

2.6 Outlook for Worldwide Supply and Demand of Foodstuffs

2.6.1 Recent Forecast of World Food Supply and Demand by Celebrated Organizations

In November 1996, the World Food Summit was held for the first time at the Food and Agriculture Organization of the United Nations (FAO) Headquarters in Rome and was attended by leaders and cabinet ministers of countries around the world to discuss about food security. The Rome Declaration adopted at this meeting set out as pledge of governments the reduction of the malnourished population by half from the present level of 840 million by the year 2015. In addition, the Action Plan for substantiating this pledge demanded mainly the developed countries to appropriate 0.7% of their Gross Domestic Product (GDP) to Official Development Assistance (ODA), although the concrete scenario for realizing the declaration has not been seen yet.

Forecasts on world food supply and demand were announced by numerous organizations immediately before and after the World Food Summit and were followed by various evaluations and discussions after the meeting. These forecasts can be compiled as follows.

Unit: In million tons

Organizations	Industrialized Countries			Developing countries			World in Total		
	Output	Cons.	Balance	Output	Cons.	Balance	Output	Cons.	Balance
Japan's MAFF	1057	924	134	1331	1465	-134	2388	2388	0
(2010)	1059	856	203	1141	1349	-208	2200	2205	-5
FAO (2010)	1028	866	162	1318	1480	-162	2346	2346	0
World Bank (2010)	1045	829	216	1261	1459	-198	2306	2288	18
IFPRI (2010)	1159	980	179	1211	1390	-179	2370	2370	0
USDA (2005)							2121	2105	16
Worldwatch (2030)							2149	2675	-526

Reference:

- 1) Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF): "Present Situation and Outlook of Food Supply and Demand in the World", 1996; Has forecast for two scenarios; the status quo scenario and the restricted production scenario (upper column is the status quo scenario and the lower column is the restricted production scenario).
- 2) FAO: "World Agriculture: Toward 2010", 1995; Makes the forecast for major farm produce by using a model, using this as the basis for making the forecast by taking into consideration the past trend of demand and supply on a country and region basis.
- 3) The World Bank: "The World Food Outlook", 1993; Makes the forecast by using a world grain model by country, by region and by grain (wheat, rice, coarse grain).
- 4) International Food Policy Research Institute (IFPRI): "Global and Regional Food Demand, Supply and Trade Prospects to 2010", 1994; Makes the forecast by using a food demand-supply equilibrium model by country, by region and by item.
- 5) United States Department of Agriculture (USDA): "Long Term World Agricultural Commodity Baseline Projections", 1994; Makes the forecast according to anticipated policy model by country that combines detailed models of respective countries with emphasis on the American market.
- 6) World watch Institute: "Tough Choices: Facing the Challenge of Food Scarcity", 1996; Makes the forecast according to food demand-supply by taking into consideration various limiting conditions in future agricultural production with the purpose of giving warning.

According to the above table, the status quo scenario of the Japanese Ministry of Agriculture, Forestry and Fisheries as well as the forecasts made by FAO, the World bank and USDA all have come to the conclusion that, although numerous problems of disparity

will exist among countries and regions, the world food demand-supply balance will be maintained until 2010 (2005 in USDA forecast).

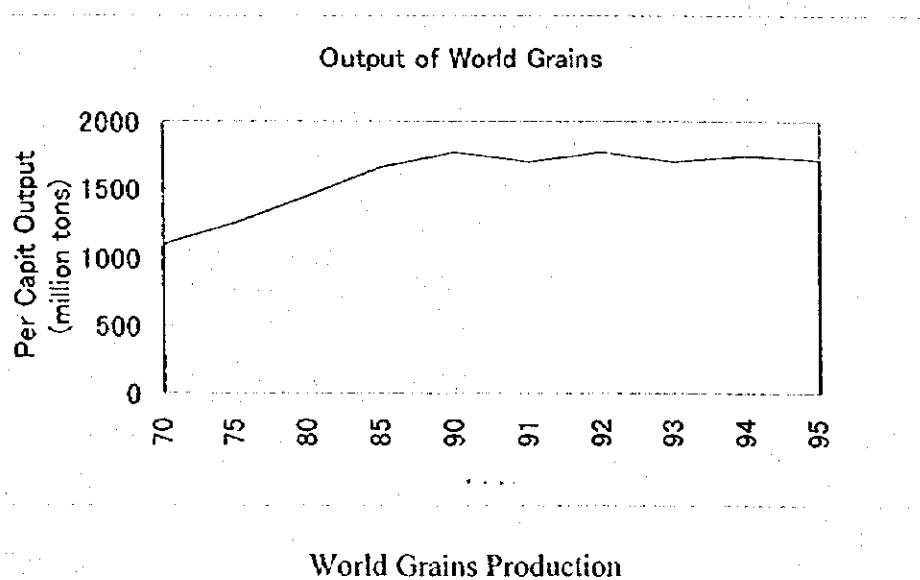
However, the World watch Institute has presented the forecast result that serious shortage of supply will occur in 2030. In addition, the restricted production scenario of the Japanese Ministry of Agriculture, Forestry and Fisheries suggests that demand- supply will become tight by 2010, possibly accompanied by slight supply shortage.

These contradicting forecast results appear to originate from the difference between two views: one expects that the increasing trend of world food production in the late 80's will continue despite some fluctuations originating from circumstantial conditions that may arise from year to year (e.g. climate, prices) while the other predicts that the stagnant production trend from 1995 onward will continue into the future owing to numerous limiting factors and become increasingly serious.

Discussions are currently taking place among researchers and research institutions of various countries and no clear international consensus has been reached with regard to long-term outlook. The World Bank is also launching a new forecast activity by taking these discussions into consideration.

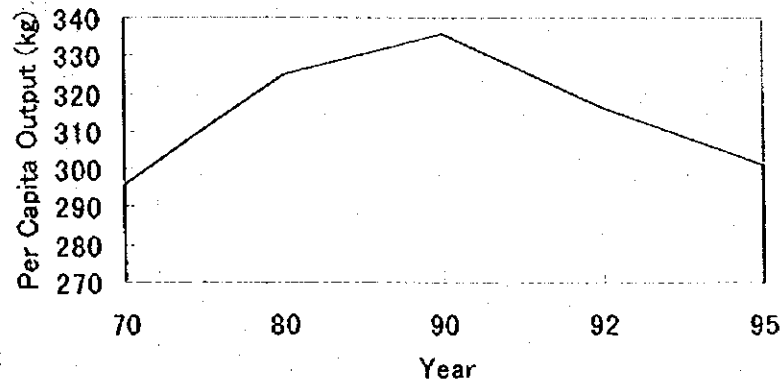
2.6.2 Recent Trends of World Food Production

(1) Changes in Grains Production



Total world grain production nearly tripled in 40 years from 631 million tons in 1950 to 1,780 million ton in 1990. However, the rate of increase has slowed down since 1990 and has started to decline in terms of per capita production for the entire world, signifying that increase in production has not been able to keep pace with the population growth.

Per Capita Output of World Grains



World Grain Production per Capita

(2) Changes in Cultivated Land Area

The cultivated land area per capita for the world as a whole declined by nearly 20% from 0.342 ha in 1975 to 0.272 ha in 1990 and continues to gradually decline. Main factors behind this decline are said to originate from increasing trends of desertification, drying, soil degradation, industrialization and urbanization.

2.6.3 Outlook of World Food Supply and Demand and Agriculture in Brazil

Lester R. Brown of the World watch Institute who warns about the world's future food demand-supply has note, "Brazil is one of the countries that have the most potential for increasing production. However, the country will still have trouble maintaining its self-sufficiency of grains even if considerable expansion of grain production is achieved. In fact, Brazil has not been able to maintain self-sufficiency of grains in the recent years and has become the largest importer in the Western Hemisphere."

Moreover, Brazil's population is predicted to increase by nearly 100 million by the year 2025 and reach a total of 252 million, meaning that the country will have the population close to that of the U.S. All sorts of agricultural resources Brazil can mobilize will have to be utilized to support an additional 100 million people while the people move up in the food chain and consume more animal products.

In fact, Brazil has vast arid and semi-arid regions that can be converted into highly productive farmland if the aforementioned adequate use of water and soil improvement are put into practice. The development and utilization of these lands is therefore a top priority item not only for stable food production in Brazil but for stabilization of the world's food demand- supply in the future.

For this reason, much is expected in the development of agricultural policy that will arouse the willingness to produce among farm workers.

Table 2.1 Balance of Payment

Unit: US\$ x 10⁶

Item/Year	1991	1992	1993	1994	1995	1996
Current transactions	-6,043	6,143	-592	-1,689	-17,972	-24,347
Trade balance	10,579	15,239	13,307	10,466	-3,352	-5,539
- Exports	32,620	35,793	38,563	43,545	46,506	47,747
- Imports	21,041	20,554	25,256	33,079	49,858	53,286
Services (net)	-11,339	-11,339	-15,585	-14,743	-18,594	-21,707
- Interest	-13,542	-7,253	-8,280	-6,338	-8,158	-9,840
- Others	1,599	-4,086	-7,305	-8,405	-10,436	-11,867
Unrequited transfers	-1,407	2,243	1,686	2,588	3,974	2,899
Capital	-4,148	25,271	10,115	14,294	29,359	32,391
- Investment	170	2,972	6,170	8,132	4,663	15,558
- Reinvestment	365	175	100	83	384	447
- Financing	2,026	13,258	2,380	1,939	2,834	4,302
- Amortization	-7,830	-8,572	-9,978	-50,411	-11,023	-14,423
- Long & medium-term loans	3,997	14,975	10,790	52,893	14,736	22,802
- Short-term Capital	-2,876	2,463	653	750	17,774	3,705
Errors and Omissions	876	-1,386	-1,119	334	2,093	973
Total Balance	876	30,028	8,404	12,939	13,480	9,017

Source: Boletim do Bank Central do Brazil, March 1997

Table 2.3 Amount of Major Agricultural Exports

Unit: FOB in million of US\$

Products	1993 (%)	1994 (%)	1995 (%)	1996 (%)	Growth Rate (%)		
					93/94	94/95	95/96
Soybeans	3,068 (36.5)	4,124 (36.6)	3,799 (32.0)	4,430 (34.9)	34.4	- 7.9	16.5
- Meat	1,815	1,980	1,997	2,727	9.1	0.9	36.5
- Soybeans	946	1,316	770	1,018	39.1	- 41.5	32.1
- Oil	306	828	1,031	685	170.6	24.5	- 33.5
Coffee	1,282 (15.2)	2,558 (22.7)	2,462 (820.4)	2,095 (16.5)	99.5	- 5.2	- 13.7
- Beans	1,065	2,219	1,970	1,719	108.4	- 11.2	- 12.8
- Instant coffee	217	340	456	376	56.7	34.1	- 17.5
Sugar	773 (9.2)	983 (8.7)	1,817 (15.3)	1,491 (11.7)	27.2	84.8	- 18.0
Meat	1,295 (15.4)	1,315 (11.7)	1,271 (10.7)	1,271 (10.0)	1.5	- 3.3	16.0
- Beef	272	268	181	194	- 1.5	- 32.5	7.5
- Processed beef	324	300	302	233	- 7.4	0.7	- 22.7
- Chicken	569	609	637	840	7.0	4.6	31.9
- Pig	83	66	84	122	- 20.5	27.3	45.2
Fruits	275 (3.3)	268 (2.4)	278 (2.3)	296 (2.3)	- 2.5	3.7	6.6
Concentr. Juice	827 (10.6)	958 (8.7)	1,105 (9.3)	1,392 (11.00)	19.1	12.2	25.9
Tobacco	890 (10.6)	1,031 (9.2)	1,175 (10.0)	1,515 (13.6)	15.8	14.0	29.0
- Cigar	697	694	769	1,029	- 0.4	10.8	33.8
- Cigarette	193	328	402	481	69.9	22.6	19.7
Total	8,410	11,264	11,871	12,693	33.9	5.4	6.9

