### JAPAN INTERNATIONAL COOPERATION AGENCY

STATE SECRETARIAT OF PLANNING, SCIENCE AND TECHNOLOGY THE STATE OF SERGIPE, THE FEDERATIVE REPUBLIC OF BRAZIL

# THE STUDY ON WATER RESOURCES DEVELOPMENT IN THE STATE OF SERGIPE IN THE FEDERATIVE REPUBLIC OF BRAZIL

FINAL REPORT

SUPPORTING REPORT (VOLUME I) MASTER PLAN STUDY

**MARCH 2000** 

YACHIYO ENGINEERING CO., LTD. (YEC)

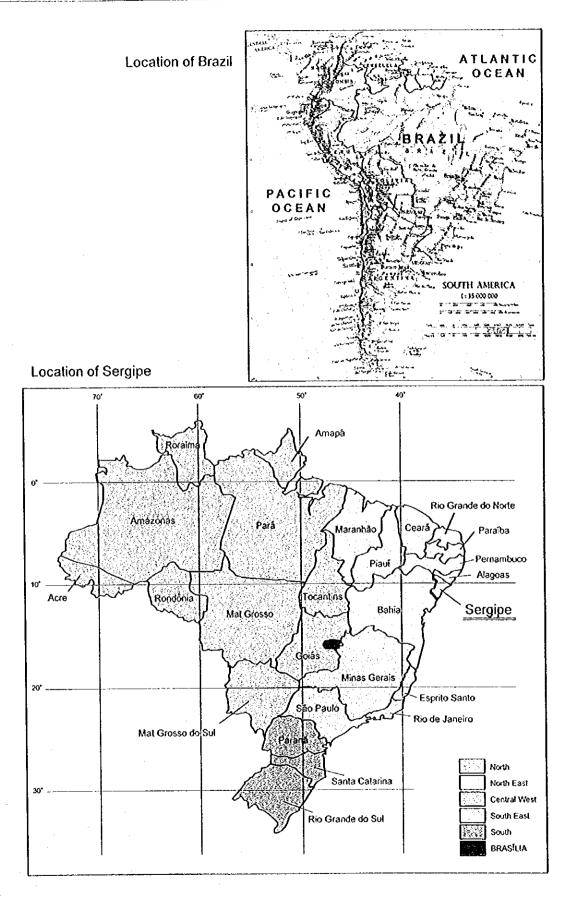


### **Exchange Rate**

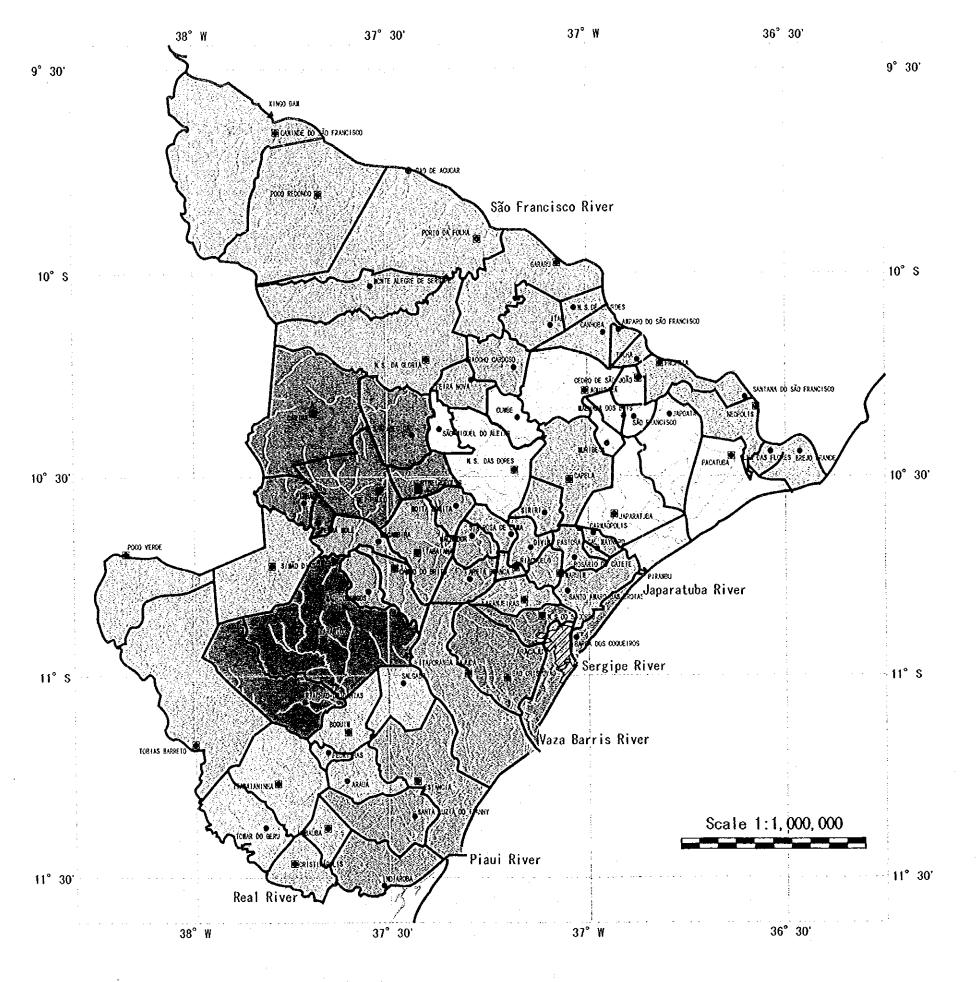
Part I Master Plan Study:

US\$ 1.00 = R\$ 1.18 =\frac{\frac{1}{2}}{141.40} as of August 1998

Part II Feasibility Study:
US\$ 1.00 = R\$ 1.92 = \frac{1}{2} 106.95 as of September 1999



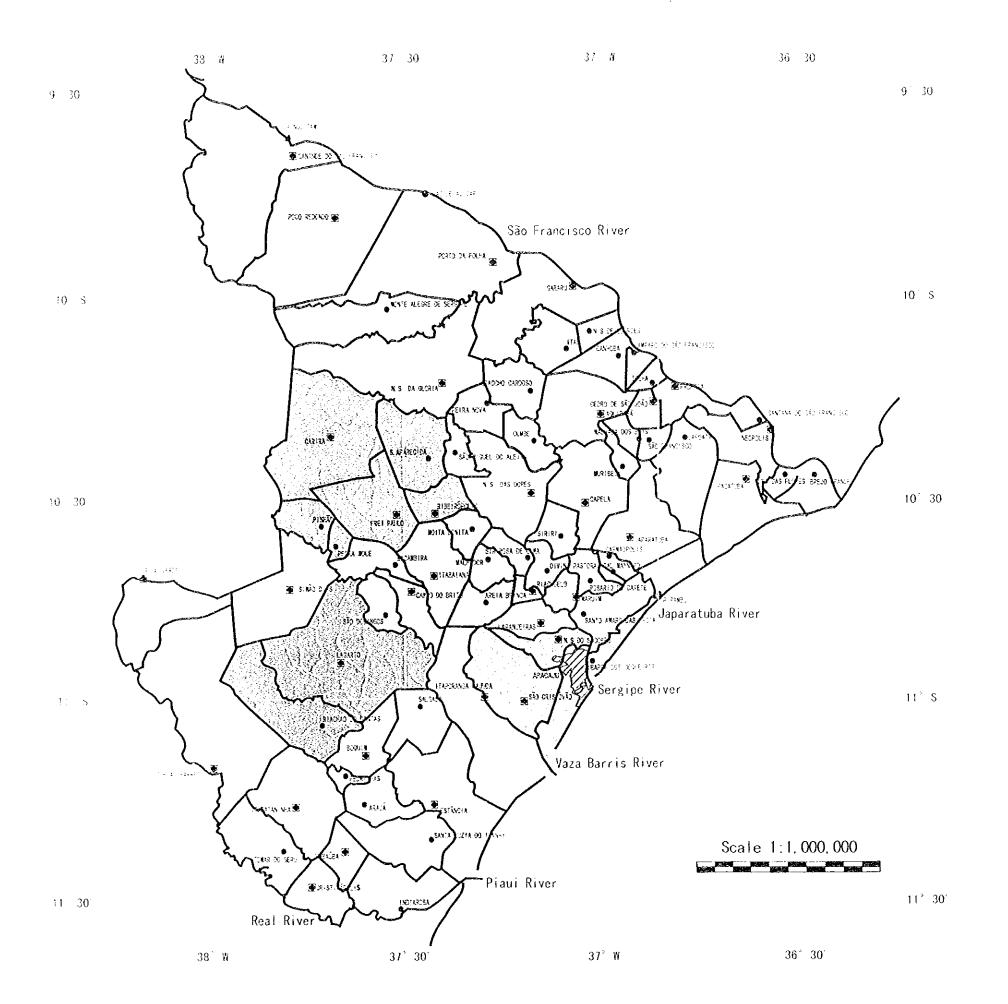
**LOCATION MAP** 



Map of the Study Area

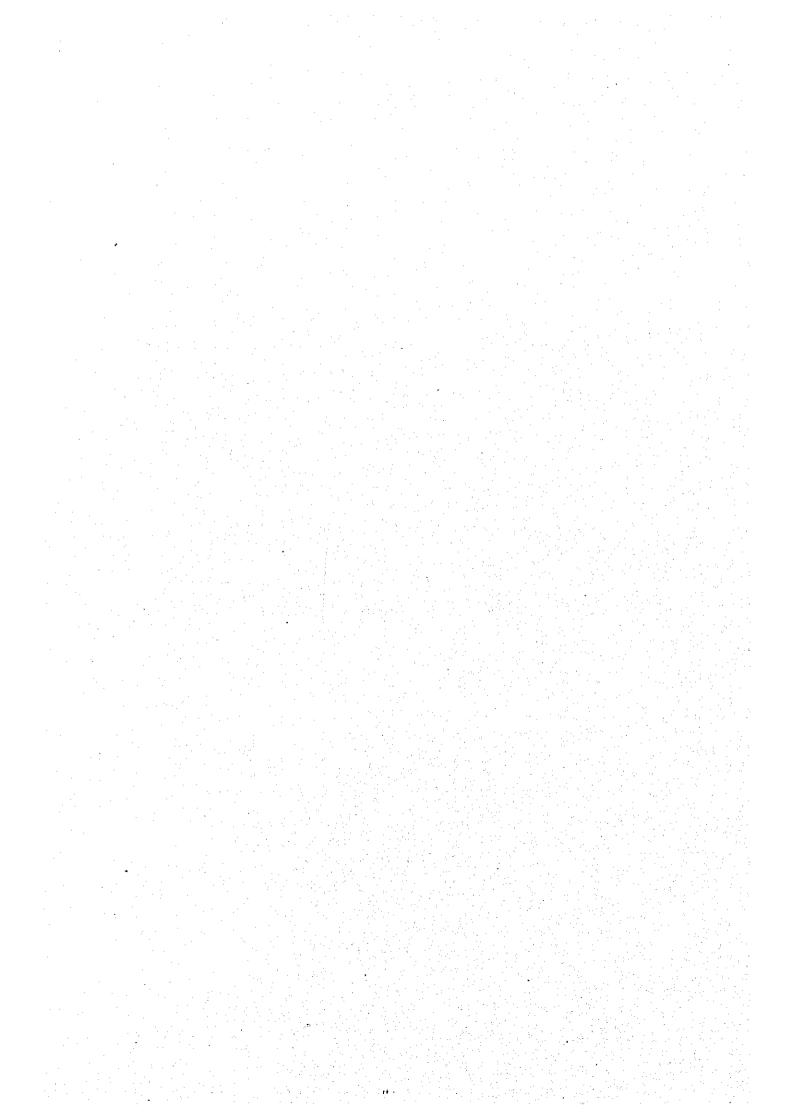
# LEGEND (Micro-region)

	SERGIPANA DO SERTAO DO SAO FRANCISCO
	CARIRA
	NOSSA SENHORA DAS DORES
	AGRESTE DE ITABATANA
	TOBIAS BARRETO
	AGRESTE DE LAGARTO
	PROPRIA
	COTINGUIBA
	JAPARATUBA
315 (5) 5.5%(2)	BAIXO COTINGUIBA
	ARACAJU
115 A 25 A 146 A	BOQUIM
<b>1</b> 2.5%	ESTANCIA



Map of the Study Area

LEGEN	) (Micro-region)
	SERGIPANA DO SERTAO DO SAO FRANCESCO
	C43184
	NOSSA SENHORA DAS DORES
	AGRESTE DE LITABATANA
	TOBIAS BARRETO
	AGRESTE DE LAGARTO
	PROPRIA
	COTINGUIBA
	JAPARATUBA
	BAIXO COTINGUIBA
	ARACAJU
	BOQUIM
	ESTANCIA



### LIST OF REPORT

### MAIN REPORT

SUMMARY SUMMARY (JAPANESE) SUMMARY (PORTUGUESE)

### SUPPORTING REPORT VOLUME I: MATER PLAN STUDY

- A. SOCIO-ECONOMY
- B. GEOLOGY AND HYDROGEOLOGY
- C. HYDROLOGY
- D. WATER QUALITY
- E. AGRICULTURE AND IRRIGATION
- F WATER DEMAND PROJECTION
- G. WATER RESOURCES DEVELOPMENT PLAN
- H. FACILITY DESIGN AND COST ESTIMATE
- I. LAWS AND ORGANIZATION
- J. OPERATION AND MANAGEMENT
- K. ENVIRONMENT
- L. ECONOMIC, FINANCIAL AND SOCIAL EVALUATION
- M. HYDROLOGICAL DATABASE SYSTEM
- N. SATELLITE IMAGERY INTERPRETATION

### SUPPORTING REPORT VOLUME II: FEASIBILITY STUDY

- A. SOCIO-ECONOMY
- B. HYDROLOGY
- C. WATER QUALITY
- D. DAM GEOLOGY
- E. DAM PLAN
- F. DAM DESIGN
- G. PLAN AND DESIGN OF WATER CONVEYANCE
- H. OPERATION AND MAINTENANCE PLAN
- I. COST ESTIMATE
- J. IMPLEMENTATION PROGRAM
- K. ENVIRONMENT IMPACT ASSESSMENT
- L. ECONOMIC, FINANCIAL AND SOCIAL EVALUATION
- M. TOPOGRAPHICAL SURVEY

### DATA BOOK

## LIST OF ABBREVIATIONS

Abbreviation	Official Name in Brazil	Name Translated in English
ADEMA	Administração Estadual do Meio Ambiente	State Department of Environment
ለNA	Agência Nacional de Água	National Water Agency
ANEEL	Agência Nacional de Energia Elétrica	National Agency of Electric Energy
ASES	Agência Reguladora de Serviços Concedidos	
CEMIG	Companhia Energética de Minas Gerais	Minas Gerais Power Company
CECMA	Conselho Estadual de Controle do Meio	State Council of Environmental Control
	Ambiente	
СЕНОР	Companhia Estadual de Habitação e Obras Públicas	State Company of Housing and Public Works
CEPEL	Centro de Pesquisa de Energia Elétrica	Electric Power Research Center
CEPES	Central de Pesquisas Espaciais de Sergipe	Sergipe Space Research Center
CHESF	Companhia Hidroelétrica do São Francisco	São Francisco Hydropower Electricity Corporation
CNPq	Conselho Nacional de Desenvolvimento Científico e Tecnológico	National Council of Science and Technolog Development
CNRH	Conselho Nacional de Recursos Hídricos	National Council of Water Resources
CNRNR	Conselho Nacional dos Recursos Naturais Renováveis	National Council of Renewal Natural Resources
CODEVASF	Companhia de Desenvolvimento do Vale do São Francisco	São Francisco Valley Development Corporation
CODISE	Companhia de Desenvolvimento Industrial e	
	de Recursos Minerais de Sergipe	Development Corporation of Sergipe State
COFIEX	Comissão de Financiamentos Externos	Commission of International Finance
COHIDRO	Companhia de Desenvolvimento de	Sergipe Water Resources and Irrigation
	Recursos Hídricos e Irrigação de Sergipe	Development Corporation
CONAMA	Conselho Nacional do Meio Ambiente	National Council of Environment
CONDESE	Conselho do Desenvolvimento Econômico de Sergipe	Sergipe Economic Development Council
CONERH/SE	Conselho Estadual de Recursos Hídricos	State Council of Water Resources
CYRD	Companhia Vale do Rio Doce	Council of Doce River Valley
DC	Defesa Civil	Civil Defense
DESO	Companhia de Saneamento de Sergipe	Sergipe Sanitation Corporation
DNAEE	Departamento Nacional de Águas e Energia Elétrica	National Department of Water and Electric Energy
DNER	Departamento Nacional de Estados e Rodagens	National Department of Roads and Highways
DNOCS	Departamento Nacional de Obras Contra as Secas	National Department of Drought Countermeasure
	Centrais Elétricas Brasileiras S.A.	Brazilian Central Electric Joint-stock Company
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuária	Brazilian Agriculture and Livestock Research Company
EMDAGRO	Empresa de Desenvolvimento Agropecuário de Sergipe	Development Company
FAO	Fundo das Nações Unidas para Alimentação e Agricultura	。""我们们是我们的人。""别数数据的基础。"
FIDA	Fundo Internacional de Desenvolvimento Agrícola	International Fund of Agriculture Development
FNS	Fundação Nacional de Saúde	National Foundation Health
FUNERH	Fundo Estadual de Recursos Hídricos	State Fund of Water Resources
JBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis	Renewable Natural Resources
IBGE	Instituto Brasileiro de Geografia e Estatística	Statistics
IICA	Instituto Interamericano de Cooperação para a Agricultura	Cooperation
INCRA	Instituto de Nacional de Colonização e Reforma Agraria	National Institute of Colonization and Agricultural Reform

