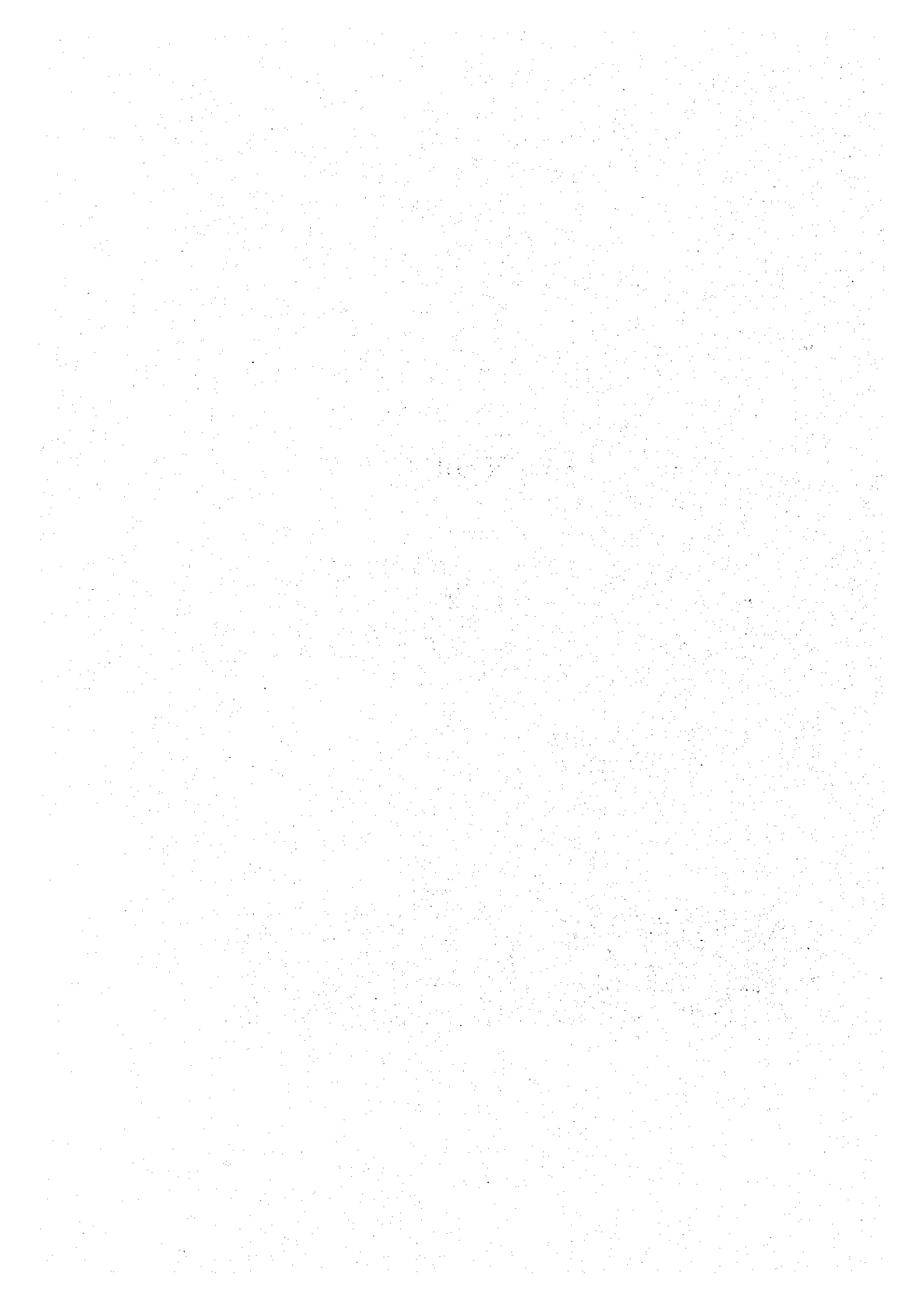


## **ANNEX VIII**

# ***DEVELOPMENT STRATEGIES AND MAJOR DEVELOPMENT PLANS IN TOCANTINS***



## ANNEX VIII

### DEVELOPMENT STRATEGIES AND MAJOR DEVELOPMENT PLANS IN TOCANTINS

#### 1 Development Strategies and Plans

##### 1.1 Development Strategies of the State Government

Before independence, the investments executed in Tocantins were only the Highway BR-153 and irrigation project of Rio Formoso, and immediately after the independence, due to the implementation of the Real Plan, the public investments of the federal government had been reduced causing a deceleration of infrastructure investments.

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

The Multi-annual Plan 1996-99 of Tocantins state contains as main development target the 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, the stabilization of an agricultural transportation system is expected. In the future, decreasing of transportation cost is expected, in comparison with other states, through the combination of the (north-south) fluvial-railway system.

##### 1.2 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. The contents of each strategy is presented as follows.

• Accomplishment of sustainable economic development
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In order to attain sustainable economic development, it is basically intended to activate the agricultural sector, through a proper use of the natural and human resources, developing the sectors of agro-industry 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.

• Consolidation of economic infrastructure

Together with the Cerrado northern 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 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 and sugar 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 Nucleuses
- Laboratories of Analysis of Seeds, Soil and Biotechnology
- Animal Diagnosis Center

• 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 governments. Programs/projects contemplated in this realm are small in scale and shall comprise: installation of plants and seeds distribution centers, soil conservation measures, local markets, plant and animal disease control system, etc. The state government has divided the state in 10 regions in order to execute this plan and a plan was elaborated for each respective region.

• 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 Conditions 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.

• **Environmentally-coordinated development to attain sustainable development**

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

### **1.3 Decennial Plan**

The Tocantins State Government elaborated the present decennial plan, for the period of 1997 to 2006, to offer path which will orient the economical agents, the government and the society.

National/international economy behavior and stabilization policies desired performance were studied to establish the fundamentals of the present plan. In this site, 3 priority strategies were established: economical structure consolidation, production sector strengthening and social disparities reduction.

#### **1.3.1 Strategies Priority**

##### **a) Infrastructure Consolidation**

The national economy depends on the economical, transportation, energy and telecommunication infrastructure.

The transport infrastructure planning will occur observing the environmental aspects, the critical protection areas and economically sustainable areas. The priority will be given to areas of promising agricultural/livestock production. The roads plan will contemplate the improvement of already existing roads and the construction of branch connection for intermodal transportation.

In the *Brazil in Action* program, the resources for the North-South railway construction are guaranteed for 120 km between Imperatriz and Estreito. However the bridge on the Tocantins river is not contemplated. The Tocantins and Maranhão states are working together to privatize this railway in order to guarantee the conclusion of the works.

In the energetic sector, the CELTINS was the first state enterprise of this sector to be privatized in Brazil. Actually, the Mines and Energy Ministry, together with the State Government, carried out a bidding process for the concession of the construction and exploration of the Lajeado Hydroelectric Power Station, which is estimated to start in the first six months of 1998 and finish in 2004.

##### **b) Production Sector Strengthening**

The government investments are oriented for the structuring of the productive sector: state road network construction; rural electrification and machinery and equipment acquisition.

In parallel, the following strategies were given priority;

- Selection of potential areas;
- Promotion of production financing mechanisms;
- Development of research and diffusion of technology;
- Efficiency promotion of producer orientation services.

#### c) **Social Disparities Reduction**

The state's population is increasing rapidly, meaning that the social sector will need more efforts to improve their quality.

The implementation of the various structure projects of the state economy will generate the increasing, expansion and diversification of the economic activities. The economic development will improve the life quality by generating jobs. On the other hand, the tributary taxes must present an increase in parallel to the economic increase, propitiating the state to have financial conditions for investment in various social sectors.

The following sectors must be developed:

- Education and scientific/technological development;
- Health;
- Social welfare;
- Job generation and income improvement.

#### 1.3.2 **Structural Projects**

- Environmental/economical zoning;
- Hydrographic basins;
- North-south railway;
- Araguaia-Tocantins hydroway;
- Lajeado power station;
- Tucuruí-Serra da Mesa electric transmission line;
- Rural electrification;
- Javaés project;
- Telecommunication.

#### 1.3.3 **Sector Programs**

- **Transportation Program**

The Tocantins state has the objective to improve the following sectors.

- Harbor infra-structure
- Airport infra-structure
- Road infra-structure

- **Agriculture/Cattle Raising Development Program**

To develop the Agriculture and Cattle Raising of the state, the following items are considered.

- Irrigated agriculture;
- Fruitculture;
- Forestry;
- Cattle raising.

The regional development program includes the following items:

**Extreme-North:** Intensive agriculture (upland rice, feijão beans, corn and cassava), vegetable, fruit (pineapple, banana) and intensive cattle raising (small animals and aquiculture).

**North:** Commercial agriculture (corn and soybean), intensive cattle raising (cow, buffalo, pork and chicken) for commercialization and processing in the ZPE of Araguaína.

**Northwest:** Intensive cattle raising for meat and milk. Suitability for forestry.

**Northeast:** Soybean production as expansion of the PRODECER III. Suitable for forestry.

**Central-West:** Agricultural production oriented for cattle raising (meat) and small animals (pork and chicken). Promote the production of rice, corn, soybean and fruits (pineapple, banana, etc.).

**Central:** Establishment of a green belt. Industry to process the pineapple. Production of rice, soybean and cassava. Small animals.

**East:** Great potential for irrigation of fruits cultivation (coconuts, cashew nuts, passion fruit, papaya, pineapple, etc.) and production of rice, feijão beans, corn and cassava. Cow, buffalo and sheep as cattle raising. Forestry for vegetable material.

**Southeast:** Rice, soybean, corn, feijão bean, sugar cane, cassava, vegetable and cattle raising.

**Southwest:** Lowlands irrigation will elevate the production. Rice in the wet season and corn, soybean and sunflower in dry season. Aquiculture.

**South:** Consolidation of Formoso Project by establishment of processing industry for rice, soybean, sunflower, corn.

The priority programs for the agricultural/cattle raising development are:

- Renewable natural resources preservation program;
- Vegetable production program;
- Irrigation program;
- Fruit production program;

- Cow production program
- Pork production program;
- Chicken production program;
- Aquiculture program;
- Vegetable extractivism and reforestry program;
- Rural promotion and extension program;
- Agricultural organization program;
- Supply and commercialization program.

- **Industry and Business Development Programs**

- Agricultural industry implantation;
- Agricultural industry technical park implantation;
- Gurupi business policenter implantation;
- "Nursery" production unit implantation;
- Implantation of investment promotion and technology transfer system for enterprises;
- Implantation of the Tocantins design development program;
- Information and documents center implantation.

- **Tourism Development Program**

- Promotion of the ecotourism as a vehicle of environmental education;
- Promotion and stimulation for the creation and improvement of infra-structure;
- Make compatible the ecotourism activities with the natural areas conservation;
- Strengthening of the international cooperation;
- Make possible the effective participation of all acting segments of the sector;
- Promote and stimulate the human resources qualification.

- **Education Development Program**

- Universalization of the education;
- Human resources preparation and education professionals valorization;
- School management and teaching autonomy;
- Educational services quality improvement;
- Culture;
- Sports;
- University.

- **Health System Development Program**

- Amplification of the public health services;
- Reduction of the child and mother mortality rate;
- Reduction and eradication of endemic diseases;
- Elevation of life expectancy;
- Increase the health sector professionals number;
- Set necessary equipment in hospitals;
- Contract and training of specialists;
- Structuring of a laboratory network in the state;
- Structuring of a hematological center network;
- Decrease of the leper disease;



- Implementation of a mental health assistance program;
- Installation of dentistry treatment and prevention centers.

- **Sanitation Program**

- Increase the water supply services;
- Implantation of sewer system;
- Improvement of the urban solid residues collection, treatment and final disposition;
- Implantation of water parks.

- **Justice Program**

The program pretends to elevate the efficacy and participation of the existing state power levels.

- **Public Security Integrated System Program**

- Modernization of the operational structure of the public security integrated system;
- Implantation of a computer system;
- Human resources preparation and valorization.

- **Social Actions and Work Program**

**Work Program**

- Assistance for the unemployment program;
- Professional qualification program;
- Employment and income generation program.

**Social Actions program**

- Children and teenagers support;
- Social development and promotion;
- Community assistance;
- Emergency services.

- **Housing Program**

- Achievement of financial resources;
- Concentrate the federal, state, municipal and FGTS budget resources to the same objective;
- Define directives;
- Unify procedures;
- Propitiate multiplication effects to the money.

- **Scientific and Technological Development Program**

- Program of research nucleus implantation;
- Technology diffusion program.

- **Government Management Modernization Program**

- Strengthening of the planning system;
- Administrative modernization;
- Tax revenue system improvement.

- **Privatization Program**

The main sectors for Privatization are as follow:

- Sanitary;
- State and federal roads;
- Bus terminal;
- Bridges;
- Fluvial transport;
- MINERATINS;
- CASETINS;
- Ecological tourism;
- Prison system;
- Educational system;
- State vehicles;
- UNITINS;
- Hospitals;
- CEASA;
- CELTINS.

- **Water Resources and Environmental Management Programs**

- Conclusion of the economic-environmental zoning process;
- Promoting the resources multiple use, integrating technologies of nature rational use;
- Integration of the management of protected and non protected areas;
- Utilization of sustainable management researches on natural resources;
- Configuration of urban/rural economic relations;
- Strengthening of extractive activity;
- Expansion of agricultural-forestry activities and aquatic resources exploration;
- Biodiversity multiple use, incentive for forestry of native specimens;
- Utilization of the state forestry vocation;
- Stimulation and support of agricultural-forestry enterprises to reutilize degraded areas;
- Development of cattle raising activities without environment destruction;
- Ordering the mining activities without environment destruction;
- Amplification of ecotourism activities.

### 1.3.4 Expansion Objectives of Production Area of the Main Agriculture/Cattle Raising Products for 1997/2000

Year	1997/1998	1999/2000	2001/2002	2003/2004	2005/2006
<b>GRAINS (ha)</b>					
Rice	194,800	292,160	397,024	536,131	682,664
Soybean	40,000	100,000	200,000	400,000	500,000
Feijao Bean	6,200	7,700	11,000	16,000	20,000
Corn	95,000	118,000	133,000	176,000	220,000
Sorghum	200	600	1,000	3,000	5,000
Sunflower	1,000	3,000	6,000	8,000	10,000
Castor Bean	500	3,000	4,900	7,000	10,000
<b>FRUITS (ha)</b>					
Pincapple	1,200	1,500	2,500	4,100	7,000
Banana	7,000	10,000	20,000	27,000	30,000
<b>OTHERS (ha)</b>					
Cassava	13,000	20,000	32,000	36,000	40,000
Sugar Cane	7,000	15,000	21,000	27,000	30,000
<b>CATTLE RAISING (heads)</b>					
Cow	5,568,000	5,907,000	6,267,000	6,650,000	7,053,000
Pork	863,795	988,959	1,132,259	1,296,323	1,484,161
Chicken	2,571,660	3,111,708	3,765,168	4,555,853	5,512,582
<b>FORESTRY (m<sup>2</sup>)</b>					
Wood	2,500	3,000	3,000	3,500	5,000

### 1.4 Agricultural Policy

As mentioned before, the most important sector of Tocantins State is the agriculture and livestock sector, therefore 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; and
- Modernization of agricultural practices in the state.

Basically, the purposes for the dynamization of the state through the mentioned guidelines are as follows:

- Improvement of life conditions (reduction of illiteracy rate, improvement of social assistance, eradication of hunger);
- Increase of income and suitable utilization of income (incentives for the qualification of agricultural processing, workmanship and agriculture);
- Consolidation of education and technology (training of producers in order to promote a sustainable agriculture);

- Development of the agriculture processing sector, taking into consideration the environment; and
- Stabilization of food supply

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

### **1.5 Environmental Policy**

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

- Education of the population aiming the environment protection;
- 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.

The federal government intends to supervise several economic activities, through the 20 items listed below, in order to attain the mentioned goals.