Table 2.2 Summary of Agricultural Policies for Crop Years of 96/97 & 97/98

Sectors	Programs	Contents of the Policies	Sectors	Programs	Contents of Policies																								
(1) Rural credit		<p>Contents of the Policies</p> <p>The conditions of rural credit for the crop year 97/98 have been improved in comparison with the crop year 96/97 in the following manner:</p> <p style="text-align: center;">Crop Year 96/97 Crop Year 97/98</p> <table border="0"> <tr> <td>Interest Rate</td> <td>12%, 9% (PRONAF)</td> <td>9.5%, 6.5% (PRONAF)</td> </tr> <tr> <td>Amount</td> <td>RS 5,200 million</td> <td>RS 8,700 million</td> </tr> <tr> <td></td> <td>RS 574 million (PRONAF)</td> <td>RS 1,650 million</td> </tr> <tr> <td>Limit/person</td> <td>RS 10,000</td> <td>RS 40,000</td> </tr> <tr> <td>Limit/purpose</td> <td>RS 50,000 (Equal to whatever crops and farming activities)</td> <td>RS 150,000 (sorghum)</td> </tr> <tr> <td></td> <td></td> <td>RS 100,000 (soybeans)</td> </tr> <tr> <td></td> <td></td> <td>RS 40,000 (livestock, etc.)</td> </tr> </table>	Interest Rate	12%, 9% (PRONAF)	9.5%, 6.5% (PRONAF)	Amount	RS 5,200 million	RS 8,700 million		RS 574 million (PRONAF)	RS 1,650 million	Limit/person	RS 10,000	RS 40,000	Limit/purpose	RS 50,000 (Equal to whatever crops and farming activities)	RS 150,000 (sorghum)			RS 100,000 (soybeans)			RS 40,000 (livestock, etc.)	(5) Minimum price guarantee policy	PCPM	The government's intervention regarding this program will be phased out. Instead, the government has decided to introduce the "Option Contract" program. Under this new program, producers are required to propose sale of their produce to the government setting timing and volume of the sale and on the basis of this proposal, contract will be made between producers and the government. This program will enable producers to sell their produce with advantageous price, while the government would reduce the purchasing volume. At present, this program is applied to exclusively to maize.			
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(2) Relief for debtor of rural credit	SECURITIZACAO	This program was conceived during the latter half of the 80s when the government had abolished the subsidy on rural credits. The objective of this program is to relieve debtors of rural credit who are under an obligation for repayment of loans. These debtors are forgiven to repay their loans with a ceiling of RS200,000, interest rate of 2.3%/year, grace period of 2-3 years and repayment period of 7-10 years. The greater portion of the beneficiaries of this program are medium farmers that reflects their deficient ability to procure finance for farming.	(6) Crop production security	CPR	This type of security is issued by producers who promise to hand over their produce. This is a sort of "green harvest" contract, but the securities are authorized by prestigious banking institutions of the country.																								
(3) Promotion of family agriculture	PRONAF	Supporting program for family agriculture which covers about 70% of the productive entities of the country. Credit conditions of this program are as follows. <ul style="list-style-type: none"> - Crop farming for both indivi. and group farmer RS 5,000/beneficiary - Procurement of equipment for indiv. Farmers RS 15,000/beneficiary - Investment for group farming: RS 75,000/beneficiary - Interest rate: 6.5%/year - PROAGRO: 2%, irrigated area: 1.7% <p>The total loan amount was hiked from RS 574 million for the crop year 96/97 to RS 1,650 million for the crop year 97/98, and it is thereby supposed that the government lays emphasis on this program.</p>	(7) Introduction of external finance	Caipira 63	This program aims to encourage introduction of external finance into the agricultural sector. In practice, country's commercial banks get loans from foreign banks to render credit services to the agents who are providing farmers with such inputs as fertilizers and agro-chemicals on the basis of "green harvest" contract. The government is encouraging finance to make use of this program, and in this end commercial banks are given quotas for external finance.																								
(4) Rural insurance	PROAGO	This program was set up as a measure to alleviate uncertainty relevant to agricultural production, but it hiked the production cost due to high rate of the premium. This situation has forced the government to reduce the premium subject to farmers' obedience to crop production in accordance with crop suitability zoning prepared by EMBRAPA.	(8) Agrarian reform		INCORA has plan to settle a total of 280 thousand people for the period 1995-98, and has settled 105 thousand people up to date. With implementation of this program, 4,800 people will be settled in Tocantins.																								
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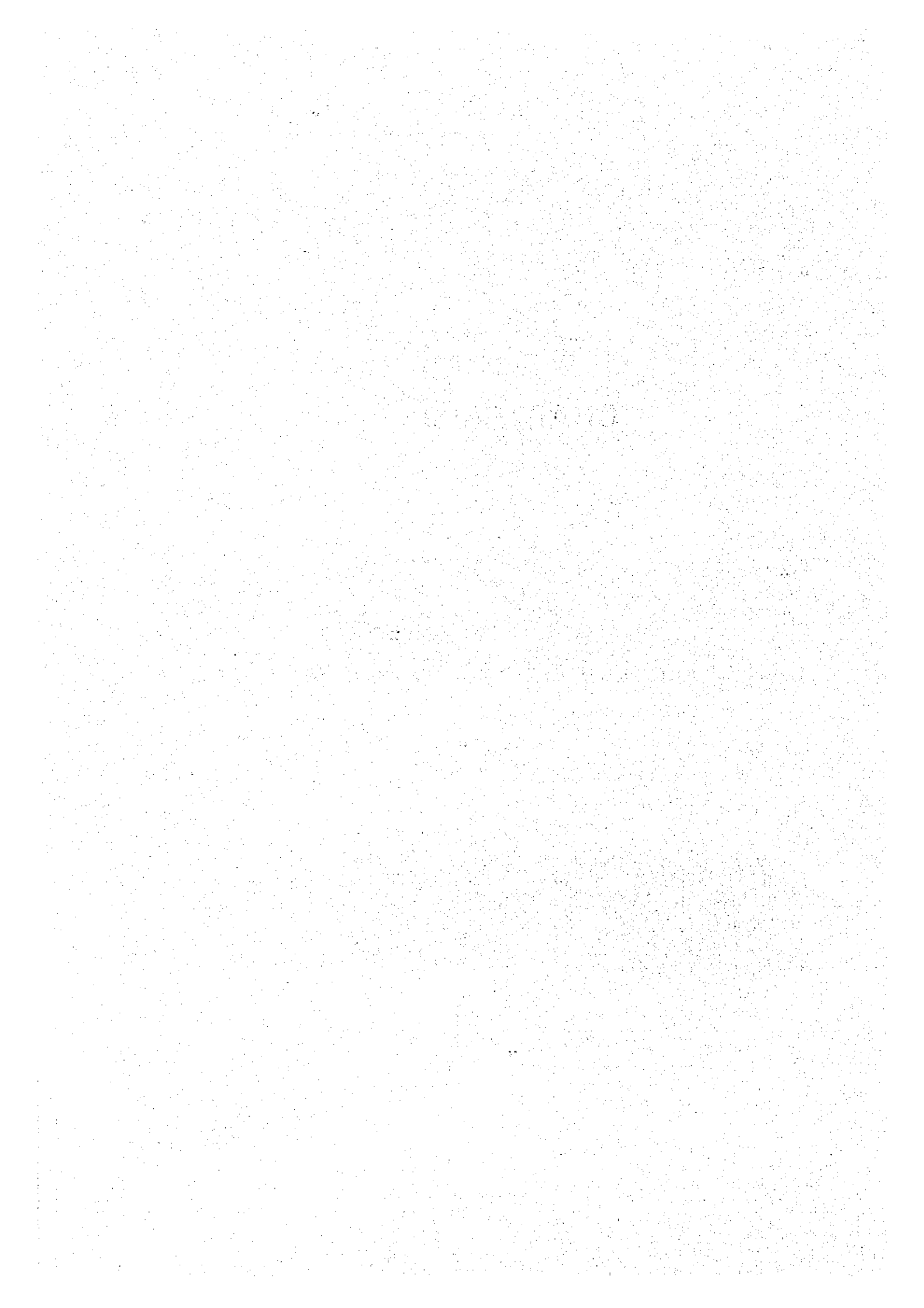
Table 2.4 Socio-economic Indicators in the States of Brazil

Items Year of data	Revenue from I.C.M.C. 1996		Fed. Gov's Transfer 1996		Gross Regional Products Total 1996		Life Expectancy at Birth 1991		Literacy Rate 1991		PIB per capita (adjust. by pop.) 1991		HDI 1991		Territorial Extension n.s.		Total Population 1991		Growth Rate 1980-1991		Population Density 1991		Rural Population 1991			
	Value	Order	Value	Order	Value	Order	Year	Order	%	Order	Value	Order	Index	Order	Area	Order	Number	Order	%	Order	No./km ²	Order	%	Order		
	(R\$ x 10 ⁶)		(R\$ x 10 ⁶)		(R\$ x 10 ⁶)						(R\$)				(km ²)						(km ²)					
North																										
Acre	44,641	26	347,466	22	1,057,793	24	2,369	14	67.0	17	65.2	19	3,633	17	0.665	17	153,698	15	417,165	25	2.99	6	2.7	23	38.2	8
Amazonas	1,186,837	11	369,602	21	7,219,215	14	3,181	7	69.5	9	76.2	15	5,107	7	0.797	9	1,567,954	1	2,102,901	18	3.57	5	1.3	26	28.6	16
Para	745,992	15	933,852	9	11,846,438	10	2,222	15	68.0	15	75.6	16	3,518	18	0.688	16	1,246,833	2	5,181,570	9	1.31	24	4.2	21	40.5	7
Rondonia	234,192	23	324,112	24	2,551,780	22	1,976	19	65.9	18	79.7	13	3,966	14	0.715	15	236,379	13	1,150,874	23	7.84	2	4.7	20	41.8	5
Roraima	43,640	27	342,367	26	557,219	27	2,215	16	75.8	11	79.4	14	3,690	15	0.749	14	225,017	14	215,950	27	9.55	1	1.0	27	35.4	11
Amapa	52,130	25	335,743	23	852,319	26	2,684	13	73.0	3	80.8	11	4,191	13	0.781	11	142,339	18	283,690	26	4.62	4	2.0	25	19.1	24
Tocantins	138,757	24	521,042	17	983,636	25	993	26	68.2	14	68.6	17	1,514	26	0.540	22	277,322	10	920,116	24	2.02	16	3.3	22	42.3	4
North-east																										
Maranhao	437,471	18	1,029,789	8	6,000,351	16	1,163	25	62.7	22	58.6	24	1,695	25	0.512	23	329,536	8	4,929,029	10	1.91	18	15.0	16	60.0	1
Piaui	281,319	22	609,623	15	2,474,317	23	919	27	65.1	19	58.3	25	1,339	27	0.502	26	251,273	11	2,581,000	12	1.72	19	10.3	18	53.1	2
Ceara	1,183,789	12	1,133,808	5	9,404,031	12	1,478	23	56.8	23	62.6	23	2,203	27	0.506	24	145,694	17	6,362,620	8	1.68	20	43.7	11	34.7	12
R.G. de Norte	378,849	16	592,832	14	5,012,539	18	1,971	20	54.6	26	63.7	22	3,149	19	0.574	21	53,107	22	2,414,121	17	2.20	11	45.4	10	30.9	14
Paraiba	448,563	17	721,836	10	4,083,503	19	1,221	24	53.7	27	58.3	25	1,915	24	0.466	27	53,938	26	3,000,677	13	1.31	24	59.3	7	35.9	10
Pernambuco	1,465,778	8	1,094,971	7	13,014,355	9	1,766	21	56.6	24	65.7	18	2,959	21	0.577	20	101,023	17	7,122,548	7	1.35	23	70.5	5	33.0	13
Alagoas	352,226	20	584,821	15	3,998,291	20	1,511	22	55.7	25	54.7	27	2,413	22	0.500	26	29,107	19	2,512,991	16	2.16	12	86.3	4	41.7	6
Sergipe	307,435	21	491,138	18	3,404,372	21	2,156	17	63.0	21	64.0	21	3,874	16	0.663	18	21,863	25	1,491,867	22	2.46	8	68.2	6	37.6	9
Bahia	2,529,957	6	1,736,703	3	25,246,714	6	2,026	18	64.8	20	64.7	20	3,054	20	0.609	19	566,979	5	11,855,157	4	2.04	15	20.9	15	42.7	3
South-east																										
Minas Gerais	5,429,800	2	1,810,340	2	50,951,348	3	3,121	9	68.3	13	81.8	9	4,605	10	0.779	12	586,624	4	15,731,961	2	1.48	21	26.8	14	25.1	20
Espirito Santo	1,381,742	10	373,227	20	8,659,834	13	3,157	8	71.4	4	82.0	8	4,834	9	0.816	8	45,733	23	2,598,505	14	2.30	10	56.8	8	26.0	19
R. de Janeiro	5,215,680	3	525,809	16	65,634,672	2	4,831	5	68.8	12	90.3	3	5,201	3	0.838	5	43,653	24	12,783,761	3	1.13	26	292.8	1	4.8	27
Sao Paulo	21,430,364	1	1,616,890	4	##	##	5,140	2	68.9	11	89.8	5	5,243	2	0.830	3	248,256	12	31,546,473	1	2.12	13	127.1	3	9.2	23
South																										
Parana	2,811,606	5	617,899	11	35,012,428	5	4,047	4	69.1	10	85.1	6	5,138	5	0.827	6	199,324	15	8,442,299	6	0.92	27	42.4	12	26.6	18
S. Catarina	1,915,829	7	1,103,569	6	17,882,112	7	3,751	6	70.8	5	90.1	3	5,114	6	0.842	4	95,318	19	4,538,248	11	2.05	14	47.6	9	29.4	15
R.G. do Sul	4,015,924	4	2,727,860	3	38,305,240	4	4,042	5	74.6	2	89.9	4	5,168	4	0.871	1	280,674	9	9,135,470	5	1.47	22	32.5	13	23.4	22
Central-West																										
D. Federal	801,024	13	87,351	27	15,320,706	8	7,808	1	70.0	7	83.2	7	5,262	1	0.858	2	5,794	27	1,598,415	21	2.82	7	275.9	2	5.3	26
Goiás	1,437,525	9	601,368	12	11,405,080	11	2,689	11	69.6	8	80.5	12	4,255	12	0.760	13	340,166	7	4,012,562	12	1.99	17	11.8	17	25.1	2
Mato Grosso	798,875	14	392,264	19	5,614,119	17	2,983	10	67.8	16	81.6	10	4,362	11	0.796	10	901,421	3	2,022,524	19	5.34	3	2.2	24	26.8	17
M.G. do Sul	610,832	15	268,778	25	6,444,107	15	2,868	12	70.1	6	90.8	1	5,055	8	0.826	7	357,742	6	1,778,741	20	2.40	9	5.0	19	20.6	23
Brazil	55,680,807		21,195,015		519,613,855		3,380		66.3		79.9		5,240		0.797		R. 508,647		148,917,244		1.93		17.3		24.0	

Source: Desigualdade Regionales: Indicadores Socioeconomicos nos Anos 90, IPEA

CHAPTER 3

PHYSICAL AND SOCIO-ECONOMIC CONDITIONS OF THE STATE OF TOCANTINS



CHAPTER 3

PHYSICAL AND SOCIO-ECONOMIC CONDITIONS OF THE STATE OF TOCANTINS

3.1 Natural Conditions

3.1.1 Meteorology

The State of Tocantins is located within tropical semi-humid climate zone with mean annual temperature of 24 - 26°C which is consistent throughout the year. The maximum annual temperature registered reached 42°C, and the minimum one was 8°C. The highest annual rainfall is registered in the region of Abreulândia and Pium with value of 2,500 mm, basin of Araguaia river, and the lowest (1,200 mm annual) is registered at the frontier with the State of Goiás. Rainfall in the Tocantins state increases from East to West, showing higher rainfall in the basin of Araguaia river and lower rainfall in the basin of Tocantins river. The climate is characterized by intensive rainfall during the summer season (October to April) and dry period during the winter (May to September). The relative humidity is higher during the rainy period, with a monthly mean value of 60 to 85%. In the east region, the humidity reaches lower than 50%.

3.1.2 Hydrology

In the State of Tocantins, the Tocantins river and the Araguaia river flow down from south to north. After the confluence, the Itacaiúnas rivers flow into Tocantins river and finally flows into the Amazonas river. The basin covers approximately 767 thousand sq. km up to the confluence with the Amazonas river. The mean flow of Tocantins river in Tucuruí, with an approximate area of 758 thousand sq km is 10,972 m³/s, and the mean flow of Araguaia river in Santa Isabel is 4,870 m³/s, with an area of 372 thousand sq. km, and in Santo Antônio do rio Tocantins it is 5,444 m³/s with an area of 302 thousand sq. km. This flow is not constant, with a dry period during the month of September for both rivers.

3.1.3 Geomorphology

The morphology of the State of Tocantins is composed by the Four large Geomorphological units (The Plateaus of the São Francisco Sedimentary Basin, the Depressions of Araguaia-Tocantins, the Bananal Plain and the Residual Plateaus of the area in between Araguaia-Tocantins rivers).

3.1.4 Geology

The main archean lands correspond to stratified units of the Goiano, Colméia, Porto Nacional and Gameleira complex, such as the *greenstone belt* type Metavolcano-sediments sequence of Natividade-Almas, Conceição do Norte and Rio do Côco.

3.1.5 Soils

(1) Major Classification of the Soils in the State of Tocantins

The Classification of the Soils in the State is shown in Fig.3.1. The prominent classes of the soils in the State are Red-Yellow Oxisols, Quartz sands and Dystrophic Litolic soils which constitute together about 63.8% of the State surfaces.














(2) Description of the Soil Characteristics

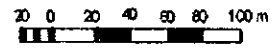
Taxonomically, the fertility levels and other characteristics of the Cerrado soils are not so different from the Amazonian region. In general, the Cerrado soils have high acidity level with frequent aluminium toxicity and low level of nutrients except those which are derived from basaltic rocks, calcareous or other mineral composition. The main remarkable difference is related to the negative soil water balance in the Savannah region as a result of the long dry season for a period of 5 to 6 months.

(3) Land Suitability and Identification of Areas Suitable for Agriculture

The land suitability map of the State of Tocantins is shown in Fig.3.2. Regarding the land suitability for agriculture (class 1 and 2), about 27.7% (7,703,142 ha) of the area of the state of Tocantins are classified as the land suitable for agriculture with good suitability; and 8.2% (2,281,478ha) has limited suitability for agriculture (class 3). And 16.4% (4,569,400ha) is suitable for cultivated pastures (animal husbandry); 40.7% (11,324,310 ha) is suitable for silviculture and natural pasture, and 7% (1,963,744 ha) is not qualified for agriculture use.

