	8,540	2,340	088 01	۲	351,9	00.001 0	0 351.9
	339	Renascença	2,120	5,348	7,468	2,010	4,820	6,830	1,850	3,920	5,770	۲	434.7	7 100.00	0 434.7
	8	Salgado Filho	1,804	9,278	11,082	2,150	7,370	9.520	2,380	5,180	7,560	7	506.4	4 100.00	506.4
	ž	Salto do Lontra	4,798	8,601	13,399	6,300	5,030	11,330	7,380	1.860	9,240	<u>ک</u>	336.9	9 100.00	336.9
	342	S. Izabel do Oeste	4,573	7,388	11,961	4,470	4,560	9,030	4,250	2,010	6,260	×	330.5	5 100.00	0 330.5
	343	S Antônio Sudoeste	8,554	8,431	16,985	9,740	5,040	14,780	10,540	2,010	12,550	بر 9	313.8	8 100.00	0 313.8
	344	São João	4,899	8,343	13,242	5,930	5,070	11,000	6,630	2,130	8,760.	۲	408.9	9 100.00	0 408.9
	345	São Jorge do Oeste	3,746	6,097	9,843	3,330	3,750	7,080	2,880	1,620	4,500	۲ 9	385.1	100:00	0 385.1
	346	Saudade do Iguaçu	1,943	2,656	4,599	2,290	2,220	4.510	2,520	1,670	4 190	۲	147.8	8 100.00	0 147.8
	347	Sulina	931	3,964	4, 895	820	2,330	3,150	700	1,340	2,040	۲	158.5	5 100.00	0 158.5
	348	Verê	2,769	7,186	9,955	3,730	4,800	8,530	4,420	2,540	6,960	γ.	345.6	6 100.00	0 345.6
	349	Vitorino	2,645	3,749	\$95.0	3,090	2,860	5,950	3.380	1,900	5,280	7	326.1	100.00	0 326.1
	Subtot	Subtotal of Municipalities of Basin	235,122	238,203	473,325	305,400	162,100	467,500	366,300	93,500	459,800				-
	0.000														

						Population				,			Area	
No. and Name of MRH	No. and Name of Municipality			1993			2005	-	2015	2	Urban	Total Area	Area	Area involved
	No. Name	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	Area		*	, EX
MRH 290	Total of MRH	995"641	157,625	337,191	230,700	159,500	390,200	276,000	152,100	428,100				
C. de Guarapuava	350 Candói	118,1	17,459	0/2"61	2,320	046'61	22,290	2,520	064,61	22,310	×	\$,000	100.00	8.666
	351 Cantagalo	6,792	20,200	26,992	17,910	22,170	40,080	39,360	21,960	61,320	7	1,844.5	41.97	774.1
	352 Guarapuava	117,385	27,041	144,426	154,360	29,050	183,410	179,920	28,780	208.700	×	4,152.2	81.95	3,402.70
	353 Inacio Martins	7227	11,858	14,385	2,850	14,660	17,510	2,830	14,520	17,350	¥	897.5	98.04	6618
	354 Larmjeiras do Sul	19,954	11,473	31,427	19,380	7,850	27,230	17,020	5,750	22,770	7	1,182.5	89.20	1,052.70
	355 Nova Laranjeiras	316	12,035	12,351	310	9,840	10,150	270	8,410	8,680	×	1,283.7	45.09	578.8
	356 Pinhão	10,068	24,076	24,144	7,760	26,820	34,580	5,620	26,580	32,200	7	2,875.2	100.00	2,875.2
	357 Quedas do Iguaçu	16,343	14,885	31,228	19,260	12,170	31,430	19,880	10,380	30,260	7	1, 192.9	100.00	1,192.9
-	358 Rio Bonito Iguaçu	694	4,502	5,196	680	3,690	4,370	89	3,150	3,750	×	459.3	100.00	- 4593
	360 Virmond	(19	2,847	3,458	0 09	2,330	2,930	540	066'1	2,530	Y	198.4	100.00	198.4
	Subtotal of Municipalities of Basin	105'921	146,376	322,877	225,430	148,550	373,980	268,560	141,310	409,870	I	I	I	•
•	Subtotal of Municipalities not of Basin	3,065	11,249	14,314	5,270	10,950	16,220	7,440	10,790	18,230	1	1	1	
MCH 291	Total of MRH	105,048	75,963	110'181	131,700	70,900	202,600	154,800	63,100	217,900				
meetio Igener	361 Bituruna	5,881	7,170	13,051	8,510	6,030	14,540	10,630	4,830	15,460	7	1,209.7	100.00	1,209.7
	362 Cievelândia	13,277	4,718	17,995	13,450	4,410	17,860	13,400	3,920	17,320	×	708.4	10.0	708.4
	363 Cruz Machado	2,540	14,275	16,815	3,160	14,530	17,690	3,650	13,920	17.570	7	1,500.5	100.00	2002,1
	364 General Cameiro	6,670	5,123	11,793	11,800	4,300	16,100	16,050	3,420	19.470	Υ	1,063.7	100.00	1,063.7
	365 Honório Serpa	803	7,075	7,878	1,530	7,590	9,120	2,130	1,570	002.6	7	\$06.6	100.00	806.6
	366 Mangueiriuha	4,783	13,912	18,695	060'6	14,450	23,540	12,660	14,040	26,700	Y	\$.108	100.00	801.3
	367 Palmas	25,957	9,860	35,817	35,420	6,630	42,050	45,210	3,800	49,010	Y	3,125.5	100.00	3,125.5
	368 Paula Freitas	1,639	160,5	4,730	3,200	2,410	5,610	4,490	1,760	6,250	×	417.0	100.00	417.0
	369 Paulo Frontin	1,648	5,060	6,708	2,360	5,460	7,820	2,940	5,470	8,410	×	377.5	100.00	377.5
	370 Porto Vitôria	1,871	1,916	3,787	2,060	1,750	3,810	2,180	1,530	3,710	7	2202	100.00	2202
	371 União da Vitória	39,979	3, 763	43,742	41,120	3,340	44 460	41,460	2,840	44 300	۲	773.9	100.00	773.9
. •	Subtotal of Municipalities of Basin	105,048	75,963	110'181	101,700	20,900	202,600	154,800	63,100	217,900	F.	I	Ĩ	
	Subtotal of Municipalities not of Basin	0	•	•	•	0	0	0	0	0	ł	1	1	
DTAL OF MUNICIPA	TOTAL OF MUNICIPALITIES OF THE BASIN	3.013.738	285 343	3.796.081	4 037 850	660 380	4 698 230	4 001 630	003 545	5.445.250	1	1	1	1

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Source: IPARDES - Population in 1993, SANEPAR - Area of Municipality

Remark: Population in 1993 projected by IPARDES, and in 2005 and 2015 were projected by JICA Team.