- Elaboration of development, preservation and improvement plans;
- Elaboration of land use programs suitable for the State;
- Control of natural resources destruction;
- Definition of environment protection areas;
- Formation of natural resources protection units;
- Water conservation in each hydrographical basin;
- Establishment of environmental criteria;
- Establishment of a natural resources management criteria;
- Establishment of criteria for environment monitoring;
- Environment authorization;
- Consolidation of the environment information system;
- Development of environment training;
- Development of environment protection programs;
- Consolidation of the environment monitoring system;
- Elaboration of plans with participation of the population;
- Establishment of criteria for the utilization of chemical products;
- Evaluation of sanitary criteria;
- Cooperation among several organisms; and
- Others.

Furthermore, 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 enacted.

The organisms 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 (State Environment Council).

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 at the southeastern 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 area and the island itself, 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 related to the environment preservation.

## **2 Main Development Plans by Sector**

### **2.1 Agricultural Sector**

Major agriculture-related projects (in execution and some still without budget) are listed hereinafter.

1. Javaés Project
2. Project of Irrigated Agriculture of Bico do Papagaio
3. Hydro-agricultural use in the State of Tocantins
4. Jalapão Project
5. Tocantins Project
6. Perforation of Deep Well Project
7. Araguatins Irrigation Project
8. Sustainable Development Program of Lowlands of the Legal Amazon
9. Development Project of Agriculture Nucleuses and Small Farmers
10. Rural Development Project in São Felix do Tocantins
11. Coordination of Cooperative and Association Activities Support
12. Common Farming Projects
13. Quintal Verde Project
14. Agriculture Mechanization Project

15. Production of Fruit Seedling and Forest Essences
16. Lowlands Project
17. State Agriculture and Livestock Research System Project
18. Project of Animal Diseases Control
19. Project of a Fish Rearing Promotion Center
20. Project of Agriculture and Livestock Health
21. Project of Combat to Rural Poverty
22. Project of Rural Labor Force Training
23. Project of Agricultural Technology Transfer to Tocantins State
24. Project of Basins Circumscription/Feeding and Management
25. Project of Genetic Improvement
26. Project of Milking Basins
27. Project of Beekeeping Development
28. Project of Home Industry
29. Project of Alternative Alimentation
30. Project of Implantation of Soil Laboratories
31. Project of Implantation of Seeds Analysis Laboratories
32. Project of Plants Nursery in Tubes
33. Project of Biotechnology Laboratory

#### **(1) Javaés Project**

The Javaés Project area is situated at the Central-West region, Bananal Island Sub-region, in the Hydrogeological Map of Brazil, 1:2,500,000 scale, edited by the DNPM/CPRM in 1981. The region consists in low lands.

The project has about 750,000 ha of area, which 255,000 ha are supposed to be a productive area.

Pre-feasibility Studies were carried out to evaluate the Hydro-agricultural utilization in sectors like hydrology, geology, climatology, marketing and social-economic by the Water Resources Secretariat of the Ministry of Environment, Water Resources and Legal Amazon.

The project was first realized by the Goiás Government as an extension of the Rio Formoso Project. This project was supposed to use the inundation method by the construction of dams which were going to feed the polders.

After more detailed studies, it was realized that the project's implementation had high costs, after all been substituted by a cheaper one.

These two projects denominated as Original Project and Alternative Project are going to be presented the following.

##### **a) Hydrology**

##### **• Groundwater Resources**

According to the studies, the groundwater resources of the region have low potential, not feasible to fulfill the water demands of the Javaés Project (5.4 m<sup>3</sup>/h/ha at rainy

season and 7.3m<sup>3</sup>/h/ha at dry season). This resource is being utilized in large scale for population consumption.

- **Dams**

Considering the low potentiality of the groundwater resources, it was realized that the dams construction is necessary.

Therefore, discharges data was collected in the following points: Riozinho river (south and north), Água Fria river, Fogo river, Ribeirãozinho river, Formoso river, Xavante river, Duerê river, Urubú river and Pium river.

**b) Original Project**

The first plan was to construct 7 dams to fulfill the Project water demands, been subdivided into sub-projects, as shown in the figure, which were named after the dams' names.

- North Riozinho;
- South Riozinho;
- Ribeirãozinho;
- Formoso;
- Xavante;
- Duerê;
- Urubú;
- Piúm.

The mean discharge of the dam's inlet rivers are presented bellow.

Dam's inlet rivers discharge (m<sup>3</sup>/s)

Dam	J	F	M	A	M	J	J	A	S	O	N	D
Riozinho(S)	22.280	26.821	26.905	23.209	7.213	2.718	1.889	1.273	1.709	2.114	4.222	12.137
Riozinho(N)	8.529	10.268	10.301	8.886	2.762	1.041	0.723	0.488	0.654	0.809	1.616	4.647
Água Fria	15.100	18.178	18.235	15.730	4.887	1.842	1.281	0.864	1.158	1.432	2.861	8.225
Fogo	11.738	14.132	14.176	12.228	3.799	1.432	0.996	0.672	0.902	1.113	2.222	6.394
Ribeiraozinho	50.621	60.935	61.131	52.733	16.386	6.177	4.292	2.895	3.883	4.800	9.589	27.576
Formoso	196.23	236.23	236.99	204.43	63.53	23.94	16.64	11.22	15.05	18.61	37.18	106.90
Xavante	50.621	60.935	61.131	52.733	16.386	6.177	4.293	2.894	3.883	4.800	9.590	27.576
Duere	56.857	68.445	68.665	59.231	18.407	6.938	4.821	3.250	4.362	5.392	10.771	30.974
Urubu	46.496	55.972	56.148	48.436	15.054	5.673	3.943	2.658	3.567	4.410	8.809	25.328
Pium	24.750	29.793	29.889	25.783	8.012	3.020	2.099	1.415	1.899	2.347	4.689	13.483

Sub-projects areas and respective water

Sub-projects	Polders No	Total Area (ha)		Q (m <sup>3</sup> /s)
		Protected	Irrigable	
Riozinho	3	9,500	8,900	16.7
Pium	3	24,800	22,900	43.0
Urubú	4	42,800	39,650	74.4
Duerê	3	30,650	30,000	56.3
Xavante	3	43,900	43,000	80.8
Formoso(North)	15	161,300	154,700	290.4
(South)	5	31,300	29,900	56.2
<b>Total</b>	<b>36</b>	<b>344,250</b>	<b>329,050</b>	<b>617.8</b>

The dams characteristics are:

Dam	Crest Extension (m)	Max. Height (m)	Max. WL (m)	Min. WL (m)	Irrigated Area (ha x 10 <sup>3</sup> )	Max. Flowing (m <sup>3</sup> /s)	Scoop Capacity (m <sup>3</sup> /s)	Inundated Area (km <sup>2</sup> )	Volume of Massive (m <sup>3</sup> x 10 <sup>6</sup> )
Riozinho	1,420	11.4	196.4	193.0	7.6	16.7	1,138	38.0	305
Pium	2,800	11.9	196.9	192.0	19.5	43.0	2,225	68.5	565
Urubú	4,900	12.8	195.8	190.0	33.7	74.5	3,775	114.0	1,280
Duerê	3,630	10.4	191.4	187.0	25.5	56.4	1,670	72.0	910
Xavante	3,790	11.6	202.6	197.0	36.6	80.8	1,318	117.0	1,025
Formoso	4,480	19.7	212.7	200.0	156.9	346.8	3,780	226.0	2,340

### c) Alternative Project

According to the CODETINS, the project above mentioned was considered expensive. The CODETINS re-evaluated the project, concluding that there was the necessity to substitute the original project by one elaborated by CODETINS itself. According to this organism, the Original Project had an implantation cost of about US\$8,000/ha, while the Alternative Project was only about US\$2,500/ha.

The project consists in the construction of dams not only for water storage, but also for elevating the groundwater level. The inundation method is going to be substituted by the sub-irrigation method.

As the pioneer project, the old sub-project Urubu's area was selected. Therefore, the original project of dams for feed polders was substituted by 3 dams (Tartaruga, Becker and Ponte), with enough stock water and conditions to elevate the ground water level, allowing the sub-irrigation. The dams position are shown in the figure.

The dams characteristics are similar, differing only in their dimensions. They are overflow dams, with central nucleuses and cut-off constructed with clay material. Sand and stones or laterite are going to be used at the transitions. The crest will be covered with reinforced concrete with metallic net, the downstream part being protected by rough rocks. The downstream and upstream dry parts are going to be in compacted landfill. The water spillway during the construction and maintenance of operational levels is going to be substituted by tubes installed at the right side, and the discharge control will be done by gates.

The alternative project, with estimated cost of 2.6 millions of real, financed by the Environment, Water Resources and Legal Amazon Ministry, had the construction works initiated in October and is estimated to be finished in November of 1998.



## **(2) Project of Irrigated Agriculture of Bico do Papagaio**

The irrigation project of the Araguatins perimeter is divided into two areas; 205 ha irrigated by inundation system and 2 ha for aquiculture. The estimated value of the project is R\$ 550,000.

The area 1 of the project is located at the east of the Araguatins municipality and the settlement of 25 families in 50 ha/family is expected, being reserved an area of 2 ha for fish breeding. The other area is located among the rivers Taquari, Barreiro and Araguaia at the south of the municipality of Araguatins, with an extension of 155 ha.

This project was also re-elaborated by the Agriculture Secretariat which has changed the central pivot system by an inundation system. The location of the project was the main reason for this change. Since it is located at the Araguaia river margin, and has an elevated ground water, the utilization of central pivot shall not be viable due to soil conditions. This project is similar to PRODECER project, being oriented to entrepreneurial lots, with an average area of 65.6 ha/lot. The estimated rice production is 861 tons per harvest, with a productivity of 4,200 kg/ha and 12 tons for fishing activity.

The dam work already started but had to be stopped due shortage in budget. The construction of the dam was financed by the State Treasury. At present, the implementation of the project is subject to approval by the Ministry of the Environment and Water Resources.

## **(3) Hydro-agricultural use in the State of Tocantins**

This project aims at benefiting a total of 14 sites in 8 municipalities by means of center pivot irrigation system (irrigable area: 20 ha) and is expected to irrigate a total area of 568 ha covering 10 NPA's projects for 600 families as follows.

- Araguaína
- Araguatins
- Tocantinópolis
- Miracema do Tocantins
- Rio Sono
- Palmas
- Colinas do Tocantins
- Natividade
- Sampaio
- Praia Norte

The irrigation type to be employed is the central pivot, being expected the acquisition of 14 sets for the irrigation of 20 ha/each. The total value of the project is estimated in R\$ 1,200,000, out of which 1,100,000 shall be financed by the Ministry of Environment

and Water Resources, and the remaining R\$ 100,000 by the State Government of Tocantins. This is a donation-type project. At present, 50% of the center pivots is already installed in the following locations and quantities.

- Palmas	3 x 20 ha
- Rio Sono	1 x 20 ha
- Miracema do TO	1 x 20 ha
- Araguaína	3 x 20 ha (not yet installed)

The municipal bureau of agriculture is signing a concession document with the beneficiary in order to assure the successful implementation of the project. According to this contract, the farmers are obligated to produce. Without production (except unexpected cases) the equipment shall be confiscated and delivered to other farmers.

The project aims at the production of fruit cultures, feijão beans and maize, basically oriented to subsistence. The equipment shall support activities of farmers associations which are selected by the municipal bureau of agriculture.

#### **(4) Jalapão Project**

This project aims at developing an agriculture and ecological tourism in the region of Jalapão in order to improve the economic conditions and to attain stability for the local population. This project covers the following 6 sectors.

- Reforesting Project: introduction of eucalyptus, mesquite, and acasian, suitable for the region;
- Agricultural and Forest Project: Agriculture and livestock integration plan;
- Coal Production Project: supply of vegetal coal is expected;
- Agriculture: in order to settle down the population, production of fruits shall be developed (cashew, coconut, mango, passion fruit, papaya, pineapple) aiming at a high rentability;
- Livestock: Buffalo and sheep-goat breeding;
- Ecological Tourism: A Project aiming at the implementation of the tourism sector, through the evaluation of Jalapão region natural potential.

The estimated implementation cost of the project is US\$ 425,955, out of which US\$ 383,359 shall be financed by the Ministry of Environment and Water Resources and US\$ 42,596 by the State Government of Tocantins. This project was submitted to the Ministry of Environment and Water Resources and, after some modification, shall be again delivered for its financing approval.

#### **(5) Tocantins Project**

The state is promoting the production of horticulture, maize and soybean through the utilization of central pivot irrigation in order to attract private investments.

Pivots shall be supplied for areas from 100 to 120 ha, where the private sector shall pay the project and the state shall supply infrastructure (roads and energy). The main benefited regions are the south-east, center and extreme north regions. The project is now suspended but the pre-feasibility studies are concluded.

#### (6) Project of Deep Well Perforation

New technology, specially irrigation systems are required by the 120 natural nucleus of agriculture production existing in the state of Tocantins which, at present, are developing an incipient agriculture. There are areas suitable for agriculture but which are not utilized in farms belonging to organized associations who need to improve production of food in order to fight against hunger and poverty. Formation of small green belts are necessary in these communities.

Through the perforation of community wells, it is expected to supply good quality water for the agriculture production nucleus (NPA) involving small irrigation projects (micro sprinkling / conventional sprinkling). With the provision of drinkable water, infectious diseases shall be reduced and consequently the infant mortality rate as well.

Therefore, with the promotion of the horticulture and vegetal production for the associated population, the improvement of rural families life quality is expected as well as the improvement of neighboring communities conditions.

The purposes of the projects are :

- Perforation of 150 deep wells in rural and urban communities;
- Assembling and irrigation of 200 ha through conventional sprinkling or micro-sprinkling;
- Acquisition of 100 diesel irrigation sets;
- Production of 200 tons of horticulture and farm products per year;
- Supply basic infrastructure to the agriculture production nucleuses.

The estimated cost of the project is as follows:

Estimated Cost for Perforation of Wells

DISCRIMINATION	QUANTITY (UNIT)	UNITARY VALUE (R\$)	TOTAL VALUE (R\$)
Perforation of 150 deep wells with elevated pipeline and reservoir with 10,000 liters/day capacity	150	12,000	1,800,000
Acquisition of complete irrigation set	100	6,962.41	696,241
<b>TOTAL</b>			<b>2,496,241</b>

Out of the above amount, the Ministry of Environment and Water Resources shall finance R\$ 2,269,310 and the State Government of Tocantins, R\$ 226,931.

**(7) Araguatins Irrigation Project**

This project aims at the installation of irrigation equipment, next to Araguatins, in order to enable the implantation of NPAs, also supplying drainage equipment, developing the highway system, construction of polders and installation of pumping station. The number of families to be benefited is not yet defined.

**(8) Sustainable Development Program of Lowlands of the Legal Amazon**

This project aims at the development of fish breeding activity together with agriculture. The following regions are under this program: Javaés region (278 thousand ha), Bico do Papagaio (90 thousand ha), Araguaína (10 thousand ha), Araguacema - Caseara (10 thousand ha), Dianópolis (10 thousand ha) and others (2 mil ha), besides the highway, electrification and processing center projects.

**(9) Development of Agriculture Nucleuses (Small Farmers) Program**

This project aims at the installation of 120 NPAs within 4 years, directly assisting 12 thousand producers and indirectly 48 thousand rural workers. The region to be benefited shall be the Bico do Papagaio and the responsible institutions are the Agriculture Secretariat, RURALTINS, ITERTINS, Education Secretariat and other related organisms. At present, three NPAs have been installed.

**(10) Rural Development Project in São Felix do Tocantins**

This project, through a suitable utilization of natural resources, aims at the development of fruits production and the reforestation of tropical specimens. The installation of the São Felix center which shall supply 30 thousand fruit seedlings per year is expected for the first stage. Aiming at the installation of the buffalo breeding center, the introduction of 20 cattle heads of this animal is also foreseen.

**(11) Coordination of Cooperative and Association Activities**

This project focuses on the creation of small farmers associations.

**(12) Common Farming Projects**

Installation of 8,000 ha of common farming areas in 30 municipalities is expected to be developed through this Project.

**(13) Quintal Verde Project**

This project aims at the production of vegetables for 18,000 families, 250 common green gardens, 500 school green gardens and 40 model farms.

**(14) Agriculture Mechanization Project**

Supply of agriculture machinery to small farmers for soils preparation is expected to be executed through this project.