LEGEND

-  YELLOW OXISOL
-  DARK-RED OXISOL
-  PURPLE OXISOL
-  RED-YELLOW OXISOL
-  RED-YELLOW PODZOLIC
-  RED BRUNIZEM SOIL
-  CAMBISOL
-  PLINTHOSOL
-  HYDRMORPHIC SOIL
-  HYDRMORPHIC QUARTZ SOIL
-  QUARTZ SAND
-  LITHOLIC SOIL
-  CONCRETIONARY SOIL



Scale

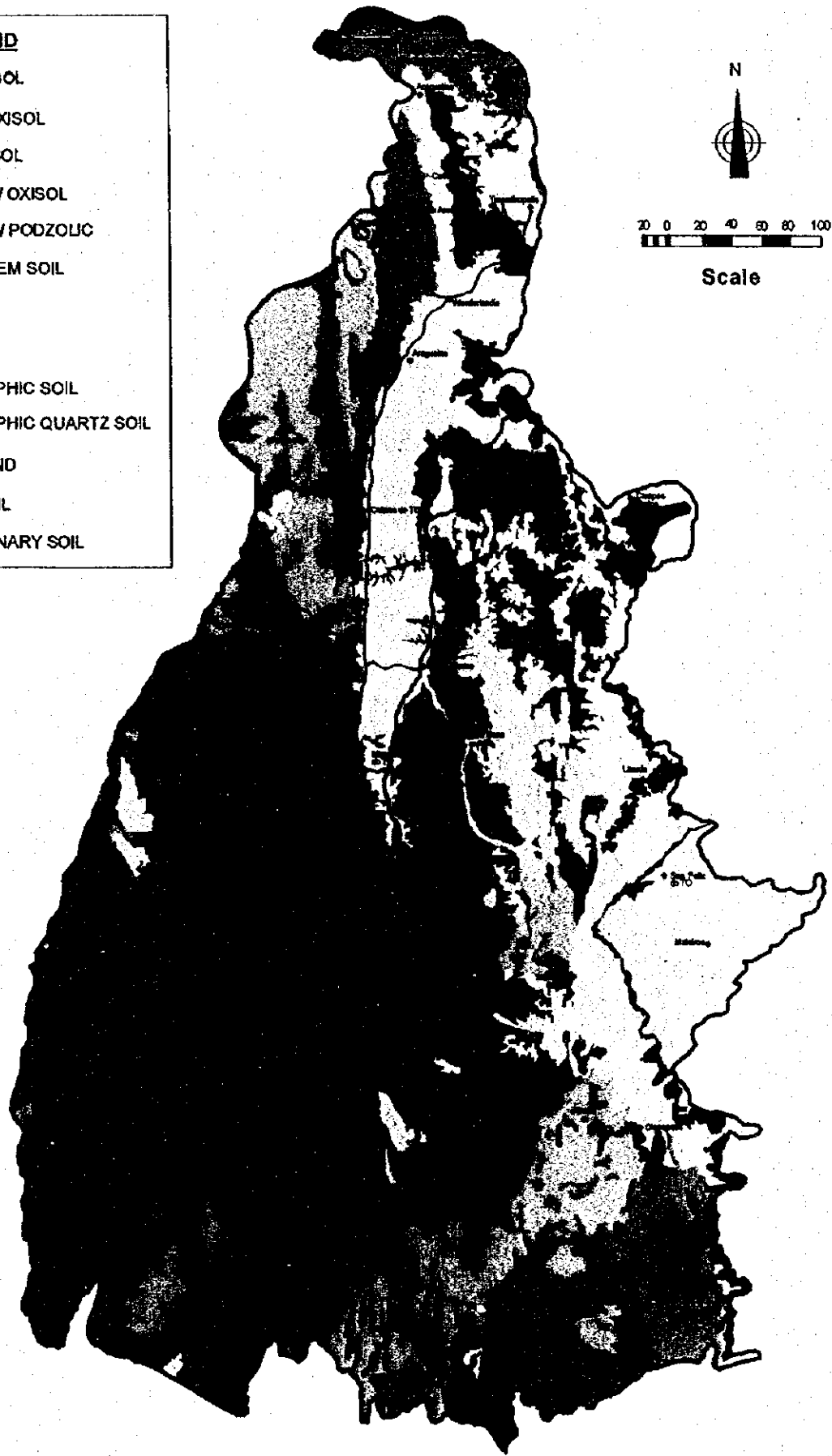


Fig. 3.1 : Classification of the Soils in the Tocantins State

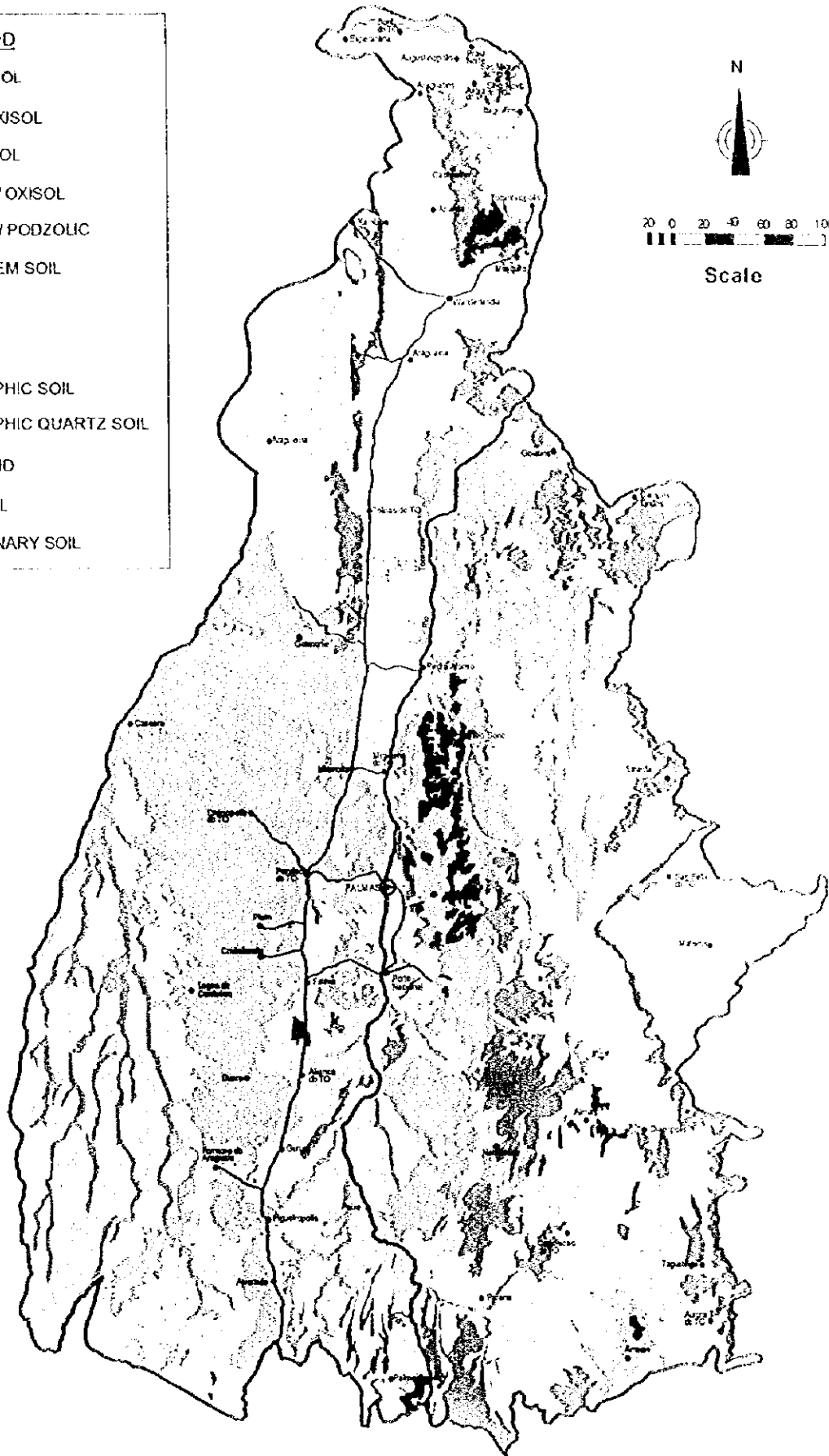
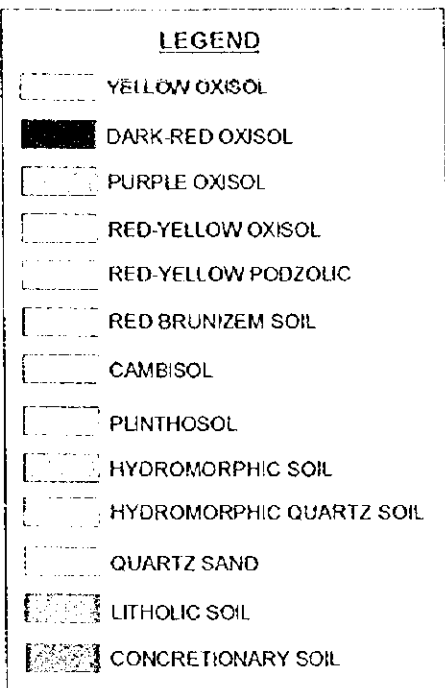














Fig. 3.1 : Classification of the Soils in the Tocantins State

LEGEND		
GROUP 1		1ABC
		1aBC
GROUP 2		2abc
		2(a)bc
		2(b)c
GROUP 3		3(abc)
		3(bc)
GROUP 4		4(p)
GROUP 5		5(n)
		5(r)
GROUP 6		6
Banana Island		Island

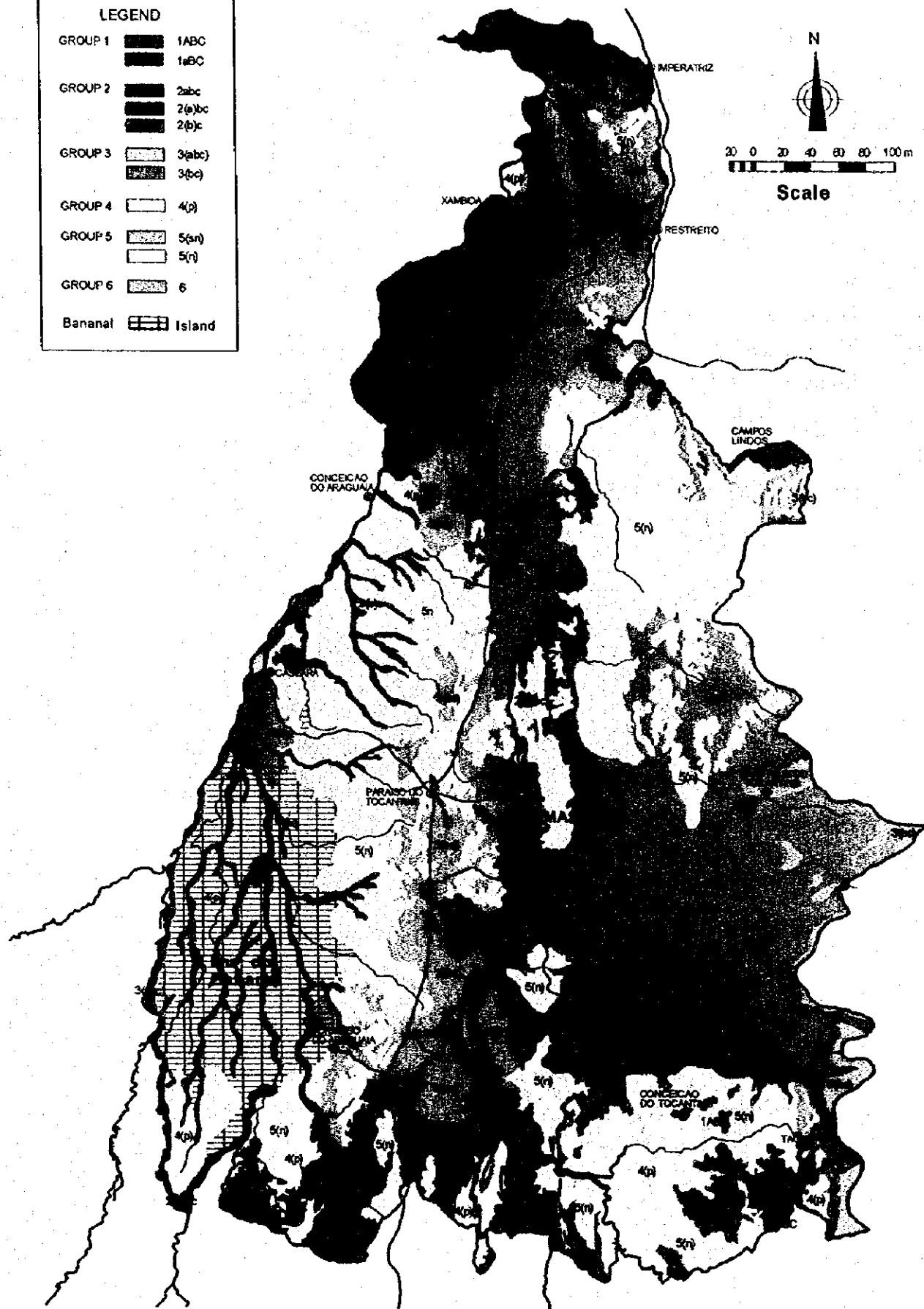


Fig. 3.2 Land Suitability Map of the Tocantins State

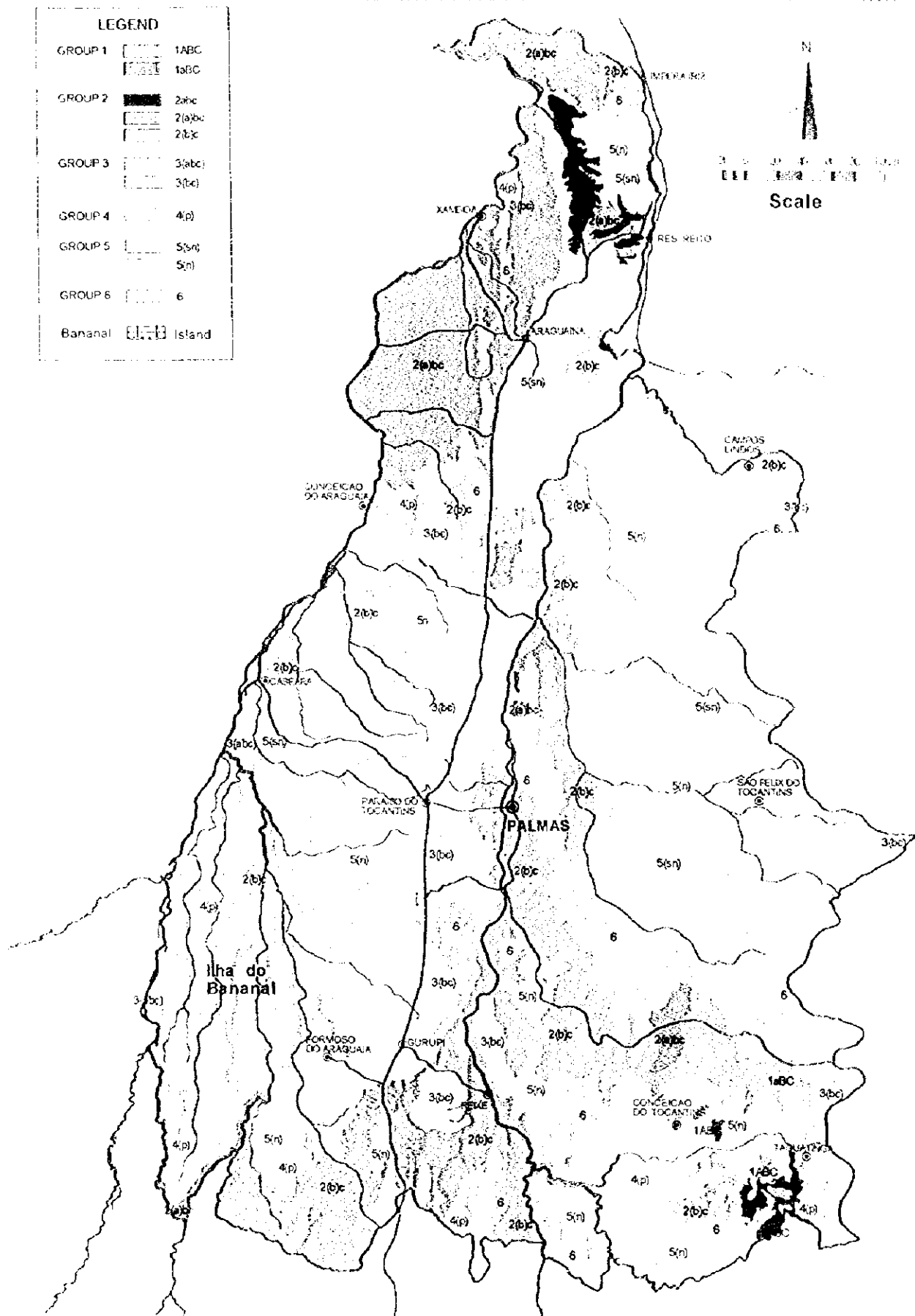


Fig. 3.2 Land Suitability Map of the Tocantins State

3.2 Environmental Conditions

3.2.1 Vegetation

The variation of the vegetation depends on the geomorphologic conditions and rainfall variation. The northern region has a dense vegetation of babaçú and the south and southeastern regions have vegetation of cerrado, predominant in the Central Plain of Brazil. The State vegetation is represented by the Cerrado which occupies a great part of the State; Dense Forest is predominant in the North and Northwestern part, and Mix Open Forest is predominant in the Extreme-North. The classification of the vegetation is shown in the Fig 3.3.