Population of Mandirituba / MRH 268, Pich / MRH 271 and Foz do Iguaçu, Cafelândia / MRH 288 in 1993 were reviwed by IPARDES in 1995

Figure of Irati/MRH 276 and Palmeira/MRH 272 are listed in Tibagi River Basin Libbun 4000: V = I libbun 4000 in the Dinne Ducin D = Duct of the I libbun 4000 in the Dinne Ducin M = 1 libbun 4

Urban Area: Y = Urban Area in the River Basin, P = Part of the Urban Area in the River Basin, N = Urban Area not included in the River Basin, (P)N = Topographically the Urban Area does not belong to the River Basin, but the Study will consider it as part of of the Basin



	<u> </u>	·	1		Unit: US\$ millie
No. and Name of MRH		No. and Name of Municipality	1993	2005	2015
MR11 268		TOTAL of MRH	10,538.30	20,213.73	34,326.4
Curitiba		Almirante Tamandaré	66.17	128.74	
.		Araucária	2,297.79	2,282.11	2,875.4
		Balsa Nova	93.81	199.23	
		Campina Grande do Sul	30.64	79.66	
· · · · ·	6	Campo Largo	233.92	573.15	
· · · · ·	7	Colombo	175.80	365.45	
		Contenda	12.22	22.41	
	9	Curitiba	6,542.87	13,980.55	
		Mandirituba	11.65	11.65	
Entry of Analysis in		Piraquara	12.42	93.68	
		Quatro Barras	54.47	98.92	1
		Fazenda Rio Grande	14.13	52.54	
		Pinhais	162.28	374.34	
		São José dos Pinhais	589.51	1,488.28	
		al of Municipalities of Basin	10,297.68	19,750.71	
	Subtot	al of Municipalities not of Basin	240.62	463.02	
MRH 271		TOTAL OF MRH	32.22	61.37	
Alto Rio Negro		Agudos do Sul	2.22	4.02	1
		Pien	11.69	21.76	
and the second states of the		Quitandinha	6.62	8.61	
A second second second second		Tijucas do Sul	11.69	26.98	. 49.8
	Sublot	al of Municipalities of Basin	32.22	61.37	105.6
	Subtot	al of Municipalities not of Basin	0.00	0.00	0.0
MRH 272		TOTAL of MRH	362.82	667.94	1,163.2
Campos da Lapa	32	Campo do Tenente	6.44	14.31	25.8
		Lapa	65.04	125.42	209.1
· · ·		Palmeira	0.00	0.00	0.0
and the second		Porto Amazonas	3.08	8.20	14.5
		Rio Negro	211.77	374.27	
		al of Municipalities of Basin	285.33	522.20	
		al of Municipalities not of Basin	76.49	145.74	1
MRH 275		TOTAL of MRH	85.74	160.89	1
São Mateus do Sul	. 46	Antonio Olinto	2.41	9.89	
040 Marcos 40 081	· · · · ·	São João do Triunfo	5.63	14.01	
		São Mateus do Sul	77.70	136.99	1
and the second		al of Municipalities of Basin	85.74	160.89	
		al of Municipalities not of Basin	0.00	0.00	
MRH 276	00000	ITOTAL of MRH	200.55	383.92	
Colonial Irati	- sn	Irati	0.60	0.00	1
Colomar man		Mallet	13.89	34.09	
		Rebouças	8.23	19.54	
· · · · ·		Rio Azul	9.80	17.11	28.2
ata general a			31.92	70.74	
ing the second second	SUDIO	al of Municipalities of Basin	168.63	313.18	
11017 102	50000	al of Municipalities not of Basin	3,234.55	5,711.90	
MRH 288	1.000	TOTAL OF MRH			
Extremo Oeste Paranaense		Boa Vista da Aparecida	5.90	13.32 14.24	
		Capitão Leônidas Marques	14.24	14.24	
		Cascavel	717.99	•	
		Catanduvas	19.55	23.53	
		Céu Azul	52.80	87.18	
		Foz do Iguaçu	929.14	2,278.95	
		Guaraniaçu	21.85	96.08	
		Ibema	13.27	15.69	
		Lindoeste	3.51	6.90	
		Matelandia	32.97	32.97	
		Medianeira	86.01	145.46	
		Santa Lúcia	2.78	2.78	ſ
		Santa Tereza do Oeste	6.64	13.06	
		Santa Terezinha do Itaipu	13.63	23.97	
		São Miguel do Iguaçu	61.04	157.74	
		Três Barras do Paraná	13.10	24.63	
		al of Municipalities of Basin	1,994.42	4,274.67	
an a	Subto	al of Municipalities not of Basin	1,240.13	1,437.23	
MRH 289	1	TOTAL OF MRH	1,005.21	1,545.04	I
Sudoeste Paranaense	316	Ampere	24.29	34.99	
	317	Barração	5.30	5.30	5.3
· · ·		Boa Esperança do Iguaçu	4.12	7.25	12.0

 Table - 4.2 (1)
 Estimated GRDP per Municipality in 1993, 2005 and 2015 - excluding contribution of Hydroelectric Power Station / Iguaçu River Basin



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No, and Name of MRH	1	No. and Name of Municipality	1993	Unit: US\$ million 2005	2015
MRH 289	319	Bom Sucesso do Sul	6.17	2003	18.0
Sudocste Paranaense (cont.)	320		32.32	32.32	
Suddesite i alanaense (conc.)	321	Chopinzinho	93.67		32.3
		Coronel Vivida		165.73	275.3
		Cruzeiro do Iguaçu	34.00	46.36	62.4
	323	Dois Vizinhos	10.53	18.53	30.7
			128.57	207.56	345.2
A	323	Eneas Margues	6.77	11.91	19.7
	320	Flor da Serra do Sul	2.24	3.94	6.5
		Francisco Beltrão	207.72	330.21	561.9
		Itapejara do Oeste	15.78	15.78	15.7
		Mariópolis	14.33	16.05	20.0
		Marmeleiro	16.36	22.01	29.6
	331	Nova Esperança do Sudoeste	3.49	6.14	10.1
	- 332	Nova Prata do Iguaçu	18.78	34.41	56,9
		Pato Branco	132.78	223.69	371,8
1	334	Pérola do Oeste	8.52	8.52	8.5
	335	Pinhal de São Bento	0.72	1.27	2.1
	336	Planalto	13.91	13.91	13.9
	337	Pranchita	11.51	26.43	43.2
	338	Realeza	30.14	30.14	30.14
	339	Renascença	12.21	16.63	19.0
	340	Salgado Filho	6.99	9.50	13.2
	341	Salto do Lontra	20.06	35.29	58.5
	342		17.91	25.67	37.6
	343		20.64	36.31	60.2
		São João	30.39	40.55	63.5
· ·	345				
			28.69	34.04	39.2
	340	Saudade do Iguaçu	15.20	26.74	44.4
			10.69	18.81	31.2
		Verè	11.39	15,67	19.42
		Vitorino	10.02	12.53	14.4
		al of Municipalities of Basin	1,006.21	1,545.04	2,428,76
	Subto	al of Municipalities not of Basin	0.00	0.00	0.00
MRH 290		TOTAL of MRH	1,022.30	2,000.58	3,480.28
Campos de Guarapuava		Candói	90.60	167.65	276.9
1	351	Cantagalo	14.71	27.22	44.90
		Guarapuava	543.10	955.40	1,644.8
		Inácio Martins	12.61	12.95	16.9
	354	Laranjeiras do Sul	59.32	136.83	248.4
	355	Nova Laranjeiras	6.82	15.73	28.5
	356	Pinhão	98.53	186.11	326.19
	357	Quedas do Iguacu	87.15	220.60	390.20
· · · · · · · · · · · · · · · · · · ·	358	Rio Bonito do Iguaçu	70.98	163.73	297.3
· · · · · · · · · · · · · · · · · · ·		Virmond	8.96	20.67	37.5
· · ·		al of Municipalities of Basin	992.78	1.906.89	3,311.9
		al of Municipalities not of Basin	29.52	93.69	168.2
MRH 291		TOTAL of MRH	452.69	790.96	1,416.7
Médio Iguaçu	261	Bituruna	44.62	100.34	1,470.7
		Clevelandia	45.03		
		Cruz Machado	45.03	70.53	109.0
		General Carneiro		77.61	154.2
· · · · · · · · · · · · · · · · · · ·		Honório Serpa	21.89	44.23	78.7
· · ·			6.92	8.93	15,7
		Mangueirinha	70.73	91.06	161.3
		Palmas Paula Sociat	87.42	117.53	201.6
1		Paula Freitas	4.10	7.02	12.0
		Paulo Frontin	6.00	10.87	J9.1
·		Porto Vitória	6.71	14.31	26.3
		União da Vitória	131.54	248.53	443.00
4 · · · ·		al of Municipalities of Basin	452.69	790.96	1,416.7
1 ·	Subto	al of Municipalities not of Basin	0.00	0.00	0.00
TOTAL OF THE MUNICIPA					