**(15) Production of Fruit Seedling and Forest Essences**

This project aims at the production of 1 million fruit seedlings to be distributed.

**(16) Lowlands Project**

Through this project, seeds of feijão beans, maize, pumpkin and watermelon are expected to be distributed to the river margin population.

**(17) State Agriculture and Livestock Research System Project**

This project is composed by 8 systems aiming at dynamizing the agricultural research in the state; the systems are as follows;

- Cereal Production System (control of plagues, improvement of rice seeds, inundation system installation, cultivation technology of sorghum, maize, soybean and sunflower, establishment of a stable agriculture for the savanna region, etc.);
- Cultivation system of fruit plants (introduction of new varieties and conservation of soil);
- Evaluation System of the Natural Potential;
- Livestock Production System;
- Forestry Production System;
- Familiar Agriculture Development System;
- Regional Development System; and
- Preservation of Vegetal Resources.

**2.2 Transportation**

**(1) River crossing system**

There is no information at present with regard to improvement of river ferry system. Plans for construction of a bridge over the Tocantins River is forged within municipalities of Palmas, Miracema do Tocantins and Pedro Afonso, as part of the road improvement project, although it is not decided yet to put or not this plan into implementation. However, it is necessary to examine the necessity of these bridges construction as a part of the transportation system in Tocantins. In particular, its examination is believed to be important in comparison with fluvial transportation system.

**(2) Waterway of the Tocantins and Araguaia rivers**

The project for the waterway for the Araguaia and Tocantins Rivers is part of the

Multi-modal Central-Northern Transportation Corridor contemplated in the PPA of the federal government. The full function of this transportation system will enlarge the agricultural boundary lines for the states of Mato Grosso, Pará, Tocantins and Maranhão. As the first phase, the waterway goes 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 TO-164 (115 km) and BR-226 (62 km), South-North railway (230 km) and Carajás railway (600 km). As a final stage, the Araguaia waterway is expected to reach Belém Port from the Mortes river directly after the repairing of Santa Isabel rapids, Pará, then via Tucuruí dam.

The Tocantins river (navigable reach 420 km) waterway is planned to establish the route from Miracema do Tocantins to Estreito and connecting with South-North railway at Estreito as the first phase. At last, it will pass through the same route after running together with the Araguaia river.

At present, on the way of the Multimodal Central-Northern Transportation Corridor, some private companies planning to establish a vegetable oil extraction plant at Itaqui, warehouses or silos at Imperatriz and Xambioá are reported. Also barges construction is supposed to be put into implementation through BNDES financing.

Surveys are being carried out by the Federal Government and AHITAR with regard to waterway system through the Tocantins and the Araguaia rivers. Cargoes to be transported through the Araguaia River shall be those produced in the state of Mato Grosso. Although grains produced in the southwest region (in the surrounding areas of Formoso do Araguaia in Tocantins and Lagoa da Confusão) may be transported by the waterway of the Araguaia River, the use of waterway during the reach of this master plan seems to be unrealizable as these products are not expected to become export commodities until 2015. Therefore, an emphasis will be laid on road improvement during the term of the master plan.

Meanwhile, no information indicating the progress of the survey on the waterway of the Tocantins River is available. Considering the time needed for improvement of the route, mooring facility and loading facility, it is foreseen that the service of the waterway would not start before 2005. The relation with the Lajeado Power Station Project will also have to be taken into consideration.

### **(3) Road construction plan**

The State Secretariat of Transportation and Public Works (STO) had elaborated the road construction plan in Tocantins for the period 1988 - 2008. According to this plan, STO does not plan to extend the total length of the state road network, but do plan to improve (to pave) the existing conditions of roads during the period of the plan; STO contemplates to elevate the proportion of road pavement from 9.7% in 1988 to 85.6% in 2008.

### **(4) South-North railway construction plan**

The South-North railway shall interconnect Central-West region with Northeast region in Brazil, Brasília to Açailândia, thereafter the connection with the port of Itaqui, Maranhão will be carried out through the Carajás railway, and from there, by sea, to the

international markets. The construction works between Açailândia and Imperatriz, for a distance of 109 km, have been already completed, and between Imperatriz and Estreito, 120 km are scheduled to be completed by the end of 1998. In the future, when the construction works are completed up to the Colinas do Tocantins city, there will be a ramification towards the Exportation Processing Zone - ZPE, in Araguaína.

## **2.3 Electric Supply Projects**

### **(1) Power Supply Situation**

Electric energy in the state of Tocantins is mainly generated through hydroelectric and thermic power stations, managed by CELTINS - Tocantins State Electrical Company.

At present, demand for electric energy of Tocantins State is increasing, however the state only fulfills 40% of the energy demand, being necessary to import the difference from the north/northeast system (Tucuruí) and south/central system (Furnas).

The projection of the energy demand up to the year 2005 indicates that the proportion of the energy supply against its demand in Tocantins would evolve in the range of 30 to 40 % up to 2000 and then would drop to below 30% from 2001 on.

### **(2) Power Station Construction Projects**

The features of the power station development projects are given in the Table VIII -2.1. As shown in this table, most of the power stations are constructed without reservoir, therefore they are used for generation of energy only.

## **2.4 Rural Electrification**

In 1995, the state of Tocantins elaborated the PROMA (Environment Protection Program through Rural Development) which contains three sub-projects: construction of hydroelectric power stations, installation of low tension TL (transmission line) and rural electrification for areas which are presently served by diesel generators.

The cost of PERTINS reaches a total cost of US\$ 100 million, out of which US\$ 68,720 thousand shall be financed by the Eximbank of Japan. The project shall attend 9,000 rural families through the installation of 18,000 km of TL and shall be executed between 1997 and 1999.

The purpose of this project is to distribute electric energy to isolated locations, at present supplied by diesel generators. The cost of the sub-project shall be borne by the state government and by beneficiaries; the former shall bear the cost of materials and equipment, while the latter shall cover the cost of manpower.

## **2.5 Tourism Development**

Tourism activity of the state of Tocantins is not well developed. For the promotion of this sector, the government offers preferential measures of tax exemption in order to reach a desirable development. The potential regions for tourism development are as

listed below:

- Region of Aurora do Tocantins, Rio Azul
- Region of Taguatinga, Cachoeira do Registro
- Region of Natividade and Igreja dos Pretos
- Region of the Araguaia and Tocantins river margins
- Lagoa da Confusão
- Paranã, thermal waters of Serra das Caldas
- Bananal Island
- Region of Cantão, tourism area of Araguaia
- Garganta do Inferno - Dianópolis
- Region of Jalapão

Besides these programs, tourist centers are being installed in the regions of Bananal Island, Cantão and Coco Javaés in order to develop the Eco-Tourism.

The Tocantins State has a great tourism capacity, but there is deficiency in basic and adequate infrastructure for the sector development. This enormous and diversified natural resources potential can make the State an important pole of tourism and eco-tourism in a national and international scale. The Government pretends to reduce the taxes to stimulate the sector, to reach this objective.

The regions with potential for tourism and eco-tourism are:

#### **Southeast Region**

**Paraná** – 9 attractions: Palmas and Paranã rivers, beaches, islands, small rivers, rich fauna, Dauto lake, Serras das Caldas thermals and folklore.

**Dianópolis** – 7 attractions: Bonita Lake, Luz Waterfall, historic attractions and folklore.

**Natividade** – 13 attractions: Natividade mountain, Paraíso Waterfall, Natividade historic center, Bom Jesus de Nazaré Center and folklore.

**Arraias** – attractions: Negreiros Plateau, Fazenda Furnas cave, as cultural and historic attractions and folklore.

**Taguatinga do Tocantins** – 9 attractions: Registro Waterfall, Caldeirões cave where can be find the crystal water fountain of Bolo de Noiva Azuis, historic cities and folklore.

#### **Southwest Region**

**Bananal Island** – 15 attractions, having the following main attractions: Araguaia National Park, Araguaia Indian Park, Araguaia river, Javaés river, fluvial beaches, lakes, folklore and contemporaneous technical scientific manifestations.

**Formoso do Araguaia** – Javaés river, Porto Piauí beach, Morro Azul Lake (thermal water), Morro Azul, Relevo Calcáreo cave, Project Rio Formoso and folklore.

**Lagoa da Confusão** – 5 attractions: Lake with 4,5 km of diameter, Pássaros lake, Casa de Pedra cave, Ilha Praia Clube lake and Resort Center.

**Cristalândia** -- attractions: mines of rock crystal extraction.



### **South Region**

**Peixe** – Peixe and Tartaruga beaches, both in Tocantins river, Tropeço archipelago (366 islands), small rivers, Peixe lake e folklore.

### **Extreme North**

**Esperantina** – future Biological Reserve of the Araguaia and Tocantins rivers joint area.

**Araguatins** -- 8 attractions: São Raimundo and São Bento beaches (located in islands) and near the cities, the Ponta de Areia and da Ponta beaches; folklore and Open Music Festival of Bico do Papagaio.

### **North Region**

**Araguanã** – the main attractions are the Araganã island beaches and folklore.

**Xambioá** – 10 attractions: beaches – Campo island, Murici island, Paletó island, small rivers of Xambioá, Cascata, Poço do Noleto and folklore.

**Araguaína** – attractions concerned with programmed events: Agricultural and Livestock exposition and Micro and Small enterprises fair,

### **Central Region**

**Palmas** – attractions: Carmo mountains, Figuras mountains, Tocantins river, beaches, Ecological Reserves of Lajeado mountains and waterfalls.

**Lajeado** – 8 attractions: Tocantins river rapids, Seguro and Escritas mountains, Funil straits and folklore.

**Porto Nacional** – 7 attractions: Tocantins river beaches, Rebojo and Cícero Elias island, historic cities and folklore.

### **Central West Region**

**Araguacema** – 13 attractions: Araguaia river, lakes, Porto do Meio, Camaleão, da Gaivota beaches, and folklore.

**Caseara** – 7 attractions: Araguaia and do Coco rivers and Lakes zone, beaches and folklore.

**Pium/Cantão** – Bananal Island/Cantão eco-tourism pole, Araguaia, Coco, Javaés rivers, beaches, swampland, folklore and fauna.

**Paraíso do Tocantins** – 5 attractions: religious festival and programmed events as Music Festival, Agricultural and Livestock Exposition and Micro and Small enterprises fair.

### **East Region / Jalapão**

The Jalapão region is composed by various municipalities, has big plateaus with crystalline rivers as Vermelho river, Prata river, Novo river beach, Pedra Funda mountain, Saca Trapo mountain, Homem mountain, Espírito Santo mountain, Gorgulho mountain, Velha waterfall, Sussuapara waterfall, dunes with 40m and folklore.

The Tocantins Government established the Tourism Complex of Araguaia by the Decree No 132, in 1995, 29<sup>th</sup> of August, to develop the eco-tourism. The first pole was the Bananal Island / Cantão Eco-tourism Pole included in the Legal Amazon Eco-tourism Development Program (PROECOTUR) by the Federal Government.

## **2.6 Agro-industry**

### **(1) Export Processing Zone in Araguaína**

The Export Processing Zone (ZPE) in Araguaína, created by the Federal Decree No.98,123 of September 6<sup>th</sup>, 1989, is a mechanism aiming at the regional economic development through the establishment of export-connected enterprises, with an extremely favorable fiscal and foreign-exchange treatment. It is located on the Belém-Brasília roadside and it shall be interconnected by a secondary road up to the North-South Railway.

The ZPE holds a surface area of 300 ha, and there is a plan to expand it up to 1,000 ha in the future. Although the installation of ZPE office was completed in 1996, no factory has been established there up to the present. Some appropriate measures that meet the current demand are keenly requested because the world trade circumstances have greatly changed since the Decree for ZPE was established in 1989.

### **(2) Economic development promotion (PROSPERAR)**

PROSPERAR is the incentive program for the economic development which gives technical and financial support to whatever economic activities may promote agricultural, cattle-raising, industrial, commercial and tourism development.

The incentive given under the PROSPERAR comprehends the grant of a grace period in payment of the ICMS for a period ranging from 10 to 15 years. This incentive was attractive at the start of the program when high inflation rate prevailed throughout the country, but is not the case nowadays when the inflation rate has been depressed. In such circumstances, new incentives to attract more investors to the state are required.

In the cities of Araguaína, Gurupí, Paraiso do Tocantins, Porto Nacional and Palmas, there are industrial zones equipped with infrastructure such as electricity supply, water supply and sewage. In these places, an incentive program comprehending the exemption of municipal taxes during a period of 10 years is being applied for the industries willing to install their facilities in these industrial zones.

Since the start of PROSPERAR in 1989, it was applied to 39 companies as of 1996, including companies related to agricultural products. 15 companies are applying for PROSPERAR at present.

### **(3) Other development projects**

#### **1) Bico do Papagaio Project**

The project site is located in the extreme-north region of the State, close to a significant supply of economic infrastructure, such as energy providing from Tucuruí, transportation through the South-North railway, a network of state roads being paved, besides lands with reasonable quality, low price and close to the ZPE.

2) Sugar-cane alcohol production poles.

Aiming at participating in the production of renewable energy, the State of Tocantins is proposing the development of studies to implant sugar and alcohol production poles. Due to its location, Tocantins state is a promising place for the production of these export commodities.

3) Pilot Project for the Implantation of the "Extreme-North Development Irradiation Pole"

4) Projects related to agricultural products, regarded in the Multi-annual plan (1999-2008) and elaborated by SEINC.

- Establishment of the laboratory for animal diagnosis and control of aliments, microbiology, and physics-chemistry;
- Establishment of the laboratory for control and development of inputs and products for agro-processing industry;
- Establishment of technology incubators;
- Establishment of the new birth industries;
- Construction of the Agro-industry Technological Complex in Tocantins; and
- Establishment of Agro-industry districts.

## 2.7 Human Resources Development

The Federal Government is promoting the human resources development under the PLANFOR as one of the 42 priority projects included in the Multi-annual Plan 1996-99.

The PLANFOR is divided into two types of activities: special projects and qualification and re-qualification projects. The special projects are studies, researches and conceptual and methodological events supporting the qualification and re-qualification projects. The other one is composed of courses and training in several fields, aiming at the employability of the trainees.

RURALTINS and SENAR (National Services of Rural Education), and sometimes SEBRAE, are performing the courses and activities. RURALTINS is the public institution responsible for technical assistance and agricultural extension services in the Tocantins State and it is linked with the State Secretariat of Agriculture (SAG). It has 62 offices all over the State (54 local offices, 7 regional offices and 1 central office in Palmas). Its staff is composed of 307 persons in all regions of the State. By its turn, the SAG reckons on 01 central office in Palmas, 03 regional offices (Araguaína, Gurupí and Taguatinga) and 19 local offices.

In the field of qualification of human resources, RURALTINS is working on the training of its own employees as well as in the qualification of small-scale farmers. Before the implementation of the PLANFOR, there was not a continuity in the training programs.

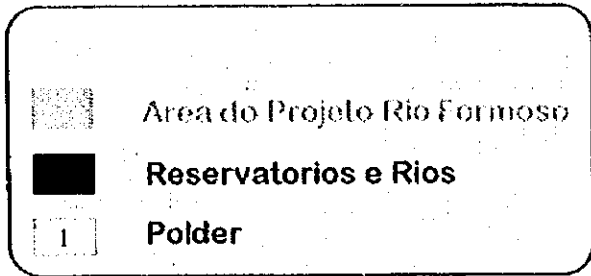
## 2.8 Social Welfare

The social welfare and assistance for the population, at the national level, is carried out by INSS. Social welfare services by INSS cover four fields: free medical services, unemployment pay, retirement pension and old-age pension. There are INSS local offices established in major cities and they attend retired persons and unemployed of all economy sectors, as commerce workers, industry workers, rural workers, miners, etc. At the state level, there is the IPERTINS (Institute of Social Welfare of the Tocantins State) which gives support only to state government employees.

Presently, INSS offices in the Tocantins State belong to the Goiás State Commission, and there are not many local offices in the State. Consequently, it causes procedures inconvenience. Urgent establishment of the Tocantins State Commission and of more local offices are demanded from the workers organizations.