3.2.2 Environmental Conservation and Indigenous Reserve Area

(1) Environmental Conservation Area

In the State, total area of 2,450 thousand ha are assigned as an environmental conservation area, administrated by the Federal, State and Municipality level.

Conservation Area	Name	Area (ha)
State Level Conservation Area	• Lajeado Conservation Area	121,416
	• Foz do Santa Tereza Conservation	17,000
	• Ilha do Bananal	1,678,000
Federal Level Conservation	• Araguaia National Park	572,000
	• Tabatinga Environmental Conservation	61,000
Municipality Level	• Araguaiana Forest Park	1,456
Total		2,450,872

(2) Indigenous Reserves

In the State, seven indigenous reserves are located with total area of 2,170 thousand ha. List of these indigenous reserves are as follows;

Name	Area (ha)	Population	Boundary	Municipality
Apinayé	141,904	718	Yes	Araguatins, Itaguatins e Tocantinopolis
Boto Velho	145,000	95	No	Cristalândia e Pium
Funil	15,704	57	No	Tocantina
Kroalândia	302,533	1,198	Yes	Giattins e Itacaja
Xambioá	3,265	167	Yes	Araguaina
Xerente	167,542	1,095	Yes	Tocantina
Araguaia	1,395,000	1,801	No	Cristalândia, Formoso do Araguaa, e Pium

3.2.3 Environmental Problems

Albeit belonging to the Legal Amazonian Region which entails conservation of natural resources, the State of Tocantins confronts deterioration of environmental conservation with a progress of deforestation taken place mainly in the 70's. Environmental problems in the

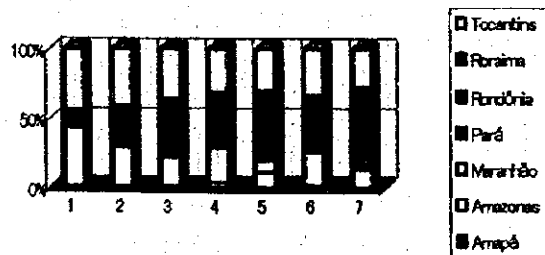
State associated with agricultural production may be resumed in the following manner:

- Decrease of forest area attributable to switching of land use from native forests to pastures
- Degradation of land fertility as an outcome of soil erosion to be brought about by the practice of burning
- Air pollution related with burning
- Water contamination stemmed from drained water at farms and industrial sewage

The practice of burning among farmers conducting subsistence farming causes a serious problem apart from degradation of land fertility, because with an emission of great amount of smoke and carbon dioxide gas (CO₂), it causes directly an obstacle to traffic activities and injures human health; indirectly, it affects global warming. Furthermore, burning has negative impact on natural recuperation force of lands and recovery of vegetation, both of which lead to decrease in area of green fields.

The amount of CO₂ emission due to transition of land use in Brazil is more than the total amount of industrial emission of CO₂ in Japan and the great majority of the former's emission is traced to the burning practice conducted in the basin of the Amazon River, the State of Tocantins is the most significant state in this dishonorable practice among the states located in the basin area of the Amazon River.

From agricultural standpoint, the frequent practice of burning in Tocantins is closely associated with extensive farming of livestock under irrational use of lands, because such livestock farmers tend to rely on burning in maintaining their pasture as the easiest way. Under the circumstance, vicious circle of: burning-degradation of land fertility-more extensive farming predominates.



Annual variation of the Forest Fires by State (1989-1995)

LEGEND

Domain	Formation group	Symbol	Dominant formation or subformation
Pluvial forest	Fp1	[White box]	Hydrophil forest
	Fp5	[Dotted box]	Dense forest
	Fp6	[Cross-hatched box]	Mix open forest
Stationary forest	[Solid black box]		Maranhense open forest
	Fad1	[White box]	Altozingu lulfoliada forest
	[Solid black box]		Mix forest
Savanna	Fd	[White box]	Deciduous forest
	Ce	[White box]	Cerradao
	[Stippled box]		Cerrado
	C2	[White box]	Dirty field and clean field
	C3	[White box]	Field with Murundu
[White box]		Indian or forest reserve	

Source: EMBRAPA

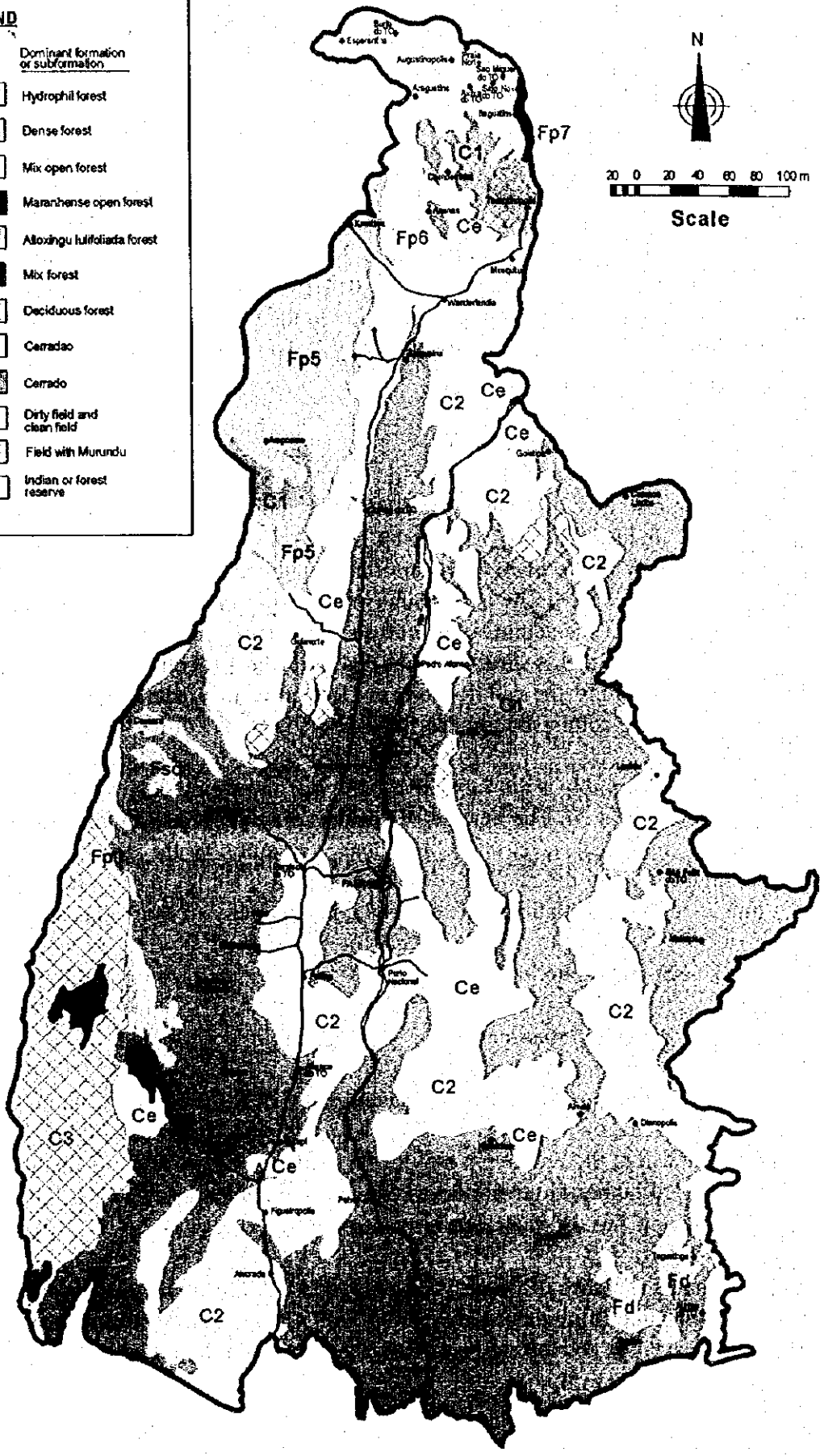


Fig. 3-3 Vegetation Map

3.3 Social Conditions

3.3.1 Population

The total population of the State of Tocantins is 1,049,823 inhabitants, which accounts for 0.66% of the total population of the country (estimated in 1995). This population was grown from 1991 at an annual rate of 3.32%. The population structure according to the Census 1996, consists of male - 537,014 (51.2%) and female - 512,809 (48.8%). The average household size is 4.33. According to the Census 1991, the age group structure was classified into: less than 9 years old - 27.9%, 10 to 59 years old - 66.7%, and more than 60 years old - 5.4%.

3.3.2 State Administration

The administrative division of the State of Tocantins consists of 139 municipalities, and the State is divided into 10 regions by SEPLAN. The administration of the State is the responsibility of the State Governor who is publicly elected. Each Secretariat of the State Government conducts its administrative guideline through their regional offices, and the smallest unit of the administrative organization is the municipal office. The administrative system of the State is directly connected with the Federal Government and is in duty to conduct smoothly the public policies. Recently, the federal government is striving to implement the administration decentralization.

The State Assembly is the legislative authority, and the number of assemblymen composing the Assembly is 24. The number of deputies are determined by the number of population. At the municipal level, the Municipal Assembly is the legislative authority of the municipality, and the number of councilors is also set up in proportion of each respective municipality's population. The terms of assemblymen and councilors are 4 years.

3.3.3 Social Structure

(1) Poverty Assessment

According to a poverty index calculated by the PCS (Solidarity Community Program), the State of Tocantins presents 42.723; the areas which showed higher poverty index are concentrated at the Extreme North region, where 8, out of 25 municipalities, appear within the first 10 higher poverty indexes. Sampaio municipality, which belongs to the Extreme North region, has the highest poverty index of 91.220.

The annual statistics of Brazil (1995) reported that the country average index of household head's income (minimum wage = 1.00) is 3.42. The index of the State is lower than the country average corresponding to 2.15, the indexes in the urban and rural zones being 2.84 and 1.18, respectively.

(2) Indigenous Group

In the State, the indigenous population, as the aborigines, is approximately 5,273 inhabitants. They are composed of 6 tribal groups and their characteristics are described as follows:

1) Karaja, Javae, and Xambioa

The big Karaja family comprehends the Karajas, Javaes, and the Xambioas, and they form their settlements at the Araguaia and the Javae rivers margins, in the Bananal Island. Their languages belong to the Macro-Je linguistic stock. The Karajas's way of life depends on the season; hunting and collection of foods are carried out in the dry season while traditional crop cultivation at upland is carried out in the rainy season. The basic foodstuff is fishes. At present, the Karajas, Javaes and Xambioas are facing many difficulties in surviving and getting aliments. The main reasons for these problems are: decrease of their settlement's territories, the constant presence of tourists, fishers and cattle raisers. In addition, the influence from the outer world has caused damages and the loss of their original culture, and produced acculturation to civilized habits.

2) Apinaje

The Apinajes form their settlements in forests bordering brooks which are tributaries of the Tocantins river left margens, in the municipalities of Tocantinopolis, Maurilandia, and Itaguatins, in the Extreme North region. They speak the dialect "Timbira" of the Macro-Je linguistic stock. A life-style of this group is traditional slash-and-burn agriculture and hunting. However, cultural assimilation is considerably high.

3) Kraho

The Krahos' reservation area is located at the municipalities of Goiatins and Itacaja. They speak the dialect "Kraho-Timbira" of the Macro-Je linguistic stock. However, young men and some adult men and women speak well portuguese. Traditional agriculture as slash-and-burn system is the main subsistence mean, and individual hunting is the main source of protain. Among the indigenous areas in the State, the Krahos' land has the poorest soil condition and the well-suited land for agriculture is small. Their acculturation and assimilation process is small in comparison with other groups owing to their strong feeling of identity.

4) Xerente

The Xerentes belong to the Xavantes family, and form their settlements in the Tocantinia municipality of the Central region. They speak the dialect "Akwe" of the Je linguistic stock. Through the contact with the outer world, presently, they have settled down and are performing agriculture and animal rearing to survive. They practice slash-and-burn cultivation and plant mainly rice. The Xerentes have undergone considerable acculturation and assimilation alike the other groups, and they have the same consumption habits as in the outer world.

The social patterns of these indigenous groups are matrilineal kinship systems except for the Xerentes (patrilineal kinship), and their religious orientation centers on spirits, based on the animistic cults. Besides, they believe in the christianity. Among the indigenous groups the most important events are festivals which centers the tribal animistic cults.

(3) Farmer's Community

The economic foundation of the State of Tocantins is agriculture and livestock. However, the rural population represents only 28% of the state total population. This phenomenon occurs mainly due to the migration of rural people to urban zones caused by the lack of basic human needs and poverty in the rural areas. On the other hand, farmers who live in the urban zones obtain their income from the labor markets of large-scale farms and other activities. Particularly, there are many landless farmers, mini farmers and small-scale farmers in the Extreme North and North regions, therefore, sever social problems caused by poverty can be widely observed. The landless farmers, mini farmers and small-scale farmers are, however, distributed over the entire State. As for the agrarian reform, INCRA is implementing several settlements for landless rural workers.

(4) Farmers' Organization

The Federal Government - Ministry of Agriculture, through its public policies, is promoting the creation of small farmers' associations (rural producers' association) aiming to stabilize the familiar agriculture and to create advantages in rural communities. The associations have an important role in the vitalization of rural communities, through the improvement of life conditions and the sustainability of familiar agriculture, facilitating the access to agricultural credit and technical assistance to small farmers. The SAG and RURALTINS are playing an important role in the organization of associations of the rural zone. On the other hand, as mentioned above, the APA-To is being supported indirectly to the organization and management of associations.

Aiming to agriculture and livestock promotion among midium- and large-scale farmers, the rural syndicates are also organized in each region. These organizations belong to the CNA (National Federation of Agriculture) which is strong farmers' organization at the national level. The central organization in the State "FAET" , as a lower branch of the CNA, is formed by regional rural syndicates.