Table - 4.2 (2) Estimated GRDP per Municipality in 1993, 2005 and 2015 - excluding contribution of Hydroelectric Power Station / Iguaçu River Basin

Fundo de Participação dos Municípios - Índices Provisórios - 95 (Municipalities' Participation Fund - Preliminary Indexes - 95) - SEFA
k: Values in US\$ were estimated by the JICA Team
Palmeira/MRH 272 and Irati/MRH 276 were listed in Tibagi River Basin Source:

Remark:

Table - 4.3 Classification of Municipalities Related to Urban Population and GRDP per Municipality in 1993, 2005 and 2015/Iguacu River Basin

0.19 1.38 5.46 1.14 0.49 0.39 0.70 0.09 8.44 10.07 100.00 5.81 3 4.S3 8.48 \$ \$ 49.41 15.880.34 150.19 963.60 170.78 167.62 167.62 209.12 S R D P 228.89 2.875.49 650.79 Million USS 24,458.37 94.39 683.10 2,701.15 44.96 201.66 561.93 1.644.84 672.59 193.77 345.24 4.176.90 4,983.01 49,498.62 4,195.54 242.51 4 2015 0.80 2.56 2.83 43 6.19 2.05 1.75 0.60 0.53 0.59 0.55 0.51 0.93 1.38 100.00 5.81 9.78 3.67 28.0 5 8.91 5 Urban Population 39,360 45,210 41,460 563,980 436,560 4,901,630 169.730 138.700 283,000 119,160 100,490 179,920 61,440 85,590 29,650 25,810 228,970 41,230 45,560 67,550 1.717.150 125,690 284,590 303,280 479,380 27,140 25,010 183,940 Population 2,452.08 8,43 3,056.65 10.51 29,083.47 100.00 0.09 7.85 .26 8.6 1.14 3.29 0.71 0.85 0.18 129 5.12 7.84 1.97 0.34 0.43 129 48.07 0.44 32.99 227 0.47 0.50 ,594.19 GRUP 955.40 207.56 128.74 2,282.11 365.45 79.66 573.15 93.68 52.54 374.34 488.28 338.17 278.95 330.21 98.92 125.42 136.99 145.46 27.22 117.53 248.53 Million USS 13,980.55 2002 0.44 0.87 1.01 10.30 5.13 2.52 5.17 6.15 3.8 0.52 0.86 100.00 1.88 0.89 38.02 3.00 8.70 ~% Urban Population 448.320 419,170 4,067,850 17,910 35,420 41,120 121,910 102,280 208,640 76,310 102,520 210,330 73,320 40,100 72,070 25,580 18,150 24,120 21,120 36,360 35,060 56,450 353,920 653,870 546,490 54360 Population 0.10 15.14 1.16 0.09 1.07 3.88 5.4 6.12 3.58 1.54 0.08 0.43 0.43 1.40 0.85 0.51 0.57 0.87 100.00 137 10.98 4 33 i geo 2,297.79 207.72 543.10 128.57 132.78 14.71 87.42 131.54 266.99 Milion USS 6,542.87 175.8 14.13 62.28 717.99 5,703.63 30.64 233.92 12.42 15,179.99 589.51 929.14 \$4.47 65.04 211.77 77.7 1,666.50 66.17 86.01 <u>[66]</u> 6.16 0.55 0.23 0.88 4.07 44.39 2.18 1.97 6.78 1.61 3.89 0.50 0.68 8.1 1.46 10.32 323,944 10.75 3,013,738 100.00 4.01 \$ 34.03 0.68 0.30 0.67 Urban Population 65,600 59,259 120,802 26,498 75,045 48,417 117,385 15,192 55,857 20,482 9,149 16,489 30,268 21,463 43,856 6,792 25,957 39,979 326,181 1.337,892 122,604 204,365 20,074 20,643 Classification No. and Name of MRH No. and Name of Municipality Population 025.721 Campina Grande do Sul Almirante Tamandare São José dos Pinhais Fazenda Rio Grande São Mateus do Sul Francisco Beltrao União da Vitória Foz do Iguaçu Dois Vizinhos Quatro Barras Campo Largo Guarapuava Pato Branco Medianeira Sub-Total Rio Negro Piraquara Sub-Total Cantagalo 4th Class Other 77 Municipalities Sub-Total TOTAL OF THE MUNICIPALITIES OF THE BASIN Araucária Colombo Cascavel Curitiba Pinhais Palmas g 228 1128 327 352 8 3 1 1 1 × 2 5 33 22 351 367 371 6 ¥ ы MRH 291/Médio Iguae Oeste Paranaense Guarapuava MRH 275/São Mateus MRH 290/Campos de Guarapuava MRH 288/Extr. Oeste MRH 290/Campos de MRH 272/C. da Lapa Paranaense Paranaense Paranaense MRH 268/Curitiba MRH 289/Sudoeste MRH 289/Sudoeste MRH 288/Extremo MRH 268/Curitiba MRR 268/Cuntiba do Sul 1st Class 2nd Class ind Class

Remark: GRDP per Municipality not including contribution of Hydroelectric Power Stations

CHAPTER 5 PRESENT SITUATION AND WATER DEMAND PROJECTION FOR 2005 AND 2015

5.1 Domestic Water

As described in Main Report I, the present average unit consumption rate of Paraná State and the present unit consumption rate per MRH, and future unit consumption rate were estimated as shown below in Table-5.1, Table-5.2 and Table-5.3.