Table VIII-2.1 Main Power Stations

	Name	Capacity	River/City	Supply Area	Information
Existing	AGRO TRAFÓ	9.82 x 4.9	PALMEIRAS river	PALMAS, DIANÓPOLIS, PONTE ALTA, NOVO JARDIM, PORTO ALEGRE DO TOCANTINS, RIO DA CONCEIÇÃO, ALMAS, NATIVIDADE, PINDORAMA, MONTE DO CARMO, PORTO NACIONAL	Beginning of Functioning: march, 1997 Type: fio d'água Cost: US\$10 millions Connected to ISAMU IKEDA through LT 3.4
	ISAMU IKEDA I	16	PONTE ALTA DO BOM JESUS	PONTE ALTA DO BOM JESUS	Total Cost US\$ 29,6 millions connected to the south-southeast network
	ISAMU IKEDA II	9.8	BALSAS MINEIRO river	Mainly PALMAS, PORTO NACIONAL	generation initiated in December, 1995 Total Cost: US\$ 19 millions constructed to use the advantage of the Isamu Ikeda lake. It is mixed barrier type
	CORUJÃO	700	LONTRA river	ARAGUAINA	Generating since 1970
	LAJES	2.76	LAJES river, WANDERLÂNDIA	ARAGUAINA	Mixed barrier restored in 1996 with a cost of US\$ 1 million
	LAJEADO	2.2	LAJEADO river LAJEADO	LAJEADO, TOCANTINIA, MIRACEMA	recovered in 1995 with a cost of US\$ 300 mil Type: fio d'água
	TAGUATINGA	2.06	TAGUATINGA river TAGUATINGA	TAGUATINGA	recovered in 1996 with a cost of US\$ 150 mil Type: fio d'água
Defined Projects	PALMEIRAS	5.5	PALMEIRAS river DIANÓPOLIS	Southwest region of the state	Finished in November, 1997 Cost US\$ 6 millions Type: fio d'água connected to FURNAS/ELETRONORTE
	DIANOPOLIS	5.5	PALMEIRAS DIANÓPOLIS	Southeast region of the state	Beginning of the work expected for June, and delivery for January, 1998 cost: US\$ 7 millions Type: fio d'água
	DIACAL	5	PALMEIRAS NOVO JARDIM RIVER	Southwest region of the State	Beginning of the work expected for 1997 and finishing for 1998 cost: US\$ 8 millions Type: fio d'água connected to FURNAS/ELETRONORTE
	SOBRADO	5.5	SOBRADO river TAGUATINGA	TAGUATINGA, AURORA	Type: fio d'água (prevision) Works in 1997 to 1998 Cost: US\$ 7,5 millions connected to FURNAS/ELETRONORTE
	FUMAÇA	5.5	BALSAS MINEIRO river	RIO DA CONCEIÇÃO	Type: fio d'água (prevision) Works from 1998 to 1999 Cost: US\$ 7,5 millions connected to FURNAS/ELETRONORTE and SE AGRO TRAFÓ PALMAS
	LAGEADO	1.0 GW	TOCANTINS RIVER, NORTH OF PALMAS		Multiple Purpose Estimated Cost: US\$ 205 millions Responsibility of ELETRONORTE Water surface of 790Km <sup>2</sup>
	Projects Under Study	Basin of rio PALMEIRAS	83MW	DIANOPOLIS	
Basin of RIO DO SONO			RIO DO SONO, RIO PERDIDA, RIO NOVO, tributary basins	MATEIROS, PEDRO AFONSO	
Basin of the CACHOEIRA DO INFERNO River		9.0 MW	CACHOEIRA DO INFERNO river	PONTE ALTA DO BOM JESUS	
Basin of the BALSAS MINEIRO river		266.5 MW	NOVO ACORDO, STA TEREZA, MONTE CARMO, PINDORAMA		US\$ 317 millions



**PROJETO JAVAES**

Sub-projeto	No Polder	Area Irrigavel (ha)	Q (m <sup>3</sup> /s)	Reservatorio (km <sup>2</sup> )	Extensao da Crista (m)
Riozinho	3	8.900	157	38,0	1420
Pium	3	22.900	430	68,5	2800
Urubu*	4	33.650	74,4	114,0	4900
Duere	3	30.000	56,3	72,0	3630
Xavante	3	43.000	80,8	117,0	3790
Formoso	20	184.600	346,6	226,0	4480

(\*) sendo reviso o projeto pelo CODETINS

**PROJETO RIO FORMOSO**

Area Implantada (ha)	Area Total (ha)	Reservatorio (km <sup>2</sup> )	Produtividade Estimada (kg/ha)		
			Arroz	Milho	Soja
17.293	23.500	34,43	4.800	6.000	2.100

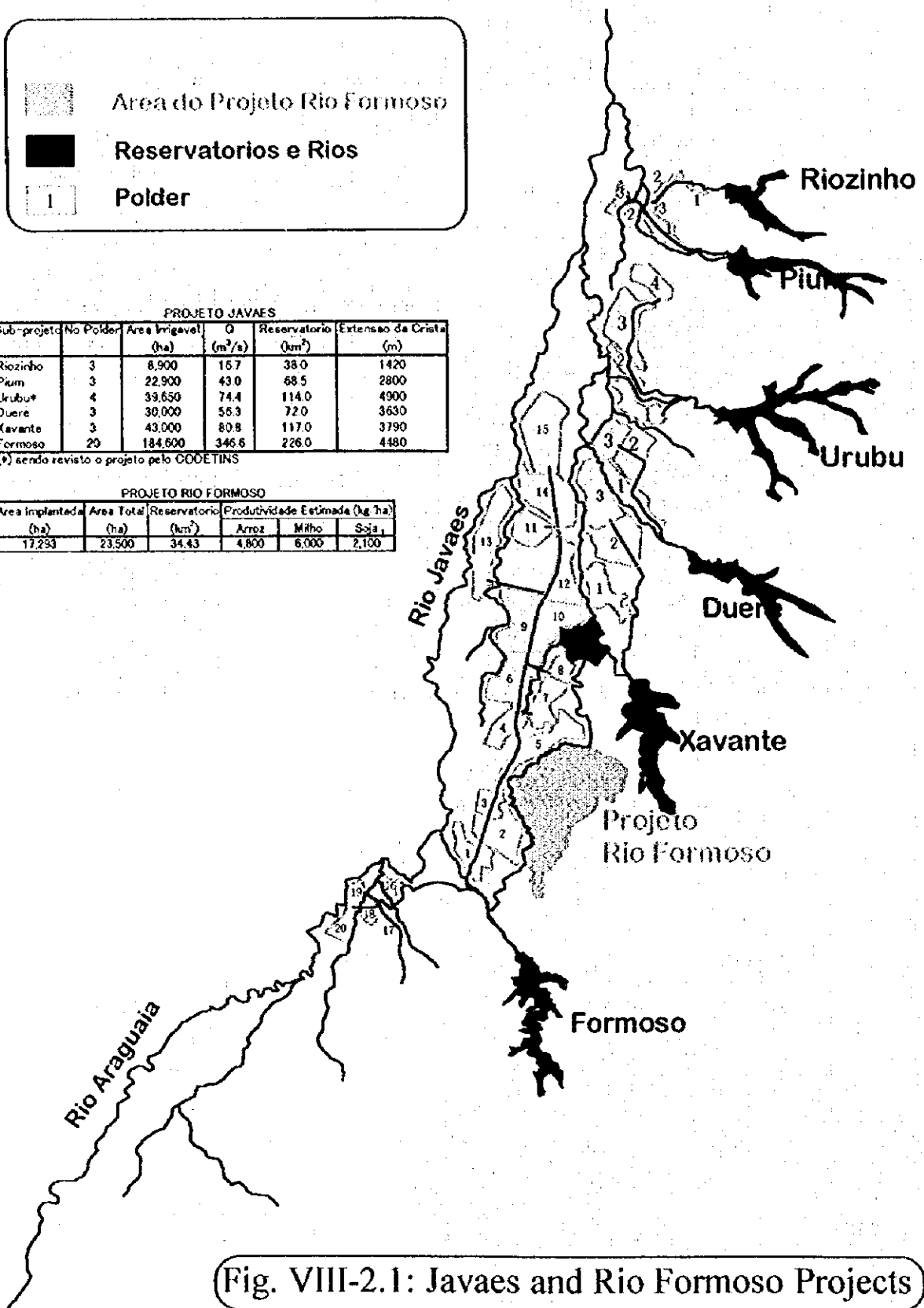


Fig. VIII-2.1: Javaes and Rio Formoso Projects

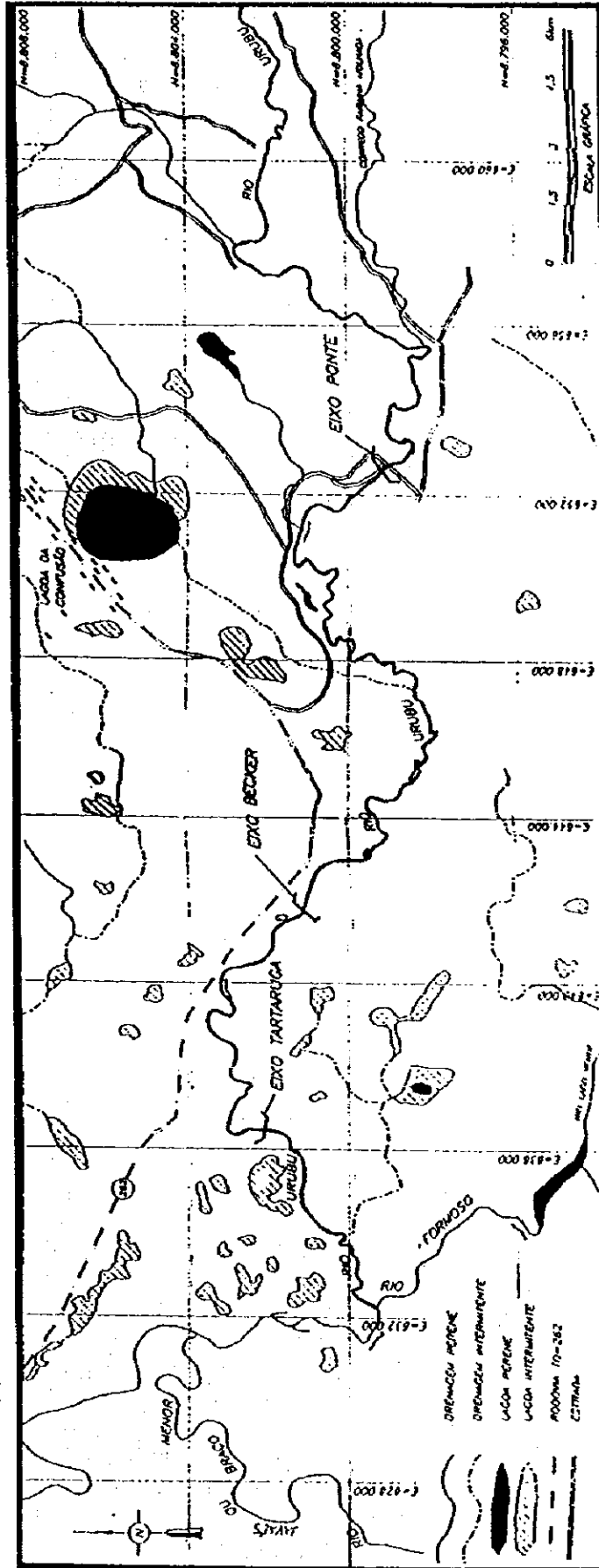


Fig. VIII-2.2 Javes Project Alternative





## **ANNEX IX**

# **IDENTIFICATION OF PREVAILING POTENTIALS AND CONSTRAINTS**



## ANNEX IX

### IDENTIFICATION OF PREVAILING POTENTIALS AND CONSTRAINTS

#### 1 Conditions of the State Agricultural Sector and Agricultural Producers

The territorial extension of the state is 278 thousand km<sup>2</sup>, which is inhabited by 1,906 thousand people (1996). The annual precipitation ranges from 1,200 mm to 2,200 mm, which enables crop production without depending on irrigation system during the rainy season. Owing to this large amount of precipitation, water resources at the Araguaia-Tocantins fluvial system are abundant and thus their use for development is technically viable. Land resources, on the other hand, are also recognized to have high potential supported by the fact that close to 55% of them are represented by arable land (the proportion is raised to 70%, if land suitable for grazing is included).

The agricultural producers in the state can be divided, for convenience, into three strata: large holders, medium/small holders and marginal/landless peasants and the farming practices in which each respective stratum is engaged are as follows; the large holders are represented by livestock farmers who predominately carry out extensive cattle raising with low productivity per unit of land; the medium/small holders, who are few in number, cultivate mainly grains and fruits; marginal/landless peasants who live on subsistence farming and their living conditions are extremely inferior without being provided with adequate social services such as electricity, water supply, etc.

#### 2 External Circumstances Besetting the Agricultural Sector

##### 2.1 Factors confronting agricultural production in Tocantins

Affected by a recent agricultural reform policy imposed by the federal government, the agricultural sector in Brazil has shown a sign of stagnation for a couple of years; nevertheless, the output of grains has attained growth despite the downward trend of the cultivated area. This fact is related to the abandonment of agricultural production by financially handicapped small farmers and it is also the case in Tocantins. The prevailing situation confronting the agricultural sector in the state may be summarized as follows;

1. Producers tend to abandon farming due to depressed or negative farm income derived from an elevated production cost in association with low productivity.
2. Accumulated debts deriving from rural credits discourage producers to continue farm operation.
3. Decrease in the agricultural investment.
4. Phasing out of the federal government intervention in the agricultural sector affecting the competitiveness of small and marginal farmers.
5. Decline of farmland prices stemmed from dull performance of the agricultural sector.
6. Upward trend of grains prices.

##### 2.2 PPA of the Federal Government

The Federal Government in its PPA proposes, besides the economic stabilization policy, to accelerate development of infrastructure which constitutes a catalyst for future development of the country economic sector. The development of the Central-Northern Transportation Corridor which is expected to contribute greatly to the economic

development of the Tocantins state is contemplated among the development projects of the PPA.

In the agricultural sector, the federal government policy focuses on the following: introduction of the option contract system for the purchase of crops in substitution for the minimum price program, phasing out public agencies participation in the rural credit, and revision of the premium for the rural insurance system. These government policies aim to introduce a market-oriented agriculture, but it does not mean that the government forsakes financially handicapped small farmers and marginal peasants; the government intends to support these farmers with the enforcement of preferential programs like PRONAF, FINAM and FNO. In addition, an emphasis is laid within the government agricultural policies on rationalization of agricultural research and extension system, development of marketing system of agricultural production, improvement of animal and plant disease control systems, incentives for participation of the private sector in the marketing of agro-products. Through the implementation of these policies, it is anticipated that the agricultural sector in Tocantins would be benefited in the following aspects, namely:

1. Development of transport network (Central-Northern Transportation Corridor, with an expectation for completion of the North-South Railway in 1998).
2. Reduction of premium of the rural insurance system through establishment of priority areas for crops.
3. Improvement of animal health protection system.
4. Incentives to invite investment from external sources in the agricultural sector (caipira 63).
5. Social guarantee plan (PRONAF, etc.).
6. Regional imbalance alleviation policy

By implementing the above policies, the following positive impacts are expected.

1. Comparative advantages for exportation of agricultural products (soybeans, meats and rice).
2. Consolidation of private sector investment, both foreign and domestic.
3. To facilitate the introduction of finances for regional development (FINAM, FNO, etc.).
4. To facilitate the application of PRONAF to small farmers.

### **2.3 Trend of Federal Government's Agricultural policy**

The agricultural production in Brazil is largely affected by the agricultural and economic policies of the federal government, in particular, the rural credit, minimum price program and rural insurance.

### **2.4 PPA of the Tocantins State Government**

Objectives of the PPA of the Tocantins State Government are as follows:

1. Accomplishment of sustainable development
2. Decentralization
3. Social development and fulfillment of welfare among regional population
4. Environmental conservation

Specific policies in favor of the agricultural sector are as follows :

1. Manpower development to be engaged in research of agricultural technology
2. Improvement of road network to complement the Central-Northern Transportation Corridor
3. Promotion of irrigation project in cerrado areas
4. Implementation of Lageado UHE Project with the participation of private sector
5. Fostering of agricultural production nucleus
6. Modernization of the marketing sector
7. Upgrading of basic education system and extension of vocational training services
8. Conversion of conventional farming into advanced one

These policies will have positive impact on development of the agricultural sector.