Abbreviation	Official Name in Brazil	Name Translated in English
	Instituto de Tecnologia e Pesquisas de Sergipe	Sergipe Institute of Technology and Research
	Banco de Cooperação Internacional do Japão	
JICA	Agência de Cooperação Técnica Internacional do Japão	Japan International Cooperation Agency
	Padrão Industrial do Japão	Japan Industrial Standard
MMARHAL	Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal	Ministry of Environment, Water Resources and Legal Amazon
	Ministério de Planejamento e de Orçamento	Ministry of Planning and Budget
MP (change	Ministério do Planejamento, Orçamento e Gestão	Ministry of Planning, Budget and Management
OECF	Fundo Cooperação e Economica Ultramarino	Overseas Economic Cooperation Fund
	Plano Estadual de Recursos Hídricos	State Plan of Water Resources
	Sub-Programa de Desenvolvimento	Water Resources Development Program for
Semi-Árido	Sustentável de Recursos Hídricos para o Semi-Árido Brasileiro	Brazilian Semi-Arid Areas
	Projeto de Apoio às Famílias de Baixa	Low Income Family Supporting Project in
	Renda da Região Semi- Árida de Sergipe	Semi-Arid Region of Sergipe
	Projeto do Desenvolvimento dos Recursos	Project of Water Resources Development
	Hídricos e Abastecimento de Água com	and Supply in Vaza Barris River - Sergipe
	Aproveitamento do Rio Vaza Barris em	
	Sergipe	
RBC		River Basin Committee
	Secretaria de Estado da Agricultura, do	State Secretariat of Agriculture, Supply and
	Abastecimento e da Irrigação	Irrigation
	Secretaria Assuntos Internacionais	Secretariat of International Affairs
	Secretaria de Estado de Educação e Cultura	State Secretariat of Education and Culture
	Secretaria de Estado de Educação e do	State Secretariat of Education and Sports
	Desporto	Class Commencial a C.D.
	Secretaria de Estado da Fazenda	State Secretariat of Finance
	Secretaria de Estado da Indústria, do Comércio e do Turismo	State Secretariat of Industry, Commercial and Tourism
	Secretaria de Estado do Meio Ambiente	State Secretariat of Environment
	Secretaria de Estado de Serviços Públicos	State Secretariat of Public Services
	Sccretaria de Estado do Planejamento	State Secretariat of Planning
	Secretaria de Estado do Planejamento e da	State Secretariat of Planning, Science and
	Ciência e Tecnologia	Technology
SES	Secretaria de Estado da Saúde	Secretariat of Health
	Empresas possuídas pelo Estado	State owned Enterprise
SPEO	Superintendência de Planejamento e Orçamento	Superintendency of Planning and Budget
SRH	Superintendência de Recursos Hídricos	Superintendency of Water Resources
SRII	Secretaria de Recursos Hídricos	Secretariat of Water Resources
SSP	Secretaria de Estado da Segurança Pública	State Secretariat of Public Security
	Superintendência de Desenvolvimento do Nordeste	Superintendency of Northeast Brazil Development
	Superintendência de Estudos e Pesquisas	Superintendency of Study and Research
	Unidade Estadual de Gestão do PROÁGUA	State Unit of PROAGUA Management
	Universidade Federal de Sergipe	Federal University of Sergipe
	Unidade de Gestão do PROÁGUA	Project Management Unit
	Programa da Nações Unidas para o Desenvolvimento	United Nation Development Program
	Departamento de Interior dos Estados Unidos	United States Department of Interior, Bureau of Reclamation
MOOD	Exército dos Estados Unidos, Corpo de	United States Army, Corps of Engineers
	Engenheiros	omea outer runy, corps of Engineers

### JAPAN INTERNATIONAL COOPERATION AGENCY

STATE SECRETARIAT OF PLANNING, SCIENCE AND TECHNOLOGY THE STATE OF SERGIPE, THE FEDERATIVE REPUBLIC OF BRAZIL

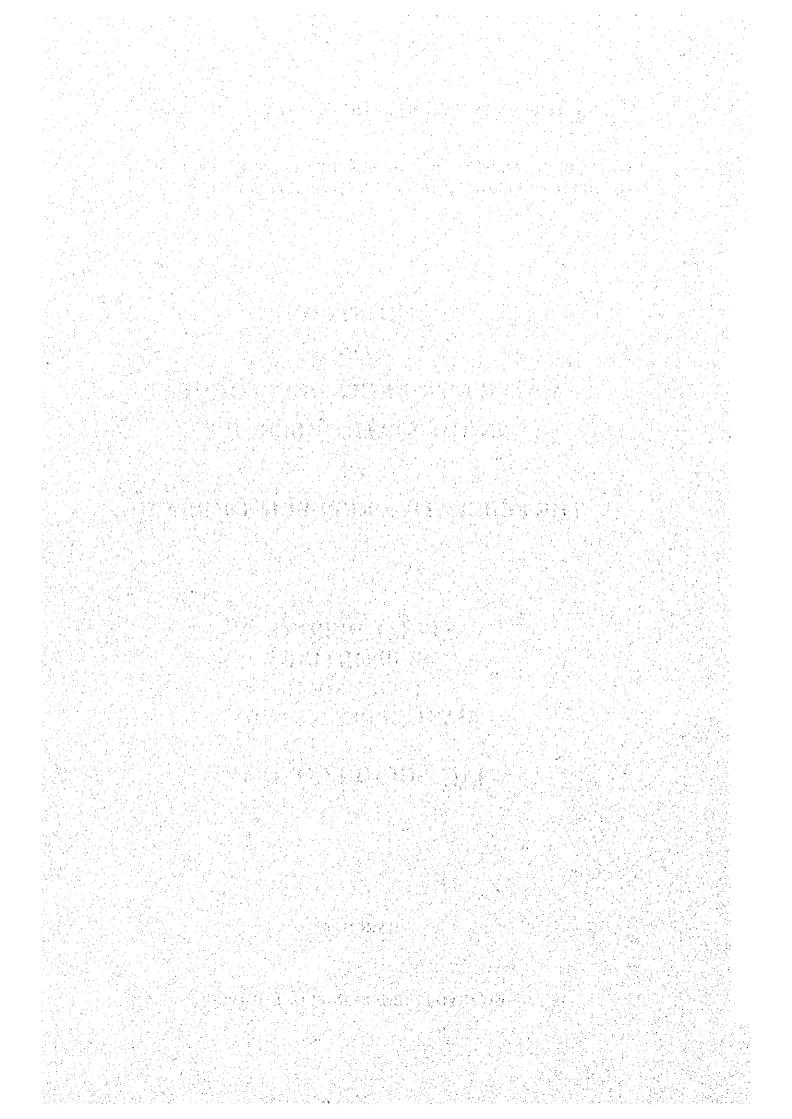
# THE STUDY ON WATER RESOURCES DEVELOPMENT IN THE STATE OF SERGIPE IN THE FEDERATIVE REPUBLIC OF BRAZIL

FINAL REPORT
SUPPORTING
(VOLUME I)
MASTER PLAN STUDY

[A] SOCIO-ECONOMY

**MARCH 2000** 

YACHIYO ENGINEERING CO., LTD. (YEC)



### THE STUDY ON WATER RESOURCES DEVELOPMENT IN THE STATE OF SERGIPE IN THE FEDERATIVE REPUBLIC OF BRAZIL

### SUPPORTING REPORT (A) SOCIO-ECONOMY

### **Table of Contents**

Table of Contents
List of Tables

		Page
СНАРТЕ	R 1 PRESENT SOCIO-ECONOMY	A-1
# <b>1.1</b> ·	1.1.1 Central Government 1.1.2 Local Government	Λ-1 Λ-1
1.2	River Basin Area	A-1
1.3	Census Population  1.3.1 State Population  1.3.2 River Basin Population  1.3.3 Population Density and Family Size  Labor Force	A-2 A-3 A-4
1.5		A-5
1.6	Economic Sector Profile	A-6 A-6 A-7 A-8
1.7	Inflation	
1.8	State Finances	A-9
CHAPTE	R 2 FUTURE SOCIO-ECONOMIC FRAMEWORK	A-11
2.1	Population Projection	A-11
2.2	GRDP Projection	Λ-12
2.3	Regional Socio-economic Framework	A-13 A-13 A-15
APPEND Appendix- Appendix-	1 Distribution of Basin Area by Municipality	

# List of Tables

	Page
Table-1.1	Distribution of Basin Area
Table-1.2	Census Population and Annual Growth
Table-1.3	River Basin Population and Annual Growth
Table-1.4	Number of Labor Force (over 10 years old)
Table-1.5	GDP & GRDP at 1995 Constant Prices
Table-1.6	Percentage Distribution of G(R)DP by Economic Sector
Table-1.7	Real Growth of G(R)DP by Economic Sector
Table-1.8	Real Growth of G(R)DP per Capita
Table-1.9	Real Growth of G(R)DP per Capita
Table-1.10	Main Livestock Population and the related Production
Table-1.11	Mining and Industrial Aspect
Table-1.12	Mining and Industrial Aspect
Table-1.13	Consumer Price Index
Table-1.14	Financial Composition of Sergipe State
Table-1.15	Debt-to-Net Current Revenue Ratio
Table-1.16	Debt Service Coverage Ratio
Table-2.1	Projected Population in Sergipe: 1997 – 2020
Table-2.2	GDP and GRDP Projection at 1998 Constant Prices
Table-2.3	GRDP per Capita
Table-2.4	Estimated Population of Sergipe State in 1997
Table-2.5	Estimated GRDP & GRDP per Capita in 1997 at 1998 Constant Prices A-14
Table-2.6	Estimated Population of Sergipe State in 2020 (Trend Scenario)
Table-2.7	Estimated GRDP & GRDP per Capita in 2020 at 1998 Constant Prices
	(Trend Scenario)
Table-2.8	Distribution of GRDP by Sector & Urban Population with Strategic
	Scenario (2020) A-17
Table-2.9	Scenario (2020) A-17 Estimated GRDP & GRDP per Capita in 2020 at 1998 Constant Prices
•	(Strategic Scenario)
Table-2.10	Estimated Population of Sergipe in 2020 (Strategic Scenario)

### CHAPTER 1 PRESENT SOCIO-ECONOMY

The socio-economic study aims at presenting two aspects for planning sections in this master plan: (1) present socio-economic structures in sectors concerned to water resources development; and (2) future socio-economic framework in the sectors. These two aspects are not only essential for planning but also fundamental for estimation of water requirement in water consumers such as domestic, industrial and agriculture sectors.

The present socio-economy is presented in Chapter 1 and the future socio-economy is presented in Chapter 2.

### 1.1 Administrative Units

### 1.1.1 Central Government

Presently, according to the Constitution of the Federative Republic of Brazil and the Constitution of the State of Sergipe, the state's central government is divided into two types of organs: (1) the organs of the direct administration; and (2) those of the indirect administration.

### (1) Organs of the Direct Administration

The responsible of the state administration is the Governor (Governador). The state has 17 secretariats with their attribution under his control, for example: Secretariat of Finance, Secretariat of Planning, Science and Technology. In addition to these secretariats, the state has some assistant organs for Governor such as Cabinet of Governor, Vice Governor & his Cabinet and Cabinet of State Police.

### (2) Organs of the Indirect Administration

The state has 8 autarchies, 10 public enterprises and companies, and 3 foundations under the administration of the secretariats, for example: State Administration of Environment (ADEMA), Sanitation Company (DESO), State Company of Housing and Public Works (CEHOP), and Company of Water Resources Development and Irrigation (COHIDRO).

### 1.1.2 Local Government

The State of Sergipe is composed of 75 municipalities presently. Each municipality has the administration organ under the control of the Mayor (Prefeito) and has the City Hall & City Council.

### 1.2 River Basin Area

Sergipe State can be divided into six river systems as shown in Table-1.1.

River basin boundaries were determined from the SUDENE 1:100,000 scale maps and the basin areas were measured by a planimeter – the measured areas are also shown above. The basin boundaries were then copied to the map showing the local government (municipality) boundaries. The location and area of each municipality could then be determined in relation to the six river basins. The distribution of basin area by municipality is given in Appendix-1.

Table-1.1 Distribution of Basin Area

Unit: km2

M: D:	River Basin									
Micro-Region	Sao Francisco	Japaratuba	Sergipe	Vaza Barris	Piaui	Real	Total			
Total	7,276.3	1,722.0	3,673.0	2,559.0	4,262.0	2,558.0	22,050.3			
Sergipana do S. do S. F	4,899.6	120.7	435.8	⊷ .			5,456.0			
Carira	, —	· · ·—	974.7	908.5			1,883.2			
N. S. das Dores	320.4	376.7	571.7	· ·	فسنت		1,268.8			
Agreste de Itabaiana			439.4	666.4		_	1,105.8			
Tobias Barreto	<del>-</del>	<del></del> -	- 1	135.8	474.6	1,450.3	2,060.6			
Agreste de Lagarto	<u> </u>		_ ·	208.8	1,145.6	136.5	1,490.9			
Propria	1,014.9	-			<del></del> : 1	<del></del> ·	1,014.9			
Cotinguiba	<del></del>	570.1	188.1	'		. —	758.2			
Japaratuba	1,041.4	423.3			-		1,464.7			
Baixo Cotinguiba	1 —	220.1	516.9	·	<del></del>		737.0			
Aracaju	<u> </u>	11.2	513.5	334.6		10 <del>14 1</del> 1 1	. 859.3			
Boquim		l			1,079.6	816.8	1,896.4			
Estancia	<u> </u>		32.9	304.9	1,562.2	154.5	2,054.5			

### 1.3 Census Population

### 1.3.1 State Population

Population distribution is one of the most fundamental information to formulate a water resources development plan. Although the latest population census was worked out in 1991, the provisional population census, so called "Contagem da População", was made by IBGE in 1996. Thus, the population distribution was principally based on the 1996 census in this study.

Table-1.2 Census Population and Annual Growth

Unit: 1,000 persons

	1970	198	0	199	1	1996		
Item	Population	Population	Growth	Population	Growth	Population	Growth	
Brazil	93,139.0	119,002.7	2.48	146,825.5	1.93	157,079.6	1.36	
Sergipe	901.6	1,140.1	2.37	1,491.9	2.47	1,624.2	1.71	
Urban	420.0	623.0	4.02	1,002.4	4.42	1,140.6	2.62	
Rural	481.6	517.1	0.71	489.5	-0.50	483.6	-0.24	
By Micro-region								
Sergipana S. do SF	74.4	101.0	3.11	113.1	1.03	115.9	0.50	
Carira	44.0	51.1	1.50	54.9	0.65	57.4	0.91	
N. S. das Dores	47.1	48.6	0.33	51.6	0.53	53.9	0.89	
A. de Itabaiana	80.8	98.5	2.00	120.7	1.87	135.6	2.36	
Tobias Barreto	63.8	72.2	1.24	87.4	1.76	92.1	1.04	
A. de Lagarto	67.9	75.8	1.11	89.1	1.48	93.1	0.88	
Propria	70.3	70.5	0.03	78.1	0.93	81.7	0.90	
Cotinguiba	30.8	33.5	0.84	37.4	1.00	38.7	0.69	
Japaratuba	30.6	33.5	0.89	42.1	2.11	43.7	0.75	
B. Cotinguiba	41.1	48.7	1.71	66.4	2.85	70.5	1.20	
Aracaju	219.2	338.9	4.45	530.2	4.15	607.6	2.76	
Boquim	75.9	98.6	2.64	125.2	2.20	134.2	1.40	
Estancia	55.8	69.2	2.18	95.7	2.99	99.7	0.84	

Source: Censo Demografico-1970, 1980 and 1991 - IBGE

Contagem da População - IBGE

Note: Growth in %

According to the 1996 census by IBGE, Brazil has a population of 157 million. This population increased by 10 million as compared to the 1991 census. During the 1990s, the average growth rate was 1.36% per annum. It slowed down from 1.93% per annum during 1980s.

In Sergipe State, the 1996 census population was 1.62 million or 1.03% of the national population. The average growth rate during the 1990s was 1.71% per annum. This growth rate was larger than that of the country.

The population in the urban area of Sergipe State was 1.14 million in the 1996 census or shared 70% of the state population, still less concentrated compared with that of Brazil which shared 78% in the census. The average growth rate during the 1990s was 2.62% per annum, which, though slowed down from 4.42% per annum during the previous decades, showed more accelerated rate than that of Brazil, 2.09% per annum.

Meanwhile, the population in the rural area of the state in the 1996 census has moved downward continuously to 0.48 million or shared only 30% in the state.

Among the 75 municipalities in the state, Aracaju City, the capital of the state, has the largest population and a function of not only politics but also economic center of the state. Its census population was 428,194 or 26% of the state population in 1996. The growth rate during the 1990s was 1.25% per annum on average, which was smaller than that of the state and the country. The second and third largest municipality in the same census was Nossa Senhora do Socorro with population of 105,728 or share of 6.5% and Lagarto with that of 75,316 or share of 4.6%, respectively. Nossa Senhora do Socorro is urban city around Aracaju City and gained the most accelerated growth rate of 9.4% among all during 1990s. Census population by municipality is given in Appendix-2.

### 1.3.2 River Basin Population

There is no statistical information regarding river basin population in the state. So the distribution of population by each river basin was conducted by the Study Team as shown in Table-1.3. The distribution to each river basin was made on the municipality basis. The municipalities located in two or more river basins are calculated as follows. In general, rural population was distributed by the percentage of each river basin area in the municipality. Urban population of each municipality was totally allocated to the river basin in which town is located. For the few cases where the town is located on the boundary between two river basins, the urban population is divided equally to each basin. The distribution percentage of those urban populations is given in Appendix-1.

Table-1.3 River Basin Population and Annual Growth

Unit: 1.000 persons

[nn.	1970	19	980	l	991	1996		
River Basin	Population	Population	Growth (%)	Population	Growth (%)	Population	Growth (%)	
S. Francisco	168.1	193.4	1.41	217.3	1.06	224.2	0.63	
Japaratuba	65.1	71.6	0.95	84.5	1.52	90.8	1.44	
Sergipe	333.7	478.3	3.67	677.3	3.21	759.2	2.31	
V. Barris	99.6	104.0	0.43	141.5	2.84	165.2	3.15	
Piaui	166.1	208.7	2.31	267.6	2.29	273.5	0.44	
Real	68.9	84.1	2.01	103.7	1.92	111.3	1.43	
Total	901.6	1,140.1	2.37	1,491.9	2.47	1,624.2	1.71	

### 1.3.3 Population Density and Family Size

According to the 1991 census, a population density of the state was 68 persons/km<sup>2</sup>. The density of the respective micro-regions were ranged from the largest one of 617 persons/km<sup>2</sup> in Aracaju Micro-region to the smallest of 21 persons/km<sup>2</sup> in Sergipana do Sertao do Sao Francisco Micro-region.

An average family size was 4.23 in the state according to the 1991 census. Among the 13 micro-regions, the largest family size was Sergipana do Sertao do Sao Francisco Micro-region of 4.80. The smallest one was Agreste de Itabaiana Micro-region of 4.11.

### 1.4 Labor Force

In 1991, the labor force in Sergipe State registered 530,700. Of this number, 513,100 or 96.7% were employed. Thus, an unemployment rate was only 3.3% in the state. This rate was somewhat larger than that in the 1980 census year.

In the past, the agricultural sector, so called as the primary sector, used to absorb the greatest portion of manpower resources in the state. In the 1991 census this sector accounted for only 149,200 or 29.7% of the total labor force. It recorded a drastic decrease to 149,700 or 42.3% in the 1980 census from 161,000 or 60.9% in the previous census 1970.