			Averag	e Unit Consur	nption Rate (1 / person . d	iy)		
	R	esidential Wat	et .	Non-	Residential W	aler	Tota	Domestic V	later
	1993	2005	2015	1993	2005	2015	1993	2005	2015
Urban Population	90.	115	140	25	30	40	115	145	180
Rural Population	70	75	80	0	0	0	70	75	80

Table-5.1 Average Unit Consumption Rate of Paraná State - 1993, 2005 and 2015

Remark: Unit rate of residential water for rural population was estimated as unit rate of the 3rd Category of the classification of MRH (shown in Table-5.2 and Table-5.3)

Table-5.2 Unit Consumption Rate per MRH - 1993

지 말 나는 말 봐요.		al a a a Artea cort	Unit C	Consumption Rate (1/ person	. đay)
	Classification	No. of MRH	Residential Water	Non-Residential Water	Total Domestic Water
	1st Category	MRH 268, 281, 282	100	30	130
Urban Population	2nd Category	MRH 269, 270 MRH 272 to MRH 276,			
		MRH 279 to MRH 280 MRH 283 to MRH 286		20	105
	3rd Category	MRH 288 to MRH 29) MRH 271, 277, 278, 287	<u>85</u> 70	<u>20</u> 15	85
Rural Population		All MRH	70		70

Table-5.3 Unit Consumption Rate per MRH - 2005 and 2015

	<u> </u>			Vait	Consumption	Rate (1/ perso	n day)	
den serve			Resident	ial Water	Non-Resid	ential Water	Total Dome	estic Water
na standar Ata	Classification	No. of MRH	2005	2015	2005	2015	2005	2015
	Ist Category	MRH 268, 281, 282, 288	125	155	35	45	160	200
Urban Population	2nd Category	MRH 269, 270, MRH 272 (0 MRH 276, MRH 279 (0 MRH 280,						
		MRH 283, MRH 283, MRH 285 to MRH 286, MRH 289 to MRH 291	100	125	30	35	130	160
	3rd Category	MRH 271, 277, 278, 284, 287	75	80	20	25	95	105
Rural Population	? ;	All MRH	75	80	-		75.	80

5.1.1 Present Unit Consumption Rate per Municipality

Each MRH was composed of municipalities with different sizes in terms of population and GRDP, therefore the Team collected the data of present unit consumption volume of residential water of some large-medium size municipalities in this river basin. Based on the information provided by ABC/SANEPAR, the unit consumption volume of 12 selected municipalities is presented in Table-5.4.

(1) Unit Consumption Rate of Residential Water for Urban Population per Municipality

According to Table-5.2 and Table-5.4, this unit rate was estimated tentatively between unit rate of large-medium size municipalities and other municipalities, by adjusting it to the total water demand per MRH to which they belong, calculated by multiplying the unit rate per MRH by the urban population per MRH.

(2) Unit Consumption Rate of Non-Residential Water for Urban Population per Municipality

This unit was estimated by the same method mentioned above, approximately in the same proportion between the unit rate of residential water and non-residential water of the MRH to which they belong.

(3) Unit Consumption Rate for Rural Population per Municipality

This unit rate was estimated using the same figure of the unit consumption rate per MRH and average unit consumption rate of Paraná State. It means that the same unit rate was applied to all municipalities.

According to what was mentioned above, present unit consumption rate per municipality for urban population and rural population is shown in Table-5.5.

			그는 그는 그는 것이 없는 것이 없다.	· · · ·	A
No. and Name of MRH	No. and I Munici		Average Consumption Volume per Month (m ²)	Service Population Estimated by SANEPAR	Estimated Consumption Volume per Capita (I/day)
MRH 268'Curitiba	2 Arau 9 Curiti 17 S. Jos		129,776 4,470,662 231,614	56,128 1,340,585 95,719	77.07 111.16 \$0.66
MRH 272/Campos da Lapa MRH 275/S. Mateus do Sul	36 Rio N 48 São N	legro fateus do Sul	47,658 40,512	19,612 16,758	81.00 80.58
MRH 288/Extr. O. Paranaense	274 Casca	ivel lo Iguaçu	468,394 533,569 187,816	171,538 168,849 68,430	91.02 105.33 91.49
MRH 289/Sud. Paranaense	327 Franc	nel Vivida isco Beltrão Branco	28,327 118,736 119,193	11,900 45,193 43,432	79.35 87.58 91,48
MRH 290/C. Guarapuava	352 Guar	apuava	152,056	101,722	84.62

Table-5.4 Present Unit Consumption Volume of Large and Medium Size Municipalities - 1993

Source : APC/SANEPAR

5.1.2 Future Unit Consumption Rate per Municipality

(1) Unit Consumption Rate of Residential Water for Urban Population per Municipality

Based on the unit consumption rate per MRH in 2005 and 2015 (shown in Table-5.3) and present unit consumption rate per municipality (shown in Table-5.4), this unit rate was estimated by the same method mentioned in Section-5.1.1 (1), approximately in the same proportion of present unit consumption rate between large-medium size municipalities and other municipalities.



(2) Unit Consumption Rate of Non-Residential Water for Urban Population per Municipality

Based on the unit consumption rate per MRH in 2005 and 2015, this unit rate was estimated by the same method of present unit consumption rate per municipality.

(3) Unit Consumption Rate for Rural Population per Municipality

This unit rates in 2005 and 2015 were estimated using the same figure of the unit consumption rate per MRH in 2005 and 2015, respectively.

According to what was mentioned above, the unit consumption rate per municipality in 2005 and 2015 is shown in Table-5.6 and Table-5.7, respectively.

5.1.3 Water Demand Projection

Water Demand in 1993, 2005 and 2015 was estimated by multiplying the urban and rural population per municipality of each year (shown in Table-4.1 (1), Table-4.1 (2), Table-4.1 (3) and Table-4.1 (4)), by the unit consumption rate per municipality of the corresponding year (shown in Table-5.5, Table-5.6 and Table-5.7), and is presented in Section-5.4.