### **3 Incentives for Investment**

The future agricultural development of the Tocantins State depends on how a large extension of uncultivated lands can be used, land which is now left fallow. To attain this target, it is important to invite producers and agro-business entrepreneurs from outside the state. For inviting this private sector, it is a pre-condition to lay a consolidated foundation of economic structure and living circumstances.

The existence of vast uncultivated lands means that these lands are available with cheaper cost, which can attract investors. At the same time, despite the absolute population is scarce in comparison with territorial extension, the proportion of young people is relatively high and these people, under the circumstances of under-development of labor-intensive agriculture and industry, constitute potential labor force to be employed by the industrial sector to be established.

For inviting more investment, it is a prerequisite that the transport infrastructure should be consolidated; this aspect is already partly secured because the Multidodal Central-Northern Transportation Corridor Project is in progress and the state government is given a high priority to the development of inter-state roads system in order to complement the said corridor.

Another positive factor to invite the private sector from outside the state is the incorporation of the ZPE and the offer of incentives from the state government relevant to taxation and special loan for industrial development like PROSPERAR.

### **4 Natural Resources**

#### **4.1 Climatic Conditions**

The annual precipitation in Tocantins fluctuates in the range of 1,200 mm - 2,200 mm, of which higher precipitation zone is located over the basin area of the Araguaia River (in this basin, paddy cultivation may be carried out with installation of only small-scale facilities to secure irrigation water). This annual precipitation is concentrated in rainy season (from October to April) and crop cultivation without relying on irrigation system is viable in this season, including the in the Jalapão area which is characterized by the lowest precipitation within the state. Although the mean monthly temperature of the

state is less variable throughout the year, the difference between high and low daily temperature is remarkable, which enables to cultivate a variety of crops. Furthermore, in spite of higher precipitation, the relative humidity is low - a favorable factor to depress the occurrence of diseases affecting crop cultivation.

Even though a high precipitation is secured, it is probable that there would be some continuous dry days without rainfall ("veranico") in the rainy season and in such a case, crop production relying exclusively on rainfall may be damaged. Furthermore, in contrast to high precipitation in the rainy season, the rest of the year has very limited rainfall, which causes difficulty in farming without irrigation system.

#### **4.2 Water Resources**

Abundant precipitation in the state ensures the development of water resources of the regional river system represented by the Araguaia and the Tocantins rivers not only in the rainy season, but also in the dry season. Owing to specific soil conditions of the "cerrado" areas, discharges among small tributaries are relatively stable without being dried up even though in the dry season. It has been confirmed that not a few sites of the said tributaries offer an opportunity for taking their water for irrigation purpose; land topography around the tributaries permits to distribute irrigation by gravity. Water resources in the state have been exploited to an extremely limited proportion up to the present, and it is supposed that problems concerning to water rights hardly take place; in addition, under-development of land resources will mitigate problems which could arise from rights of way for construction works required for development of water resources.

As explained before, the potential of the water resources within the state is presumed to be very high, but the constraints concerning to the development of these resources are related to the absence of detailed study on hydrological performance of river system. Another limitation is that the two major rivers - Araguaia and Tocantins - which are flowing at a lower elevation, are not possible to be developed for irrigation purpose utilizing a gravity system. Apart from these constraints on development of water resources, abundant river discharge sometimes brings about inundation over some areas during the rainy season.

#### **4.3 Land Resources**

In the State of Tocantins about 14,554 thousand ha (52%) are evaluated to be suitable for crop cultivation, but the actual area occupied by crops is less than 1% (126 thousand ha in 1996) of this potential area. It is roughly calculated that approximately 1,985,700 ha of land are eligible for crop production after deducting the reservation areas of Legal Amazon and indigenous reserves. It implies that there is a great potential for future development of the agricultural sector in Tocantins. Especially, highly productive lands classified as class II and superior lands are located in the northern region as well as along the Tocantins River.

In order to study the potential of land resources, the following analysis was carried based on the soil and land classification.

### 1) Land Suitability for Agriculture

The land suitability map is shown in Fig IX – 4.1. The areas which are considered to be suitable for agriculture with the land suitability classes of class 1, 2 and 3 are shown in Fig IX-4.2. Because of their high land suitability, agricultural farming can be carried out with low level technology and hence it is easier for the farming of small farmers. The estimated total land area suitable for agriculture is 9,984,600 ha.

The lands suitable for upland agriculture are distributed in the north (Bico do Papagaio), north-western region and along the Tocantins river. Low lands for rice production are concentrated in the south-western region. The estimated area is 1,255,300 ha.

### 2) Lands suitable for Cattle Breeding

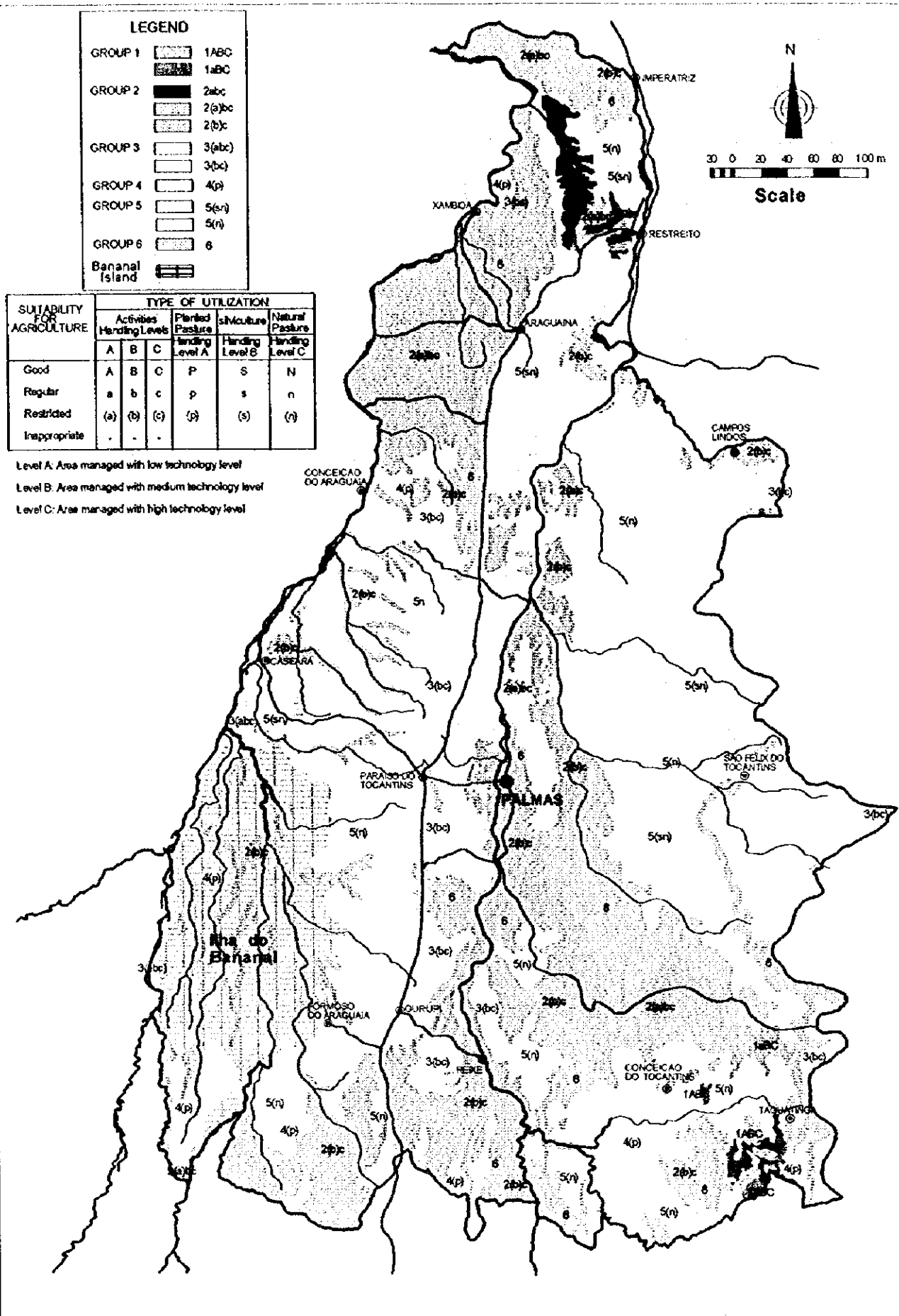
The land suitable for pasture cultivation corresponds to class 4. It means that the lands of higher classes can also be used for the cultivation of pasture and are suitable for cattle breeding. The area suitable for cattle breeding is shown in Fig. IX-4.3 and the estimated area is 14,554,000 ha.

### 3) Lands Suitable for Silviculture

Silviculture, as shown in Fig. IX-4.4, fits for lands of classes up to 5. The area corresponding to this classification is approximately 25,878,300 ha.

### 4) Reserved and Future Reserve Area

Reserved areas are shown in Fig. IX-4.5. These areas can be separated into two types. The first, shown in black mesh, is the reserved area of national parks. The other area includes the area reserved for Indians. The total area is estimated as 2,582,700 ha. Lands of class 6, where agriculture is not recommended, are classified as future reserved areas as shown in Fig. IX-4.6.



**LEGEND**

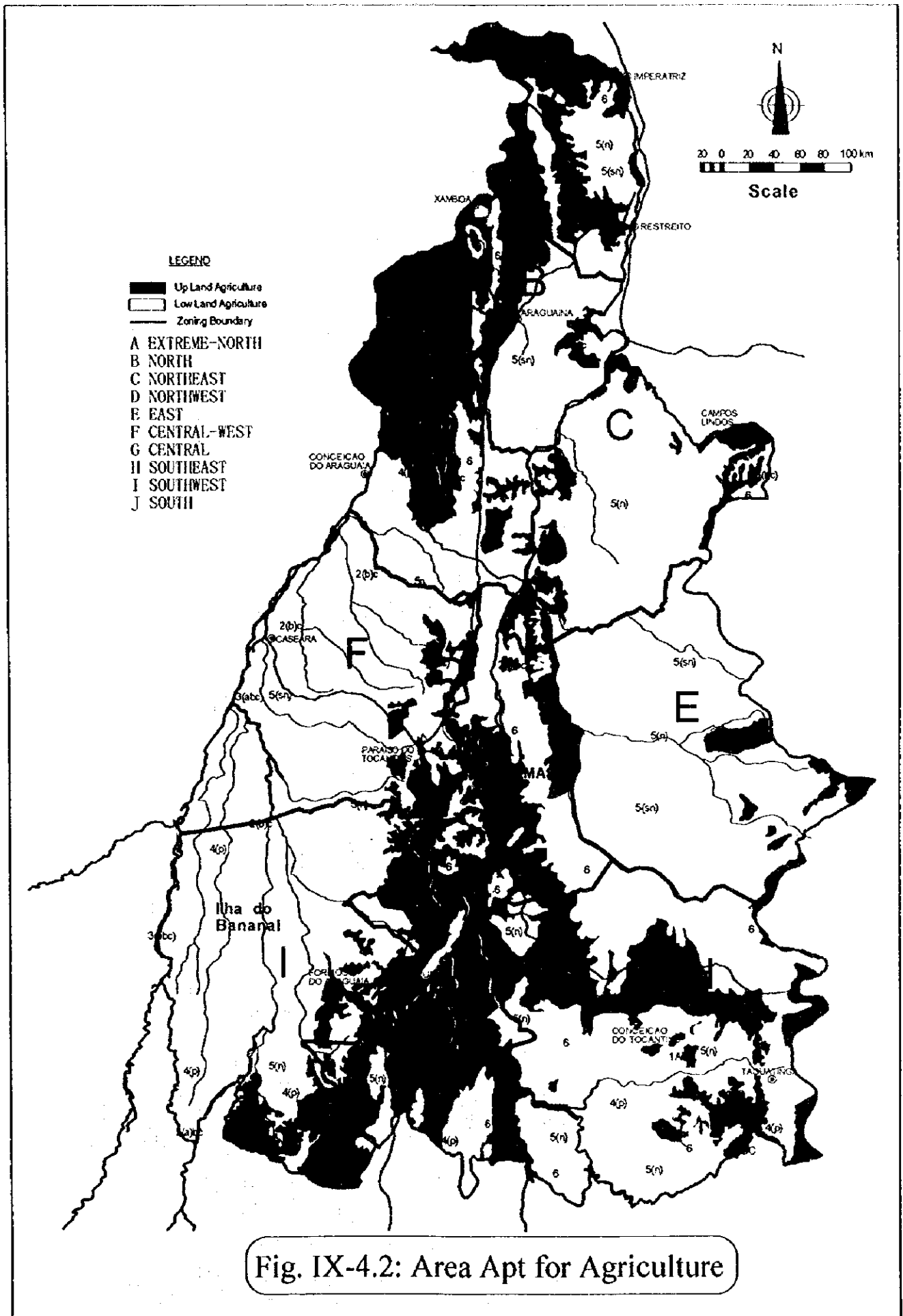
GROUP 1	1ABC
GROUP 2	2abc
GROUP 3	3(abc)
GROUP 4	4(p)
GROUP 5	5(n)
GROUP 6	6
Bananal Island	

SUITABILITY FOR AGRICULTURE	TYPE OF UTILIZATION					
	Activities Handling Levels			Planted Pasture	silviculture	Natural Pasture
	A	B	C	Handling Level A	Handling Level B	Handling Level C
Good	A	B	C	P	S	N
Regular	a	b	c	p	s	n
Restricted	(a)	(b)	(c)	(p)	(s)	(n)
Inappropriate	-	-	-	-	-	-

Level A: Area managed with low technology level  
 Level B: Area managed with medium technology level  
 Level C: Area managed with high technology level