The industrial sector, or the secondary sector, employed the smallest share of the labor force among the three major economic sectors. Its share was 17.4% in the state in 1991. It increased only 0.1% from the previous census 1980. In the manufacturing sub-sector, its share of labor force kept the same percentage of 7.4% in the 1980s. Thus, the industrial contribution for the state economy has stayed almost unchanged since 1980.

On the other hand, the number of workers in the service sector, or the tertiary sector, expanded at an annual rate of 6.5% in the state during 1980s. In particular, the public service sub-sector registered the highest rate of 7.6% per annum among all sectors and sub-sectors. Then, the share of the services sector increased from 37.2% in 1980 to 49.6% in 1991 in the state.

Table-1.4 Number of Labor Force (over 10 years old)

ltem	Gainful Workers (1,000 Persons)			Percentage Distribution(%)			Ave. Growth Rate(%)		
Helli :	1970	1980	1991	1970	1980	1991	<b>'70-'80</b>	<b>'80-'90</b>	
1. Agriculture	161.0	149.7	149.2	60.7	42.3	28.2	-0.7	0.0	
2. Industry	31.1	61.4	100.5	11.7	17.3	18.9	7.0	4.6	
-Manufacturing	15.2	26.3	39.2	5.7	7.4	7.4	5.7	3.7	
3. Services	68.6	131.4	263.5	25.8	37.2	49.6	6.7	6.5	
-Commerce	15.1	28.5	56.1	5,7	8.1	10.6	6.5	6.3	
-Social Services	10.3	25.1	53.7	3.9	7.1	10.1	9.3	7.2	
-Public Services	9.0	14.2	31.6	3.4	4.0	6.0	4.7	7.6	
4. No Jobs	4.8	11.2	17.6	1.8	3.2	3.3	8.8	4.2	
	265.5	353.7	530.8	100.0	100.0	100.0	2.9	3.8	

Source: Censo Demografico 1991, Mao- de Obra, No. 16 Sergipe, IBGE

Recenseamento Geral do Brasil 1980, Censo Demografico, Mao-de Obra, Sergipe, 1983, IBGE

Censo Demográfico, Sergipe, Recenseamento Geral 1970, Dec. 1972, IBGE

### 1.5 Gross Regional Domestic Product

Gross domestic product (GDP) in Brazil was R\$658 billion at market prices in 1995. It was broken down into gross value added (GVA) of main economic sectors as shown in Table-1.5. They were summarized as follows: R\$68 billion at factor cost in the agricultural sector or 12.2% of GDP, R\$189 billion in the industrial sector or 33.6%, and R\$344 billion in the services sector or 54.2%. Per capita GDP was R\$4,250 as shown in Table-1.8.

Gross regional domestic product (GRDP) of Sergipe State in 1995 was R\$3.60 billion, accounting for 0.55% of GDP. GVA share to GRDP of main three economic sectors in the state was tabulated in Table-1.6. They are broken down R\$0.42 billion or 12.6% of GRDP for agriculture, R\$1.00 billion or 30.2% for industry, and R\$1.90 billion or 57.3% for services. Per capita GRDP in 1995 was R\$2,260 as shown in Table-1.8. It was only 53% of the national per capita GDP. Incidentally, GRDP of state level was estimated by SUDENE.

Table-1.5 GDP & GRDP at 1995 Constant Prices

Unit: R\$ billion

					Oilit.	113 CHINGH
Economic Sector	1990	1991	1992	1993	1994	1995
Gross Domestic Product in Brazil						
1. Agriculture	55.5	57.0	60.1	59.5	65.0	68.3
2. Industry	173.8	170.1	162.9	173.7	185.7	189.0
-Manufacturing	111.5	108.9	104.5	112.9	121.7	123.8
3. Services	333.2	330.2	327.5	331.9	338.1	343.8
-Commerce	31.8	31.8	31.0	33.1	35.1	38.0
4. Sub-total	562.5	557.3	550.4	565.1	588.8	601.1
5. GDP at Factor Cost	511.5	510.4	505.7	521.4	546.3	561.8
6. GDP at Market Price	601.8	584.8	574.3	597.0	638.8	658.1
Gross Regional Domestic Product in Sergipe		-				
1. Agriculture	0.55	0.62	0.51	0.31	0.41	0.42
2. Industry	1.01	0.91	0.95	0.98	. 0.98	1.00
3. Services	1.60	1.67	1.66	1.72	1.80	1.90
4. GRDP at Factor Cost	3.16	3.21	3.12	3.01	3.19	3.31
5. GRDP at Market Price	3.37	3.40	3.31	3.20	3.47	3.60

Source: Anuario Estatistico do Brasil 1996,1997, IBGE

Agregados Economicos Regionais, Nordeste do Brasil, 1965-95, 1996, MPO, SUDENE

Note: Value added of the respective sectors was calculated applying the economic indices in the references above.

Table-1.6 Percentage Distribution of G(R)DP by Economic Sector

Unit: %

			•			Unit: 70
Economic Sector	1990	1991	1992	1993	1994	1995
Brazil						
1. Agriculture	. 11.8	11.5	12.2	12.4	14.2	12.2
2. Industry	41.3	38.4	38.3	37.9	36.1	33.6
Manufacturing	29.6	26.6	25.7	25.1	23.7	22.0
3. Services	46.9	50.1	49.5	49.7	49.7	54.2
Commerce	8.2	7.6	7.6	7.6	7.2	<b>6.8</b> .
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sergipe State						
1. Agriculture	16.6	16.3	16.8	7.8	12.7	12.6
2. Industry	38.9	42.4	37.1	40.2	33.2	30.2
Manufacturing	20.8	17,8	17,4	20.0	-	
3. Services	44.6	41.4	46.1	52.0	54.1	57.3
Commerce	17.6	16.8	15.1	17.8	_	* *** <u>*</u> ***
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Anuario Estatistico do Brasil, 1996, 1997, IBGE

Agregados Economicos Regionais, Nordeste do Brasil, 1965-95, 1996, MPO, SUDENE

For six years, GDP increased from R\$602 billion to R\$658 billion in real terms, i.e., average growth rate of 1.3% per annum. GRDP in Sergipe State grew at a rate of 1.0% per annum on average for the same period, which was smaller than the growth rate of the country. Then, the share of the state in the country diminished for this period. The real growth rates of the main economic sectors on average per annum during 1990 to 1995 were shown in the Table-1.7.

Table-1.7 Real Growth of G(R)DP by Economic Sector

Unit: %

Economic Sector	1991	1992	1993	1994	1995	<b>'90-'9</b> 5
Brazil						
1. Agriculture	2.8	5.4	-1.0	9.3	5.1	4.2
2. Industry	-2.1	-4.3	6.7	6.9	1.8	1.7
Manufacturing	-2.4	-4.1	8.1	7.8	∴ 1 <b>.7</b>	2.1
3. Services	-0.9	-0.8	1.4	1.9	1.7	0.6
Commerce	0.1	-2.5	6.6	6.0	8.5	3.7
Total	-0.9	-1.2	2.7	4.2	2.1	1.3
Sergipe State						
1. Agriculture	13.1	-18.2	-39.0	30.6	2.7	-5.4
2. Industry	-10.0	4.6	.3.1	-0.3	2.2	-0.2
3. Services	4.7	-0.6	3.3	5.0	5.2	3.5
Total	1.4	-2.5	-3.6	5.9	4.0	1.0

Source: Anuario Estatistico do Brasil, 1996, 1997, IBGE

Agregados Economicos Regionais, Nordeste do Brasil, 1965-95, 1996, MPO, SUDENE

As shown in Table-1.8, in terms of average annual growth between 1990 and 1995, both per capita GDP and per capita GRDP of the state were calculated as of 0.4% and -0.5%, respectively. These figures imply that both economic conditions have kept almost the same level for the past six years, although the economy has fluctuated for the period. These in 1991 and 1992 were resulted in serious negative growth in particular. In 1995, these barely recovered to the 1990 level in consequence of the recent real growth.

Table-1.8 Real Growth of G(R)DP per Capita

Economic Sector	1990	1991	1992	1993	1994	1995
G(R)DP per Capita at 1995 Constant Prices (R\$)	4.			+ 1		4.1
Brazil	4,168	3,980	3,857	3,956	4,177	4,246
Sergipe	2,312	2,282	2,184	2,073	2,210	2,256
	1991	1992	1993	1994	1995	<b>'90-'95</b>
Annual Growth Rate (%)						
Brasil	-4.5	3.1	2.6	5.6	1.7	0.4
Sergipe	-1.3	-4.3	-5.1	6.6	2.1	-0.5

Source: Anuario Estatistico do Brasil 1996, 1997, IBGE

Agregados Economicos Regionais, Nordeste do Brasil, 1965-95, 1996, MPO, SUDENE

### 1.6 Economic Sector Profile

### 1.6.1 Agricultural Sector

Value added (VA) of agriculture sector accounted for 13.8% of GRDP on average during 6 years from 1990 to 1995, which fluctuated between 9.7% in 1993 and 18.2% in 1991. The real growth of agriculture sector during the same period was a decline of 5.4% per annum, as shown in Table-1.7, which was far greater than 0.24% decline per annum of the rural population between 1991 and 1996 census.

Production tendency changed so much during this decade. The crop area of cotton, sugarcane and maize declined between 1985 and 1996 as shown in Table-1.9. Particularly, the area of cotton declined dramatically. Adversely, the production of coco and orange increased remarkably. Orange production in particular increased more than 40% during the same period and shared substantial portion in the agriculture sector of the state.

**Table-1.9** Main Agriculture Products

	Pro	oduction (1,000	ton)	Cro	p Area (1,000	0 ha)
ltem	1985	1996	Changes (%)	1985	1996	Changes (%)
Cotton	: 13.5	0.8	-99.9	33.8	1.9	-94.4
Sugarcane	1,605.9	1,341.8	-16.4	26.5	22.4	-15.5
Cassava	461.1	597.0	29.5	35.2	39.8	13.1
Maize	98.5	114.2	15.9	98.5	81.6	-17.1
Coco (1000 fruits)	80.9	95.4	17.9	42.6	50.2	17.8
Orange (1000 fruits)	2,920.6	4,173.1	42.8	28.3	41.4	46.3

Source: "Municipal Agriculture Production, 1981-1996" (IBGE) and EMDAGRO for Modification

As to the livestock, pig and poultry population increased slightly but cattle population and the production of milk and eggs decreased remarkably between 1990 and 1995 as shown in Table-1.10.

Table-1.10 Main Livestock Population and the related Production

Item		Number (1,000 heads)							
Hem	1990	1995	Changes (%)						
Cattle	1,030	797	-22.6						
Pig	96	99	3.1						
Poultry	2,925	3,041	4.0						
Milk (1000 liters)	99,862	66,013	-33.9						
Eggs (1000 dozens)	10,325	6,719	-34.9						

Source: "Municipality Livestock Population, 1976 to 1995" (IBGE) and EMDAGRO for Modification

### 1.6.2 Mining and Industrial Sector

VA of mining and industrial sector accounted for 28.3% of GRDP on average during 6 years from 1990 to 1995. The real growth of the sector during the same period declined 0.2% per annum.

According to the economic census by IBGE in 1985 and Official Registration of Industries in Sergipe 1991/92 (Cadastro Industrial Sergipe 1991/92) by CODISE, in the terms of distribution of gross production value, manufacturing sector shared 56% in 1991/92, but decreased dramatically from almost 100% during the preceding decade. Light industries such as textiles and food industries accounted for dominant shares in the state. On the other hand, mining sector, especially crude oil extraction industry, surged to 44% from almost nothing. Number of establishment decreased from 1,918 in 1980 to 1,458 in 1991/92, mainly due to non-metallic sector, which declined from 826 to 143 in the same period.

Both number of establishments and distribution of gross production value were concentrated in large cities such as Aracaju, Estancia, Itabaiana and Laranjeiras that shared respectively 53.2% in 1991/92 and 73.5% in 1985.

Table-1.11 Mining and Industrial Aspect

Item	Numbe	er of Establish	ments	Distribution of Gross Production Value (%)				
	1980	1985	1991/92	1980	1985	1991/92		
Sergipe	1,918	1,989	1,458	100.0	100.0	100.0		
Mining	43	35	. 4	0.3	0.3	44.4		
Manufacturing	1,875	1,954	1,454	99.7	99.7	55.6		
Textile	121	94	122	40.8	37.3	14.1		
Food & Beverage	479	511	570	26.9	26.8	11.8		
Non-Metallic	826	837	143	13.3	10.2	3.2		
Chemical	15	. 21	23	1.3	16.7	4.9		
Others	434	491	596	17.4	8.7	21.6		
Aracaju	383	409	627	50.7	35.8			
Estancia	66	56	57	13.8	14.0	_		
Itabaiana	126	132	86	2.0	1.4	•		
Laranjeiras	14	38	6	4.2	22.3	· -		

Source: Censo Economico de 1985, Industria, Comercio e Service, Volume 2, IBGE Cadastro Industrial Sergipe, 1991/92, SEICT, CODISE and SEBRAE

### 1.6.3 Services Sector

VA of services sector accounted for 50.9% of GRDP on average during 6 years from 1990 to 1995. The real growth of the sector increased 0.9% per annum, in spite of decline in other sectors.

According to the economic census by IBGE in 1985, the wholesale and retail sector amounted to dominant share of 90% both in 1980 and 1985, as shown in Table-1.12. Aracaju City also took a predominant position of the sector in the same years.

Table-1.12 Aspect of Services Sector

Item	Number of es	tablishments	Contribution of Sales Amount (%)				
	1980	1985	1980	1985			
Sergipe	5,609	7,439	100.0	100.0			
Wholesale & retail	3,805	4,766	89.9	90.7			
Others	1,804	2,673	10.1	9.3			
Aracaju	2,424	2,979	66.3	59.8			

Source: Censo Economico de 1985, Industria, Comercio e Servico, Volume 2, IBGE

### 1.7 Inflation

In Brazil, consumer price index is widely used as one of instrument to measure inflation. The consumer price index of Brazil moved moderately downwards during these years, as shown in Table-1.13. In Sergipe, the index declined also moderately till 1997 but upward movement has taken place in 1998 though moderate. According to SUPES survey, the price advances in 1998 were concentrated largely in the durable goods and food /beverage sector. The rest of items are showing moderately 2 to 5%.

Table-1.13 Consumer Price Index

Unit: %

					Omt. 70
Year	1994	1995	1996	1997	1998*
Brazil <sup>(1)</sup> Sergine <sup>(2)</sup>	1,238.0	25.9 13.9	11.3	7.2 5.6	1.8

Source: (1) Precos ao Consumidor, Brasil Total, FGV, Conjuntura Economica, 1998 October

(2) Indice de Vida - Aracaju, SEPLANTEC/SUPES, 1998 September

\* as of September, 1998

### 1.8 State Finances

### 1.8.1 Financial Composition

The state government recorded a deficit balance for three consecutive fiscal years from 1994 till 1996. In fiscal year of 1997, the huge amount of surplus was realized due to privatization of a state owned electric enterprise, ENERGIPE. According to government official, this surplus will be carried over mainly for coming investment expenditure. In fiscal 1998, the government estimated a balanced budget.

As shown in Table-1.14, some 40 to 50% of total revenue were derived from transfers from Federal Government, some 30 to 35% from taxes, mainly ICMS (a kind of value added tax) and the rest from loans.

The major item among expenditures was personnel expenditure. The Law No. 82/95 requires the state government that total personnel expenditures of not only the state government officials but also of the state owned enterprises' employees whose salaries are paid from the state account shall not exceed, since 1998, 60% of the net current revenue that means total current revenue of the state excluding an amount transferred to municipalities. The percentage of proceeding 3 years was 85% in 1995, 73% in 1996 and 66% in 1997. Sergipe State government estimates possibility to achieve the requirement of this 60% in 1998 fiscal budget.

Table-1.14 Financial Composition of Sergipe State

Unit: R\$ million

	<del></del>				Chill Hy minion
Year	1994	1995	1996	1997	1998
Revenues	429.3	733.9	934.1	1,575.9	893.6
1. Current	326.2	643.7	729.8	861.9	802.6
1) Tax	139.6	262.2	313.3	372.5	330.0
2) Transfers from Federal Gov.	166.2	355.6	396.9	441.7	452.7
2. Capital*	103.1	90.2	204.3	714.0	91.0
1) Credit Operations	83.8	48.6	118.1	169.3	55.1
Expenditures	453.3	770.4	938.0	1,253.0	893.6
1. Current	312.0	700.4	719.2	843.8	687.3
1) Personnel	155.2	456.1	443.5	469.8	368.8
2) Financial	27.3	34.5	40.7	43.7	35.1
2. Capital	141.3	70.0	218.8	409.2	206.3
1) Investment	119.7	60.8	136.2	236.8	185.6
2) Repayment	14.6	9.0	82.4	172.4	20.5
Deficit/Surplus	-24.0	-36.5	-3.9	322.9	0.0
(% of Revenues)	-5.6%	-5.0%	-0.4%	20.5%	0.0%

Source: Balanco Geral, Governo de Sergipe, 1994,1995,1996 and 1997

Investment, including financial investment, in total expenditures was 18% on average during the 5 years, fluctuating from 8.9% in 1995 to 26.5 in 1994.

### 1.8.2 Debt Situation

The state government finances were sustained by loans around 11% on average during the years from 1994 to 1998. The debts in Table-1.15 mean such accumulated amount of loan payable. In general, the debt amount is compared with net current revenue to measure its financial burden (Debt Ratio), as shown in Table-1.15. Although the debt ratio has been declining obviously, the state has still owed loans equivalent to one year's net current revenue.

Orcamento-Programa, Governo de Sergipe, 1998 (Original Budget)

<sup>\*</sup> The amount of 1997 was mostly derived from the privatization of ENERGIPE, formerly owned by the state.

Table-1.15 Debt-to-Net Current Revenue Ratio

Unit: R\$ 1,000 (1990-1992), R\$ million (1993-1998)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
A. Net Current Revenues	11.0	48.1	502.1	11.8	291.2	576.1	646.1	762.2	716.5
B. Debts	20.7	122.1	1613.1	44.7	383.8	569.0	684.2	746.4	737.8
C. Ratio (B/A)	188%	254%	321%	380%	132%	99%	106%	98%	103%

Source: Balanco Geral, Governo de Sergipe, 1994,1995,1996 and 1997

Orcamento-Programa, Governo de Sergipe, 1998 (Original Budget)

Note: Debts in 1998 is as of September.