Classification	No. and Name of MRH	Classification of	1 L	Init Consumption	Rate (1/ person . d	lay)
of MRH		Municipality		Urban Population	0	Rural Population
			Residential Water	Non- Residential Water	Total Domestic Water	Domestic Water
1st Calegory	MRH 268/Curitiba	Curitiba Other Municipalities	110 80	35 20	145 100	70 70
2nd Category	MRH 272/Campos da Lapa MRH 275/S. Mateus do Sul MRH 276/Col. Irati MRH 290/C. Guarapuava MRH 291/Médio Iguaçu	All Municipalities	85	20	105	70
 	MRH 288/Extr. Ocste Paranaense	Foz do Iguaçu Cascavel Other Municipalities	105 90 70	35 20 15	140 110 85	70
	MRH 289/Sud. Paranzense	Pato Branco, Francisco Beltrão	90	25	115	
3rd Category	MRH 271/A. Rio Negro	Other Municipalities All Municipalities	80 70	20	100 85	70

Table-5.5 Present Unit Consumption Rate of Domestic Water per Municipality - 1993	Table-5.5 Present Un	t Consumptio	on Rate of Domestic	Water per	Municipality	y - 1993
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Source : APC/SANEPAR

Remark: Toledo in MRH 288 does not belong to the Basin but is estimated in the same way as Cascavel Unit rate of Residential Water for rural population was estimated as the same figure as the unit rate of the 3rd Category of MRH Classification

Classification	No. and Name of MRH	Classification of		Unit Consumption	Rate (1/ person .d	ay) .
of MRH	n in the state of the	Municipality		Urban Populatio		Rural Population
			Residential Water	Non-Residential Water	Total Domestic Water	Domestic Water
1st Category	MRH 268 Curitiba	Curitiba Other Municipalities	140 100	40 30	180 130	75
	MRH 288/Extr. Ocste Paranaense	Foz do Iguaçu Cascavel Other Municipalities	140 125 110	40 35 30	180 160 140	75
2nd Category	MRH 212/Campos da Lapa MRH 275/S. Mateus do Sul MRH 276/Col. Irati MRH 290/C. Guarapuava MRH 291/Médio Iguoçu	All Municipalities	100	30	130	ż.
	MRH 289/Sud. Paranacase	Pato Branco, Francisco Beluño Other Municipalities	110 95	35 25	145 120	.75
3rd Calegory	MRH 271/A. Rio Negro	All Municipalities	75	20	95	75

Table-5.6 Future Unit Consumption Rate of Domestic Water per Municipality - 2005

Remark: Toledo in MRH 288 does not belong to the Basin but is estimated in the same way as Cascavel Unit rate of Residential Water for rural population was estimated as the same figure as the unit rate of the 3rd Category of MRH Classification

Table-5.7	Future Unit	Consumption Rate	of Domestic Water per Municip	pality - 2015
		~ ~		

Classification	No. and Name of MRH	Classification of		Unit Consumption	Rate (17 person / da	iy)
of MRH		Municipality		Urban Population	n i	Rural Population
			Residential Water	Non-Residential Water	Total Domestic Water	Domestic Water
Ist Category	MRH 268/Curitiba	Curitiba Other Municipalities	170 135	50 40	220 175	80
· · · · ·	MRH 288/Extr. Oeste Paranaerise	Foz do Iguaçu Cascavel Other Municipalities	165 155 135	50 45 40	215 200 175	80
2nd Calegory	MRH 272/Campos da Lapa MRH 275/S. Mateus do Sul MRH 276/Col. Irali MRH 290/C. Guarspuava MRH 291/Médio Iguaçu	All Municipalities	125	35	160	80
	MRH 289/Sud. Paranaense	Pato Branco, Francisco Beltrão Other Municipalities	135 115	40 30	175 145	80
3rd Category	MRH 271/A. Rio Negro	All Municipalities	80	25	105	80

Remark: Toledo in MRH 288 does not belong to the Basin but is estimated in the same way as Cascavel Unit rate of Residential Water for rural population was estimated as the same figure as the unit rate of the 3rd Category of MRH Classification

5.2 Industrial Water

5.2.1 Unit Consumption Rate per Value Added (V.A.) per Municipality

During the study of the "Master Plan for Pilot River Basin(s)", complementary data regarding industrial water consumption could not be collected, therefore the Team decided to use the same unit consumption rate used for the estimation per MRH for the estimation of industrial water per municipality, as shown in Table-5.8.

Table-5.8 Average Unit Consumption Rate per Value Added (V.A.) - 1993, 2005 and 2015

Unit Rate - 1993 Unit Rate with Present recovery Rate	Unit Rate - 2005 Increase of Water Recovery Rate: 19%	Unit Rate - 2015 Increase of Water Recovery Rate: 37.50%
m ³ /day . US\$ 1,000.00 (V.A.)	m ³ /day . US\$ 1,000.00 (V.A.)	m ³ /day . US\$ 1,000.00 (V.A.)
0.059	0.048	0.037

5.2.2 Gross Regional Domestic Product (GRDP) by Secondary Sector per Municipality

For the estimation of industrial water demand for the target years, GRDP by Secondary Sector per Municipality was estimated as follows:

(1) GRDP by Secondary Sector per Municipality in 1993

Based on the estimated GRDP by Secondary Sector per MRH (shown in Table-5.10 of Main Report I) and on the Municipalities' Participation Fund - Preliminary Indexes/95 issued by SEFA, the GRDP by Secondary Sector of 101 municipalities in 1993 was estimated by excluding the contribution of hydroelectric power stations, and is presented in Table-5.9 (1) and Table-5.9 (2).

(2) GRDP by Secondary Sector per Municipality in 2005 and 2015

Based on the past trend of GRDP by Secondary Sector per Municipality during the years 1981 to 1991 (shown in Sectorial Report Vol. A) by excluding the contribution of hydroelectric power stations in the values of 1989 and 1991, and on the one of 1993 mentioned above, the GRDP of the Secondary Sector per Municipality was estimated per each municipality, adjusting the estimated GRDP by Secondary Sector per MRH (shown in Table-5.10 of Main Report I) to the years to which they belong, and is presented also in Table-5.9 (1) and Table-5.9 (2).

5.2.3 Water Demand Projection in 1993, 2005 and 2015

Water demand of industrial water per municipality was estimated by multiplying the average unit consumption rate per value added by GRDP by Secondary Sector per Municipality of each year, and is presented in Section-5.4.

In this Study, it was considered that all industrial activity was located in the urban area. Therefore, some municipalities included in the study zoning, but with their urban area outside this river basin, were considered as having industrial water demand equal to zero.