Presently, there are 12 agricultural cooperatives established by medium- and large-scale farmers. However, due to harsh circumstances of agricultural management, most of the cooperatives are in dissolution. In the southern irrigated rice production areas, as COOPERJAVA which is established by large-scale irrigated rice producers, operates commercially, including an agroindustry.

3.3.4 Women's Role in Agriculture

Generally, rural women in the State of Tocantins are involved in some stage such as seeding, weeding, and harvesting of agricultural production. In addition, domestic activities,

i.e., housekeeping, and child care, are an essential part of women's work. The domestic activities also include food preparation, fetching water, firewood collection, and washing cloths. These unproductive activities constrain the improvement of working conditions and the status of women in rural area.

According to the results of interview survey of gender in the rural areas, a gender-base division of labor is linked with the social status of women. Most activities related to capital acquisition and maintenance are the responsibility of men. The source of walth controlled by women are few and more related to household consumption.

RURALTINS is carrying out social assistance programs such as courses in home economics, handicraft, vegetable gardens, home industry, domestic animal rearing, nutrition, basic health care, etc., for rural women, securing the cooperation of the PACS's staff. However, the implementation of these programs does not have a wide reach due to the lack of personnel and financial resources.

3.3.5 Education

(1) Basic Education

Basic education services are the responsibility of the Secretariat of Education and Culture of the State of Tocantins under the guideline of the Ministry of Education. At the 1st grade school, the average number of pupils is 108 per school and 23 pupils per teacher.

Pupils who finish the primary course of the 1st grade school represent 62% of the enrolled pupil. Pupils who leave school without completing the primary course represent 17%. The rest represents pupils who had failed or had been transferred. At the secondary course, pupils who finish the course represent 63%, and those who leave the school without completing the course represent 19%. The main reasons of leaving school are the participation in farm work and/or other labor activities. Moreover, rural teachers have low qualification. Therefore, the educational effects on the basic education are fruitless.

(2) Vocational Education

Vocational education services for professionals are carried out under the PLANFOR (National Plan of Professional Education) of the Ministry of Labor. The PLANFOR aims to mobilize and to articulate the vocational education capacity available in the country in order to quality of the economically active population.

In terms of rural training, RURALTINS and SENAR, and sometimes SEBRAE, are performing the courses and activities. The UNITINS has cooperated in the field of special projects. In 1995/1996, the training for RURALTINS's staff was implemented as: 12 courses of agricultural sector, 16 courses of livestock sector, 2 courses of social assistance, and 11 courses of other sectors.

(3) Higher Education

There are 2 universities established in the State; UNITINS and ULBRA. In addition, there are also 2 colleges in Gurupi and Paraiso do Tocantins.

(4) Education for Indigenous Groups

In 1991, the State government concluded an agreement with Goias Federal University and FUNAI to promote education for indigenous groups, and started the "Indigenous Education Project". As a first step for the attainment of this goal, it was carried out the training of indigenous teachers, belonging to the community where they would teach and speak the same language as their students, in order to use both their own culture and the Brazilian as well, utilizing the Portuguese language, too.

(5) Literacy Rate

According to the Census 1991, the literacy rate in the State of 10 years old and over is 69.25%: 56.50% in rural area and 78.04% in urban area. Low literacy rate in the urban area is caused by inflow of rural people. The average rate at the Country and the Northern region was 80.28% and 75.06%, respectively. Judging from these figure, it can be said that the literacy rate of the State is lower than the country and the northern region.

3.3.6 Health

(1) Health Services

The coordination of health services in the State of Tocantins is the responsibility of the State Secretariat of Health under the guidelines and in accordance with the SUS of the Ministry of Health. Health administration is conducted through three regional offices: Northern regional office in Araguaina, Southern regional office in Gurupi and Central regional office in Palmas. The regional offices are responsible for the supervision of 11 regional hospitals.

The hospitals which have medical services are 83 hospitals; 62 public hospitals and 21 private hospitals. In addition, there are public health institutions; 77 health centers and 136 health posts in rural zone. According to the 1995 data, the staff engaged in medical services are: 561 doctors, 175 nurses, 1,437 auxiliary nurses, 227 dentists, 22 trainers for rehabilitation, and 34 assist. physicians. the number of beds is 1,172 in the public hospitals, 710 in the private hospitals and 870 in other facilities (health centers). Medical personnel and beds per 10,000 persons is 5.27 doctors, 3.69 dentists, 1.77 nurses, and 4.2 beds. (see Tables IV-5.1 to 3, Annex IV)

In comparison with the Country and the Northern region, the number of doctors is less than one half of the country (13.04), but there is only a small difference between the northern region (6.02).

(2) Main Diseases

Recently, the acute diarrhea diseases are diffused in the entire State and it was recorded 9,766 patients at 66 municipalities in 1996. The visceral leishmaniosis is found in 0.45 per 10,000 persons. The Chagas disease (parasitic disease) is spreading among farmers who live in houses made of thatch roof and clay walls, and 3.4% of the total population of the State have a chagas parasite. There is also a high breakout rate of the Dengue in the State.

In rural area, there are many patients of tuberculosis, Hansen's disease, and hepatitis caused by poverty, malnutrition and poor sanitation conditions. There are also some meningitis cases.

(3) Preventive Medicine and Health Education

The State Secretariat (SES) is implementing inoculations against tuberculosis, yellow fever, and hepatitis B, sterilization against malaria, and blood tests to detect the visceral leishmaniosis, in order to prevent these epidemic and infectious diseases. Furthermore, the SES prepares and provides the serum against poisonous snakes.

In order to promote home health control and prevention against diseases, the SES is carrying out health campaigns and the PACS (Community Health Agent Program - 1 agent per 250 people) to the rural population. A school health program in the 1st and 2nd grade schools is being promoted by the SES, and voluntary assistant training is carried out among the pupils.

(4) Others

Concerning with child and mother health, the SES presumes that there is a high infant mortality rate although there is not a official record about this. The main causes are malnutrition, diarrheal diseases, pneumonia and mainly stillbirth deaths. There is also a high mortality rate among women during delivery. It is informed that this situation is caused by ignorance and malnutrition of pregnant women.

3.4 Economic Conditions

3.4.1 Gross Regional Product (GRP)

Although the GRP in Tocantins had been growing for four years since 1994 with a higher annual rate than that in Brazil and in North Region on the average, its level still remains at lower rate accounting for only 0.19% of the GDP in 1994. Similar to GRP, an annual growth rate of per capita GRP in Tocantins had been much higher than that in Brazil and the North Region, but the level of per capita GRP is extremely inferior to that of Brazil and the North Region and the Tocantins state, locating the state of Tocantins in the 26th position among country's 27 states and with a proportion of 29.4% of the nation's GDP per capita and 43.2% of the average value of the GRP in the North Region.

The greater portion of the state's GRP is covered by the primary sector (agriculture and livestock), which is followed by the tertiary sector (commerce and services). The secondary sector (manufacturing) covers remarkably small portion of the GRP in Tocantins. So far as the annual growth rate is concerned, the primary and tertiary sectors had shown almost parallel trend, while the secondary sector, even though very small in value, had obtained significance growth.

3.4.2 State Budgetary System

Budgetary system of state government in Brazil is mainly supported by indirect tax, of which the merchandise and services circulation tax (ICMS) plays the most important role. Total amount of ICMS collected in Brazil accounts for 60% of total revenue and is greater than the federal income tax

Following the new constitution enacted in 1988, expansion of autonomy for local public finance is sought by endowing state governments with a collection of ICMS for their budgetary arrangements. However, the imbalance in development of economic activities have resulted in large gap in fiscal capacity among states. The federal government has decided to allocate subsidies through the constitutional provision and these subsidies play an important role in state's budgetary building.

There are two main sources of the subsidies that are transferred from the federal government to states' government: one is the transfer of funds from the National Treasury and the other is transfer of funds for for specific purposes based on independent negotiation between the federal government and states government; the former is allocated to each state based on a calculation performed according a formula using population (substitute variable of the need for fiscal spending) and income per capita (substitute variable of fiscal capacity), while the latter is distributed according to the need and maturity of each project implemented by states government.

In 1996, the state of Tocantins received an amount of R\$ 521,042 thousand, which account for 2.7% of the total funds of the National Treasury transferred to state government; this proportion has been constant for the last three years, although the transferred amount is growing.

In contrast to transfer of funds from the National Treasury, which is allocated mechanically according to formula without necessarily considering the individual needs of each state, transfer made on a negotiation basis may be able to realize necessary government spending if it is allocated with full consideration of individual needs and maturity of each project implemented by the provincial government.

3.4.3 ICMS

The ICMS was established in 1988 and has been collected since 1989. The federal government has been granting the authority of collection to state governments under the

policy of promoting decentralization. Thus the tax rate is decided accepting the demands from the local level. In concrete terms, persons charge of tax matters at each province discuss and determine the tax rate at the tax council meeting of the federal government.

In the state of Tocantins, various incentives are provided by revising regulation on the ICMS to redress disparity among industrial sectors. In the livestock industry, for instance, measures such as exempting tax on transactions of cattle among farmers and reducing the percentage of taxes imposed on slaughterhouse and freezing stations while giving incentives to poultry farms and dairy product factories. Furthermore, a 50% exemption of the ICMS was given for the Program Precocious Steer. A decision was also made to not levy ICMS on primary products that have been produced within the state. Therefore, paddy and live weight of cattle are tax exempt.

The rate of ICMS for processed farm and animal products is 7% for those distributed within the state and 12% for those distributed outside the state. In commercial and industrial sectors, the rate of ICMS imposed is 12% for items distributed both inside and outside the state.

As it can be seen above, the state of Tocantins is trying to play a frontier role in farming and livestock of Brazil by reducing the rate of the ICMS imposed on this industry.

So as to strengthen export competitiveness of domestic products, the federal government has decided to exempt the ICMS on exports starting December 1996. This will make exported soybeans tax-exempt but the tax is imposed when soybeans are sent to some oil mill in the country.

Any exception to ICMS is decided by discussion among persons in charge of tax matters at each province. Such meeting was held in Palmas City on May 27, and Tocantins Province has proposed changing the nature of the existing ICMS from production tax to that of consumption tax in an effort to increase the willingness for production among producers.

The ICMC is the major source of revenue for the state budget and accounted for 20.1% of the total sum of the revenue. The leading sector which contributed to the greatest portion of the ICMC dependent income was the commerce in 1995, which was followed by livestock, electricity, fuels and communications sectors. The remaining sectors such as transport, agriculture and mining played minor role in contribution of the ICMC revenue. The Table 4-2-2 resumes revenues derived from the ICMC for each sub-region in Tocantins.

3.4.4 Fiscal Balance

The fiscal revenue of the state government of Tocantins depends in its great majority on the transfer of funds from the National Treasury and this revenue represented approximately 60% of the total revenue and the remaining sources of the revenue are the ICMC and sale of state bonds. The proportion of the transfer has declined recently from 70% in 1994 to 60% in 1996. The revenue from taxation has increased in these days; it had jumped twice for the period 94/95 and had multiplied by 25% for 95/96.

Tax revenue consists of the ICMC and others, of which the ICMC covers as large as 87% of the total revenue.

Public bonds issued accounts for 12 to 13% at present (1996). Although one cannot conclude at present stage that it will create a serious problem in the state, attention must be given to future changes and mode of their investment. As increase in revenue is likely to be influenced by the transfer of funds from the National Treasury considering the scale of current transfer, it fluctuates largely along with changes in the Brazilian economy and its tax system, making it difficult to predict. However, an annual increase of 20 to 30% can be expected by judging from various conditions that exist at present.

As for fiscal expenditure of the state government, the increase in investment is conspicuous, although it is natural for a developing state. Increase in repayment of domestic and foreign interest is also a natural consequence of increase in issue of public bonds. While concrete analysis cannot be made because the conditions for issue of public bonds are not known, fiscal utilization that will not result in stagnation of and proper investment when the time for interest payment and repayment arrives. The status of expenditure for salary-related expenses and other administrative expenses are considered to be sound.

The fiscal balance for the past 3 years based on the aforementioned revenues and expenditures is as shown in the following table.

3.4.5 Industrial Activities

According to SEINC (Secretariat of Industry, Commerce and Tourism), the registered companies in the State are as shown below.

Business Field	Number
Industry including construction	1,207
Wholesale market	510
Retail market	8,115
Services (restaurant, bank, consultants services, tourism, taxi, bus, transportation, barbershop)	208
Extraction activity (babaçu, mining, timber cutting, etc.)	31
Hotel Services	114
Total	10,119

Sources: Register of Taxpayers/SEFAZ - May/96

Three (3) municipalities consist of Araguaína, Palmas, Gurupi represent 38% of all the activities.

Municipality	Number of Companies
Araguaína	1,341
Palmas	1,306
Gurupi	1,235

3.5 Agricultural and Livestock Production Conditions

3.5.1 Farming System

(1) Agricultural Production

Rice is the major crop cultivated in the State of Tocantins followed by other crops such as maize, cassava, soybean, feijao bean, banana, sugarcane, banana and pineapple. The cropping area and the production for these major crops are shown below.

Agricultural Production in the State (1995/96)

Crop	Area (ha)	Yield (t/ha)	Production (t)	No of Producers
Rice (Non-Irrigated)	74,630	1.39	103,919	12,532
Rice (Irrigated)	53,629	4.14	222,214	284
Maize	69,049	1.86	128,739	11,887
Feijao Bean	5,684	0.29	1,628	4,132
Soybean	7,292	1.92	14,030	58
Cassava	11,034	17.81	196,505	13,047
Sugarcane	5,334	46.72	249,201	1,318
Banana (*)	6,487	0.64	4,156	3,264
Pine apple	585	22.06	12,905	330

* - The unit for the production and yield for banana is 1000 bunches

(Source: SEPLAN Data-95/96)

Apart from the above mentioned fruits, orange, cashew and acerola are also cultivated in small areas. The total cultivation area for various crops during various periods are shown below in the following table.

Cultivation Area (ha) in the State during Various Periods

Crop	1985	1989	1995	1996	1996/ 1995 (%)	1996/ 1989 (%)
Rice	323,234	381,260	167,313	128,289	76.7	33.6
Maize	84,498	102,530	75,105	69,049	91.9	67.3
Feijao Bean	18,653	10,480	8,106	5,684	70.1	54.2
Soybean	27,140	59,070	20,007	7,292	36.4	12.3
Cassava	12,244	10,120	11,476	11,034	96.1	109.0
Sugarcane	2,801	5,910	5,553	5,334	96.1	90.3
Banana	15,200	14,570	8,749	6,487	74.1	44.5

(Source : IBGE Data)

While comparing the cropping area according to the zones, it is inferred that more than 90% of the irrigated rice is cultivated in south-western zone especially in Formoso do Araguaia and Lagoa da Confusão. Sugarcane is cultivated mainly in the south-east region (mainly Arraias) which contributes about 90% of the sugarcane production of the State. Pine apple is cultivated mainly in the Central region especially Miracema do Tocantins and Palmas.

The agricultural production in the Tocantins State is compared with the Northern region and Brazil as shown below.