Incidentally, loan is a negotiable matter. So loan period varies depending on the loan agreement. The state raised long-term funds in large part, which means financially less burdensome because of smaller annual repayment for the state. The debt payment, which means a total amount of repayment of loan and interest payment, is compared with net current revenue to measure its payment affordability (Debt Service Coverage Ratio), as shown in Table-1.16. In general, 25% of the ratio are considered a financial upper limit. The Sergipe state government has maintained constantly lower level of the ratio, except in 1997 when state owned enterprise was privatized and provisional repayment especially to BNDES was made from the fund of the stock release. It means that the state government financial condition is currently healthy in terms of debt service coverage ratio.

Table-1.16 Debt Service Coverage Ratio

Unit: R\$ 1,000 (1990-1992), R\$ million (1993-1998)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
A. Net Current Revenues	11.0	48.1	502.1	11.8	291.2	576.1	646.1	762.2	716.5
B. Debt Payment	2.0	3.1	23.5	1.4	41.9	43.5	123.1	216.1	55.5
C. Ratio (B/A)	18.2%	6.4%	4.7%	11.9%	14.4%	7.6%	19.1%	28.4%	7.7%

Source: Balanco Geral, Governo de Sergipe, 1994,1995,1996 and 1997 Orcamento-Programa, Governo de Sergipe, 1998 (Original Budget)

### CHAPTER 2 FUTURE SOCIO-ECONOMIC FRAMEWORK

### 2.1 Population Projection

The long-term projection of population is indispensable for formulating the future framework of socio-economic structure in the project areas.

The population of Brazil was estimated up to the year 2020 by IBGE in the Annually Statistic Book in 1996 as shown in Table-2.1. Its annual growth rate was 1.0% between 1996 and 2020.

As to the population of Sergipe State, the SUPES provides population projections for the state with a breakdown of its municipality level during the period from 1990 to 2010 in the annual publication called "Anuario Estatistico de Sergipe 1996". These projections were based on the results of the 1991 census.

In this study, the future population is projected on the basis of the 1996 census results, applying the method of the SUPES projection. Table-2.1 shows the population projected up to the year 2020 at 10-year intervals. The projected population by municipality is given in Appendix-2. The state population in 2020 was projected at 2.78 million. Its growth rate is 2.3% on average between 1996 and 2020. It is smaller than that (2.47%) between the 1980 and 1991 censuses, but almost the same rate as the growth during 1970 to 1996.

Table-2.1 Projected Population in Sergipe: 1997 – 2020

Unit: 1000 persons

Itam	Census	Projected Population								
ltem	1996	1997	1998	2000	2010	2020	% (*)			
Brazil	157,079	159,060	161,247	165,715	184,157	200,306	1.0			
Sergipe	1,624	1,654	1,685	1,750	2,163	2,778	2.3			
Urban	1,141	1,171	1,202	1,267	1,668	2,237	2.8			
Rural	483	483	483	483	495	541	0.5			
By Micro-region	i te ek		1.0		:	La Property				
Sergip. do SF	116	117	117	119	131	154	1.2			
Carira	57	58	59	60	70	85	1.7			
N. S. das Dores	54	54	. 55	56	63	73	1.3			
A. de Itabaiana	136	139	143	150	215	297	3.3			
Tobias Barreto	92	93	94	97	110	132	1.5			
A. de Lagarto	93	94	95	97	106	118	1.0			
Propria	82	83	84	- 86	110	152	2.6			
Cotinguiba	39	39	39	40	43	. 47	0.8			
Japaratuba	44	44	. 44	45	- 51	59	1.3			
B. Cotinguiba	70	71	72	75	91	115	2.1			
Aracaju	608	625	643	680	891	1,212	2.9			
Boquim	134	136	138	142	167	204	1.8			
Estancia	100	101	102	103	115	130	1.1			
By River Basin	.1					4.00	·			
Sao Francisco	225	226	228	232	266	332	1.6			
Japaratuba	91	95	95	97	116	. 147	1.4			
Sergipe	759	776	798	841	1,016	1,494	2.9			
Vaza Barris	165	160	163	168	203	253	1.8			
Piaui	273	284	287	294	331	. 380	1.8			
Real	111	113	114	118	141	172	2.0			

Source: Anuario Estatistico do Brazil 1996, IBGE

Contagem da População 1996, IBGE

Anuario Estatistico de Sergipe 1996, SEPLANTEC/SUPES

\* Annual growth rate between 1996 and 2020

### 2.2 GRDP Projection

The long-term projection of GRDP is also indispensable for formulating the future framework of the socio-economic structure in the project areas. Official GRDP projection is not available, even though the report of "Plano plurianual 1996-1999, Governo de Sergipe" tried to give the projection. Only the national development plan named "Perennial-Year Plan 1996-1999, Message from National Congress" proposed the target growth of 4.6% per annum on average during the planning period. The plan, however, presents the projections only until the year 1999. After that, no projection scenarios were suggested in any of the development plans, at present. Therefore, GDP and GRDP in the future are estimated on the following assumptions.

### (1) GDP

- 1) Until the year 1999, GDP will increase at the growth rates predicted in the national plan, and continue to grow at the same rate of 5% as proposed in the plan to the year 2000.
- 2) Beyond the year 2000, the growth rates were assumed to slow down to the followings: three-quarters (3.75%) of the growth (5.0%) at the end of 20 century for the first decade and two-quarter (2.5%) for the second decade.

### (2) - GRDP

- 1) Till the year 2000, GRDP of the state will increase at the same growth rates (5.0%) as GDP's growth after 1997.
- 2) Beyond the year 2000, GRDP is assumed to keep the same rate of 5.0%, in order to alleviate the economic disparity between the national average and state level.
- Agriculture Sector will be assumed to grow at the rate of 1% per annum after 1997. The growth rate of Industrial Sector and Services Sector after 1997 was estimated as shown in Table-2.2.

Table-2.2 GDP and GRDP Projection at 1998 Constant Prices

	Year 1995		1997	1998	2000	2010	2020
GD	P and GRDP (RS	billion at 1998	Constant Pri	ces) by Data a	nd References		
1)	Brazil	799.39	868.78	912.21	1,005.71	1,453.30	1,860.35
2)	Sergipe	4.43	4.89	5.13	5.66	9.22	15.02
	Agriculture	0.55	0.57	0.57	0.58	0.64	0.71
	Industry	1.34	1.49	1.57	1.75	2.95	4.93
	Services	2.54	2.83	2.99	3.33	5.63	9.38
Av	erage Growth Ra	te (% annum)					a shake the
1)	Brazil	1.80*	4.50	5.00	5.00	3.75	2.50
2)	Sergipe	1.33*	5.00	5.00	5.00	5.00	5.00
	Agriculture	- 4.88*	1.00	1.00	1.00	1.00	1.00
,	Industry	1.94*	5.57	5.55	5.55	5.38	5.25
	Services	3.90*	5.57	5.55	5.55	5.38	5.25

Source: Plano Pluriannual 1996-1999, Mensagem ao Congresso Nacional, GOB, MPO

Anuario Estatistico do Brazil 1996, IBGE

\* Annual growth rate between 1990 and 1995

Note: Based on Precos ao Consumidor, FGV and SUPES, in Table-1.13 for calculating 1998 constant price

By 2020, GRDP of the state will reach to R\$15.02 billion at 1998 constant prices as shown in Table-2.2. It was 3.4 times of that (R\$4.43 billion) in 1995. Thus, it accounted for 0.80% in Brazil, which become larger than the percentage (0.55%) in 1995.

GRDP per capita in 2020 was calculated at R\$5,400 at 1998 constant prices, as shown in Table-2.3. It was 1.95 times of that (R\$2,770) in 1995. It was 58% of the national average, which became larger than that (54%) in 1995. Thus, the regional disparity could shrink and the people's lives would get closer to the national level for this period.

Table-2.3 GRDP per Capita

Year	1995	1997	1998	2000	2010	2020
Population Proje	ction (million)			1 to 1		·
l) Brazil	154.97	159.06	161.07	165.72	184.16	200.31
2) Sergipe	1.60	1.65	1.68	1.75	2.16	2.78
Per Capita GDP	and GRDP(R\$)	)				
1) Brazil	5,160	5,460	5,660	6,070	7,890	9,290
2) Sergipe	2,770	2,960	3,050	3,230	4,270	5,400
Indices of Per Ca	pita G(R)DP to	1997 Value			·	
l) Brazil	_	1.00	1.04	1.11	1.44	1.70
2) Sergipe	_	1.00	1.03	1.10	1.44	1.83

Source: Plano Pluriannual 1996-1999, Mensagem ao Congresso Nacional, GOB, MPO Anuario Estatistico do Brasil, 1996, IBGE

### 2.3 Regional Socio-economic Framework

### 2.3.1 Present Regional Socio-economic Framework

Sergipe State, which is composed of 75 municipalities, is divided into 13 Homogeneous Micro-Regions (Microrregioes Homogeneas-MRH). In this section, these MRHs are used as regional unit because these units are used for statistical work by federal level and state level (hereinafter described as MRH).

The MRH is regional unit that is composed of several municipalities with similar natural and socio-economic conditions. And using this unit, estimated present regional socio-economic framework is summarized as follows. And the detail is shown in Table-2.4 and Table-2.5.

- Concentration of the State's population for central region (Grande Aracaju) composed of MRII-Aracaju and MRH-Baixo Cotinguiba is high and reaches about 42% of the State's one. Moreover, concentration level of 2nd & 3rd economic sector's GRDP in the same region is very high and reaches about 75 % of the State's one.
- Difference of the GRDP per Capita among MRHs is very large. The GRDP per capita of four MRHs, namely MRH- Sergipana do Sertao do Sao Francisco, Itabaiana, -Lagarto and -Estancia, which have regional core city, correspond to a level ranging approximately from 20% to 40% of GRDP per capita of the central region mentioned above. Other MRHs' GRDP per capita is estimated at a level of less than 20% of the central region's one.

Estimated Population of Sergipe State in 1997 Table-2.4

No 9 Nous - CARRIE	Urban Pop	ulation	Rural Pop	ulation	Total Pop	ulation	Urban/Total
No. & Name of MRII	Persons	%	Persons	%	Persons	%	(%)
01.Sergipana do Sertao do S.F.	54,047	4.6	62,418	12.9	116,465	7.0	46.4
02.Carira	29,899	2.5	28,135	5.8	58,035	3.5	51.5
03.Nossa Senhora das Dores	28,933	2.5	25,483	5.3	54,416	3.3	53.2
04. Agreste de Itabaiana	77,208	6.6	61,853	12.8	139,061	8.4	55.5
05. Tobias Barreto	50,575	4.3	42,533	8.8	93,108	5.6	54.3
06.Agreste de Lagarto	40,227	3.4	53,754	11.1	93,980	5.7	42.8
07.Propria	54,543	4.7	28,131	5.8	82,674	5.0	66.00
08.Cotinguiba	22,051	1.9	16,950	3.5	39,001	2.4	56.5
09. Japaratuba	18,239	1.6	25,839	5.4	44,079	2.7	41.4
10.Baixo Cotinguiba	58,553	5.0	12,923	2.7	71,457	4.3	81.9
11.Aracaju	613,690	52.4	11,044	2.3	624,734	37.8	98.2
12.Boquim	61,940	5.3	74,226	15.4	136,166	8.2	45.5
13.Estancia	60,898	5.2	39,731	8.2	100,629	6.1	60.5
Total or Average	1,170,784	100.0	483,022	100.0	1,653,806	100.0	70.8
River Basin							
Sao Francisco	114,768	9.8	111,050	23.0	225,818	13.7	50.8
Japaratuba	56,279	4.8	35,922	7.4	94,511	5.7	59.6
Sergipe	697,485	59.6	81,062	16.8	776,237	46.9	89.9
Vaza Barris	96,907	8.3	63,124	13.1	160,031	9.7	60.6
Piaui	149,958	12.8	134,232	27.8	284,190	17.2	52.8
Real	55,387	4.7	57,632	11.9	113,019	6.8	49.0

Source: Censo Demografico 1970,1980 & 1991 / IBGE Contagem da População 1996 / IBGE

Anuario Estatistico de Sergipe 1996 /SEPLANTEC, SUPES

Table-2.5 Estimated GRDP & GRDP per Capita in 1997 at 1998 Constant Prices

Unit: R\$ million for GRDP

							<del>,</del>
No. & Name of MRH	1st Se	ector	2nd & 3r	d Sector	Total of	GRDP	GRDP per
No. & Ivalle of MKH	GRDP	(%)	GRDP	(%)	GRDP	(%)	Capita (R\$)
01. Sergipana do Sertao do S.F.	86	15.2	157	3.6	243	5.0	2,090
02. Carira	39	6.8	9	0.2	48	1.0	830
03. Nossa Senhora das Dores	24	4.2	8	0.2	32	0.6	580
04. Agreste de Itabaiana	69	12.1	93	2.2	162	3.3	1,160
05. Tobias Barreto	33	5.8	45	1.1	. 78	1.6	840
06. Agreste de Lagarto	44	7.7	126	2.9	170	3.5	1,810
07. Propria	20	3.6	44	1.0	64	1.3	780
08. Cotinguiba	20	3.6	10	0.2	30	0.6	780
09. Japaratuba	24	4.1	27	0.6	51	1.0	1,160
10. Baixo Cotinguiba	46	8.0	739	17.1	785	16.1	10,980
11. Aracaju	30	5.2	2,859	66.2	2,889	59.1	4,620
12. Boquim	82	14.6	31	0.7	113	2.3	840
13. Estancia	53	9.1	172	4.0	225	4.6	2,230
Total or Average	570	100.0	4,320	100.0	4,890	100.0	2,960
River Basin	ing in the	1941	17 5 5 64.	1.00		17,30	
Sao Francisco	120	21.0	195	4.5	315	6.4	1,390
Japaratuba .	45	7.9	243	5.6	288	5.9	3,040
Sergipe	122	21.4	3,209	74.3	3,331	68.1	4,290
Vaza Barris	87	15.4	336	7.8	423	8.7	2,650
Piaui	129	22.5	280	6.5	409	8.4	1,440
Real	67	11.8	57	1.3	124	2.5	1,090

Source: Censo Agropecuario 1995-1996/ IBGE

Anuario Estatistico de Sergipe 1996/ SEPLANTEC, SUPES Anuario Estatistico do Brasil 1996/ IBGE

### 2.3.2 The Scenario for Regional Development Planning

Using the two planning factors regarding socio-economic situation, namely distribution planning of the state's population and GRDP, two scenario are drawn in order to formulate the regional development plan which displays the regional socio-economic framework at the target year.

- The Trend Scenario
   Scenario drawn under the condition that the present socio-economic framework will continue up to the target year without any change.
- The Strategic Scenario
  Scenario drawn under the basic policy of decentralization to solve or to avoid the foreseeable problems, such as over-concentrated situation of population and economic activity in the central region, and to alleviate the large socio-economic disparity among these MRHs that was estimated in the trend scenario.

### (1) The Trend Scenario

This scenario is drawn by distributing the state's scale estimation regarding the population and GRDP described in the previous section to MRHs with the following conditions.

- Primary Sector/Agriculture and Livestock/ per MRH: GRDP of this economic sector (1st Sector) per MRH is estimated by applying the ratio of production value per MRH and per municipality, based on the production value of agriculture's sector and livestock's sector per municipality shown in census of agriculture/livestock (Censo Agropecuario)-1995 with a precondition that ratio will continue up to the target year.
- Secondary and Tertiary Sector/ Industry and Commerce & Service/ per MRH: GRDP of these economic sectors (2nd and 3rd Sector) per MRH is estimated by applying the ratio of the Circulation and Service Tax (Imposto sobre Circulacao Mercadoria e Servicos-ICMS) per MRH and municipality, based on the collection of this tax per municipality shown in Statistic Year Book of Sergipe (Anuario Estatistico de Sergipe)-1996 with a precondition that ratio will continue up to the target year.
- Population by Area/Urban Population, Rural Population/ per MRII:
   Population by area per MRH is estimated by JICA Study Team by applying the same method used for estimation of population by Superintendence of Study and Research (SUPES) of the State Secretariat of Planning, Science and Technology (SEPLANTEC).

The remarkable prospective points of this scenario are shown as follows:

- The concentration ratio of population on central region rises from 42% to 48% and GRDP per capita of central region also rises from 75% to 80%.
- These two types of concentration on central region mentioned above mean that about half of state's population live in small area of the State (1,600 km², equivalent to 7% of the State's territory) and the greater part of economic activity is conducted in the same small area. And these may break out natural environmental problems such as preservation of coast area and urban environmental problems such as shortage of infrastructure in the water resources development works.

Table-2.6 Estimated Population of Sergipe State in 2020 (Trend Scenario)

No. & Name of MRH	Urban Pop	ulation	Rural Pop	ulation	Total Pop	ulation	Urban/Total
No. & Name of MKH	persons	%	persons	%	persons	%	(%)
01. Sergipana do Sertao do S.F.	107,262	4.8	46,819	8.7	154,082	5.6	69.6
02. Carira	61,605	2.7	23,466	4.3	85,071	3.1	72.4
03. Nossa Senhora das Dores	51,109	2.3	22,118	4.1	73,227	2.6	69.8
04. Agreste de Itabaiana	222,917	10.0	74,400	13.8	297,317	10.7	75.0
05. Tobias Barreto	95,376	4.3	36,275	6.7	131,651	4.7	72.5
06. Agreste de Lagarto	62,662	2.8	55,716	10.3	118,378	4.3	52.9
07. Propria	127,681	5.7	23,912	4.4	151,593	5.5	84.2
08. Cotinguiba	30,344	1.4	16,974	3.1	47,318	1.7	64.1
09. Japaratuba	33,732	1.5	25,598	4.7	59,330	2.1	56.9
10. Baixo Cotinguiba	106,042	4.7	9,116	1.7	115,157	4.1	92.1
11. Aracaju	1,147,670	51.3	64,075	11.8	1,211,745	43.6	94.7
12. Boquim	111,393	5.0	92,210	17.1	203,602	7.3	54.7
13. Estancia	79,515	3.5	50,359	9.3	129,874	4.7	61.2
Total or Average	2,237,309	100.0	541,037	100.0	2,778,346	100.0	80.5
River Basin					in the first of	- E	
Sao Francisco	239,204	10.7	92,410	17.1	331,614	11.9	72.1
Japaratuba	105,418	4.7	41,594	7.7	147,012	5.3	71.7
Sergipe	1,370,935	61.3	123,820	22.9	1,494,755	53.8	91.7
Vaza Barris	188,050	8.4	64,787	12.0	252,837	9.1	74.4
Piaui	234,054	10.5	146,162	27.0	380,216	13.7	61.6
Real	99,648	4.4	72,264	13.3	171,912	6.2	58.0

Table-2.7 Estimated GRDP & GRDP per Capita in 2020 at 1998 Constant Prices (Trend Scenario)

Unit: R\$ million for GRDP 1st Sector 2nd & 3rd Sector Total of GRDP GRDP per No. & Name of MRH GRDP **GRDP** GRDP Capita (R\$) (%) (%) (%) 01. Sergipana do Sertao do S.F. 108 15.2 519 3.6 627 4.2 4,070 02. Carira 48 6.8 30 0.2 78 0.5 920 760 03. Nossa Senhora das Dores 30 4.2 **26** 0.256 0.4 04. Agreste de Itabaiana 85 12.1 308 2.2 393 2.6 1,320 05. Tobias Barreto 41 191 5.8 150 1.1 1.3 1,450 06. Agreste de Lagarto 55 7.7 416 2.9 471 3,980 3.1 25 07. Propria 3.6 145 1.Ò 170 1.1 1,120 08. Cotinguiba 25 3.5 33 0.21,230 58 0.4 09. Japaratuba 29 4.1 92 0.6 121 0.8 2,040 2,447 10. Baixo Cotinguiba 59 8.1 17.1 2,506 16.7 21,750 11. Araçaju 37 9,473 5.2 66.2 9,510 63.3 7,850 12. Boguim 103 14.6 102 0.7 205 1.4 1,010 13. Estancia 65 9.1 569 4.0 4.2 634 4,880 Total or Average 710 100.0 14,310 100.0 15,020 100.0 5,400 River Basin Sao Francisco 149 21.0 614 763 5.1 2.300 4.3 927 7.9 983 Japaratuba 56 6.5 6.5 6,690 Sergipe 150 21.2 10,718 74.9 10,868 72.4 7,270 Vaza Barris 109 15.4 931 6.5 1,040 6.9 4,110 Piaui 162 22.8 931 1,093 6.5 7.3 2,870 Real 84 11.7 189 1.3 273 1.8 1,590

The rise of GRDP per capita in central region is estimated to be about R\$3,700 but the rises of GRDP per capita in other MRHs range from R\$100 to R\$2,700. It means that the difference of socio-economic condition among MRHs will become wider.