**Fig. IX-4.1: Land Suitability Map**





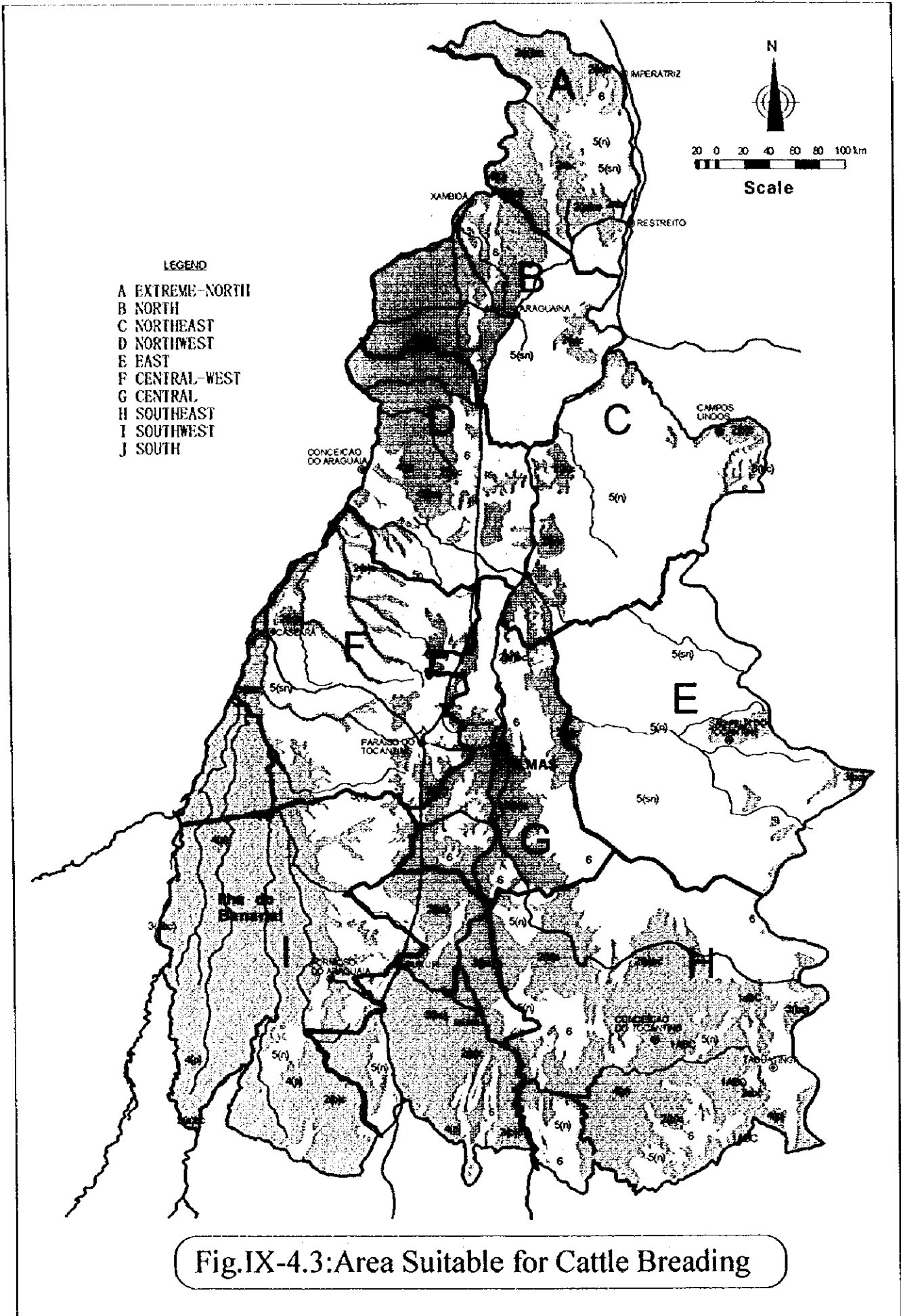
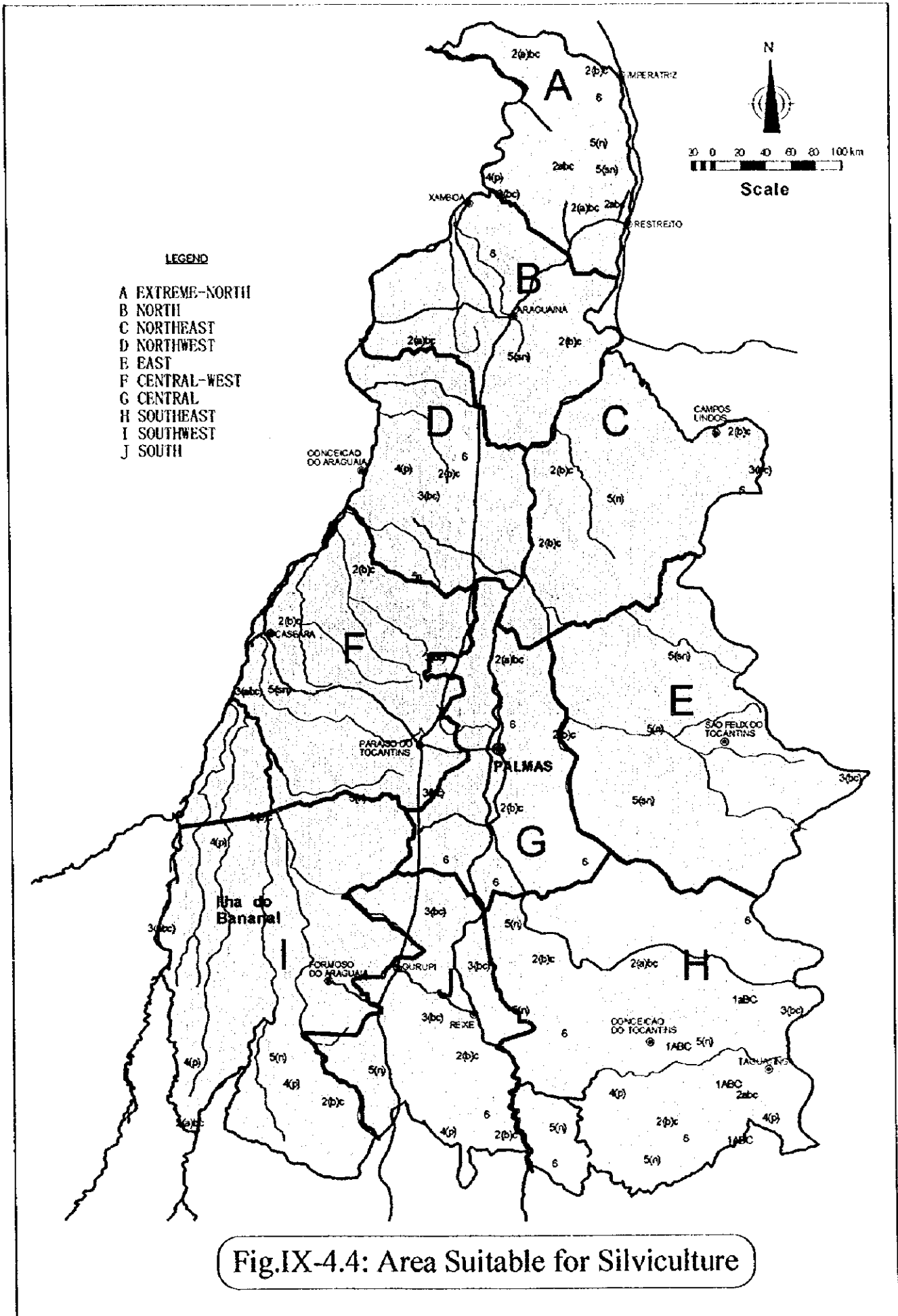
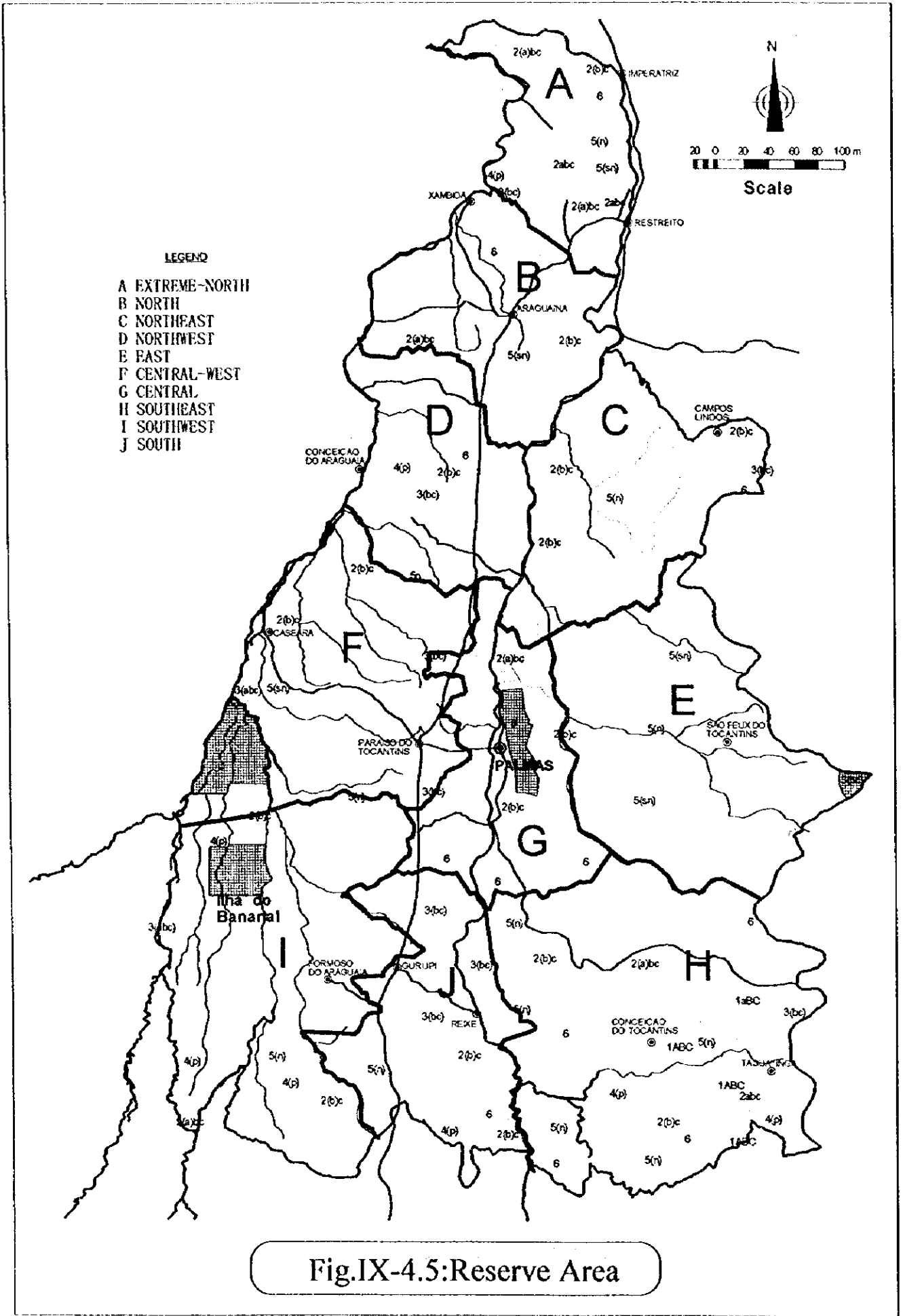
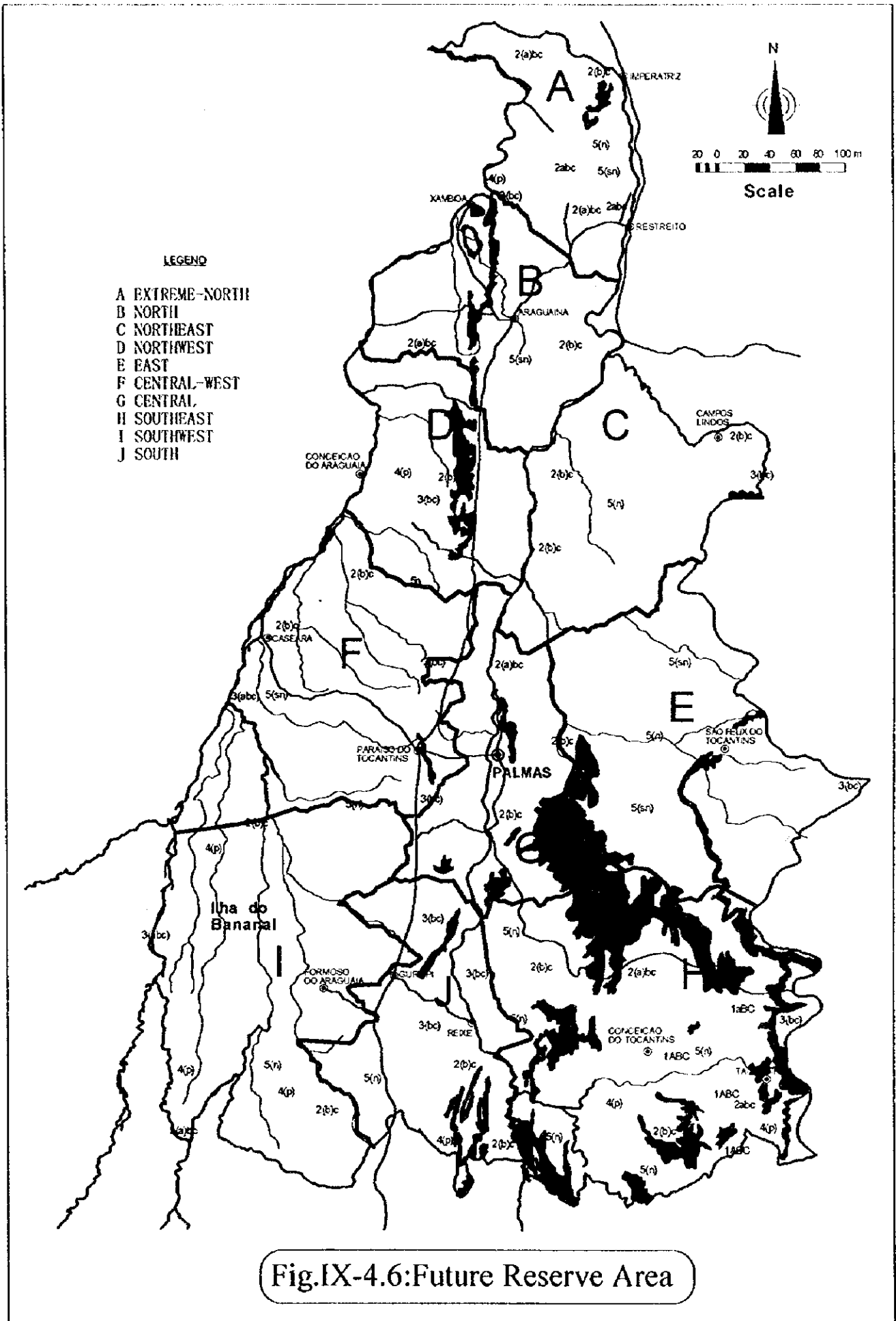


Fig.IX-4.3:Area Suitable for Cattle Breeding







A summary of the above mentioned areas is shown in the next table. Among the legal Amazon area, 50% of the area need to be reserved for conservation and only 50% can be developed which is mentioned below as the area apt for development.

Land Suitability in the State of Tocantins

Item	Land Suitability		Area Apt for Development (km <sup>2</sup> )			
	Area (km <sup>2</sup> ) (a)	(%)	Reserve Area (b)	(c) = (a)-(b)	Reserve for Amazon Region (d)	Area for Development (e) = (c)-(d)
Agriculture	99,846	35.9	11,749	88,097	44,048.5	44,048.5
Cattle Breeding	145,540	52.3	20,844	124,696	62,348	62,348
Silviculture	258,783	92.9	25,827	232,956	0	232,956

#### 6) Land Resources According to Regions

Land classification area in each region of the State of Tocantins is shown in Table IX-4.1.

The area suitable for development in each region for the activities of agriculture, cattle breeding and silviculture are mentioned below.

Area Apt for Development in Each Region of the State of Tocantins

Region	Area Apt for Development (km <sup>2</sup> )					
	Agriculture		Cattle Breeding		Silviculture	
	A	B	A	B	A	B
Ext. North	8,950	4,475	9,210.6	4605.3	15,773.9	14,292.9
North	10,875.6	5,437.8	10,875.6	5,437.8	20,108.9	20,108.9
North east	3829.0	1,914.5	3829.0	1,914.5	23,935.0	20,433.0
Northwest	9,198.2	4,599.1	9,827.7	4,913.8	17,853.5	17,835.5
East	2,387.8	1,023.3	2,387.8	1,023.3	31,686.1	31,344.8
Central west	7,595.3	3,039.6	11,780.1	3,667.6	30,349.8	25,904.9
Central	12,224.1	5,416.5	12,224.1	5,416.5	20,174.9	18,783.9
Southeast	15,044.9	7,522.5	28,676.0	14,338.0	36,753.1	36,753.1
Southwest	13,419.9	2,459.6	38,403.5	11,868.3	40,496.8	25,829.8
South	16,321.4	8,160.7	18,325.8	9,162.9	21,651.2	21,651.2
State	99,846.0	44,048.5	145,540	62,348.0	258,783	232,956

Note : A - represents the total land area available according to land suitability and  
B - represents the net area after deducting the reserve area and area reserved for environmental conservation ; For Silviculture, the 50% deduction is not made.

The land resources, which are sufficient enough in terms of extension, call for some improvement measures from agronomic viewpoint, which constitutes constraints on development. The constraints related with land resources may be resumed as follows;

1. Soils with high acidity and high aluminium contents are broadly distributed.
2. Generally speaking, soils are less fertile, vulnerable to erosion and hard in formation, therefore mechanization is essential for farming.
3. The greater part of arable lands are represented by "cerrado" soils, which are sensitive to ecological transformation and are difficult to be recuperated once they are developed.