No. and Name of MRII	INO and	Name of Municipality	1993	2005	Unit: US\$ million 2015
MRH 268		TOTAL of MRH	4,261,84	7,743.53	12,844.6
Curitiba		Almirante Tamandare	27.86	53.18	E 7 2
Controla					1
· · · · ·		Araucaria	: 1,152.47	1,308.39	
	-	Balsa Nova	52.32	99.02	
		Campina Grande do Sul	11.14	33.34	65.9
		Campo Largo	110.76	252.93	1 · · ·
	1 7	Colombo	74.63	151.44	266.4
	8	Contenda	1,44	2.66	5.0
· · ·	9	Curitiba	2,390.16	4,815.82	8,196.5
and the second second	10	Fazenda Rio Grande	4.48	9,19	17.2
		Mandirituba	1.53	3.07	5.7
		Pinhais	65.55	192.75	
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		Piraquara	3.94	11.65	21.5
		Quatro Barras	28.35	41.98	67.7
		Sao Jose dos Pinhais	212.77	573.91	1,040.7
		of Municipalities of Basin	4,137.40	7,549.32	12,531.0
	Subtotal	of Municipalities not of Basin	124.44	194.21	313.5
MRH 271		TOTAL of MRH	6.77	12.89	24.1
Alto Rio Negro	28	Agudos do Sul	0.14	0.37	0.6
and the second	- 29	Pien	4.22	6.93	12.3
	30	Quitandinha	0.43	0.98	4 · · ·
		Tijucas do Sul	1.98	4.61	9.2
		of Municipalities of Basin	6.77	12.89	
	Subtotal	of Municipalities not of Basin	0.00	0.00	1
MRH 272	Sucioial				
		TOTAL OF MRH	144.48	259.40	
Campos da Lapa		Campo do Tenente	0.30	0.18	4
		Lapa	14.23	18.09	
	34	Palmeira	0.00	0.00	0.0
	35	Porto Amazonas	0.88	2.51	4.7
	36	Rio Negro	108.77	190.81	340.9
		of Municipalities of Basin	124.18	211.59	
-	Subtotal	of Municipalities not of Basin	20.30	47.81	
MRH 275	0001014	TOTAL of MRH	30.25	48.95	
Sao Mateus do Sul	1	Antonio Olinto	0.26		
Sao maicus do Sui	1			0.53	
		Sao Jozo do Triunfo	0.46	0.25	
		Sao Mateus do Sul	29.53	48.16	
	Sublota	of Municipalities of Basin	30.25	48.95	
	Subtotal	of Municipalities not of Basin	0.00	0.00	
MRH 276		TOTAL of MRH	53.75	102.17	179.2
Colonial Irati	50	Irati	0.00	0.00	0.0
	51	Mallet	4.19	9.86	
· · · ·		Reboucas	1.12	2.05	
		Rio Azul	2.08	4.05	
		of Municipalities of Basin	7.39	15.96	
MRH 288		of Municipalities not of Basin	46.36	86.21	151.1
	1	TOTAL of MRH	424.10	626.89	
Extremo Ocste Paranaense		Boa Vista da Aparecida	0.27	0.35	0.4
		Capitao Leonidas Marques	0.58	0.84	1.1
standard and a standard an	274	Cascavel	147.45	171.48	232.5
-	275	Catanduvas	0.41	0.68	
	276	Ccu Azul	14.74	27.20	
		Foz do Iguacu	20.18	31.55	
	1 .	Guaraniacu	0.58	0.81	
		Ibema			1 .
	1		4.16	6.15	
		Lindoeste	0.10	0.15	
		Matelandia	2.25	4.33	
	294	Medianeira	12.55	23.33	
· · ·	305	Santa Lucia	0.09	0.10	
		Santa Tereza do Oeste	0.36	0.71	0.9
		Santa Terezinha de Itaipu	1.45	1.77	
		Sao Miguel do Iguacu	5.86		
				7.09	
		Tres Barras do Parana	0.55	0.63	F
		of Municipalities of Basin	211.58	277.24	
	- ISobiola	of Municipalities not of Basin	212.52	349.65	474.1

Table-5.9 (1) Estimated GRDP by Secondary Sector per Municipality in 1993, 2005 and 2015 - excluding contribution of Hydroelectric Power Station/Iguaçu River Basin

(to be continued)

No. and Name of MRH	No. and	Name of Municipality	1993	2005	Unit: US\$ milli 2015
MRH 289		TOTAL OF MRH	168.98	400.32	745
Sudoeste Paranaense	316	Ampere	6.65	12.44	23
		Barracao	0.34	0.79	1
		Boa Esperanca do Iguacu	0.03	0.06	0
		Bom Sucesso do Sul	0.07	0.12	Ō
		Capanema	1.09	2.27	4
· ·		Chopinzinho	2.18	6.28	<u>i</u>
		Coronel Vivida	4.23	11.86	22
		Cruzeiro do Iguacu	3.43	13.59	25
		Dols Vizinhos	45.50	123.23	229
		Eneas Marques	0.13	0.30	
		Flor da Serra do Sul	0.07	0.20	
		Francisco Beltrao	73.34	142.24	265
		Itapejara do Oeste	2.08	4.04	
		Mariopolis	3.02	2.54	4
	330	Marmeleiro	1.32	4.29	7
		Nova Esperanca do Sudoeste	0.06	0.09	ó
		Nova Prata do Iguacu	0.35	1.14	2
		Pato Branco	12.47	41.23	76
		Perola do Oeste	0.37	0.83	1
		Pinhal Sao Bento	0.02	0.03	0
		Planato	0.40	0.89	i
		Pranchita	0.40	1.50	2
		Realeza	1.53	4.19	7
		Renascenca	1.83	4.62	8
		Salgado Filho	0.25	4.02 0.58	°
		Salto do Lontra	0.29	0.38	
		Santa Izabel do Oeste			
-			0.40	0.79	
		Santo Antonio do Sudoeste		3.24	6
:		Sao Joao	0.46	1.00	1
	343	Sao Jorge do Oeste	0.52	1.16	2
		Saudade do Iguacu	1.25	2.35	4
		Sulina	4.66	9.38	17.
		Vere	0.40	0.97	. 1
	349	Vitorino	0.54	1.34	2
		of Municipalities of Basin	168.98	400.32	746
	Subtotal	of Municipalities not of Basin	0.00	0.00	. 0
MRH 290		TOTAL of MRH	180.50	315.38	600
Campos de Guarapuava	350	Candoi	3.84	5.05	. 9
	351	Cantagalo	1.89	4.16	7
		Guarapuava	99.44	183.56	349
		Inacio Martins	5.53	8.00	15
		Laranjeiras do Sul	5.17	8.41	15
		Nova Laranjeiras	0.78	1.37	2
		Pinhao	12.78	14.89	28
		Quedas do Iguacu	24.51	46.82	89
		Rio Bonito Iguacu	7.75	10.80	
		Virmond	0.72	1.29	2
		of Municipalities of Basin	162.41	284.35	541
1011 441	Sublota	of Municipalities not of Basin	18.09	31.03	59
MRH 291		TOTAL of MRH	147.33	260.82	323
Medio Iguacu	1	Bituruna	10.99	24.83	31
		Clevelandia	4.72	21.37	17
		Cruz Machado	3.35	17.42	. 24
		General Carneiro	9.88	19.67	24
		Honorio Serpa	0.30	0.30	0
		Mangueirinha	21.92	25.26	34
		Palmas	34.95	53.91	71
		Paula Freitas	0.30	0.46	0
		Paulo Frontin	0.44	0.89	1.
		Porto Vitoria	0.36	2.03	1
		Uniao da Vitoria	50.12	94.66	. 114
		of Municipalities of Basin	147.33	260.82	323
	Subtota	of Municipalities not of Basin	0.00]	0.00	0
TOTAL OF THE MUNICIPA			4,996.29	9,061.44	15,035

 Table-5.9 (2)
 Estimated GRDP by Secondary Sector per Municipality in 1993, 2005 and 2015 - excluding contribution of Hydroelectric Power Station/Iguaçu River Basin

Source: Fundo de Participação dos Municípios-Indices Provisórios-95 (Municipalities'Participation Fund-Preliminary Indexes-95)/SE Remark: Values in USS were estimated by JICA Team

: Figures of Palmeira/MRH 272 and Irati/MRH 276 are listed in Tibagi River Basin

5.3 Agricultural Water inclusive of Livestock and Fishery

The data concerning agriculture was collected from EMATER database with municipality wise. In the case that a municipality extends over other river basins, the data was split by the area weighted average assuming that the data is uniformly spread in the municipality.