### (2) The Strategic Scenario

This scenario is drawn under preconditions as follows in order to improve the negative part estimated in the Trend Scenario. The outline of this scenario is shown in Table-2.9 and Table-2.10. Also, the method of decentralization of population and economic activity is shown in Table-2.8.

- Primary Sector per MRH:
  - Increment of GRDP is distributed to some MRHs based on the analysis and the planning which is described in the section 2.4. MRHs which receive the distribution are 7 MRH, namely MRH-Sergipana do Sertao do Sao Francisco, MRH-Agreste Itabaiana, MRH-Tobias Barreto, MRH-Agreste de Lagarto, MRH-Propria, MRH-Japaratuba, MRH-Estancia. But the domestic water demand for workers who move to planned irrigation sites is negligibly small compared to the irrigation water demand; therefore, the number of worker is not estimated.
- Secondary Sector and Tertiary Sector per MRH: A part (15%) of the 2nd and 3rd Sector's GRDP of municipality Aracaju is distributed to some MRHs based on the various alternative study. And also, a part of urban population is distributed to same MRHs as its GRDP's distribution; therefore, the estimation regarding number of immigrants is shown in Table-2.8.

Table-2.8 Distribution of GRDP by Sector & Urban Population with Strategic Scenario (2020)

Unit: R\$ million for GRDP

			<b>_</b>	unt : K\$ imino	II IOI OKDI	
1st S	ector			Distribution of Urban Population		
Area(ha)	GRDP	GRDP	(%)	(Persons)	(%)	
24,709	76.4	284.20	20.0	43,860	20.0	
0	0.0	0	0	0	0	
0	0.0	0	0	0	0	
2,452	7.6	284.20	20.0	43,860	20.0	
225	0.7	0	0	0	0	
3,203	9.9	284.20	20.0	43,860	20.0	
13,483	41.6	142.10	10.0	21,930	10.0	
0	0.0	71.05	5.0	10,963	5.0	
890	2.7	71.05	5.0	10,963	5.0	
0	0.0	0	0	0	0	
0	0.0	-1,421.00	-100.0	-219,294	-100.0	
0	0.0	0	0	0	0	
370	i.l	284.20	20.0	43,858	20.0	
46,332	140.00	0	0	0	0	
	Area(ha) 24,709 0 0 2,452 225 3,203 13,483 0 890 0 0 370	24,709         76.4           0         0.0           0         0.0           2,452         7.6           225         0.7           3,203         9.9           13,483         41.6           0         0.0           890         2.7           0         0.0           0         0.0           0         0.0           370         1.1	Ist Sector         GR           Area(ha)         GRDP         GRDP           24,709         76.4         284.20           0         0.0         0           0         0.0         0           2,452         7.6         284.20           225         0.7         0           3,203         9.9         284.20           13,483         41.6         142.10           0         0.0         71.05           890         2.7         71.05           0         0.0         0           0         0.0         0           0         0.0         0           370         1.1         284.20	1st Sector         2nd & 3rd Sector GRDP           Area(ha)         GRDP         GRDP         (%)           24,709         76.4         284.20         20.0           0         0.0         0         0           0         0.0         0         0           2,452         7.6         284.20         20.0           225         0.7         0         0           3,203         9.9         284.20         20.0           13,483         41.6         142.10         10.0           0         0.0         71.05         5.0           890         2.7         71.05         5.0           0         0.0         0         0           0         0.0         0         0           0         0.0         0         0           0         0.0         -1,421.00         -100.0           0         0.0         0         0           370         1.1         284.20         20.0	1st Sector         2nd & 3rd Sector GRDP         Distribu Urban Po Urban Po Urban Po Urban Po Urban Po Urban Po (%)           Area(ha)         GRDP         GRDP         (%)         (Persons)           24,709         76.4         284.20         20.0         43,860           0         0.0         0         0         0           2,452         7.6         284.20         20.0         43,860           225         0.7         0         0         0           3,203         9.9         284.20         20.0         43,860           13,483         41.6         142.10         10.0         21,930           0         0.0         71.05         5.0         10,963           890         2.7         71.05         5.0         10,963           0         0.0         0         0         0           0         0.0         0         0         -219,294           0         0.0         0         0         0           370         1.1         284.20         20.0         43,858	

Note-1: The number of distribution urban population = Total urban population in 2020 / Total GRDP by 2nd & 3rd Sector in 2020 = 190 person/million R\$ GRDP

Note-2: Distribution GRDP by 1st Sector = Increase of GRDP of 1st Sector until 2020(140 million R\$) / Irrigation area existents & projected (46,322 ha) = 3,020.00 R\$/ ha

Table-2.9 Estimated GRDP & GRDP per Capita in 2020 at 1998 Constant Prices (Strategic Scenario)

Unit: R\$ million for GRDP

					Unit	: K2 miii	ion for GRDP
No. & Nome of MDII	1st Se	ctor	2nd & 3rd	Sector	Total of C	RDP	GRDP per
No. & Name of MRH	GRDP	(%)	GRDP	(%)	GRDP	(%)	Capita (R\$)
01. Sergipana do Sertao do S.F.	162	22.9	804	5.6	966	6.5	4,910
02. Carira	39	5.5	30	0.2	69	0.5	800
03. Nossa Senhora das Dores	24	3.4	26	0.2	50	0.3	670
04. Agreste de Itabaiana	76	10.7	592	4.1	668	4.5	1,960
05. Tobias Barreto	34	4.7	150	1.1	184	1.2	1,390
06. Agreste de Lagarto	54	7.5	700	4.9	754	5.0	4,650
07. Propria	62	8.7	287	2.0	349	2.3	2,020
08. Cotinguiba	20	2.9	104	0.7	124	0.8	2,130
09. Japaratuba	27	3.8	163	1.1	190	1.3	2,680
10. Baixo Cotinguiba	46	6.5	2,447	17.1	2,493	16.6	21,640
11. Aracaju	30	4.2	8,052	56.3	8,082	53.8	8,140
12. Boquim	82	11.6	102	0.7	184	1.2	900
13. Estancia	54	7.6	853	6.0	907	6.0	5,220
Total or Average	710	100.0	14,310	100.0	15,020	100.0	5,400
River Basin							
Sao Francisco	238	33.6	1,024	7.2	1,262	8.4	3,190
Japaratuba	47	6.6	1,033	7.2	1,080	7.2	6,610
Sergipe	129	18.1	9,552	66.7	9,681	64.5	7,300
Vaza Barris	93	13.1	1,101	7.7	1,194	7.9	4,460
Piaui	135	19.1	1,403	9.8	1,538	10.2	3,390
Real	68	9.5	197	1.4	265	1.8	1,540

Table-2.10 Estimated Population of Sergipe in 2020 (Strategic Scenario)

<u>.</u>	and the state of t	the second particles			and the second second		
No. & Name of MRH	Urban por	oulation	Rural Pop	ulation	Total Pop	ulation	Urban/Total
140. & Name of WKH	persons	%	persons	%	persons	%	(%)
01. Sergipana do Sertao do S.F.	151,122	6.7	46,819	8.7	197,942	7.1	76.4
02. Carira	61,605	2.8	23,466	4.3	85,071	3.1	72.4
03. Nossa Senhora das Dores	51,109	2.3	22,118	4.1	73,227	2.6	69.8
04. Agreste de Itabaiana	266,777	11.9	74,400	13.8	341,177	12.3	78.2
05. Tobias Barreto	95,376	4.3	36,275	6.7	131,651	4.7	72.5
06. Agreste de Lagarto	106,522	4.8	55,716	10.3	162,238	5.8	65.7
07. Propria	149,611	6.7	23,912	4.4	173,523	6.3	86.2
08. Cotinguiba	41,307	1.8	16,974	3.1	58,281	2.1	70.9
09. Japaratuba	44,695	2.0	25,598	4.7	70,293	2.5	63.6
10. Baixo Cotinguiba	106,042	4.7	9,116	1.7	115,157	4.1	92.1
11. Aracaju	928,376	41.5	64,075	11.9	992,451	35.8	93.5
12. Boquim	111,393	5.0	92,210	17.0	203,602	7.3	54.7
13. Estancia	123,373	5.5	50,359	9.3	173,732	6.3	71.0
Total or Average	2,237,309	100.0	541,037	100.0	2,778,346	100.0	80.5
River Basin							Britania in i
Sao Francisco	303,164	13.8	92,410	17.1	395,574	14.2	76.6
Japaratuba	121,865	5.2	41,594	7.7	163,459	5.9	74.6
Sergipe	1,202,811	41.9	123,821	22.9	1,326,632	47.8	90.7
Vaza Barris	202,669	21.4	64,787	12.0	267,456	9.6	75.8
Piaui	307,152	13.3	146,162	27.0	453,314	16.3	67.8
Real	99,648	4.4	72,263	13.3	171,911	6.2	58.0
•		-	and the second second second			4.1	

MRHs which receive the distribution of this GRDP are also studied from various view points regarding socio-economic and natural potential such as estimated urban population, estimated sector's GRDP and accessibility to water resource. And MRHs which receive the distribution are 7 MRH, namely MRH-Sergipana do Sertao do Sao Francisco, MRII-Agreste Itabaiana, MRII-Agreste de Lagarto, MRH-Propria, MRH-Cotinguiba, MRII-Japaratuba and MRII-Estancia.

### 2.3.3 Scenario to be applied for the Study

The Strategic Scenario is applied to the formulation of the Master Plan of Water Resources Development for the reasons as follows:

- Prospective high level of concentration of population and economic activity in the central region estimated in Trend Scenario has quite a possibility which breaks out the new problems regarding social and environmental fields. And it needs a large amount of investment to solve these problems. For this reason, the regional planning led from decentralized scenario should be selected.
- A harmonized development planning of the state is expected with a full use of water resources, other natural resources and human resources. From these viewpoints, the decentralized progress is considered desirable.

# **APPENDIX-1**

Distribution of Basin Area by Municipality

Appendix-1 Distribution of Basin Area by Municipality

	Name of Municipality			Rive	r Basin			(km²	Distribution of urban population
Code	and Region	Sao Francisco	Japaratuba	Sergipe	Vaza Barris	Piaui	Real	Total	in the municipalities   located in two or more river basin
1-0120	Caninde do São Francisco	908.2	<del></del>					908.2	Realed in two of more liver passa
	Feira Nova		27.4	161.9				189.3	Japaratuba 50%: Sergipe 50%
	Gararu Gracho Cardoso	640.4 142.9	93.3					640.4 236.2	Sao Francisco 50%: Japaratuka 5
1-0310		202.9	25.5					202.9	SOOF FURCISED SOME SUITABLE ST
	Monte Alegre de Sergipe	418.5						418.5	
	Nossa Senhora da Gloria	471.5		273.9				745.4	Soo Francisco 50%: Sergipe 50%
	Poco Redondo Porto da Folha	1220.0 895.1						1220.0 895.1	
02-0140		077.1		296.4	338.2			634.6	Vaza Barris 100%
	Frei Paulo			68.2	338.6			406 8	Vaza Barris 100%
02-0445	Nossa Senhora Aparecida			347.1				347.1	
	Pedra Mole				79.0			79.0	
02-0520 02-0600	rinnao Ribeiropolis			263.0	152.7			152.7 263.0	
	Aquidaba	241.5	128.7	203.0				370.2	São Francisco 100%
03-0190	Cumbe		131.4					131.4	
	Malhada dos Bois	53.4	5.9					59.3	Sao Francisco 100%
	Muribeca Nossa Senhora das Dores	25.5	56.5 54.2	428.4				82.0 482.6	Japaratuba 100% Japaratuba 50%: Sergipe 50%
	Sao Miguel do Aleixo		31.2	143.3				143.3	July and a second second second
04-0050	Arcia Branca			86.8	42.3			129,0	Sergipe 100%
	Campo do Brito			1540	200.8			200.8	F: 1000/
	Itabaiana Macambira			154.8	183.6 137,4			338.4 137.4	Sergipe 100%
	Malhador			102 2	131,4			102.2	
	Moita Bonita			95.7				95.7	
	Sao Domingos				102 3	10.0	262.2	102.3	D3 1000/
	Poco Verde Simao Dias				135.8	18.0 413.8	362.7 11.2	380.7 560.8	Real 100% Piaut 100%
	Tobias Barreto				133.0	42.7	1076.4	1119.1	Real 100%
06-0350	Lagarto				208.8	753.7		962.5	Piani 100%
	Riachao do Dantas	20.0				391.9	136.5	528.4	Piaui 100%
	Amparo de São Francisco Brejo Grande	39.8 149.2						39,8 149,2	
	Canhoba	165.8						165.8	
07-0160	Cedro de São João	73.0						73.0	
	Ilha das Flores	57.6						57.6	
	Neopolis Nossa Senhora de Lourdes	249,9 80,6						249.9 80.6	
	Propria	95.5						95.5	
07-0730	Telha	56.5						56.5	
	Santana de São Francisco	47.0						47.0	
08-0130			431.9	78.2				431.9 93.0	Carolina 1009/
	Divina Pastora Santa Rosa de Lima		14.8	65.2				66.2	Sergipe 100%
08-0720		·	123.4	43.7				167.1	Japaratuba 100%
	Japaratuba	90.2	283.8					374.0	Japaratuba 100%
	Japoata	332.9 407.3	64.5					397.4 407.3	São Francisco 100%
	Pacatuba Pirambu	138.8	60.4					199.2	Japaratuba 100%
	Sao Francisco	72.2	14.6					85,8	São Francisco 100%
	Carmopolis		40.0					49.0	
	General Maynard		18.1	163.4				18.1 163.4	
10-0300	Laranjeiras Maruim		10.5	81.7				95.2	Sergipe 100%
	Riachuelo			78.6				78.6	0
	Rosano do Catete		80.7	23.2				103.8	Japaratuba 100%
	Santo Amaro das Brotas		70.8	167.1	85.5			237.9	Sergipe 100%
	Aracaju Barra dos Coqueiros		11.2	96.3 76.7	6,0			181.8 87.9	Sergipe 100% Sergipe 100%
	Nossa Senhora do Socorro			157.2				157.2	co.g.yc tooss
11-0670	Sao Cristovao	•		183.3	249.1			432.4	Vaza Barris 100%
12-0040	Araua					194.6		191.6	
	Boquim Cristinapolis					213.6	251.3	213.6 251.3	
	Itabaianinha					301.6	178.4	430.0	Piaul 50%: Real 50%
	Pedrinhas					39.9		39.9	
	Salgado					255.8	1171	255,8	
	Tomar do Geru Umbauba					74.1	337.1 50.0	337.1 124.1	Piaui 100%
	Estancia					649.6	30.0	649.6	11021 100/6
	Indiareba					156.9	154.5	311.4	Real 160%
	Itaporanga D'Ajuda	•		32.9	304.9	419.5		757.3	Vaza Barris 100%
	Santa Luzia do Itanhy					336.2		336.2	
01- Serg	jipana do Sertao do São Francisco	4899.6	120.7	435.8				5456.0	
02- Cari		320.4	376.7	974.7 571.7	908.5			1883.2 1268.8	
	sa Senhora das Dores este de Itabaiana	320.4	310.7	571.7 439,4	666.4			1105.8	
	ias Barrelo				135.8	474.6	1450.3	2060.6	
06-Agr	este de Lagarto				208.8	1145,6	136.5	1490.9	
07- Proj		1014.9	120.1					1014.9	
08- Cet 09- Japa		1041.4	570.1 423.3	188.1				758.2 1464.7	
	aratuba xo Cotinguiba	1041,4	220.1	516.9				737.0	
11-Arac			11.2	513.5	334,6			859.3	
12- Bog	เน้าท				***	1079.6	816.8	1896.4	
13- Esta	incia			32.9	304.9	1562.2	154 5	2054.5	
Sertão S	Sergipano (01-02)	4899.6	120.7	1410.5	908.5			7339.2	
Agreste	Sergipano (03-06)	320.4	376.7	1011.1	1011.0	1620.1	1586.8	5926.1	
	ergipano (07-13)	2056.3	1224.6	1251.4	639.5	2641.9	971.2	8785.0	