Table IX - 4.1 Land Classification Area in the different regions of the State of Tocantins (1/2)

Class	Extreme-North						North						Northeast								
	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	
	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	8,840.81	0.00	8,840.81	8,840.81	4,420.41	10,810.73	0.00	10,810.73	10,810.73	5,405.36	3,152.01		3,152.01	3,152.01	5,405.36	3,152.01		3,152.01	3,152.01	5,405.36	1,576.01
3	109.24	0.00	109.24	8,950.05	4,475.03	64.86	0.00	64.86	10,875.59	5,437.79	676.96		676.96	3,828.97	5,437.79	676.96		676.96	3,828.97	1,914.49	
4	260.51	0.00	260.51	9,210.56	4,685.28	0.00	0.00	0.00	10,875.59	5,437.79	0.00		0.00	3,828.97	5,437.79	0.00		0.00	3,828.97	1,914.49	
5	6,563.36	1,481.00	5,082.36	14,292.93	14,292.93	9,233.31	0.00	9,233.31	20,108.90	20,108.90	20,106.06	3,502.00	16,604.06	20,433.03	20,108.90	20,106.06	3,502.00	16,604.06	20,433.03	20,433.03	20,433.03
6	193.27	0.00	193.27	14,486.20	14,486.20	973.20	0.00	973.20	21,082.10	21,082.10	97.78		97.78	20,530.81	21,082.10	97.78		97.78	20,530.81	20,530.81	20,530.81
Total	15,967.20	1,481.00	14,486.20			21,082.10		21,082.10			24,032.81	3,502.00	20,530.81			24,032.81	3,502.00	20,530.81			

Class	Central						Southeast						Southwest								
	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	Apt. area	Reserve	Net	Cumulative	Area after	
	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	(a)	(b)	(c)=(a)-(b)	Sum	Env. Ded.	
1	0.00	0.00	0.00	0.00	0.00	1,386.59	0.00	1,386.59	1,386.59	693.30	0.00	0.00	0.00	0.00	693.30	0.00	0.00	0.00	0.00	0.00	0.00
2	9,484.91	1,391.00	8,093.91	8,093.91	4,046.96	11,789.84	0.00	11,789.84	13,176.44	6,588.22	10,711.35	5,792.20	4,919.15	4,919.15	6,588.22	10,711.35	5,792.20	4,919.15	4,919.15	2,459.58	
3	2,739.19	0.00	2,739.19	10,833.10	5,416.55	1,868.47	0.00	1,868.47	15,044.91	7,522.45	2,708.55	2,708.55	0.00	4,919.15	7,522.45	2,708.55	2,708.55	0.00	4,919.15	2,459.58	
4	0.00	0.00	0.00	10,833.10	5,416.55	13,631.08	0.00	13,631.08	28,675.99	14,337.99	24,983.63	6,166.25	18,817.38	25,736.53	14,337.99	24,983.63	6,166.25	18,817.38	25,736.53	11,868.27	
5	7,950.79	0.00	7,950.79	18,783.89	18,783.89	8,077.14	0.00	8,077.14	36,763.13	36,763.13	2,093.26		2,093.26	25,829.79	36,763.13	2,093.26		2,093.26	25,829.79	25,829.79	
6	2,904.51	1,509.00	1,395.51	20,179.40	20,179.40	10,679.77	0.00	10,679.77	47,432.90	47,432.90	0.00		0.00	25,829.79	47,432.90	0.00		0.00	25,829.79	25,829.79	
Total	23,079.40	2,900.00	20,179.40			47,432.90		47,432.90			40,496.79	14,667.00	25,829.79			40,496.79	14,667.00	25,829.79			

Note : Area after Environmental Deduction represents the Area Apt for Development after the Deduction of area for the Environmental Conservation

Table IX - 4.1 Land Classification Area in the different regions of the State of Tocantins (2/2)

Northwest				East				Central west						
Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.	Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.	Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,168.16	0.00	7,168.16	7,168.16	3,584.08	149.23	0.00	149.23	149.23	74.62	3,441.74	0.00	3,441.74	3,441.74	1,720.87
2,030.06	0.00	2,030.06	9,198.22	4,599.11	2,238.61	341.30	1,897.31	2,046.54	1,023.27	4,153.54	1,516.00	2,637.54	6,079.28	3,039.64
629.46	0.00	629.46	9,827.68	4,913.84	0.00	0.00	0.00	2,046.54	1,023.27	4,184.82	2,928.90	1,255.92	7,335.20	3,667.60
8,025.83	0.00	8,025.83	17,853.51	17,853.51	29,298.24	0.00	29,298.24	31,344.78	31,344.78	18,569.68	0.00	18,569.68	25,904.88	25,904.88
1,227.48	0.00	1,227.48	19,080.99	19,080.99	2,427.12	0.00	2,427.12	33,771.90	33,771.90	109.52	0.00	109.52	26,014.40	26,014.40
19,080.99	0.00	19,080.99			34,113.20	341.30	33,771.90			30,459.30	4,444.90	26,014.40		

South						State								
Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.	Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.	Apt. area (a)	Reserve (b)	Net (c)=(a)-(b)	Cumulative Sum	Area after Env. Ded.
0.00	0.00	0.00	0.00	0.00	1,386.59	0.00	1,386.59	1,386.59	693.30					
10,096.05	0.00	10,096.05	10,096.05	5,048.03	75,644.83	7,183.20	68,461.63	69,848.22	34,924.11					
6,225.30	0.00	6,225.30	16,321.35	8,160.68	22,814.78	4,565.85	18,248.93	88,097.16	44,048.58					
2,004.45	0.00	2,004.45	18,325.80	9,162.90	45,693.95	9,095.15	36,598.80	124,695.96	62,347.98					
3,325.43	0.00	3,325.43	21,651.23	21,651.23	113,243.10	4,983.00	108,260.10	232,956.06	232,956.06					
1,024.78	0.00	1,024.78	22,676.01	22,676.01	19,637.44	1,509.00	18,128.44	251,084.50	251,084.50					
22,676.01		22,676.01			278,420.70	27,336.20	251,084.50	278,420.70						



## **5 Farming Technology and Institutional Supporting Services to Farmers**

Problems relevant to the poor performance of the agricultural sector are summarized as follows:

1. For the majority of the cases, the crop farming is not conducted according to soil suitability.
2. Subsistence crop farming predominates in the State and the farmers are less ambitious as for the enhancement of farming practices and living standards.
3. Without provision of appropriate extension services of advanced technology to farmers, crop productivity remains inferior and capital formation among farmers is scarcely made. In sum, energy for development is deficient.

The afore-mentioned problems are derived solely or jointly from the factors given below.

1. Marketing channel to farmers is immature.
2. Unconsolidated system for acquisition, maintenance and supply of spare parts for agricultural machinery.
3. Without irrigation system, farming in the dry season is not feasible.
4. Agro-based industry is under-developed.
5. Rural organization is not functioning satisfactorily.
6. Technical assistance services are rendered less frequently than necessary due to deficient manpower engaged in extension services and lack of means of transport; furthermore, organization to conduct research and development of unconventional technology applicable to local farming has not been consolidated.
7. Difficulty to access rural credits.

## **6 Livestock**

### **6.1 Potentials**

Based on the analysis of present situation described in the chapter VII. 5, the Tocantins is favored with several conditions for livestock development. There are plenty of the existing natural resources. The meat and milk production can be increased with improving the livestock disease control program, improving the quality of pasture grasses and marketing, better farm management, application of modern technology, and introducing adaptable improved breeding stocks.

A plus factor for livestock production is the large marginal land, underutilized land with low cost land: the considerable supply of crop residues utilize as feed especially cattle feed lot and in small farms; a favorable climate for fodder production; and the underutilized manpower in the rural areas. Technologies for livestock production and processing are also available which can serve as bases for further development.

The livestock industry in the Tocantins is favored by several conditions for livestock development. First, livestock products in general are high marketable in the neighboring states. Particularly meat, unlike most commodities, there is no competition on local beef and pork sold especially in the wet market. The income elasticity of demand for meat is also high, e.g., as the income increases, people tend to buy more beef and pork than any

other foods.

Second, the Tocantins has a range of climates suitable for various livestock activities, including those of exotic breeds and their improved type of livestock breeds.

Third, most people in the Tocantins have a high familiarity with livestock farming either traditionally or through experience they have been employed by large scale farms.

Fourth, there exists a range high energy feed materials such as cereal by-products, root crops, plantain and miscellaneous concentrate feed ingredients.

Fifth, the Tocantins has a high yield potential in pasture production and agricultural products with a variety of pasture grasses and crops.

## **6.2 Constraints**

The problems affecting livestock industry in the Tocantins may be summarized as follows:

- 1) Productivity of cattle differs greatly large scale farms and small scale farms.
- 2) Large scale farms have been modernized while small scale farms have been largely ignored.
- 3) There is a lack of sufficient improving breeds for breeding stock.
- 4) The management of livestock feeding systems varies widely due to divergent climatic conditions in the Tocantins. There is a great need to popularize particular systems for different agro-ecological zones in the Tocantins.
- 5) Marketing and transport facilities for livestock products are not well organized, particularly small scale farms.
- 6) Prices of concentrated feed and feed ingredients are high.
- 7) Supporting facilities for providing technical assistance and extension services to small scale farms are not adequately established.
- 8) There is a great need to establish a livestock disease diagnostic laboratory, which will increase livestock productivity.
- 9) Also needed to establish a quality control systems for livestock products. This will create an incentive for farmers to raise quality livestock products.
- 10) There is a very low utilization of hay, silage and high energy feeds such as agricultural by-products of cereals, root crops, plantain and miscellaneous which are abundant in the Tocantins.

## **7 Agro-industry**

An agro-industry has not been developed in Tocantins except for some rice processing factories located at paddy cultivating zones like Formoso and Pedro Afonso. This situation comes from the fact that the agricultural output with the exception of paddy has not reached such a volume as to supply the agro-industrial sector with raw materials for processing them on economically competitive basis. And, it should be also noted that rice processing industry in the region is unable to produce high-quality processed rice, because paddy, the raw material to be processed, is inferior in quality and the processed rice is disadvantageous in comparison with celebrated products supplied from the Rio Grande do Sul state and other regions. The marketing facilities including wholesale markets are also under-developed under the circumstances of low level of

demand associated with low population density and depressed income among consumers.

The agro-industry and marketing sectors, which are inactive at present as briefly described above, may have a chance to attain a remarkable development in the future, provided that the demand for food increases in parallel with the increase of the state population and that an expansion of agricultural output (in particular, that of paddy and soybeans) is realized through rational use of uncultivated arable lands.

The geographical condition, which is a critical factor in the development of agro-industry and marketing system, favored Tocantins State, because the state is endowed with a comparative advantage in this aspect being located at the central part of the country and being eligible as a point of supply of commodities for various destinations options; especially, the saved distance to the Brazilian Northeast Region, which is constrained for agricultural production due to inferior land fertility and thereby is seeking for commodities of medium-level quality to comply with the income standards of the population, is of particular advantage.

For making the most of the geographical advantage, it is determinant that the transport infrastructure should be consolidated; the actual progress for development of the transport infrastructure is behind the times (the road network density is as low as 38m/km<sup>2</sup>), in particular, in so far as the road network connecting to the trunk highway (BR153) is under-developed both in density and in quality (pavement works). As mentioned in other sections, the Multimodal Central-Northern Transportation Corridor Project is in progress and the state government is given high priority to the development of inter-state roads system to complement the said corridor including the construction of a bridge over the Tocantins River. With the completion of the transportation network, both inside and outside the state, it is beyond doubt that the marketing of regional agricultural products would be facilitated.

## **8 Marketing**

### **8.1 Geographical Conditions**

The Tocantins State is an inland state surrounded by six states and easily accessible to Brasilia - capital city of Brazil - with an accomplishment of burgeoning development - as well as to the Northeast Region including such cities as São Luis, Belém, Teresina and Salvador, region which can not attain self-sufficiency of food due to constraints in its natural conditions. This geographical advantage suggests that the state has promising potential to play the role of major food supply nucleus of the country; this is the case in terms of transportation distance for both domestic market-oriented commodities and exports if a comparison is made with the rest of the country states. In terms of international market, there should be some restraints due to its distance from MERCOSUL countries. However, with the start of ALCA - Americas Free Business Area - foreseen for 2005, its position will become a favorable factor. The completion of the Multimodal Central-Northern Transportation Corridor shall needless to say reinforce this advantageous factor of the state.

One of the key factors to make the most of the advantages cited before is to consolidate the road network to connect the city of Estreito, a proposed entrepôt of the agricultural

commodities of the state. Furthermore, the right margin sector of the Tocantins River has problems in marketing agro-products to the Northeast Region and international market because the route for these markets are isolated by the Tocantins River due to the lack of bridges crossing it. A waterway through the Tocantins River is an alternative for relaxing this impasse, therefore a detailed study on it in comparison with other alternatives is essential.

## **8.2 Advantage and Constraints for Development Viewed from the Conditions of Transportation Network Infrastructure.**

Improvement in transportation network is an important factor to increase agricultural and livestock production. A reduction in transportation cost derived from improvement works in the transportation network not only contributes to an efficient transportation of the crops and production inputs but also it has the equal effect to the producer in reducing his production cost.

### **1) Present condition of road improvement**

Because Tocantins state is in an inland location, close to the center of Brazil, it should have a very good advantage in transportation once the transportation infrastructure is improved.

A principal road BR-153 is running along the center of the State from south to north, making it easy to built a transportation network throughout the State.

Road density of federal roads and state roads is low  $38 \text{ m/km}^2$ , at present. It is now necessary to pave the existing roads in order to improve the roads condition in the rainy season. Marketing channels in the State are roughly divided into east and west by the Tocantins river. There are only three bridges in the State, Porto Nacional, Peixe and Estreito. The east side of Tocantins river is in a difficult situation for marketing commodities. In order to improve this situation, the construction of bridges at Palmas, Miracema do Tocantins and Pedro Afonso are proposed. However, up to the present, implementation plans have not been made yet.

### **2) Present condition of waterway transportation**

In this State, two main rivers are running from south to north, the Araguaia river and the Tocantins river. Once the transportation of large volumes of commodities is possible though waterway, waterway transportation program utilizing the river is progressing. It is the main project among long-term projects of the federal government. At present, the production of Tocantins state has not been marketed through waterway yet, although some grains were transported from Nova Xavantina (Mato Grosso state) at upper stream section of Araguaia river to Xambioá (Tocantins state) in the past. If this project shall benefit Tocantins state, it is necessary to study the construction cost for waterway utilization in the state and the effect (merit) of its utilization.

### **3) Railway**

About 40% of the construction works 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.

At Estreito, the bridge on the Tocantins river has already been completed for the route BR-010. From Tocantins state, Estreito is easily accessible. Therefore, transportation cost should be calculated from Estreito for the time being.

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 at the south, in future. And if a bridge is constructed at Pedro Afonso, soybean transportation cost in PRODECER III area could 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.

#### 4) Shipment Port

South-North railway and Carajás railway are managed and controlled by CVRD. Therefore, consistent and integral transportation up to the shipment port of São Luis (Madeira wharf) is maintained. In Madeira wharf, grain terminal silos (75,000 ton) were constructed and it has the handling capacity of several hundred thousand ton annually. Existing facility can easily handle the shipment of an estimated quantity of 320,000 ton for 1997.

#### 5) Marketing Services

Because marketed quantity has been rather limited, transportation companies (by truck), grain wholesalers (atacadista), etc. have not been developed in Tocantins state. Further, due to small population and resultant small market, a CEASA is still not available. However, population is rapidly increasing at some places like Palmas and its need is increasing. Presently, a considerable quantity of fruit and vegetable is coming from CEASAs in Goiânia and Anápolis in Goiás state.

However, if production of agricultural produce that can be cultivated in the State such as carrot, cabbage and sugar beat is promoted, those produce can be supplied in consumption areas such as Belém where those fruits and vegetables are in shortage.

### 8.3 Merit in Improving Transportation

Among future programs there are state roads and local electrification improvement programs, both being implemented by state governments. Also national road (BR-153) widening program being chalked out by federal government, Araguaia and Tocantins river navigation plan and South-North railway improvement plan, all are parts of the transportation infrastructure improvement plan. It is expected that the state road improvement program shall make a good progress with the introduction of IDB fund. The local electrification program is also expected to progress considerably. National road BR-153 widening program of the federal government will also be put into execution and transporting capacity would be greatly improved, although there are some doubts about the practicability of the plan.