5.3.1 Current Agriculture

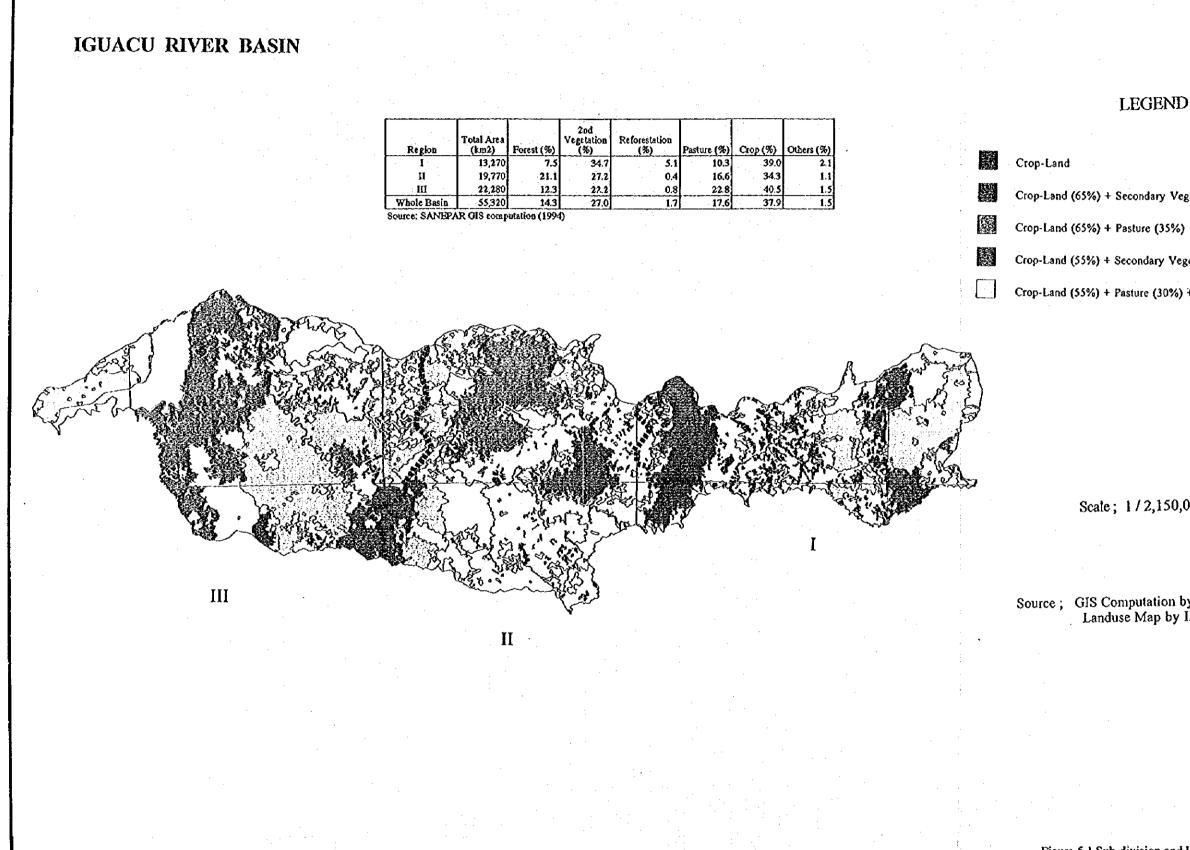
According to SANEPAR GIS computation (1994) based on IAP satellite imagery analysis (1990 and 1994), 37.9 % (21,000 km²) and 17.6 % (9,700 km²) of Iguaçu river basin are currently utilized as crop land and pasture, while the state average is 37.6 % and 23.1 %, respectively. Dividing the river basin into three as shown in Figure-5.1, characteristics of agriculture was identified and the result is shown in Table-5.10.

	Total Crop		Leven en e					1		
Region	Area (km²)	Item	Cotton	Sugarcane	Beans	Maize	Soybean	Cassava	Potato	Wheat
		Area Ratio to Total					1.1.1			
I	5,180	(%)	0.0	0.0	31.1	55.2	6.9	0.2	6.6	0.6
	23. P803	Productivity (ton/ha)		-	1.0	2.8	2.4	13.9	14.5	1.5
	6942594	Mechanization (%)	-		78.0	76.0	96.9	45.8	99.0	91.0
	a colected as	Implementation of				1.50				
	1.3.66.63.5	Conservation (%)			24.4	25.8	65.0	4.2	10,0	55.6
	2.3.42.446	Implementation of								
	10.00	Non-tillage (%)	. – 1		0,3	2.1	23.2			12.4
******		Area Ratio to Total				·				
-11	6,780		0.0	0.0	14.2	. 54,1	30.3	.1.3	0.1	2.5
	Gran D	Productivity (ton/ba)	<u> </u>		0.9	3.1	2.5	16.5	18,1	2.1
		Mechanization (%)	-	-	51.2	59,4	99.6	23.6	99.0	97.9
	Sec. 24	Implementation of			. :					+
	2002000	Conservation (%)	_	— · · · ·	21.4	35.8	87.3	5.8	10.0	86.0
	100000	Implementation of								а. С
		Non-tillage (%)	-	-	0.0	26.3	64.6	· -	-	68.1
	and a second second second	Area Ratio to Total	· ·							
Ш	9,020	(%)	1.1	0.6	11.1	\$3.9	30.5	2.8	0.0	9.7
		Productivity (ton/ha)	1.6	37.9	1.0	3.3	2.3	25.4		<u>- 1.5</u>
	12-005-05	Mechanization (%)	71.3	33.3	56.3	62.3	90.7	53.8	· · · ·	84.7
	4285.0	Implementation of				$\mathcal{F}_{i} = \mathcal{F}_{i} \mathcal{F}_{i}$				$(x_{ij}) = 1$
	Refere	Conservation (%)	64.6	50.5	51.7	51.8	79.2	38.2	<u> </u>	72.5
	diam'r, se	Implementation of			÷ .	40.00	498.3	· ·		
	100.00	Non-tillage (%)		-	0.9	6.5	19.6		<u> </u>	13.7
		Area Ratio to Total								
	20,980	(%)	0.5	0,3	17.0	54.3	24,7	1.6	1.6	5.1
River Basin Average	1.00	Productivity (ton/ha)	1.6	37.4	1.0	3.1	2.4	22,7	14.6	1.6
ų B.	1912 6	Mechanization (%)	71,3	32.1	64,7	64.8	94.7	45.8	99.0	86.9
> ئ	2.2.2.00	Implementation of			5.9 J. 4 S.					
Ri.	23.262	Conservation (%)	64,6	48.4	31.2	40.1	81.5	28.7	10.0	74.1
	200000	Implementation of .			4.1.4					
	38.49	Non-tillage (%)	<u> </u>		0.4	11.8	37.9		. –	22.1
	1.0.0.0	Scale of Farmers	Small	Medium	Large	Total (h	ousehold)	Accession of the second		
	197383	Number of		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · ·		COLOR:	051530	
1	1893 A. C. C. C.	Household (%)	89.0	9.0	2.0	1.1.1	37,200	123112 IS		Same.
		Scale of Farmers	Small	Medium	Large	Total (h	ousehold)			and second as
	STAR	Number of		ļ	· ¥ ÷			i de la persona	10 9000	2004 12
11	19533 18864	Household (%)	76.0	16.9	7.1		25,200			180.50
<u>-</u>	i contrata de la cont	Scale of Farmers	Small	Medium	Large	Total (h	ousehold)			1997 B
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i m	BRAD Provi	Household (%)	89.0	9,3	1.7	i en i de	76,900	l de les second	16 C C	200 a a
	fund di	Scale of Farmers	Small	Medium	Large	Total Ch	ousehold)	i	100000-000-0	
River	1000 C	Number of		<u></u> .					A space	San C
Basin	100000	Household (%)	86.7	10.6	2.7	i.e.	139,300	hé Baché.	Augustan	
04211		Tereser in the first with	,					the second second	A. A. State of the second second	1000 C 1000 C 1000