**Comparison of Agricultural Production of the State of Tocantins
with Northern Region and Brazil (1994-95)**

Crop	Percentage of Area		Yield (t/ha)		
	Toc./Nor.R	Toc./Brazil	Tocantins	North. Reg.	Brazil Ave.
Rice	29.7	3.76	2.49	1.77	2.38
Maize	11.8	0.48	1.49	1.52	2.36
Feijao Bean	3.0	0.15	0.35	0.55	0.62
Soybean	100.0	0.27	1.81	1.91	2.16
Cassava	2.41	0.51	16.73	14.12	13.22
Sugarcane	29.1	0.11	49.22	50.87	67.23
Banana (*)	11.3	1.99	0.65	1.13	1.11
Pineapple (**)	15.0	1.00	18.01	20.79	22.34

* - Yield for Banana is given in 1000 bunches/ha

** - Yield for pine apple is given in 1000 fruits/ha.

(Toc. - Tocantins; Nor.R - Northern region which includes Amazonas, Para, Roraima, Acre, Amapa, Rondonia and Tocantins) (Source : Statistical year book of Brazil - 1995)

(2) Agricultural Farm Structure (Landholding Size)

In the State of Tocantins there are approx. 47,000 farmers cultivating a total area of approx. 235,000ha, with an average cultivation area of 5.0ha.

In the State of Tocantins, the farmers are classified based on their income and their landholding size as shown below. These classifications are followed by the banks while giving the credit for the farming activities :

1) Classification according to the Central Bank

1. Mini Farmer : Gross annual income of upto R\$7,500
2. Medium Farmer : Gross annual income of R\$7,500 - R\$22,000
3. Large Farmer : Gross annual income of above R\$22,000

2) Classification according to FNO (North Constitutional Fund)

a) Classification according to gross value of production

1. Mini Farmer : Gross value of production of upto R\$14,000
2. Small Farmer : Gross value of production of R\$14,000 - R\$58,000
3. Medium Farmer : Gross value of production of R\$58,000 - R\$288,000
4. Large Farmer : Gross value of production of above R\$288,000

b) Classification according to landholding size

1. Mini Farmer : Upto 240ha
2. Small Farmer : 240-640 ha
3. Medium Farmer : 640-1,200 ha
4. Large Farmer : Above 1,200 ha

(For the areas of Araguacu and Sandolandia, 7/8th of the above values are used for

classifying the farmers according to their landholding sizes. For the inundated areas, the sizes of the above mentioned areas are multiplied by 2).

3) Classification according to INCRA (National Institute for Colonization and Agrarian Reform)

1. Mini Farmer : Upto 80ha
2. Familiar Farmer : 80-320 ha
3. Medium Farmer : 320-1,200 ha
4. Large Farmer : Above 1,200 ha

As per the PRONAF (National Support for the Familiar Agriculture), the small farmer is defined as follows :

1. Landholding area of less than 240 ha
2. Number of workers - 2
3. The family should live in the farm or nearby area and not in the town.
3. 80% of the income is from agriculture

The limit of the banking credit through various programs of agriculture and animal husbandry are decided based on the above classification.

3.5.2 Land Use and Land Tenure

(1) Actual Land Use

Of total land resources in Tocantins, approximately 55.4% is assessed to be arable, 14.1% suitable for grazing, 17.6% suitable for forestry, and the remaining 12.9% is reservation and alineated land. Referring to the agricultural census conducted in 1985 and information compiled in the guideline for regional development by zone prepared by SEPLAN the state's actual land use as of 1995 is roughly estimated as follows:

Category	Area (ha)	%	Category	Area (ha)	%
Arable land	2,710,583	9.7	Grazing land	10,650,900	38.3
- Cropped land	251,943	0.9	- Improved pasture	3,297,579	11.8
- Fallow land	887,626	3.2	- Natural pasture	7,353,321	26.4
- Reclaimed land	1,797,764	6.5	Others	11,336,178	40.7
Forest	2,915,260	10.5	- Alienated area	850,908	3.1
- Natural foresr	2,912,432	10.5	- Reservation, etc.	10,485,270	37.7
- Forestation	2,828	0.0	Total	27,838,670	100.0

In addition, cropped land has changed from 654,953 ha (57.5% of the total reclaimed area) in 1985 to 251,943 ha (22.1% of the total reclaimed area) in 1995. Remarkable decrease in cropped area took place from 1990 onward and as for causes for this phenomenon, it is presumed that farmers in the state have been affected by vulnerable farm management that could not keep up with the agricultural policy of the federal government that were carried out during this period such as minimum price system of farm produce and changes in agricultural financing system.

(2) Land Tenure

Individuals and legal persons (associations) own an area equal to 63% (174 thousand km²) of the area of the state. In addition, squatters occupy some portions. The details of the land tenure is shown in the table shown below. Individuals own the greater majority of the lands in Tocantins with each farmer holding approximately 435 ha. Squatters also occupy relatively large extension in average of 152 ha per farmer.

Status of the Land Tenure

Land Holders	Land Extension		Land Unit		Area per Unit (ha)
	Area (ha)	%	No.	%	
Individuals	15,882,000	77.2	36,522	91.5	434.9
Renters	83,000	2.9	1,379	0.5	60.2
Sharecroppers	39,000	1.1	527	0.2	74.0
Squatters	1,350,000	18.8	8,892	7.8	151.8
Total	17,354,000	100.0	47,320	100.0	366.7

(3) Land Titling and Title Registration

The status of land titling and title registration in Tocantins as of May 1997 is as follows:

- 1) Total area of lands completed title registration: 21,750 800 ha (approx. 78% of the state territory extension)
 - a. Private land distributed by INCRA: 4,500,000 ha
 - b. Private land distributed by IDAGO: 14,000,000 ha
 - c. Private land distributed by ITERTINS 2,500,000 ha
 - d. Federal land 708,000 ha
 - e. State land 42,800 ha
- 2) Total area of lands without completion of title registration: 6,091,900 ha (approx. 22% of the state territory extension)

Reasons for incompleteness of title registration:

- a. At a trial in dispute
 - b. Legally occupied by individuals, but not yet registered
 - c. Expropriated to public sectors due to without exploitation, but land ownership is unknown, etc.
- 3) Proportion of titled land by region
 - a. Northern region: 80% - 8,550,800 ha
 - b. Central region: 25% - 4,100,000 ha
 - c. Southern region: 30% - 9,100,000 ha

3.5.3 Actual State of Farming

Most of the small farmers own a relatively large area of land, but they cultivate upland rice, feijao, mandioca, etc., for subsistence in small areas. Each crop is cultivated in a small field and is left fallow during next year. In the next year, they burn the next field and sow seeds or plant stocks within burned stubs. Generally, it takes about 4 to 5 years to return to the primary field. However, a few of the small farmers introduce cash crops such as vegetables and fruit trees, and cultivate various crops in the same field by crop rotation method.

Most of the farmers do not have any irrigation facility. Therefore, annual crops are cultivated in wet season and crops grown over several seasons, such as mandioca and fruit trees have minimal growth in dry season and restart the growth in wet season. Vegetables which are cultivated in wet season are kept under roof of polyethylene seat (guidance of RURALTINS).

RURALTINS provides the technical guidance to farmers, which are based on EMBRAPA's guidance. However, yields of many crops are low and are 56 % to 83 % of the average yields in Brazil except for rice and mandioca.

3.5.4 Agro-Economic Conditions

(1) Class Division

The farm size and the corresponding number of holding in the State of Tocantins are shown below :

	Farm Size	Number of Holding	%	Total Area	%
(A)	>10ha	3,603	1.6	18,672	0.1
	10<50ha	9,415	19.9	285,819	1.6
	50<100ha	7,582	16.0	571,360	3.3
	(Sub-total)	(20,600)	(43.5)	(875,851)	(5.0)
(B)	100<500ha	19,356	40.9	4,374,293	25.2
	500<1,000ha	3,835	8.1	2,698,757	15.6
	(Sub-total)	(23,191)	(49.0)	(7,673,050)	(40.8)
(C)	1,000<5,000ha	3,208	6.8	6,178,956	35.6
	5,000<10,000ha	234	0.5	1,574,142	9.1
	10,000ha<	87	0.2	1,652,406	9.5
	(Sub-total)	(3,592)	(7.5)	(9,405,504)	(54.2)
	Total	47,320	100.0	17,354,405	100.0

- (a) In this state, the agricultural production activities are not active, and therefore the area size doesn't reflect the economic conditions directly, and it is not clear from the class division.
- (b) Having a livestock population of 5 times of human population, many parts of the state have the animal husbandry as the main source of income. In terms of area, it is the class (C) in the above table and can be considered as large farmer.

- (c) Class B is considered as small farmer, and the present area is not enough to have income with extensive animal husbandry, but have potential with the future mechanization.

The PRONAF considers, to divide the classes, as small farmer, which is able to receive their assistance, areas of 4 fiscal modules of 320 ha, and above 300 ha, it is considered as medium farmer.

- (d) Below 100 ha of class (A) is considered as mini farmer. This area is not enough to mechanize, requiring the creation of association to the community cultivation, or an intensive agriculture to increase the income even in small areas.
- (e) Actually the big farmers of (C) can produce cereal, the bottom band of (B) can produce other cultures or intensive animal husbandry of small animals. So, the above table can be utilized only as a reference.

(2) Present Situation and Management of Each Class

- (a) The big farmers (C) can realize a good management of their farms, improving their pasture and installations, introducing better varieties to increase the productivity.

Between the medium and small farmers, there are farmers who do the extensive pasture decreasing the productivity. The lands where the utilization level is low or is acquired by INCRA, or have high taxes, it is necessary to increase the cereal production.

- (b) The medium farmers are the land owners, who generally do the extensive animal husbandry and subsistence production, and are not different to the small farmers. It can be cited that the low knowledge and engagement in the agriculture may be main cause. Related to priority plans, it is necessary to produce a new generation through educating young people about the importance of agriculture, mechanization and leadership capability in projects. These young people will form the fundamental part in the agriculture production.
- (c) Mini farmers (A) should be included in the NPA plans, making them easier to access to technology, market and finances. Even without sufficient lands it is possible to rent those lands. It can be accounted that the young people engaged in the NPA plans can be included in the mechanization projects.

3.5.5 Agricultural Credit Situation

(1) Present Situation of Agricultural Credit

In the state of Tocantins, the agricultural credit operations are basically executed by the

Bank of Brazil and Amazonian Bank. Amazonian Bank executes the financing operations of PROCERA for INCRA settlement, PRORURAL for small farmers and NORMAL for medium and large farmers respectively. Among the seven states where this bank operates, the State of Tocantins represents 23.6% of the financed amount. Financing for small farmers or PRORURAL for Tocantins reach only 3%, even in number of operations or in value, demonstrating the difficulty of access for the small farmers to this financing source.

While comparing the financing operation by sector, it is verified that the financing value of the Bank of Brazil for agriculture activity is higher than livestock. Even after reducing 40 operations with a value of R\$ 37 millions of PRODECER III initiated in 1996, there is a remaining of R\$ 23 millions for 1,500 operations. Considering the 40 thousand farmers in the State of Tocantins, the loan utilization rate, in numbers or amount is still low, taking into account that the Bank of Brazil is the main agriculture financing agent of the government.

After stabilization of the economy, fixed financing interest for agricultural support decreased from 16% to 12%. In case of financing as FNO, there is a discount in the TJLP for the Amazonian region and the small farmers. With a high initial investment, the charges taken by PRODECER are remarkable and as a consequence, it is difficult to cover the debt. PRODECER is one of the few organism in the state who support medium farmers, and it is necessary to take some prevention measures against the high interest rates.

(2) Acquisition Method of Agriculture Credit

The majority of agriculture credits are faced towards large farmers (cattle farmers) and do not cover the demands of medium farmers, an important group for the development of the state, and also makes it difficult to access for the small farmers. With a high illiteracy rate and low productivity, small farmers are assisted by RURALTINS for the elaboration of drawings and documents, but due to the reduced number of the staff, demands are not completely covered. The other barrier found for acquisition of credit is the lack of property documents necessary to certify real ownership of land, a requirement to obtain a bank credit, which can be avoided.

In 1996, through a national policy on favor of small farmers, 1,800 farmers applied for financing assistance, however, only 790 farmers were approved. Training of leaders of small farmers association and strengthening of RURALTINS structure shall be an important base in order to access to financing sources. Furthermore it is important to quicken the banking procedures in the procurement of agricultural credit.

(3) Agriculture Credit Programs and their Rules

Many different financing programs are found in the state, besides the national, regional, and state programs, making it more complex. Each program is defined as follows:

- National Level

In national level, there are yearly financing resources for planting, such as, PROGER-RURAL, EGF/SOV, Finame Agrícola-PAI and PRONAF. The Federal government has a future purpose of strengthening of PRONAF, turned to small rural farmers in order to balance the income differences found at present. Furthermore, there are credits granted to the Agrarian Reform Settlers such as PROCERA, ALIMENTATION CREDIT, PRODUCTION FOSTER CREDIT and HOUSING CREDIT.

- Regional Level

In regional level, incentives are given from SUDAM financed by the BASA, an organism responsible for the management of the Amazonia Legal and the FNO. The FNO is composed of two types of financing lines: the special addressed exclusively to small farmers and the normal addressed to large farmers.

- State Level

Within the state financing program, the PRODIVINO is funding for the associations of small farmers.

- Special Programs

There is the PRODECER which is being executed by JICA.

3.5.6 Livestock Industry

Close to 15% of ICMC-related revenue in Tocantins stem from livestock sector, thus the sector plays an important role in economic activities. Major animals reared in Tocantins are cattle, buffalo, goat, hog and poultry. The State's share in population of these animals in comparison with the country as a whole is insignificant, but per capita head for cattle, buffalo and hog occupies the 3rd position respectively. Livestock activity in Tocantins is heavily dependent on cattle farming, in particularly on beef cattle farming, because the population of cattle exceeds to that of poultry.

(1) Cattle

The greater portion of cattle raised in the State are represented by beef cattle and the population of cattle in the North Region and in the Northwest Region account for each 20% and 14% of the state's population. An extensive farming system by largeholders predominates in this farming; fattening of cattle is a major activity on the North Region, while production of steers is mainly carried out in regions covering Northwest, Central and South. Steers produced in these regions are transported to the North Region to fatten there. The most widely spread breed is Nelore and its crosses. Fattened cattle are sold to private slaughterhouses to process and produce beef or transported in liveweight to the Noertheast Region of the country.

(2) Buffalo

Farming of buffalo in Tocantins in the past is represented by largeholders, but most of them do not realized proper raising of animals leaving them to grow as wild animals. Nevertheless, in these days, buffalo population in the State has consistently grown faster than that of cattle and farmers are shifting from cow to buffalo as a source of milk and meat. The main reason is that buffaloes are emerging as more economical animals since males are utilized for meat production, females are used for breeding and milk production.

(3) Hog

Most common breed of hog is an indigenous breed, although some improved breeds crossed with hybrid breeds originated in Europea are found in the suburb areas of major municipalities. Consumption of pork in the State is sharp both in urban and rural areas and the leading production regions in the State are the Extreme North and the Southeast. Constraints on development of swine farming are deficient production of maize – the major source of feed – and absence of processing plant. Due to being anticipated an early return on investment, swine farming tends to become popular activity among small and medium farmers.

(4) Poultry

Traditional extensive chicken raising is common in the village of Tocantins. However, confined feeding system with new economic cross and some hybrids are beginning to appear large towns and cities. Locally produced eggs and chickens have gained preference among local population. Supported by relatively high price higher returns on poultry farming is expected, if proper farming should be put into force.

(5) Animal Health

Before independence from the State of Goias, animal health status covering actual region of Tocatins had been poor without taking adequate precautions against diseases. After independence, the campaign for dissemination of vaccination against FMD has held widely in cooperation with the federal government, the occurrence of FMD and other diseases have decreased significantly. Nevertheless, it is worthy to indicate that an absence of veterinary diagnostic center under the supervision of the state government combined with deficiency in quarantine and inspection system of animals has caused to spread diseases other than FMD, which, in turn, has prevented livestock farmers from attaining higher productivity of livestock. In this context, strengthening of animal health protection system is an essential factor for development of livestock industry in the State.