# **APPENDIX-2**

Census and Projected Population of Sergipe State

Appendix-2 (1) Census and Projected Population of Sergipe State in Urban Area

Color   Colo	1	Name of Municipality		Cenais Population Projected Popul											
50   50   50   50   50   50   50   50	Code		1970			1996	1997				2020				
0.0000 Gars			357		5,322	7,877	8,154			12,781	18,060	9,045	26,811	47,299	
0.0250 Grache Carlos														11,436	
0.1000   More Alegned Sterije			1,241	1,742	1,855	2,066	2,111	2,157	2,252	2,720	3,465	2,252	2,720	3,465	
1.00000   Proc Roberdo   2019   2019   12,591   15,481   15,429   16,700   12,701														3,525	
0.000 Proces fields 0.101 Cares 0.2014 Cares														42,353	
0.0216  Celina   2.284   4777   7.415   8.600   4.870   5.115   5.271   5.27														16,870	
20.0169   1.000   1.														17,628	
0.000   Archael   147   149														14,415	
0.0000   Recircular   1.000														1,553	
0.0000 Agaidab														5,460	
6-0-000   Cloride   1-02   1-02   1-02   1-02   1-02   1-02   1-03   1														15,837	
Octobe   O	03-0190	Cumbe												3,314	
10-140  News Serkward at December   1971   1972   1970   1973   1381   1345   1548   1248   1345   1248   1346														4,639	
Georgia Serial Bisses	03-0460	Nossa Senhora das Dores		7,151	10.982	12,309		12,884	13,435	16 544		13,485	16,544	21,282	
GA-100   Cargo do Bitto														60,269	
64-070   Meam∈	04-0100	Campo do Brito	2,415	2,735	4,911	6,678	7,101	7,552	8,539	17,957	29,197	8,539	17,957	29,197	
George   Mahake   2022   2,664   4,727   4,647   4,728   4,929   5,455   6,345   4,929   5,455   6,345   6,945   6,946   6,9														148 134	
0.06505 Sa-Derriegos			2,022	2,664	4,327	4,647		4,782		5,455	6,545	4,920	5,455	6,545	
60-650  Peca Netale														7,309	
50-000  Tekins Burston   6,703   12,812   21,853   25,165   23,888   26,0612   22,143   3,848   69,127   22,143   3,546   40,265   40,000   40,00														15,953	
66.055  Richards Olbertas														30,196	
66 059   Richas do Braisa   2012   2139   3130   3447   3500   4,076   4,318   5,714   7,691   4,318   5,714   7,691   6,7010														98.830	
Octobal   Color   Co	06-0580	Riachao do Dantas	2,032	2,329	3,330	3,847	3,960	4,076	4,318	5,714	7,691	4,318	5,714	7,691	
07-0110 Cesheks														1 631 5 703	
00-070   Bada Harses   3,045   3,855   3,181   3,501   3,501   3,611   3,744   4,448   5,555   3,781   4,448   4,481	07-0110	Canhoba	1,219	1,265	1,353	1,450	1,470	1,491	1,533	1,691	2,022	1,533	1,691	2.022	
07-010 Nespecis 07-0170 Nespecis 07-0170 Nespecis 08-06-08-08-08-08-08-08-08-08-08-08-08-08-08-														4,091	
07-0730 Progrås														63,110	
07-070 Teba 07-070 Teba 07-070 Teba 07-070 Sastana de Sao Francisco 0 0 0 3,746 4025 4,724 4,925 4,724 1,725 1,385 979 1,125 1,385 6,000 Dichar Pateria 08-070 Dichar Pateria 1,125 1,166 1,155 1,165 1,155 1,155 1,155 1,155 1,171 1,180 1,185														6,528	
Composition														1,386	
School Divina Pastora   1,125   1,166   1,555   1,687   1,715   1,714   1,391   2,003   2,494   1,891   2,003   2,003   2,003   2,009   2,00	07-9999	Santana de São Francisco	0	0	0	3,746	4,025	4,324	4,992	12,353	20,968	4,992	12,353	20,968	
Section   1,547   1,483   1,485   1,925   1,962   2,001   2,007   2,445   3,058   2,007   2,445   3,058   3,007   3,040   3,099   4,401   6,190   6,746   6,863   6,982   7,227   8,853   10,194   7,227   10,859   15,67   3,000   3,000   4,001   6,190   6,746   6,863   6,982   7,227   8,853   10,194   7,227   10,859   15,67   3,000   4,000   6,746   6,863   6,982   7,227   8,853   10,194   7,227   10,859   15,67   3,000   4,000   6,746   6,863   6,982   7,227   8,853   10,194   7,227   10,859   15,67   3,000   4,000   6,746   6,863   6,982   7,227   2,875   3,151   3,160   3,897   4,500   3,500   4,														30,781 2,491	
09-0349 Japana												2,079		3,058	
09-040 Japonta 2,65 2,599 3,325 3,507 3,545 3,583 3,660 3,897 4,529 3,660 3,897 4,529 09-040 Pearluba 09-040 Septiandu 1,014 1,555 2,626 3,435 3,625 3,835 4,238 7,999 12,467 4,238 7,999 12,467 1,000 1,000 Septiandu 1,014 1,555 2,626 3,435 3,625 3,835 4,238 7,999 12,467 4,238 7,999 12,467 1,000 1,000 Septiandu 1,001 1,000 Septiandu 1,001 1,000 Septiandu 1,001 1,000														4,976	
90-9550 Piaruku   1,014   1,555   2,656   3,435   3,625   3,825   4,238   7,999   12,467   4,238   7,999   12,467   4,238   7,999   12,467   4,238   7,999   12,467   3,367   3,367   3,361   1,00150 Carmopolis   2,387   3,665   3,516   6,451   6,644   6,947   7,481   11,021   15,643   7,481   11,023   15,684   11,023   11,024   11,024   11,024   11,024   11,024   11,024   11,02														4,529	
09-090 So Francisco 1382 1,490 1,731 1,947 1,992 2,038 2,133 2,617 3,367 2,133 2,617 3,35 (19015) Curraçofics 1287 3,065 3,516 6,541 6,694 6,947 7,981 11,021 15,684 7,481 11,023 15,684 1,985 1,981 10,021 15,684 1,985 2,538 1,644 1,985 2,538 1,644 1,985 2,531 1,040														8,656	
10-0150 Carmopolis   2387 3,065 5,361 6,451 6,694 6,947 7,481 11,023 15,684 7,481 11,023 15,681 0-02150 Central Maynard   1,015 1,109 1,140 1,496 1,529 1,535 1,614 1,985 2,533 1,634 1,985 2,533 10-0160 Laracjiciras   4,551 6,553 16,020 19245 19,964 20,710 22,287 32,692 46,416 22,287 32,692 46,416 0-0200 Maxim   6,225 8,457 11,105 10,378 10,383 10,739 10,700 9,780 9,881 10,700 9,780 9,881 10,000 9,780 9,981 10,000 9,780 9,881 10,000 9,780 9,881 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,981 10,000 9,780 9,991														3,367	
10-050   Larangierius	10-0150	Carmopolis	2,387	3,065	5,361	6,451	6,691	6,947	7,481	11,023	15,684	7,431	11,023	15,684	
10-020   Marulim														2,538 46,416	
10-0610   Rosario do Catere   19-03   29-19   4,454   5,406   5,502   5,812   6,312   9,522   13,699   6,312   9,522   13,691   1,000   1,00	10-0400	Maruim	6,235	8,457	11,105	10,878	10,833	10,789	10,700	9,780	9,851	10,790	9,780	9,851	
10-0600 Sario Amazo dia Brotas   2483   5,388   7,223   7,755   7,761   7,768   7,781   7,467   7,910   7,781   7,467   7,910   7,781   7,467   7,911   7,467   7,467   7,911   7,467   7,467   7,911   7,467   7,46														9,943	
11-0000 Bara for Coqueiros   3,508 5,500													7,467	7,910	
11-0130 Nossa Senhera do Socorro														602,002	
12-0040 Arzus														224,500	
12-0067   Boquim														89,231	
12-0170 Cristinagotis 2,136 3,205 4,921 5,360 5,452 5,546 5,739 6,575 8,078 5,739 6,575 8,078 12-0300 Itabalarinha 3,907 7,468 12,131 13,593 13,906 14,226 14,888 18,253 22,471 14,988 14,988 11,701 15,244 18,981 18,484 29,85 13,030 22,488 14,288 14				.,					.,		0,332			23.789	
12-0510 Pedrinhas  1,824 2,243 4,831 5,514 5,650 5,790 6,079 7,604 9,901 6,079 7,604 9,901 12-0520 Stagado  1,868 2,212 3,629 4,549 4,759 4,979 5,450 8,966 13,451 5,450 8,966 13,451 12-0520 Tomar do Geru  895 1,851 3,027 3,663 3,805 3,953 4,267 6,381 9,149 4,267 6,381 9,149 12-0760 Urskauba  2,176 4,313 8,103 9,222 9,464 9,712 10,222 13,032 17,159 10,227 13,032 17,151 13-0210 Estarcia  13-0280 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,588 4,694 5,505 13-0320 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  13-0280 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  13-0280 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  13-0380 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  13-0380 Indiaroba  2,163 2,669 3,923 4,159 4,208 4,257 4,358 4,694 5,505 4,358 4,694 5,505 13-0320 Indiaroba  13-0380 Indiaroba  1,146 1,418 1,868 2,257 2,344 2,434 2,626 3,912 5,596 2,626	12-0170	Cristinapolis	2,136	3,205	4,921	5,360	5,452	5,546	5,739	6,575	8,078	5,739	6,575	8,078	
12-0600   Salgado   1,858   2,212   3,629   4,549   4,759   4,970   5,450   8,996   13,451   5,450   8,996   13,451   12-0750   Tomar do Genu   895   1,861   3,027   3,663   3,805   3,953   4,267   6,381   9,149   4,267   6,381   9,149   1,20760   Umbauba   2,176   4,313   8,103   9,222   9,464   9,712   10,227   13,032   17,159   13,032   17,159   13,032   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   13,032   13,033   10,242   13,032   13,032   13,033   13,032   13,033   10,242   13,032   13,032   13,033   1														9,901	
12-0760 Umbauba	12-0620	Salgado -	1,868	2,212	3,629	4,549	4,759	4,979	5.450	8 996	13,457	5,450	8,996	13,457	
13-0210   Estancia   20,265   28,001   44,356   45,764   46,051   46,923   49,949   53,170   46,923   61,540   82,46   13-0280   Indiaroba   2,163   2,669   3,923   4,159   4,208   4,257   4,358   4,694   5,505   4,358   4,694   5,506   13-020   Indiaroba   13-020   Indiaroba   1,146   1,418   1,868   2,257   2,344   2,434   2,626   3,912   5,596   3,912   5,196   3,913   3,914   3,912														9,149 17,159	
13-0320	13-0210	Estancia			44.356	45,764	46,051	46,340	46,923	49,949	53,170	46,923	61,540	82,400	
13-0630 Santa Luzia do Itanhy														5,505	
02- Carria  9,448 15,192 24,857 28,990 29,899 30,839 32,811 44,928 61,605 32,811 44,928 61,60  03- Nossa Senbrua das Doces 15,256 18,095 25,044 28,242 28,933 29,641 31,115 39,127 51,109 31,115 39,126 51,044  04- Agreese de Itabañana 24,097 36,592 61,033 74,175 77,208 80,397 87,281 147,508 222,917 87,281 168,476 26,677  05- Tobias Barneto 15,226 24,896 42,869 49,200 50,575 51,988 54,934 71,525 95,376 54,934 71,525 95,376  06- Agreese de Lagarto 14,664 21,657 35,863 39,464 40,227 41,004 42,607 51,992 62,662 42,607 70,962 106,52  07- Propria 38,344 41,718 45,911 53,096 54,543 56,071 59,395 84,897 127,681 59,395 99,455 149,61  08- Cotinguiba 10,937 13,697 20,347 21,756 22,051 22,351 22,966 26,142 30,344 22,966 30,585 41,30  09- Japarabcha 8,552 11,201 15,895 17,816 18,239 18,677 19,599 25,771 33,732 19,599 30,595 44,60  10- Baixo Cotinguiba 21,709 31,631 51,403 57,215 88,533 59,880 62,724 80,307 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,0														5,596	
02- Carria  9,448 15,192 24,857 28,990 29,899 30,839 32,811 44,928 61,605 32,811 44,928 61,60  03- Nossa Senbrua das Doces 15,256 18,095 25,044 28,242 28,933 29,641 31,115 39,127 51,109 31,115 39,126 51,044  04- Agreese de Itabañana 24,097 36,592 61,033 74,175 77,208 80,397 87,281 147,508 222,917 87,281 168,476 26,677  05- Tobias Barneto 15,226 24,896 42,869 49,200 50,575 51,988 54,934 71,525 95,376 54,934 71,525 95,376  06- Agreese de Lagarto 14,664 21,657 35,863 39,464 40,227 41,004 42,607 51,992 62,662 42,607 70,962 106,52  07- Propria 38,344 41,718 45,911 53,096 54,543 56,071 59,395 84,897 127,681 59,395 99,455 149,61  08- Cotinguiba 10,937 13,697 20,347 21,756 22,051 22,351 22,966 26,142 30,344 22,966 30,585 41,30  09- Japarabcha 8,552 11,201 15,895 17,816 18,239 18,677 19,599 25,771 33,732 19,599 30,595 44,60  10- Baixo Cotinguiba 21,709 31,631 51,403 57,215 88,533 59,880 62,724 80,307 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,007 106,002 62,724 80,0	01- Sere	icana do Sertao do Sao Francisco	15,704	26,629	44,464	52,553	54,047	55,592	58,838	79,353	107,262	58,833	99,908	151,121	
04. Agreste de Itabiana 24,097 36,592 61,033 74,175 77,208 80,397 87,281 147,508 222,917 87,281 168,476 266,77 05- Tobias Baratio 15,226 24,896 42,899 49,200 50,515 51,988 54,934 71,525 95,376 54,934 71,525 95,376 06- Agreste de Itagarto 14,664 21,657 35,858 39,464 40,227 41,034 42,607 51,592 62,662 42,607 70,962 106,52 07- Propria 38,341 41,778 46,911 53,096 54,543 56,071 59,395 84,897 127,681 59,395 99,455 149,61 06- Colinguiba 10,937 13,697 20,347 21,756 22,095 22,351 22,965 26,162 10,334 22,966 30,585 41,961 09,100 10	02- Care	a .	9,448	15,192	24,857	28,990	29,899	30,839	32,811	44,928	61,605	32,811	41,928	61,605	
05- Tobias Barreto 15,226 24,896 42,869 49,200 50,515 51,988 54,934 71,525 95,376 54,934 71,525 95,37   06- Agreste de Lagarto 14,664 21,657 35,883 39,464 40,227 41,004 42,607 51,992 62,662 42,607 70,962 106,52   07- Proçeia 38,341 41,778 45,911 53,096 54,543 56,071 59,395 84,897 127,681 59,395 99,455 149,61   08- Colinguiba 10,937 13,697 20,347 21,756 22,051 22,351 22,966 26,142 30,344 22,966 30,585 41,30   09- Japarascha 85,52 11,201 15,895 17,816 18,239 18,677 19,599 25,771 33,732 19,599 30,595 44,60   10- Baixo Colinguiba 21,709 31,681 51,408 37,215 85,533 59,880 62,724 80,307 106,042 62,724 80,307 106,04														51,109 266,776	
07- Propria 38,341 41,778 45,911 53,096 54,543 56,071 59,395 84,897 127,681 59,395 99,455 149,61 68- Cotinguiba 10,937 13,697 20,347 21,766 22,051 22,351 22,965 26,142 30,344 22,966 30,585 41,30 69- Jagarancha 8,552 11,201 15,895 17,816 18,239 18,677 19,599 25,771 33,732 19,599 30,595 44,69 10- Baivo Cotinguiba 21,709 31,681 51,403 57,235 58,533 59,880 62,724 80,307 106,042 62,724 80,307 106,041 11- Aracaju 199,139 311,930 523,032 597,339 613,690 630,479 665,490 861,530 1,147,670 665,490 758,436 928,37 12- Boquim 19,636 32,627 53,424 60,424 61,940 63,498 66,744 84,766 111,393 66,744 84,765 111,39 13- Estancia 27,307 37,018 57,225 60,239 60,898 61,549 62,887 70,255 79,515 62,887 88,632 123,37				24,895	42,869	49,200	50,575	51,983	54,934	71,525	95,376	54,934	71,525	95,376	
C8. Codinguiba         10,937         13,697         20,347         21,756         22,051         22,351         22,966         26,142         30,344         22,966         30,585         41,30           09. Japarancha         8,552         11,201         15,895         17,816         18,239         18,677         19,599         25,771         33,732         19,599         30,585         44,60           10- Baix Codinguiba         21,709         31,681         51,423         57,215         58,533         59,880         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,724         80,307         106,042         62,744         80,307         106,042         62,744         80,307         106,042         62,744         80,307         106,042         62,847         80,307         106,042         62,847         80,307         106,042         62,847         80,307         106,042         62,847         80,307         106,042         80,532         128,37         128,37			14,664	21,657										106,521	
O9 Jagaranda         8,552         11/201         15/895         17/816         18,239         18/677         19/599         25/771         33,732         19/599         30/595         44/67           10- Baivo Cotinguiba         21,709         31,681         51,403         57,235         58,533         59,880         62,724         80,307         106,042         62,724         80,307         106,041           11- Aracaju         199,139         311,930         522,012         597,359         613,690         630,479         656,490         851,530         1,147,670         665,490         758,436         28,37         12-Boquim         19,636         32,627         53,424         60,424         61,940         63,498         66,744         84,766         111,393         66,744         84,765         111,393         66,744         84,765         111,393         66,744         84,765         111,393         66,744         84,765         113,393         12,337         31,018         57,225         60,259         60,898         61,549         62,887         70,255         79,515         62,887         88,632         123,37														41,309	
H- Aracaju 199,139 311,930 523,032 597,359 613,690 630,479 665,490 861,530 1,147,670 665,490 758,436 928,37 12-Boquim 19,636 32,627 53,424 60,424 61,940 63,498 66,744 84,766 111,393 66,744 84,765 111,39	09-Japa	ratixte	8,552	11,201	15,895	17,816	18,239	18,677	19,599	25,771	33,732	19,599	30,595	44,696	
12-Boquin 19,636 32,627 53,424 60,424 61,940 63,498 66,744 84,766 111,393 66,744 84,765 111,39 13-Estancia 27,307 37,018 57,225 60,259 60,898 61,549 62,887 70,255 79,515 62,887 88,632 123,37														106,012 928,376	
en a companya di programa di Arian di A	12-Bog	alitta	19,636	32,627	53,424	60,424	61,940	63,498	66,744	84,766	111,393	66,744	84,765	111,393	
	13- Esta:	ncs <b>a</b>	27,307	31,018	57,225	60,259	60,89\$	61,549	62,887	70,255	79,515	62,887	88,632	123,374	
														212,726	
Agreste Sergipano (03-06) 69,243 101,240 164,814 191,081 195,942 203,030 215,936 309,751 432,064 215,936 350,089 519,78 Leste Sergipano (07-13) 325,621 479,932 768,242 867,945 889,895 912,507 959,805 1,233,668 1,636,377 959,805 1,172,775 1,504,80														519,782 £504.801	
		Secretary and					100								
Sergice 420,016 622,993 1,002,377 1,140,569 1,170,784 1,201,967 1,267,390 1,667,700 2,237,309 1,267,390 1,667,700 2,237,30	Serg-çe	· · · · · · · · · · · · · · · · · · ·	420,016	021,993	1,002,317	1,140,569	1,170,784	1,201,967	1,267,390	1,007,700	2,231,309	1,267,390	1,067,700	2,237,309	