Table-5.10 Agricultural Character	ristics of Iguaçu	River Basin	(1994)
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Note: Size of Farmers; Small < 50 ha, Medium 50 + 250 ha, Large >250 ha Source: adapted and enlarged from EMATER for Agricultural Data as of 1994

SANEPAR GIS computation based on IAP satellite imagery analysis for Crop Area



LEGEND

Crop-Land (65%) + Secondary Vegetation (35%)

Crop-Land (55%) + Secondary Vegetation (30%) + Pasture (15%)

Crop-Land (55%) + Pasture (30%) + Secondary Vegetation (15%)

Scate; 1/2,150,000

Source; GIS Computation by SANEPAR Landuse Map by IAP (1990 & 1994)

Figure-5.1 Sub-division and Landuse in Iguaçu River Basin

The most distinct characteristic of agriculture in Iguaçu river basin is potato culture. Almost all potato of Paraná state is produced in the upstream of Iguaçu around Curitiba and Lapa despite the fact that its cropping area is limited. Beans and maize culture extend over the whole river basin; however, other dominant crops vary with location.

The total number of farmers in Iguaçu river basin is 139,300 in 1994. Among them, 86.7 % is classified as the small size, which owes less than 50 ha, and the medium (between 50 and 250 ha) and large (greater than 250 ha) size are limited to 10.6 and 2.7 %, respectively. In contrast with the state tendency, which shows the expansion of medium size farmers, small size farmers are dominant in Iguaçu river basin.

5.3.2 Current Water Consumption and Future Water Demand

(1) Current Water Consumption

The necessity of irrigation was examined in the Strategy study. Crop water requirements of dominant crops in Paraná were computed and compared with effective rainfall to examine the necessity of irrigation. Its conclusion was that rain-fed agriculture is practically adequate in Paraná as long as the favorable weather will continue. Although there are a few cases of irrigation in pilot river basins, especially the suburb of Curitiba for horticulture, its area and water consumption are considered as negligibly small. Therefore, the agricultural water in Iguacu river basin consists of water for livestock and fish pond.

(2) Future Agriculture

The population growth of livestock and expansion of fish pond were projected for the year of 2005 and 2015 in accordance with the Strategy formulated. Each municipality may differ in future livestock growth and expansion of fish pond area. Trend analysis for each municipality requires individually to specify the market, price, raising method and so on, however, such detail study should follow after the Master Plan. And further, the state trend integrating all relevant information is considered to be more reliable. Therefore, the state trend was applied to project the future livestock population and fish pond area.

The growth of cattle and chicken population was assessed during the Strategy study by means of the linear regression of population in the last 20 years. As a result, cattle and chicken are expected to increase approximately 174 thousand and 1.837 million heads/year respectively in the whole Paraná state. And pig population in the state will be stabilized at around 4 million heads by the year of 2000. Applying the same rate, the population of livestock was projected with the following equation.

Cattle (1,000 head) = 174.256 x Year - 337839

Chicken (million head) = $1.83697 \times \text{Year} - 3591.68$

During the Strategy study, it was assumed that the annual expansion of fish pond area is 2 %. The same rate was applied to pilot river basins to estimate its area in 2005 and 2015.

The result of projection is shown in Table-5.12 with the current livestock population and fish pond area as of 1994.

63

(3) Water Demand Projection

Although the rates of water consumption of livestock and fish pond may vary with location due to the difference of climate, variety of livestock species, soil properties etc., such variation is negligible at this study. Therefore, the rates determined during the Strategy study was adopted with the following assumptions.

- 1) An livestock of 100 kg live weight requires 10 liter/day as the total water requirement.
- 2) Natural pasture contains as much as 80 % of water during the growth period. Therefore, amount of water actually supplied to cattle is a part of total water requirement which cannot be provided by moisture content of forage. It was assumed that the actual water supply to cattle is 33 % of total water requirement.
- 3) Since pigs and chickens are not herbivores, it was assumed that there is no water intake by means of food. Therefore, their water requirements depend on an average live weight.

The rates of water requirement of each livestock is shown in Table-5.11.

Table-5	5.11	Water	Requireme	nt of	Livestock

		Total Water	Actual Water
	Average Live	Requirement	Supply
Livestock	Weight (kg)	(liter/head/day)	(liter/head/day)
Pig	40	4.0	4.0
Cattle	300	30.0	10.0
Chicken	2	0.2	0.2

Total water requirement includes water intake by forage. Actual water supply is a supply in liquid phase.

For the water consumption of fish ponds, the rate of 1 mm/day was adopted with the following assumptions.

- 1) There is no change of water in a pond.
- 2) The bottom of a pond is well coated with clay. Therefore, no seepage occurs or scepage ceases after the long use.
- 3) 60 % of annual rainfall is stored in a pond and 40 % is overflowed. An average rainfall and evaporation are 1,700 mm and 1,300 mm, respectively. Thus, annual water loss from a fish pond is approximately 300 mm (= 1,300 1,700 x 0.6).

The current water consumption and future water demand are just multiplication of livestock population or fish pond area by the above rates. The result is discussed in the Section-5.4.

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Table-5.12 (2) Projection of Livestock Population and Fish Pond Area

Now: The total area of the niver he an is alightly different from the area adopted by the Study Team due to roundup during the computation. Source: SANEPAR GIS Computation based on IAP Statilite limagery Analyses for Area of Munkinpality. EMAATER for the Population of Liversook and Fish Pood Area at of 1994