3.5.7 Agricultural Support System

(1) Present State of Agricultural Support

There are various agricultural supports for farmers in Tocantins State, such as extension of agricultural technologies and guidance of farming, development of new technologies by research, supply of seeds, stocks and farm materials, agricultural credits, etc. Extension services are being provided by public extension institutes and various other private sectors.

The public organizations which provide the agricultural support are RURALTINS, banks etc. On the other hand, the private sectors which are related to agricultural support include various enterprises, NGOs, cooperatives, and many other groups.

(2) Organizational Structure of RURALTINS and the Actual State of Agricultural Support

RURALTINS is the public institute connected with SAG of the State Government, and executes the policies decided by the State Government. The similar institutes are named as EMATER in other many states. The duties of RURALTINS are technical assistance to farmers, execution of projects along the policies of the Federal Government, such as PRONAF, planning the regional projects, guiding pest control and prevention of animal epidemics, improvement of farmers' living, training for staff and farmers, etc.

ASBRAER (Brazil Association of Technical Assistance and Rural Extension Organizations) serves as a coordinating and facilitating agency at the national level, and conduct a meeting of all the EMATERs and the similar institutes in Brazil once in every three months. However, DATER of the Ministry of Agriculture and Supply (Federal Government) serves as the government coordination agency of the EMATERs at the national level. DATER has fourteen engineers and seven administrative officials, and gives priority to promoting and management of PRONAF as well as planning of projects on extension and informing them to EMATERs.

The central office of RURALTINS is in Palmas, the State Capital. The whole state is divided into seven regions and a regional office is set up in each region. The central office and the regional offices serve as the coordinating and facilitating agency at the state level and at the regional level, respectively. Furthermore, each region is divided into four to thirteen areas and the local office is set up in each area. Total number of the local offices in the State is 54, and the extension services by these local offices cover the majority of the 139 municipalities of the State.

The extension workers carry out various works, such as support to the farmers to prepare the application for the credit, technical assistance for crop cultivation and animal raising and guidance for farming, courses for women on handicraft, health and sanitation among others, delivering free seeds to farmers, etc. With regard to support of application to credit, extension worker sends documents and the application form to about 20 % of total farmers, who can read a letter, and visits directly and explains the application form and fills up the

form to the rest due to high illiteracy rate of the farmers.

The constraints of extension activities include shortage of man power having above high school education due to cheap salary, antiquated buildings and facilities, shortage of equipment, shortage of budget, shortage of vehicles and four wheels driven cars for bad roads.

(3) Other Sources of Agricultural Support

Other than RURALTINS, the following organization provide the agricultural support for the farmers.

1) SAG

Sometimes, SAG carries out agricultural support together with RURALTINS. Costs for the support activities are paid by the SAG's budget.

2) LUMIAR Project

The new project LUMIAR of INCRA starts this year. It is a project, financed by FAO, destined to supply technical assistance to the settlers of the INCRA Agrarian Reform projects. Utilizing this resource, professionals will be contracted (agronomists, veterinarians and technicians) who will be trained to give technical assistance and rural extension to the settlers.

3) Banks (Bank of Brazil, Central Bank, Bank of Amazon, BAMERINDUS)

These banks provide the various credits for small farmers in co-operation with the Federal Government, through various programs such as PRONAF, PROCERA, PRORURAL, PRODEPEC, PAI, FNO, etc.

4) Enterprises (e.g. Consultant companies)

In the loan systems of PRONAF and LUMIAR, private sectors can negotiate with banks to provide agricultural support for farmers who want to receive the credits. Many private sectors make the credit application of farmers, guiding the farming techniques and supervising the farming, at least, three times until harvesting after supplying funds, and receive a reward of 1.5 to 2 % of total farmer's funds.

5) Companies of Seeds and Stocks (Domestic Enterprises and Multinational Companies)

There are no companies of seeds and stocks in Tocantins now. Seeds are imported from domestic enterprises and multinational companies of other states, such as CARCII(Brazil, Goias), SELECTA(Brazil), AGROCERES(Brazil), PIONIER (USA), etc. Generally, these companies provide technical assistance to farmers who purchase these seeds.

Stocks are also imported from other states. SAG of the Tocantins State has provided free stocks of fruits trees and trees to schools, NGOs and municipalities for promotion of fruit trees and afforestation. And FIETO has also served free stocks of fruits trees to farmers and schools to prepare the industrialization of fruits for the future.

These imported seeds and stocks should be quarantined by SAG of the State, but the inspection system does not give satisfactory results.

6) Stores of Farm Materials

In Brazil, it is established by law that the store of chemicals and fertilizers must keep a specialist for agricultural support at least. However, most stores in Tocantins explain about how to use the fertilizer. The law is not always obeyed in Tocantins.

7) NGOs

The FETAET (Federation of Agriculture Workers of Tocantins State) gathers several associations and syndicates of rural workers in the State. Its main function is to act in the organization of the workers. The CPT (Pastoral Land Commission), an organism of the Catholic Church, also acts in the support of the organization of rural workers. These two organisms are supporting the APA-TO (Alternatives for Small Agriculture in Tocantins State), which is an NGO dedicated to give technical assistance and rural extension to small farmers, giving the guidelines for its actuation. The resources for APA-TO come from international NGOs.

8) Agricultural Cooperatives

There are fourteen cooperatives in Tocantins, whose members are medium and /or large scale farmers. Among them, COOPERJAVA and COOPERFORMOSO in the large scale paddy area near Formoso do Araguaia, and COVALE and COOPERSAN in the large scale upland area near Pedro Afonso are active. In case of COOPERJAVA, cooperative provides technical assistance, cleaning, drying, storage and sale of rice, seeds productions of rice and soybeans, purchase of farm materials to the members.

9) FAET in Tocantins

Large scale farmers organize CNA at the national level, and FAET in Tocantins at the state level. This group represents a political group in Tocantins State. Most members in Tocantins are livestock raisers. The organization employs many agricultural engineers and provides extension services. Furthermore, FAET reckons on the services of SENAR (National Service of Rural Education).

(4) Actual State of Agricultural Research

Public agricultural research at the national level is organized by EMBRAPA. Attached to

the Ministry of Agriculture and Supply, EMBRAPA is a public corporation that manages a national network of 33 research centers, 4 organs to provide seeds, information, etc., and 4 branches.

The focus of these research centers varies: 7 centers for specific crops, 4 centers for fruits trees, 5 centers for livestock, one for forestry, 9 centers for agricultural production in particular to agronomic conditions, 5 centers for irrigation, mechanization and processing and 2 centers for basic research such as biotechnology, respectively (Table 4-5-8(2)). Besides, a number of the Brazilian states have their own agricultural research stations.

However, there is no research center of agriculture and livestock raising in Tocantins. Tocantins State has only the state university of Tocantins (UNITINS) as the main research organization. However, research facilities and equipment of UNITINS are very limited. In order to develop a new adaptable technology to agriculture of Tocantins, it is necessary to strengthen UNITINS.

To solve the problems in Tocantins, it is temporarily planned to carry out the research by a consortium composed of UNITINS, NGOs and others (Project PRODETAB from fund of World Bank).

3.5.8 Agriculture Infrastructure

The irrigation infrastructure of Tocantins State has a low development level with approximately 53,000 ha of irrigated area in the whole state being concentrated the majority areas in the Formoso-Araguaia region. A summary of the existing development works of infrastructure found in the state of Tocantins is listed as follows.

(1) Rio Formoso Project

The estimated area of this project is 23,500 Ha and is located in the south region of the Javaés Project. This project was divided in 4 stages, with three stages already finished. The implanted area is 17,293 ha, where 12,234 ha are suitable for agriculture, 3,443 ha. are inundated (preservation) and 1,625 ha are not suitable for agriculture activity. At present there are still some areas where irrigation was not finished.

The employed method for rice and corn is the sub-irrigation system. Rice shall be cultivated in the whole area and, soybean and corn shall be cultivated in half areas for each crop due the quantity of water. During the rainy period, water of Formoso river shall be used and for dryness period shall be used the two existing reservoirs.

(2) PRODECER III

This is a nippon-brazilian project, with the purpose of increase the production of Brazilian savanna areas; being implanted in the State of Tocantins in the region of Pedro Afonso. The total area of the project has 40,000 ha and due its location in the region of legal Amazons, 20,000 ha are available for agriculture and the remaining 20,000 ha. are destined for legal

reservoir. The number of parcels to be implanted is 41, with a mean area of 485 ha. destined for plantation. Main products to be cultivated are soybean, corn (upland and irrigated), feijão bean and cashew-nut.

The project also include to supply a dryer and storage unit with a drying capacity of 1,200 ton per day, storage capacity of 60,000 ton and dispatching capacity of 120 ton per hour.

3.6 Conditions for Distribution and Marketing of Agro-products

3.6.1 Outline of the Conditions for Distribution and Marketing

Agricultural produce in Tocantins are mostly generated not only from livestock raising in the central-west and south-east regions of the State, but also rice, soybean, pineapple cultivation area. On the other hand, the majority of consuming commodities in the State is imported from other states.

Commodity flow in Tocantins, generally speaking, seems to be along BR153, and is connected with outside the State such as Belém, San Louis in the north-east and the south-east via Brasilia.

However, merchandise transportation to and from adjacent states are becoming active due to recent construction and pavement of existing roads. For instance, state road TO-080 starts from Paraiso do Tocantins to Casera at the riverbank of Araguaia river through Marianopolis do Tocantins and TO-336 leads to Conceição do Araguaia, Para state at the riverbank of Araguaia from Guarai. Both roads are used to transport calves to Para state and bring grown cattle into Tocantins state.

Further, a paved state road from Dianopolis to Mimosa or Barreiras, both in Bahia state is an established route for transporting soybean and lime. Adding to the conventional south to north cargo transportation in the Tocantins state, east to west cargo transportation has already started.

3.6.2 Distribution and Market System

(1) Present Situation of Marketing Commodities

1) Marketing of Fruits and Vegetable

Most of the fruits and vegetable circulated in the country pass through the way of wholesale markets (CEASA: Centrais de Abastecimento S.A.) in the main cities. Very few quantity is delivered directly to large scale venders like a supermarkets from producers. Fruits, vegetable and egg only are dealt in CEASA according to the regulations. Meat and fishes are excepted. The biggest CEASA in São Paulo deals flowers also. Some wholesalers in CEASA install their own cold storage for keeping valuable fruit imported from neighboring countries. CEASA is generally divided into several sections based on a sort of commodity

articles. In the same section many wholesalers compete each other in business. There is no bidding auction to form prices, but negotiations face-to-face between a seller and a buyer. Usually many CEASA establish together retail market or feira where producers bring in their products directly and sell. This kind of retail markets play also the function for forming retail prices.

CEASA in major cities covers not only the area where it exists, but also the whole country by means of collection and distribution functions. Big wholesaler may accept orders from buyers by long distance fax or phone. Total transaction in weight in 1996 at the fruits and vegetable wholesale market of Belem, a typical city in northern Brasil, is 157,699 ton (DETECCEASA/PA).

Present situation reveals the dynamic movement of fruit and vegetable in the vast country at will. Onion, potato, garlic from Argentina, and some fruits from Chile are competing with such kind of domestic products in terms of quality and price

There is no CEASA yet in Tocantins. Fruit and vegetable production in the State does not attain self-sufficiency in general. Imported fruits and vegetable from outside the State mainly come from CEASA in Goiania or Anapolis in Goiás. Middlemen from Tocantins go there and purchase them, and sell them in retail shops in the State. In regard to pineapple which increased its production in recent years in the State, producers usually sell their products directly to wholesalers in São Paulo and Rio de Janeiro. The means of transportation for pineapple are generally in bulk and by truck.

In main cities in the State, public markets (feira) for food and daily necessities are established by the municipal office. In Palmas, capital city of the State, the market opens on Saturdays. In Taquarato ward, 15 km from Palmas, residential area, public market for daily goods and food is also established, opens every Sunday.

2) Marketing of Soybean

Marketing for soybean grains produced in Brazil is in domestic oil extraction factories and abroad, but rice is consumed only inside the country because of less price competitiveness in the international market. On the other hand, producers price on rice and soy bean are pressed down actually by means of the cheap rice and edible oil are occasionally imported under the low price policy for staple food by the government.

Edible oil, lees, grain are relevant to the marketable products from soybean. Cotton seed oil shared nearly half till middle of 1960s. Others were oil from peanuts, soybean, maize, sunflower. From late of 1960s soybean production increased and soybean oil became major portion of edible oil production in Brazil.

About 80% of soybean production is processed for producing crude edible oil and lees, and remaining 20% is exported in a form of soybean grain on the country level. Brazil produces 2,500,000-3,000,000 ton of soybean oil yearly, and approx. 2,000,000 ton is for domestic consumption, and the remainder for export. Ceval, Ovelra, Cargill are leading oil extraction

companies in the country. Any plant for soybean oil does not operate in Tocantins, but also in Pará, Maranhão along the Central-North Transportation Corridor so far.

3) Marketing of Babaçu

Babaçu palm : palmácea babaçu (*Orbignya speciosa*), grows naturally in a large quantity in Minas Gerais, Baia, Tocantins, Maranhão, Piauí. Many rural people utilize it traditionally, trunk and leaves as house- materials, edible oil and detergent from kernel which contains oil of 50%. Residue after oil expressed becomes for animal feed, and husk for fuel. Kernel weighs 10% of a fruit. Generally women crush and take out kernel which dropped on the ground, and work efficiency 10 kg/day (2.50 R\$). Crushing tool has been anticipated for a long time.

4) Rice Marketing

Cereal cultivation occupies about 90% of the cultivated land in Tocantins, of which more than 60% is rice field. Main production fields are located in Formoso do Araguaia, Lagoda da Confusão, especially Project of Rio Formoso yields high productivity.

Wet paddy just after harvesting is sold to rice miller or cooperative directly by a producer, then rice mills process wet paddy for cleaning, drying, milling, grading and packing. After that milled rice is delivered to retail shops through wholesalers or directly.

Markets for Tocantins rice are mostly within the State and cities in North-East Brazil, where 35 million populated and demanding more rice due to income and population increase. It is said that the Tocantins gets a good position to supply rice to North-East in comparison with southern states which are biggest rice production areas.

COPERJAVA (Formoso do Araguaia) yields No.2 (Tipo-2) of 97% out of their milled rice that is destined for the North-East market where demanding low and medium class of rice mainly. Southern rice is also supplied to North-East, but Tocantins rice is able to compete it well. In a case of COPERJAVA, by-products from rice mill such as fine broken rice and rice bran can be sold to a feed mill in Anapolis, Goias.

(2) Plants and Animals Quarantine and Inspection

Agricultural products inspection activities in Tocantins are defined to 5 crops, i.e. rice, beans (feijão), maize, sorghum, soybean, and SAG is for the responsible organization in implementation. In the past, every year about 400,000 ton inspected by SAG , but in 1996 inspected 302,347.260 ton, and issued certificates 13,464 affected by production reduce in recent years. Some portion of marketed cereals may not be inspected illegally because the inspection fee (paddy 0.87R\$/ton, milled rice 1.47R\$/ton) is charged.

Plant protection agreement in South-America under WTO is implemented. In Tocantins hoppers (gafanhoto) generates in huge amount every other year. In 1996, 16,000 ha of rice, maize, pasture fields were damaged.