Appendix-2 (2) Census and Projected Population of Sergipe State in Rural Area

						Projected Population					ion			
Code	Name of Municipality		Census Po	pulation				nd Scenari		Population	C	\$	-1-	
(000	and Region	1970	1980	1991	1936	1997	1998	2000	2010	2020	2000	egic Scena 2010	2020	
01-0120	Caninde de Sao Francisco	2,487	5,794	6,151	6,636	6,7)7	6,841	7,051	8,207	9,553	7,051	8,207	9,553	
	Feira Nova	3,451	2,787	2,412	1,979	1,902	1,828	1,689	1,137	766	1,689	1,137	766	
01-0240		8,914	9,205	8,086	7,729	7,660	7,591	7,455	6,311	6,223	7,455	6,811	6,223	
01-0260		4,428	4,289	3,321	3,157	3,125	3,094	3,032	2,740	2,476	3,032	2,740	2,476	
01-0310		2,967 5,310	2,650	2,396	2,241	2,211	2,182	2,124	1,858	1,626	2,124	1,858	1,626	
01-0420	Monte Alegre de Sergipe Nossa Senhora da Gloria	10,731	5,655 12,379	4,559 9,803	4,406 8,964	4,376 8,805	4,346 8,649	4,287 8,345	4,004 6,978	3,740 5,834	4,287 8,345	4,004 6,978	3,740 5,834	
	Poco Redondo	8,501	14,921	15,473	12,909	12,450	12,007	11,167	7,773	5,410	11,167	7,773	5,410	
	Porto da Folha	11,794	16,724	16,398	15,353	15,152	14,954	14,565	12,768	11,192	14,565	12,768	11,192	
02-0140	Carira	10,181	10,817	8,003	8 027	8,032	8,037	8,046	8,095	8,143	8.046	8,095	8,143	
02-0230		6,104	5,822	5,405	5,456	5,466	5,477	5,497	5,601	5.708	5,497	5,601	5.708	
	Nossa Senhora Aparecida	1,172	7,830	7,116	6,071	5,851	5,697	5,347	3,892	2,833	5,347	3,892	2,833	
02-6500		965	1,292	1,305	1.389	1,406	1,424	1,460	1,654	1,874	1,460	1,654	1.871	
02-0520 02-0600		2,609 6,927	2,658 7,480	2,013 6,157	1,975 5,509	1,962 5,388	1,948 5,269	1,922 5,040	1,796 4,035	1,679 3,230	1,922 5,040	1,796 4,035	1,679 3,230	
03-0020		13,714	10,819	8,632	8,603	8,597	8,591	8,589	8,522	8,465	8,580	8,522	8,465	
03-0190		2,178	1,919	1,503	1,450	1,475	1,471	1,462	1,417	1,374	1,462	1,417	1,374	
	Malhada dos Bois	1,553	1,383	1,526	1.544	1,543	1,551	1.559	1,596	1,633	1,559	1,596	1,633	
	Muribeca	3,267	3,872	4,313	4,168	4,140	4,111	4,056	3,787	3,537	4,056	3,787	3,537	
	Nossa Senhora das Dores	10,511	10,342	8,624	8,050	7,940	7,831	7,618	6,638	5,784	7,618	6,638	5,784	
03-0700		2,587	2,210	1,928	1,897	1,784	1,761	1,716	1,507	1,324	1,716	1,507	1,324	
	Areia Branca	2,786	5,033	6,696	7,859	8,115	8,379	8,933	12,306	16,952	8,933	12,306	16,952	
	Campo do Brito	8,824	9,173	8,509	8,235	8,181	8,128	8,022	7,514	7,038	8,022	7,514	7,038 25,043	
	Itabaiana Macambira	25,210 3,810	26,279 3,543	23,793 3,608	24,004 3,643	24,046 3,650	24,089 3,657	24,174 3,671	24,605 3,743	25,043 3,816	24,174 3,671	24,605 3,743	3,816	
	Malhador	4,248	5,644	5,655	6.109	6,204	6,301	6,498	7,584	8,850	6.498	7,584	8,850	
	Moita Bonita	7,671	7,410	6,737	7,029	7,089	7,149	7,272	7,916	8,617	7,272	7,916	8,617	
	Sao Domingos	4,104	4,797	4,703	4,590	4,568	4,545	4,502	4,283	4,084	4,502	4,283	4,084	
05-0550	Poco Verde	9,080	10,754	9,817	8,742	8,542	8,345	7,967	6,318	5,010	7,967	6,318	5,010	
	Simao Dias	21,353	18,559	19,058	18,542	18,440	18,34)	18,139	17,170	16,253	18,139	17,170	16,253	
	Tobias Barreto	18,149	17,975	15,695	15,575	15,551	15,527	15,450	15,241	15,012	15,480	15,244	15,012	
06-0350	Lagario Riachao do Dantas	38,634 14,610	38,992 15,151	39,606 13,662	39,699 13,973	39,718 14,036	39,736 14,099	39,774 14,227	39,961 14,882	40,148 15,567	39,774 14,227	39,961 14,882	40,148 15,567	
	Amparo de São Francisco	970	783	842	862	865	870	878	921	965	878	921	965	
07-0070		4,862	4,068	3,268	3,066	3,027	2,989	2,913	2,564	2,257	2,913	2,564	2,257	
	Canhoba	3,501	2,817	2,510	2,440	2,426	2,413	2,385	2,254	2,130	2,385	2,254	2 130	
07-0160	Cedro de São João	2,535	1,475	1,101	1,131	1,137	1,143	1,156	1,219	1,287	1,156	1,219	1,287	
	liha das Flores	3,612	3,892	3,944	4,082	4,110	4,139	4,196	4,495	4,815	4,196	4,495	4,815	
	Neopolis	9,039	9,374	12,287	7,416	7,029	6,663	5,986	3,503	2,050	5,985	3,503	2,050	
	Nossa Senhora de Lourdes Propria	3,145 2,953	3,655 2,307	2,699	2,896	2,937	2,979	3,064	3,527	4,061	3,064	3,527	4,061	
07-0730		1,307	2,307 958	3,147 1,368	3,151 1,531	3,152 1,566	3,133 1,602	3,154 1,675	3,162 2,098	3,170 2,628	3,154 1,675	3,162 2,098	3,170 2,628	
	Santana de Seo Francisco	07	. 0	1,503	1,934	1,881	1,782	1 601	9)7	549	1,601	937	549	
	Capela	13,155	13,614	10,384	10,249	10,222	10,195	10 142	9,850	9,625	10,142	9,880	9,625	
	Divina Pastora	1,258	1,002	1,090	1,145	1,158	1,169	1,193	1,319	1,458	1,193	1,319	1,458	
	Santa Rosa de Lima	1,595	1,487	1,615	1,416	1,379	1,343	1,275	980	753	1,275	980	753	
08-0720		3,890	3,740	3,974	4,154	4,191	4,228	4 304	4,703	5,138	4,304	4,703	5,138	
	Japaratuba	6,164	6,070	6,814	6,917	6,938	6,959	7.001	7,214	7,433	7,001	7,214	7,433	
	) Japoata ) Pacatuba	4,721 8,686	5,231 8,628	7,224 9,483	6,958 8,973	6,906	6,854	6,752	6,264	5,811	6,752	6,264	5,811	
	Pirambu	1,887	1,758	2,212	2,511	8,874 2,575	8,777 2,642	8,585 2,779	7,686 3,581	6,832 4,615	8,585 2,779	7,686 3,581	6,882 4,615	
	Sao Francisco	596	568	485	535	546	556	579	704	857	579	704	857	
	Carmopolis	1,650	1,395	1,421	1,344	1,329	1,314	1,285	1,150	1,029	1,285	1,150	1,029	
10-0250	General Maynard	855	680	808	856	866	876	896	1,006	1,129	. 896	1,006	1,129	
	Lavanjeiras	6,095	6,717	2,924	2,065	1,926	1,797	1,561	780	359	1,563	- 780	389	
	Marvim .	2,999	2,902	3,578	3,621	3,630	3,638	3,656	3,744	3,835	3,656	3,744	3,835	
	Rischuelo	2,910	1,822	2,145	1,767	1,700	1,635	1,513	1,026	695	1,513	1,926	695	
	) Rosario do Catete ) Santo Amaro das Brotas	1,930 2,954	967 2,561	1,185 2,901	1,164 2,402	1,150 2,313	1,156 2,227	1,147 2,065	1,107	1,068 971	1,147 2,065	1,107 1,416	1,068 971	
11-0030		2,7,7	2,501	2,701	2,102	2,313	2,227	2.005	0	3/1	2.003	0,410	311	
11-0060		1,963	2,439	5,285	8,001	8,693	9,445	11,149	25,552	58,563	11,149	25,552	58,563	
	Nossa Senhora do Socorro	7,812	12,092	558	667	691	716	769	1,099	1,571	769	1,099	1,571	
	Sao Cristovao	10,259	12,431	1,325	1,599	1,660	1,724	1,858	2,707	3,942	1,858	2,707	3,912	
	Arava	4,614	6,519	6,8%	6,651	6,603	6,555	6,451	6,010	5,591	6,461	6,010	5,591	
	Bequim	9,179	9,382	9,354	9,223	9,100	8,978	8,740	7,641	6,680	8,710	7,641	6,680	
	Cristinapolis Itabaianinha	3,647 17,775	4,036 18,992	6,011 18,754	7,414 18,944	7,737 18,982	8,063 19,021	8,769 19,097	13,340 19,486	20,294 19,883	8,769 19,097	13,340 19,486	20,294 19,883	
	Pedrinhas	2,147	3,155	2,425	2,410	2,407	2,404	2,398	2,363	2,339	2 398	2,368	2,339	
	Salgado	6,591	10,013	13,683	13,059	13,053	13,017	13,036	12,978	12,921	13,036	12,978	12,921	
12-0750	Tomar do Geru	8,804	8,671	8,251	8,801	8,915	9,031	9,267	10,544	11,996	9 267	10,544	11,996	
	) Umbauba	3,555	5,192	6,490	7,267	7,433	7,603	7,955	9,974	12,505	7,955	9,974		
	D Estancia	7,780	8,632	9,513	10,985	11,366	11,636	12,325	16,434	21,914	12,325	16,434		
	D. Indiaroba D. Itaporanga D'Ajuda	4,54 <b>8</b> 10,313	5,081 11,875	7,684 13,246	7,745 12,095	7,757	7,770	7,791	7,913	8,045	7,791	7,918	8,045	
	Santa Luzia do Ranhy	5,816	6,573	8,006	8,655	11,877 8,791	11,663 8,929	11,247 - 9,212	9,3 <i>77</i> 10,766	7,818 12,582	11,247 9,212	10,766	7,818 12,582	
		2,010	2,273	-,	2,2,5	V. 71	0,727	7,414	.0,700	2,502	,,,,,,	.0,700		
01- Ser	gipana do Sertao do Sao Francisco	58,673	74,414	68,599	63,374	62,418	61,491	59,716	52,276	46,819	59,715	52,276	45,819	
02- Car	va.	34,558	35,893	30,029	28,427	28,135	27,852	27,312	25,073	23,466	27,312	25,073	23,466	
	ssa Senhora das Dores	31,810	30,545	26,526	25,652	25,483	25,317		23,468	22,118	24,990			
	este de Itabaiana	56 653	61,884	\$9,701	61,459		62,243		67,954	74,400		67,954		
	Ras Barreto reste de Legarto	48,582 53,244	47,288 54,143	44,570 53,268	42,859 53,672	42,533 53,754	42,213	41,586 54,000		36,275	41,586			
07- Pro		31,924	28,729	31,166	28,559	28,131	53,836 27,731		54,843 24,682	55,716 23,912	54,000 27,009			
	inguita	19,898	19,843	17,063	16,965	[6,950	16,936	16,914	16,881		16,914			
	aratuba	22,054	22,255	26,218	25,894	25,839			25,449	25,598	25,695			
10- Ba	to Cotinguiba	19,403	17,044	14,963	13,219	12,923	12,643	12,126	10,229	9,116	12,126	10,229	9,116	
II-Ara		20,034	26,962	7,168		11,014			29,358	64,075	13,776		64,075	
12- Be		55,312	65,961	21,779	73,769	74,226			82,342	92,210	75,724			
13- Est	nsocial .	28,457	32,161	38,449	39,480	39,731	39,997	40,578	44,496	50,359	40,578	44,496	50,359	
Sertao :	Sergipano (01-02)	93.231	110,313	98,628	91,801	90.554	89,343	87,028	77,349	70,286	87.028	77,349	70 226	
Agreste	: Serg pano (03-06)		193,860		183,652					188,508		184,997		
	ergipano (07-13)		212,955		208,153					282,243		233,437		
			4.			100					· // /	100		
Sergipe	!	481,602	517,128	489,493	483,606	433,022	492,641	452,500	495,783	541,037	432,500	495,783	541,037	
								-	311	_		_		

Appendix-2 (3) Census and Projected Population of Sergipe State in Urban and Rural Area

Code	Name of Municipality and Region			oculation				rend Scenari	o	Population	Strategic Scenario			
		1970	1980	1991	19%	1997	1998	2000	2010	2020	2000	2010	2020	
0120 0220	Caninde de São Francisco Feira Nova	2,844 4,405	6,153 4,241	11,473 4,417	14,513 4,686	14,892 15,281 16,097 20,583 27,612 4,777 4,881 5,131 8,217 12,202				16,097 5,131	35,018 8,217	56. 12.		
0240	Gararu	10,721	11,284	10,465	10,211	10,163	10,115	10,022	9,431	9,265	10,022	9,431	9.	
0260	Gracho Cardoso	5,669	6,031	5,176	5,223	5,236	5,251	5,284	5,460	5,941	5,284	5 450	5	
0310	Itabi	5,017	4,728	4,834	4,839	4,842	4,847	4,858	4,835	5,151	4,858	4,835	5,	
0420	Monte Alegre de Sergipe	6,721	8,591	9,589	10,088	10,198	10,312	10,551	11,839	13,940	10,551	11,839	13,	
0450	Nossa Senhora da Gloria	13,718	20,422	23,478	24,412	24,634	24.869	25,375	28,710	33,568	25,375	35,235	49	
0540 0560	Poco Redondo Pono da Folha	9,308 15,944	16,731 22,862	20,155 23,476	18,749 23,206	18,554 23,170	18,386 23,140	18,137 23,099	19,117 22,581	22,281 24,124	18,137 23,099	19,11 <i>7</i> 22,981	22,	
0140	Carira	12,405	15,594	15,418	16,636	16,902	17,175	17,747	21,099	25,771	17,747	21,099	24, 25,	
0230	Frei Paulo	8,730	8,827	10,278	11331	11,565	11.808	12 320	15 707	20,123	12 320	15 707	20	
0145	Nossa Senhora Aparecida	8,079	8,755	8,584	7,945	7,849	7,764	7,625	7,854	8,883	7,625	7,854	8	
3500	Pedra Mole	1,312	1,721	2,144	2,322	2,359	2,398	2,476	2,877	3,427	2,476	2,877	3,	
2520	Pinhao	3,368	3,992	4,430	4,728	4,794	4,863	5,008	5,863	7,139	5,008	5,863	7,	
X600	Ribeiropolis	10,112	12,202 16,134	14,032	14,455	14,565 17,484	14,683 17,704	14,947	15,600	19,729	14,947	16,600	19	
1020 1190	Aquidaba Cumbe	15,942 3,610	3,401	16,275 3,325	17,269 3,500	3,538	3,576	18,162 3,655	20,618 4,038	24,302 4,689	15,162 3,656	20,618 4,038	24 4	
350	Malhada dos Bois	2,628	2,436	2,550	2,860	2,931	3,006	3,167	4 419	6,021	3,167	4,449	6	
430	Muribeca	5,458	6,077	6.682	6.828	6,862	6,898	6,974	7.384	8,176	6,974	7,334	8	
460	Nossa Senhora das Dores	16,185	17,493	19,606	20,359	20,533	20,715	21,101	23,183	27,066	21,104	23,182	27	
700	Sao Miguel do Aleixo	3,243	3,099	3,132	3,078	3,069	3,060	3,043	2,923	2,972	3,043	2,923	2	
050	Areia Branca	3,774	6,342	10,542	14,040	14911	15.852	17,968	45,284	77,221	17,968	45,284	. 77	
100	Campo do Brito	11,242 41,635	11,968	13,420	14,913 72,207	15,283 73,824	15,679 75,493	16,562	25,470 100,210	36,234 129,318	16,562 78,992	25,470	36	
1290 1370	Itabaiana Macambira	4,705	52,596 4,411	64,838 4,968	5,361	5,450	5,543	78,992 5,742	7,238	9,090	5,74 <u>2</u>	121,179 7,238	17)	
390	Malhador	6,270	8,308	9.982	10.756	10,918	11.082	13 418	13,039	15,395	11.418	13,039	15	
410	Moita Bonita	8,179	8,617	9,232	10,032	10,205	10,383	10,755	13,051	15,926	10,755	13,051	15	
68)	Sao Domingos	4,945	6,294	7,752	8,335	8,470	8,612	8,916	11,170	14,132	8,916	11,170	14	
550	Poco Verde	11,056	14,359	17,666	17,612	17,631	17,660	17,749	18,563	20,963	17,749	18,563	20	
710	Simao Dias	27,900	27,038	32,196	33,707	34,047	34,400	35,149	39,633	46,449	35,149	39,633	40	
740 350	Tobias Barreto	24,852 51,266	30,787 58,320	37,577 72,144	40,740 75,316	41,430 75,985	42,139 76,665	43,622 78,062	52,060 85,838	64,239 95,120	43,622 78,062	52,060 105,208	139	
580 580	Legario Riachao do Dantas	16,642	17,480	16,992	17,820	17,996	18,175	18,545	20,596	23,258	18,545	20,596	23	
010	Amparo de São Francisco	1,885	1,699	1,891	1,994	2015	2,037	2,081	2,269	2,596	2,081	2,269	1	
070	Brejo Grande	7,955	7,242	6,701	6,813	6,840	6,869	6,932	7,191	7,961	6,932	7,191	7	
110	Canhoba	4,720	4,082	3,853	3,890	3,8%	3,903	3,918	3,945	4,152	3,918	3,915	4	
160		5,470	4,919	5,122	5,161	5,173	5,181	5,198	5,090	5,378	5,198	5,090		
270	Ilha das Flores	6,660 16,289	7,747 17,581	7,125	7,585 16,732	7,681 17,038	7,779 17,416	7,996 18,399	8,943 28,945	10,379 54,1%	7,980 18,399	8,943 39,441	65	
440 470	Neopolis Nossa Senhora de Lourdes	4,001	4,180	21,411 4,668	5317	5,460	5,608	5,920	7,993	10,589	5,920	7,993	10	
570	Propria	21,339	21,298	25,091	25 986	25,169	26 354	26,728	28 689	30,812	26,728	32,750	41	
730	Telha	1,946	1,759	2,205	2,411	2,495	2,547	2,654	3,223	4,014	2,654	3,223	4	
999	Santana de Sao Francisco	. 0	. 0	. 0	5,730	5,905	6,107	5,593	13,290	21,516	6,593	13,290	21	
130	Capela	20,152	23,014	25,105	25,744	25,877	26,011	26,285	27,766	29,441	26,286	32,209	40	
200	Divina Pastora	2,383	2,168	2,645	2,833	2,872	2,912	2,993	3,362	3,952	2,993	3,362	3	
)650 )720	Santa Rosa de Lima Siriri	3,142 5,158	2,970 5,388	3,363	3,341 6,803	3,342 6,910	3,344 7,020	3,354 7,246	3,425 8,470	3,8}2 10,114	3,354 7,246	3,425 8,470	10	
)330	Japaratuba	9,253	10,473	6,297 13,004	13,663	13,801	13.941	14 227	15,797	17,628	14 227	18,113	23	
340	Japosta	6,936	7,750	10,549	10,465	10,451	10.437	10,412	10 161	10,341	10,412	10,161	01	
490	Pacatuba	9,438	9,831	11,500	11,154	11,090	11,027	10,907	10,491	10,056	10,907	12,910	15	
530	Prambu	2,901	3,314	4,838	5,946	6,200	6,456	7,037	11,540	17,082	7,017	11,540	17	
620	Sao Francisco	1,978	2.013	2 222	2.482	2,538	2.594	2,712	3,321	4,224	2,712	3,321		
)150 1250	Carmopolis General Maynard	4,037 1,830	4,460 1,870	6,782 2,148	7,795 2,352	8,023 2,395	8,261 2,439	8,766 2,530	12,172 2,991	16,713 3,667	8,766 2,530	12,172 2,991	16	
360	Laranjeiras	10,643	13,270	18,911	21,310	21,890	22,507	23,850	33,471	46,804	23,850	33,471	46	
400	Maruim	9,237	11,359	14,683	14,499	14,463	14 427	14 356	13,524	13,686	14.356	13.524	13	
590	Riachuelo	5,980	5,901	7,551	7,771	7,831	7,897	8,043	8,865	10,639	8,043	8,855	10	
610	Rosario do Calete	3,893	3,916	5,639	6,570	6,779	6,997	7,460	10,629	14,767	7,460	10,529	14	
660	Santo Amaro das Brotas	5,437	7,949	10,624	10,157	10,074	9,995	9.816	8.883	8,831	9,846	8.883	8	
030 060	Aracaju Barra des Coqueires	183,908 5,471	293,131 7,939	402,341 12,727	428,194 16,155	439,472 16,997	451,048 17,902	475,121 19,921	616,190 35,743	799,144 71,205	475,121 19,921	512,546 35,743	602 71	
480	Nossa Serbora do Secorro	9,367	13.683	67.574	105,724	10,557	113,517	121,885	165,008	243,223	121,885	165,560	226	
670	Sao Cristovao	20,427	24,134	47,558	57,553	58,713	59,897	62 339	73,947	93,173	62 339	73,947	93	
040	Araua	6,526	8,903	10,477	10,608	10,640	10,674	10,747	11,090	11,981	10,747	11,090	11	
067	Boquim	14,097	18,323	23,015	23,789	23,967	24,152	24,547	26,483	30,469	24,547	26,433	30	
170 300	Cristinapolis Itabaianinha	5,783 21,682	7,241 26,460	10,932 30,885	12,774 32,537	13,184 32,888	13,609 33,247	14,508 33,9\$5	19,915 37,740	28,372 43,354	14 508 33 986	19,915 37,740	28 43	
510	Pedrinhas	3,971	5,399	7,306	7,924	8,057	8 194	8,477	9,973	12,249	8,477	9,973	12	
620	Salgado	8,459	12,225	16,717	17,608	17,812	18,027	18,435	21,975	26,377	18,456	21,975	26	
750	Tomar do Geru	9,599	10,532	11,278	12 464	12,721	12,984	13,534	16,928	21,146	13,534	16,928	21	
760	Umbauba	5,731	9,505	14,593	16,489	16,897	17,315	18,183	23,005	29,654	18,183	23,005	29	
210	Estancia Inflancia	28,045	36,833	53,859	56,749	57,357	57,975	59,247	66,383	75,084	59 247	77,975	104	
280 320	Indiaroba Itaporanga D'Ajoda	6,711 14,046	7,750 16,605	H,607 20,324	11,904 20,174	11,965 20,173	12,027 20,181	12,152 20,227	12,612 21,078	13,550 23,062	12,152 20,227	12,612 27,861	· 13	
630	Santa Luzia do Itanhy	6,962	7,991	9,874	10,9}2	11,135	11,364	11,838	14,678	18,178	11,838	14,678	18	
	and the second second					·								
Sergia Carina	oana do Sertao do São Francisco	74,377 44,006	101,043 51,091	113,063 54,886	115,927 57,417	116,466 58,035	117,082 58,691	118,554 60,123	131,629 70,001	154,082 85,071	118,551 60,123	152,188 70,003	197 85	
	Senhora das Dores	47,066	48,640	51,570	53,894	51,416	54,958	56,105	62,595	73,227	56,105	62,596	73	
	te de Itabaiana	80,750	98,476	120,734	135,644	139,061	142,645	150,353	215,462	297,317	150,353	236,438	341	
fobia	s Валею	63,808	72,184	87,439	92,059	93,108	91,200	96,520	110,257	131,651	96,520	110,260	131	
	te de Lagarto	67,908	75,800	89,136	93,136	93,980	94,840	96,607	106,434	118,378	96,607	125,508	162	
rece Co. so		70,265	70,507	78,077	83,655	82,674	83,802	85,404 30,830	109,579	151,593	86,404	124,141	173	
L'otin Japan	guiba duha	30,835 30,606	33,540 33,456	37,410 42,113	38,721 43,710	39,001 41,079	39,288 41,465	39,879 45,295	43,023 51,221	47,318 59,330	39,879 45,295	47,467 56,016	58 70	
	Cotinguiba	41,112	48,725	66,371	70,454	71,457	72,523	74,851	90,535	115,157	74,851	90,539	113	
Araca		219,173	338,892	530,200	607,626	624,734	612,361	679,266		1,211,745	679,266	787,755	992	
Boqu	mt.	75,948	98,588	125,203	134,193	136,166	138,202	112,468	167,109	203,602	142,468	167,111	203	
	cia	55,764	69,179	95,674	99,739	100,629	101,547	103,465	114,751	129,874	103,465	133,132	173	
Estan	minana (01.02)	319 193	157 124	167040	172 244	114 500	134 333	179 K 27	ንበ! ለነሳ	210141	178 677	222 101	791	
Fsian as Sc	rgipano (01-02) orgipano (03-06)	118,383 259,532	152,134 295,100	167,947 348,879	173,341 374,733	174,500 380,565	175,773 386,643	178,677 399,585	201,630 494,743	239,153 620,572	178,677 399,585	222,191 \$35,101	283 708	
stan to Se tse S				348,879		380 565	386 643		494,743	620,572		\$35,101		

### JAPAN INTERNATIONAL COOPERATION AGENCY

STATE SECRETARIAT OF PLANNING, SCIENCE AND TECHNOLOGY THE STATE OF SERGIPE, THE FEDERATIVE REPUBLIC OF BRAZIL

# THE STUDY ON WATER RESOURCES DEVELOPMENT IN THE STATE OF SERGIPE IN THE FEDERATIVE REPUBLIC OF BRAZIL

FINAL REPORT
SUPPORTING
(VOLUME I)
MASTER PLAN STUDY

## [B] GEOLOGY AND HYDROGEOLOGY

**MARCH 2000** 

YACHIYO ENGINEERING CO., LTD. (YEC)

### THE STUDY ON WATER RESOURCES DEVELOPMENT IN THE STATE OF SERGIPE IN THE FEDERATIVE REPUBLIC OF BRAZIL

# SUPPORTING REPORT (B) GEOLOGY AND HYDROGEOLOGY

### **Table of Contents**

Table of Contents List of Tables List of Figures

			Page
CHA	APTE	ER 1 INTRODUCTION	B-1
CHA	APTE	ER 2 TOPOGRAPHY AND GEOLOGY	B-2
	2.1	Topography	B-2
	2.2	Geology	B-2
	2.3	Topography and Geology by River Basin	B-5
CHA	APTE	ER 3 HYDROGEOLOGY	B-7
	3.1	Hydrogeological Classification	B-7
	3.2	Current Groundwater Use and Hydrogeological Information	B-8
	3.3	Groundwater Field Survey	B-10
CHA	APTE		
	4.1	Modified Aquifer Classification	B-12
	4.2	Groundwater Recharge	B-12 B-14
	4.3	Well Capacity and Water Quality	B-20
	4.4	Groundwater Development Potential	B-20
	4.5	Total Evaluation of Groundwater Development Potential	B-22
CHA	PTE	R 5 RECOMMENDATION	B-23
	5.1	Promising Groundwater Development Site	B-23
	5.2	Geophysical Method for Groundwater Survey	
٠.	5.3	More Detailed Groundwater Potential Assessment for Specified Are	
	5.4	Proper pumping Test for Aquifer Parameters	

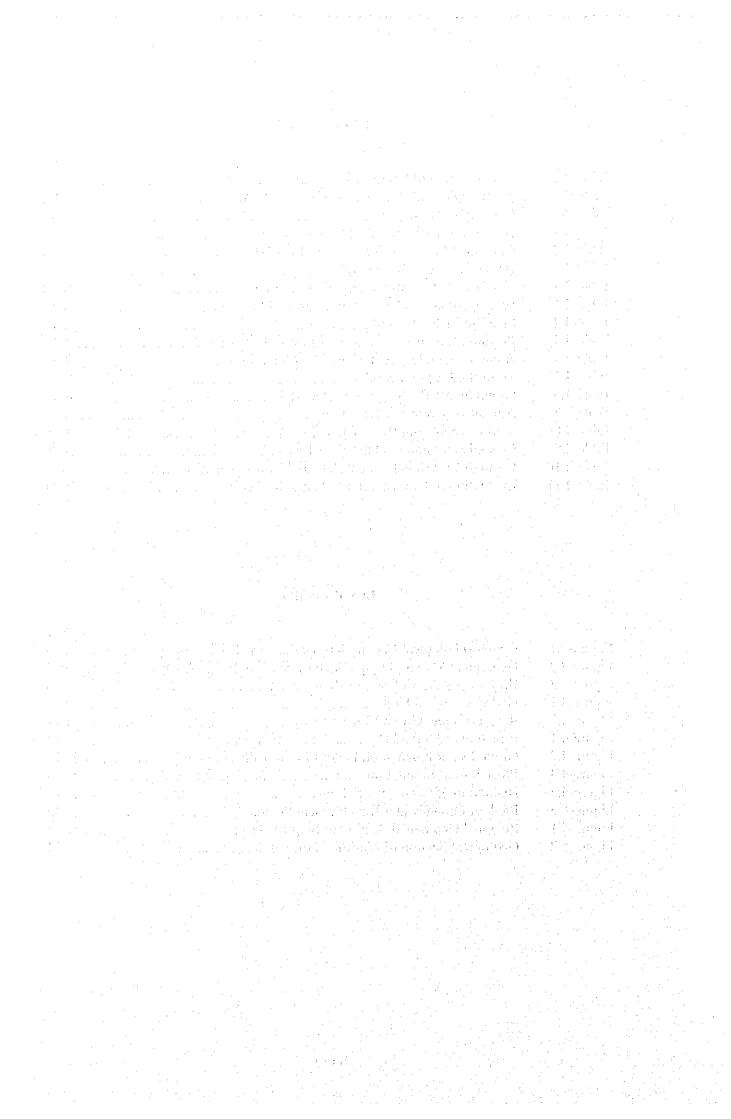
5.5	undwater Level MonitoringB-2			
5.6	Groundwater Data-base			
APPENDI Appendix- Appendix- Appendix-	ICES Current Groundwater Use and Hydrogeological Information Result of Groundwater Field Survey			

# List of Tables

		Page
Table-2.1	Classification of Landform	
Table-2.2	Stratigraphy and Rock Faces of the Study Area	
Table-2.3	Geology of Basin	
Table-3.1	Hydrogeological Unit the Study Area	
Table-3.2	Contents of Deep Well Data-base by SRH	
Table-3.3	Basic Capacity of Deep Well	
Table-3.4	Number of Deep Wells Drilled by Aquifer	B-10
Table-4.1	Hydrogeological Classification for the Master Plan	
Table-4.2	Specific Yield of Aquifer	
Table-4.3	Presumed Annual Groundwater Level Fluctuation	B-14
Table-4.4	Annual Groundwater Recharge by Method-(I)	
Table-4.5	Simplified Aquifer Model	
Table-4.6	Groundwater Recharge by Method-(II)	
Table-4.7	Annual Groundwater Recharge	
Table-4.8	Well Capacity and Water Quality by Aquifer	
Table-4.9	Groundwater Potential by River Basin	
Table-4.10	Groundwater Development Potential by Municipality	
Table-4.11	Evaluation of Groundwater Potential by Aquifer	

# List of Figures

		Page
Figure-2.1	Geomorphological Map in Sergipe State by Satellite Image Analysis	_
Figure-2.2	Geological Map in Sergipe State by Satellite Image Analysis	B-4
Figure-2.3	Bird's-eyes View of Sergipe State	B-5
Figure-3.1	Hydrogeological Unit	
Figure-3.2	Result of Field Groundwater Survey	
Figure-4.1	Principle of Method-(I)	.B-12
Figure-4.2	Groundwater Fluctuation Pattern Empirically Assumed	.B-13
Figure-4.3	Procedure of Simulation	.B-15
Figure-4.4	Histogram of Groundwater Level	.B-19
Figure-4.5	Rank of Groundwater Development Potential	.B-22
Figure-5.1	Regional Geological Section of Sergipe Basin	.B-24
Figure-5.2	Geological Section of Marituba Formation	



### CHAPTER 1 INTRODUCTION

This report describes the result of groundwater development study carried out within the Study on Water Resources Development in the State of Sergipe in the Federative Republic of Brazil which was carried out by JICA during 1998 and 2000.

The groundwater development study was mainly carried out within the Master Plan Study, which occupied the first half of the above JICA Study. The field surveys were performed for the groundwater development study during July 1998 and December 1998. The summary of this groundwater development study is described in the Main Report of this Study, and the more detailed results are described in this Supporting Report. Important data and all the results are expressed in this report except the deep well data-base established by SRH which is expressed in the Data-Book. This data-base, which saves more than 4,000 deep well data obtained when these wells were drilled, was main data sources for this groundwater study as well as the hydrogeological data which was obtained from the field surveys carried out by the Study Team. This report deals with mainly groundwater potential analysis and its results. The groundwater development plan, which was formulated based on the potential analysis, was described in the Main Report and Supporting Report-G (Water Resource Development Plan) with the surface water development plan.

In this study, the Study Team member in charge of groundwater development obtained important hydrogeological data and information through the discussions and the field surveys performed with the hydrogeologists of Sergipe state. As described former, the purpose of this study was to formulate groundwater development plan as a part of the comprehensive water resources master plan for all the Sergipe state during limited study period and with limited information. Consequently, the analyzed results such as groundwater potential may have some insufficiency in its accuracy because the study area is too wide to be covered by the existing data in quality and quantity, in addition the study area is too wide and complicated in hydrogeological structure to be analyzed by the usual analysis method. It is expected that hydrogeologists of Sergipe state with many experiences will revise some results of the groundwater potential analysis by the careful examination of this report and moreover will assess by themselves more detailed groundwater potential in the near future.

### CHAPTER 2 TOPOGRAPHY AND GEOLOGY

Very old rocks of Precambrian age form geological flame of Sergipe State. Shield with flat geomorphic surface covers the state. Earth movements finished in Mesozoic age, then Sergipe State became geologically stable.

### 2.1 Topography

Geomorphological map is shown in Figure-2.1. Classification of landform in Sergipe State is outlined as shown in Table-2.1.

Cla	ssification	Note	
Plain along coast and	Marine deposit	Distributes along the coast of the study area.	
near river mouth	Marine and fluvial deposit	Distributes near river mouth.	
	Flood plain	Distributes down stream of rivers.	
	Теггасе	Distributes in border between coastal plain and plateau.	
Flat plateau spreading inland	Plateau spreading in Cretaceous and Tertiary	Plateau surface is flat, rainfall carves and divide plateau into many small hills. Elevation is less than 150m.	
	Plateau spreading in Precambrian	Inselbergs and pediments form this landscape. The ground surface is undulating. Elevation is 150-300m	
Mountain rising from plateau	Mountain	Hard rock remains from crosion as mountain. Elevation is 300-600m.	

Table-2.1 Classification of Landform

### 2.2 Geology

Table-2.2 and Figure-2.2 show geology of Sergipe State. As shown in the figures, metamorphic rock of Precambrian distributes in 2/3 of inland area. Mesozoic system distributes in the other 1/3 area near the coast covering Precambrian rocks, and Tertiary system distributes covering Mesozoic system. Quaternary system distributes along the coast.

Age		Stratigraphy	Rock Faces
Cenozoic	Quaternary	Diluvium, Alluvium	Clay, silt, sand, gravel
	Tertiary	Barreiras Formation	Claystone, siltstone, sandstone, conglomerate
Mesozoic	Cretaceous	Tucano Basin	Limestone, sandstone, shale
Paleozoic	Silurian	Sergipe Basin	Limestone, sandstone, shale
Late Proterozoic		Caninde Domain	Gabbro, amphibolite, metavolcanic rock, ultramafic rock
		Poco Redondo Domain	Granites, migmatite, gneiss
		Maranco Domain	Granites, metaconglomerate, phyllite
		Macurure Domain	Micaschist, quartzite, gabbro
Middle Proterozoic late Proterozoic		Vaza-Barris Domain	Carbonate, phyllite, argillaceous rock
		Estancia Domain	Sandstone, argillaceous rock, conglomerate.
Archaean – early Proterozoic		Sao Francisco Craton	Gneiss, migmatite, granodiorite.
		Itabaiana Dome Craton	Migmatite.

Table-2.2 Stratigraphy and Rock Faces of the Study Area