Seed is controlled and inspected by SAG also according to a federal law. SAG inspected the seed production fields of 1,695ha in 1996, and inspected seed about 4,000 ton together with seed imported from other states.

Also Federal Government establishes the agro-chemical residue acts for agricultural products, but any organization is not established to execute it so far in the State. Dealers of agricultural chemical are forced to register for selling and permission from the State government.

Quarantine offices are set up in 3 places near the state border-line in Aguiarnópolis-Estreito, Couto Magalhaes, Barreiras de Talismã. Officers in quarantine offices mainly check and confirm the certificates. Occasional office open sometimes on the road BR-153. Laboratories are in Araguaína and Gurupi.

3.6.3 Price of Agricultural Produce

Federal government of Brazil set floor price (Preços Mínimos Apovados para a Safra) for agricultural produce every year. Those floor prices for rice, maize and soybean are different by the area of production. Those produced in Tocantins are placed in the middle of the range. In producing areas near the consumption site such as south, southeast and northeast of Brazil, the floor prices are set higher than the prices for inland areas.

Price ranking of agricultural crops produced in Tocantins state and its competitiveness can be known by comparing the prices of prime crops (soybean) in wholesale markets or main producing areas of whole Brazil based on the price information collected by federal government and SAG, state government. As an example, soybean (Pedro Afonso) produced in Tocantins state is of less advantage in price due to its inland production site and high transportation cost owing to rather poor transportation infrastructure.

3.6.4 Infrastructure in the Distribution Sector

The storage installation capacity of agricultural products in the State of Tocantins is 70,980 tons distributed in 142 facilities for conventional storage: 29,841 tons in three granary facilities; 280,240 tons in 24 silos with a total capacity of 1,081,240 tons in 169 warehouses. The CASETINS (Tocantins State General Warehouses and Silos Company) has a capacity for 90,800 tons in 22 conventional facilities, which are used by CONAB (National Supply Company), however the index of utilization is very low with many facilities out of operation.

Production of grains in the State of Tocantins as of 1996 was 470,530 tons according to IBGE/PSA, however the storage capacity is higher. Therefore, the utilization rate of the available facilities has decreased in the last period. As a consequence, there is a project of reutilization of the existing facilities, comprehending the utilization of five warehouses. This project comprehends the rental of these facilities by private companies as well as their alteration.

According to the conditions of warehouses and their facilities for cereals, CONAB classified half of warehouses as suitable. According to the present production in Tocantins, the available storage facilities are considered to sufficient, but not when compared with the potential production.

3.6.5 Marketing Prospect of Major Agricultural Commodities

(1) Rice

Main production fields of rice are Formoso do Araguaia and Lagoa da Confusão; especially the Project of Rio Formoso enjoys high yield. Major marketing destination of rice produced and processed in these areas are large cities in the Northeast Region of the country as well as within the State. The Northeast Region has a population of around 35 million and demand of rice there is hiked keeping pace with an increase of income and growth of population.

(2) Soybeans

An output of soybeans in Tocantins remains low with a production of 14,030 in 1996, which does not reach economic size to encourage installation of industry to process the grains as raw material. The leading production area are the Irrigation Project of Formose where the grain is cultivated as secondary crop of paddy. Apart from this area, cultivation of soybeans has just started in PRODECER III Project area in total cultivated area of 40,000 ha a year, but its production is still unstable; the target yearly output is set forth as approx. 50,000 tons with an average yield of 2.7 tons/ha on condition that soil improvement works and acquisition of hybrid seeds should be put into force. The Brazilian soybeans are generally shipped to markets in March, just after harvest season. This period coincides with off-season of soybeans in the USA.

The harvest season of soybeans in Tocantins falls in March through June (in March 1997, a large quantity of the production was heat damaged due to excessive rainfall). As for the fluvial transportation in the Araguaia river and the Tocantins river, barges can not efficiently navigate the rivers after July because of low water level, it is thereby suggested that fluvial transportation should be made before June.

Proposed marketing route of soybeans produced in Tocantins is from site of origin to Estreito (by land or fluvial transportation) and then from Estreito to Itaquí (by railroad) for exportation or from site of origin to Balsas, the State of Maranhão (by land transportation) for processing there. Worthy to indicate is that proliferated output of soybeans in Tocantins would motivate installation of oil extraction factory within the State.

(3) Maize

An invasion of swine and poultry farming from southern regions of the country to central and northern regions is notable and in response to this phenomenon demand of maize to be

used as feed for these animals is being expanded nationwide. The balance of production and consumption of maize in Tocantins is in deficit, which is fulfilled with import from the State of Mato Gross and other neighboring states bringing about higher cost than other states. Under the circumstances, it is expected that the output of maize in Tocantins would be grown considerably.

3.6.6 Transportation Infrastructure

(1) Transportation Sector

Transportation business is not yet developed in the State, and no transportation companies are registered in the chamber of commerce. Therefore transportation companies from other states normally undertake the transportation of agricultural products in Tocantins.

The ferry boat operation at more than 20 river ports is undertaken only by PIPES Company from Carolina, Maranhão State. Under these circumstances, the transporting charge is not fixed in a charge list, and as a result usually the buyers in another state (destination) provides transportation.

On the other hand, the Secretary of Treasure prepares the freight table that is lower than substantial rate for calculation of ICMS.

(2) Present Situation and Future Development Plan of Road Network

Roads are classified in federal, state and transitory (from federal to state). Federal road are managed by the federal government, states by the state government (Work and Transportation Secretary) and the municipal under the care of the municipalities.

The highway net of Tocantins state goes in the north-south direction through the BR-153 Belém-Brasília highway finished in 1978, and in the east-west direction through the state highways. The paved highway are two way roads with a width of 7,0 to 8,0 m and a capacity for heavy trucks (total weight more than 50 ton).

According to information by Secretary of Transportation and Works (STO), the total length of roads will not changed during 1988-2008, and the plan means to improve existing roads into a pavement.

(3) Fluvial Transportation

1) Waterway Transportation of Araguaia-Tocantins river

In the state of Tocantins, the Araguaia and Tocantins river are suitable as waterway, at present, with the AHITAR (Management of Araguaia-Tocantins Waterway) project, elaborated for this purpose. Utilization plan of floatboats for both rivers was not executed yet, but some navigability tests in the Araguaia river were carried out 8 years ago but for the moment any project for the Tocantins river.

However in Xambioá, at the margin of the Araguaia river, the CVRD company has a facility (unloading, storage of 3.000 tons, for trucks) with unloading capacity of 120 thousand annual tons. (March to June), but due the raising of the Tocantins river level in 1997, the plan for the construction of a 40,000 tons. floatboats was reduced to 10,000 tons.

The AHITAR projects gave priority to the Araguaia rivers because the Tocantins river is a local river with small distance and transportation volumes. Therefore, there are not detailed studies for the Tocantins river. In the PRODECER project of Pedro Alfonso was estimated that transportation of soybean produced by the project shall be cheaper through the fluvial mean; reason why they implanted a silo at the border of this river.

2) Crossing Floatboat

The most important road of Tocantins State is the Highway BR-153 which communicates the north with the south. In the south, is found the state of Goiás, with direct access and in the north, in the state of Maranhão, access is made through a bridge located in Estreito on the Tocantins river. At present, there is not any bridge along the 750 km of the Araguaia river of the state of Tocantins but there are two bridges on Tocantins river (Estreito and Porto Nacional). In other cases, crossing are made through floatboats.

(4) Railway

Presently, there is no railway services available in Tocantins state. However, as a part of Multi Modal Central Northern Transportation Corridor, South-North railway (109 km, Imperatriz to Acailandia) in adjacent state of Maranhao and Carajas railway (496 km between Acailandia and Sao Luis) are already used to transport soybeans for export.

South-North railway, Carajas railway, Sao Luis port, Madeira wharf including transshipment facility are all managed and controlled by CVRD. It makes stable transportation possible in Brazil where transportation services in harbors are generally unstable.

About 40% of the construction work to extend the South-North railway, from Imperatriz to Estreito has been completed as of May 1997 and 100% shall be completed by the end of 1998.

Further extension of South-North railway has not been decided but because bridge girders on the Tocantins river have been completed, the railway would be extended to Colinas do Tocantins of south in future. And if a bridge was constructed at Pedro Afonso, soybean transportation cost in PRODECER area would be greatly reduced. It is obvious that the soybean produced in Tocantins state will be in advantage compared to the one produced in other states.

(5) Multi-modal Central-Northern Transportation Corridor Plan

The project for the waterway for the Araguaia and Tocantins Rivers belongs to Multi-modal Central-Northern Transportation Corridor contemplated in the PPA of the federal

government. The full function of this transport system will enlarge the agricultural boundary lines for the states of Mato Grosso, Pará, Tocantins and Maranhão. As the first phase the waterway reaches from the Mortes river (navigable reach: 580 km) upper stream of the Araguaia (navigable reach: 1,230 km) to the port of Itaqui, Maranhão via the Araguaia river, roads TO164 (115 km) and BR226 (62 km), South-North railway (230 km) and Carajas railway (496 km). As a final stage the Araguaia waterway is expected to reach Berém Port from the Mortes directly after the repairing St. Esabel rapids, Pará, then via Tucuruí dam.

The Tocantins river (navigable 420 km) waterway plans to establish the route from Miracema do Tocantins to Estoreito and connects with South-North railway at Estoreito as the first phase. And finally it will pass through the same route after running together with the Araguaia.

At present on the way of Multidodal Central-Northern Transportation Corridor, some private companies plan to establish a vegetable oil extraction plant at Itaqui, warehouses or silos at Imperatriz and Xiambioá are reported. Also a barge building is supposed to put into implementation by BSDES finance.

Agricultural products from the states of Mato Grosso, Pará, Tocantins and Maranhão may be destined to the international market from the port of Itaqui, as the most viable and least cost-alternative in relationship to the placing of loads after a multi-modal system of hydro-highway-railway transportation is being implanted.

3.7 Development Strategies and Major Development Plans

3.7.1 Development Strategies and Policies

The state government recognizes that deficiency of infrastructure is the major constraint on development of the region, thereby the state government's policy on development is given priority to their consolidation.

The Multi-annual Plan 1996-99 of the state of Tocantins contains as main target of development an installation of transportation and electric infrastructure in due reference to the multi-annual plan of the federal government.

This plan aims to supply electric energy to 10,000 rural families through a line of 15,000 km, within 4 years. In the sector of transportation, the implantation of the highway network together with the navigation of the Araguaia and Tocantins rivers, and the north-south railway is foreseen. For the areas with potential to increase agricultural production it is expected the stabilization of an agricultural transport system. In the future, decreasing of transportation cost is expected, in comparison with other states, through the combination of the (north-south) fluvial-railway system.

(1) Profile of the Multi-annual Plan

The basic strategies of the plan consists of : (1) accomplishment of sustainable economic development, (2) consolidation of economic infrastructure, (3) decentralization of development programs/projects, (4) social development and fulfillment of social welfare among local population, and (5) environmentally-coordinated economic development to attain sustainable development. Contents of each strategy is presented below.

1) Accomplishment of Sustainable Economic Growth

In order to attain sustainable economic development, basically it is intended to activate the agricultural sector, through a proper use of the natural and human resources, developing the sectors of agroindustry and production technology/survey, increasing the prices of products trough the following plans.

- Suitable and sustainable utilization of the Cerrado area and lowlands;
- Insertion of cereals products in the internal and external markets (considering low transportation cost);
- Redistribution of the population in this region;
- Development of technology and agricultural research;
- Development of the industrial processing of agricultural products

2) Consolidation of Economic Infrastructure

Together with the north of the Cerrado region development policy, the federal government intends to develop infrastructure of the state utilizing the SUDAM and the Amazon Development Fund through plans included in the federal government's multi-annual plan, although most of them are still in the stage of planning and conception, being necessary more time and deeper studies.

Basically, the priority was focused on the transportation infrastructure, considering that in 1996, 80% of investments were utilized for highway network. Other development plans are presented as follows.

- Horticulture and Reforesting Center of Jalapão
- Alcohol Center
- Javaés/Formoso Project
- Development Project of Cerrado
- Horticulture Development Center in Palmas and the north region
- Center for the development of Araguaia-Tocantins Tourism
- Agriculture Production Nucleus
- Laboratories of Analysis of Seeds, Soil and Biotechnology
- Animal Diagnosis Center

3) Decentralization of Programs/projects

This strategy has a primary objective to promote regional economic activities through transfer of implementation authority of programs/projects from the state government to municipal government. Programs/projects contemplated in this realm are small in scale and shall comprise: installation of plants and seeds distribution center, soil conservation measures, local markets, plant and animal disease control system, etc.

The state government divided the state in 10 regions in order to execute this plan and a plan was elaborated for each respective region.

4) Social Development and Fulfillment of Welfare among Local Population

Through the implementation of the following plans the raising of living and work conditions is expected.

Installation of a Professional Training Center
Program of Work and Income Improvement

Health training programs and increase of the number of persons living in the cities outskirts through new financing programs are foreseen. For the health sector, it is expected the installation of hospitals and as for the education, the installation of technical schools and improvement of college facilities are foreseen.

5) Environmentally Sound Development to Attain Sustainable Development

This plan, through the ZEE, intends to elaborate the environment zoning in order to attain a development balanced with the natural resources.

(2) Agricultural Policy

As mentioned before, the most important sector of Tocantins State is the agriculture and livestock sector, then the plans are oriented to improve the development of this sector

- Sustainable development
- Establishment of a staff in charge of the definition and elaboration of plans, financing, administration and evaluation.
- Exchange between public and private sectors
- Improvement of life conditions
- Development of a sustainable agriculture
- Modernization of agricultural practices in the state

The methods to be employed can be divided into long term and short term plans. For the long term plan, development of the north region of the state, margin areas of Tocantins river and the Formosa-Javaés area is expected. Regarding the short term plan, it shall be elaborated for each sector.

(3) Environmental Policy

The State Environment Law was enacted in 1991 containing the following objectives:

- Education of the population for protection of the environment
- Guidelines of socio-economic activities for a sustainable environment preservation
- Preservation of natural resources and environment
- Activities oriented to the ecology and health
- Suitable utilization of natural resources
- Preservation of life and sanitary conditions

Besides, in 1990, the criteria for the use of chemical products was elaborated and in 1994, it was defined that for the execution of programs, the elaboration of EIA/RIMA (Environment Impact Study/Environment Impact Report) would be necessary. In 1995, the State Reforesting Law was established.

The organism concerned to the preservation of natural resources are NATURATINS (Nature Institute of Tocantins), SEPLAN (State Planning System), CMA (Environment Monitoring Center), IBAMA/TO, Agriculture Secretariat and COEMA-TO (National Council of Environment).

The main environment issues of the state are the destruction of forest resources and forest burning activities, unsuitable use of fauna and flora resources, inappropriate use of mining resources, the necessity of a better development procedure of agriculture and livestock activities, expansion of cities, the necessity of the development of ecological tourism and preservation of vegetal resources.

The main regions involved in the environment programs are Bico do Papagaio, Ilha do Bananal and surroundings and gold mining area of the southeast region.

The Bico do Papagaio is a region where settlement was carried out through inadvisable procedures such as cleaning of land without environment protection criteria, burning activities and others problems related to the use of land.

In the Bananal Island, between the Cerrado and the island several fishing and hunting activities are being carried out producing a decrease in the quantity of these resources. Besides, through the rice cultivation, agrochemical products are affecting the fauna and flora of the region.

In the southeast region, extraction of gold is being developed at present, creating environment problems in this area.

Besides the above mentioned areas, the national park and indigenous areas can be mentioned as areas concerning to the environment preservation.