With the completion of this plan, transportation of the State produce to South-North directions will be improved. Further, with the improvement of state roads being implemented by the state government, collection of produce will be made much more efficiently. As a consequence, accessibility to large consuming sites such as Goiânia and

Brasilia, also Belém, Fortaleza, Recife, etc., consuming sites in the northeast, will be improved.

Opening of the Imperatriz/Estreito railway, which is an extension of the South-North railway, will increase competitiveness of grain producing industry, for which low cost transportation is essential. It will secure export route to overseas market from São Luis port.

When all these projects are completed, it is anticipated that advantageous position of grain cultivation industry in the State who needs mass transportation means will be secured.

According to a study made by AHITAR who is promoting Araguaia and Tocantins river navigation schemes, transportation cost of grains from São Luis to Rotterdam is 21R\$ while that of Santos, one of the main grain export ports in Brazil, to Rotterdam is 32R\$ per ton. Considering the ocean freight after opening of South-North railway (Imperatriz/Estreito) is expected to be 11R\$, transportation cost from Estreito to Rotterdam may possibly be 32R\$, same as the cost to transport from Santos. This show that in the field of transportation, Tocantins state has an advantage over other states of Brazil.

In other words, the distance from Estreito which can be a base of transportation is judged to be an important factor for grains production with the completion of São Luis port and the start of grains transportation by Carajás railway and South-North railway, and thus geographical disadvantage of this state in the past would change into convenience.

It is expected that the improvement of the federal road BR-153 would be an important factor for the development of the state economy because the BR-153 is the main access road from the majority of the state areas and the transportation on this road is expected to increase in the future.

How to carry the produce economically to Estreito, a base of marketing, is the important task for the state to plan on the grains production and marketing. In this point, present state road improvement project is judged to have a great impact on the activation of agricultural sector.

At present, it is difficult for the east sidars of the Tocantins river to cross the river and access BR-153, making it necessary to study other transportation means at producing areas including the waterway transportation through the river up to Estreito.

Transportation convenience in the state would be improved in general by the federal government and state government. However, it is possible that the eastern side of Tocantins river may still remain unimproved.

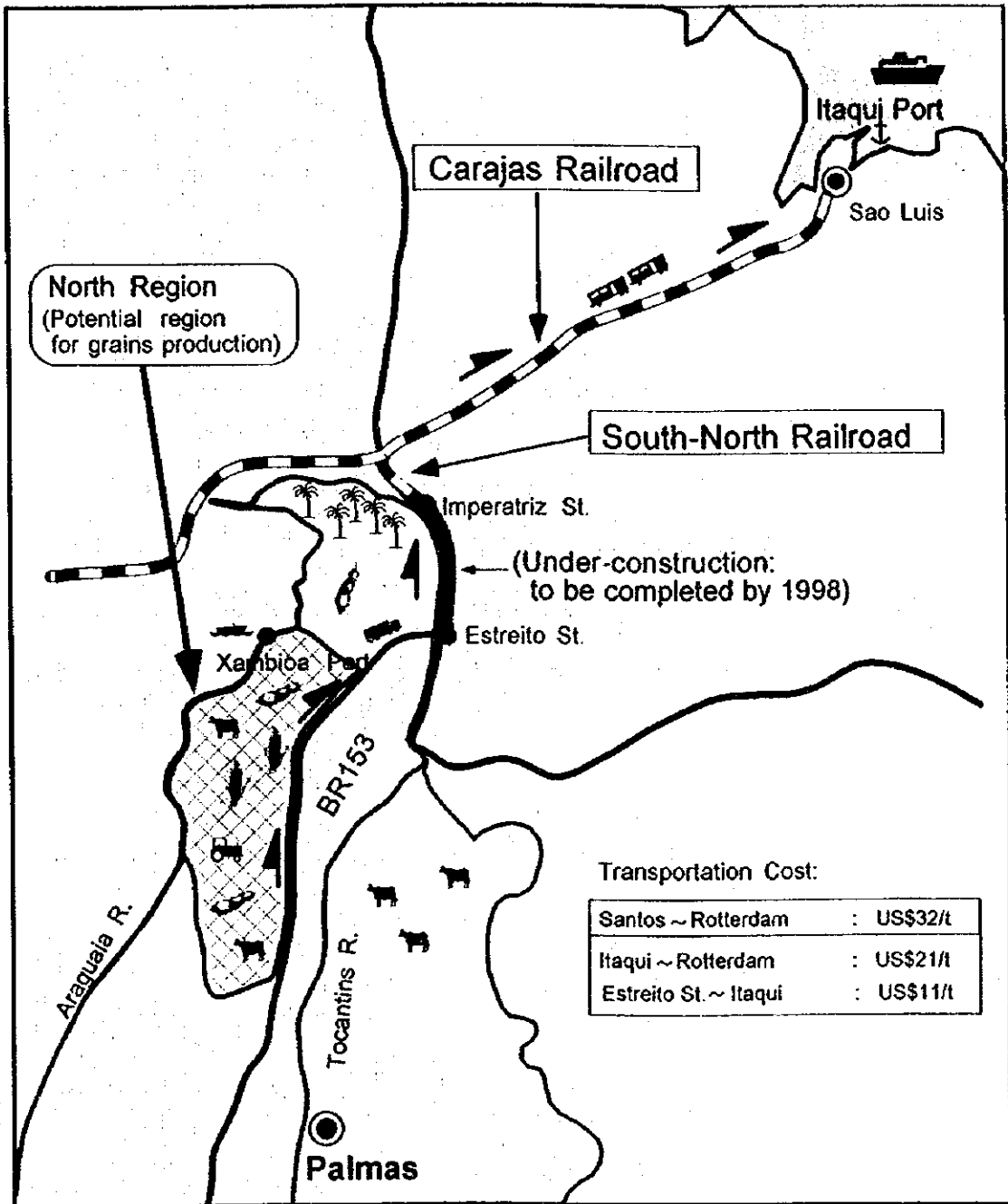


Fig. IX-8.1: Transports

## **9 Rural Society**

The rural society in the state is under-developed in terms of public organizations services, such as education and basic public health services as explained hereinafter.

### **9.1 Public Organizations Services**

Inappropriate services provided by public organizations stem from deficient manpower engaged in relevant services, an evasion of necessary vocational training for empowerment of human resources, locally distorted assignment of staff, lack of financial resources, etc. In addition, such physical constraints as obsolete installations and deficient number of vehicles impede rendering proper services to rural population.

### **9.2 Education**

Unsatisfactory education level together with low literacy rate at present has a great deal with insufficient number of qualified teachers, supply of poor educational materials and the long distances to the educational facilities. Low literacy rate among rural adult people constitutes a bottleneck in the introduction of advanced farming technology and promotion of rural organization. Deficient education level among rural women is a factor, which contributes to decelerate the improvement of rural life quality.

### **9.3 Basic Public Health Services**

Due to shortage of staff, physically deteriorated facilities and equipment, limited supply of medicines and other materials, public health services to rural population are rendered inappropriately. Besides, the absence of basic education on prevention of diseases causes prevalence of epidemics and parasite-related diseases. In addition, poor nutrition and personal health control restrains farmers in dedicating themselves to farming activities.

Despite being confronted with the above problems, the rural society in Tocantins may be improved with an adequate application of the following factors for the development.

1. Existence of large number of potential labor force.
2. Relatively higher proportion of rural population who has easy access to urban facilities due to reduced distance between rural and urban areas.
3. Lands are easily available and horticultural farming can be introduced without severe difficulty.
4. Vast extension of land resources making difficult the occurrence of social conflicts between land owners and landless peasants engaged in the activity of babaçú extraction.
5. Rural population is willing to form rural organization, especially in the extreme-north (Bico do Papagaio region) where a basis for this formation is consolidated.
6. Past experience in land conflicts will mitigate conflicts on land ownership.



## **10 Environmental Conservation and Sustainable Agriculture**

The majority of land resources in Tocantins consists of "cerrado" soils which are vulnerable to erosion caused by ecological transformation, thus the most scrupulous attention should be paid in development of the area. The development of land in Tocantins is subject to legal regulation in the realm of ecological conservation, because Tocantins State is included in the Legal Amazon Region; the development of land for agricultural purpose is limited to 50% of the total extension of the land. In addition, included in the territory of Tocantins, there are the Araguaína National Park and indigenous reserves and therefore care in formulation of development works is also needed so as to evade negative impact on these reserves. Other important zones related to environmental conservation coincide with the Bico do Papagato area, the peripheral area of the Bananal Island and the gold mines situated in the southeastern region.

## **11 Summary of Potentials, Constraints and Issues to be Tackled**

The potentials and constraints presented in the previous sections, together with the issues to be tackled for an optimization of potentials and overcome of constraints are presented in the Table IX-11.1.

Table IX-11.1 Summary of Potentials, Constraints and Issues to be Tackled

Category	Potentials	Constraints	Issues to be Tackled
State budgetary system	<ul style="list-style-type: none"> <li>• Tax-related revenue is not sufficient but is growing steadily</li> <li>• Investment on development projects is not exaggerated</li> </ul>	<ul style="list-style-type: none"> <li>• Inactive economic performance is associated with deficient tax-related revenue</li> <li>• Dependence on state bonds is not healthy budget formation</li> </ul>	<ul style="list-style-type: none"> <li>• Increase of tax-related revenue by vitalizing regional economy</li> <li>• Budgetary formation without dependence on state bonds</li> <li>• Investment promotion from outside the state</li> <li>• Activation of development investment</li> </ul>
Agricultural policy	<ul style="list-style-type: none"> <li>• Encouragement to efficient farm management aiming at elevating productivity</li> <li>• Revision of premium of rural insurance system will facilitate crop production in accordance with land suitability</li> <li>• Improvement of crop quality owing to reinforced competitiveness</li> <li>• Preferential policies on small farmers still remain in force</li> </ul>	<ul style="list-style-type: none"> <li>• Backwardness of protective measures</li> <li>• Increasing cost of rural credit</li> <li>• Difficulty in getting supports from federal research agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Fostering competitive producers (in particular, medium farmers)</li> <li>• Guidance to ensure crop farming according with land suitability</li> <li>• Intensification of state-owned organization (UNITINS, RURALTINS)</li> <li>• Expansion of rural credit services</li> </ul>
Investment environment	<ul style="list-style-type: none"> <li>• Land price is less expensive</li> <li>• Potential labor force is abundant</li> <li>• Central - Northern Transportation Corridor Project and state road networks development project are in progress</li> <li>• Incorporation of ZPE and various preferential measures to invite investment to the state</li> </ul>	<ul style="list-style-type: none"> <li>• Economic structure is not solid</li> <li>• Under-development of infra-structure (transport, energy, communication)</li> <li>• Manpower development and public health services are unsatisfactory</li> <li>• Environment to invite private sector in investment of infrastructure is immature</li> </ul>	<ul style="list-style-type: none"> <li>• Vitalization of economic activities (increase and diversification of crop production)</li> <li>• Development of infra-structure and bottom-up of economic level</li> <li>• Acceleration of roads system development as well as electric and communication network</li> </ul>
Natural resources	<ul style="list-style-type: none"> <li>• High precipitation and high temperature to enable diversification of crop production</li> <li>• Development of tributaries can be made with less investment</li> <li>• Soils suitable for crop cultivation</li> <li>• High availability of hydriical resources with quality and adequate climatic conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal distribution of precipitation is irregular</li> <li>• Rivers discharge vary notably by season; inundation at rainy season</li> <li>• Great investment is required for development of the major rivers</li> <li>• High acidity of soils which calls for improvement</li> <li>• Presence of temporary hydriical sources</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of hydrological investigation of river system</li> <li>• To conduct a detailed study on efficient use of natural resources</li> <li>• Increment of aquiculture</li> </ul>
Crop farming/ Supporting services	<ul style="list-style-type: none"> <li>• Favorable soils and climate conditions for crop cultivation</li> <li>• The existence of vast extension of uncultivated land makes it possible to conduct projected farming</li> <li>• Manpower at supporting institution are capable for executing their duties</li> <li>• Possibility of introduction of new crops</li> </ul>	<ul style="list-style-type: none"> <li>• Actual crop farming does not coincide with soil suitability</li> <li>• Under-development of inputs and produce marketing channel</li> <li>• Farmers are reluctant to accept advanced farming technology</li> <li>• Inappropriate system to develop technology suitable to local conditions</li> <li>• Extension services are not rendered adequately due to lack of manpower and means of transport</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrading of technical services to farmers to convert their farming practice from subsistence crops to cash crops</li> <li>• Reinforcement of rural organization</li> <li>• Amelioration of living standards such as health care and nutritious conditions</li> <li>• Enhancement of rural infra-structure</li> <li>• Enlargement of rural credit services in par with expansion of cultivates area</li> <li>• Improvement of research institutions</li> <li>• Budgetary arrangement to enhance institutional services</li> </ul>

Table IX-11. 1 Summary of Potentials, Constraints and Issues to be Tackled (Continued)

Category	Potentials	Constraints	Issues to be Tackled
Livestock	<ul style="list-style-type: none"> <li>• Climate conditions are favorable to a variety of livestock activity</li> <li>• Elevating productivity may be attained owing to substitution of natural pasture</li> <li>• Raw materials for animal feeds are available locally</li> <li>• Geographical advantage to market produce to Northeast and North Amazon Regions where demand for livestock produce is high</li> </ul>	<ul style="list-style-type: none"> <li>• Indifference to diversification of activity adhering to cattle raising</li> <li>• Difficulties to introduce high quality breeds of animal</li> <li>• Absence of institution engaged in research applicable to peculiar local conditions</li> <li>• Deficient organization in charge of animal health protection</li> <li>• Difficulty to access rural credit</li> <li>• Lack of means of transport for marketing of produce</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporation and renovation of research institution and breeds production farm</li> <li>• Upgrading of animal health protection system</li> <li>• Organization of small and medium producers</li> <li>• Establishment of animal feeds manufacturing factory</li> <li>• Effective use of composts</li> <li>• provision of information and technical assistance services for diversification of activity</li> </ul>
Marketing/ Agro-industry	<ul style="list-style-type: none"> <li>• Perspective for expansion of agricultural output</li> <li>• Agro-based raw materials for processing may be diversified</li> <li>• Increased production of grains will enable to make use of by-products for processing</li> <li>• Being located at central part of the country, various options as destination of produce are considered</li> <li>• Incentives to invite industry by the state government (ZPE, tax exemption, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Except for some crops, output is not enough to provide raw materials for processing</li> <li>• Quality of crops for processing is not satisfactory</li> <li>• Deficient demand for agricultural products due to low population intensity and depressed level of income</li> <li>• Under-development of road network</li> <li>• Lack in quantity and quality of electric energy</li> </ul>	<ul style="list-style-type: none"> <li>• Study on comparative advantages of the state's marketing circumstances</li> <li>• Research on combination of various raw materials for processing</li> <li>• Promotion for development of transport and other infrastructure such as road network and electric energy system</li> <li>• Improvement of agro-industrial section of UNITINS</li> <li>• Organization and strengthening of research, control and follow-up sector for the products commercialization in the State</li> <li>• Improvement of the zoosanitary inspection and fiscalization conditions.</li> </ul>
Rural society	<ul style="list-style-type: none"> <li>• Proportion of rural population is higher than the national average</li> <li>• Improvement of rural infrastructure is in progress</li> <li>• Existence of Rural Qualification Programs</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased rural population</li> <li>• Young population's reluctance to farming</li> <li>• Under-development of infrastructure</li> <li>• Depressed level of farm income</li> <li>• Low literacy rate among rural population and inadequate education facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Amelioration of rural circumstances (electricity, water supply, sewerage, housing, public health)</li> <li>• Enhancement of education system</li> <li>• Encouragement for participation of rural population in community circle (including women's circle)</li> <li>• Continuity of rural Qualification Programs</li> </ul>
Environmental conservation/ Sustainable agriculture	<ul style="list-style-type: none"> <li>• Owing to regulation on land use, degradation of soil fertility may be evaded, which contributes to realization of sustainable agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• Land use for crop farming is not at farmers' disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• Preventive measures to evade soil erosion and water contamination to be caused by expansion of crop cultivated area</li> <li>• Incentive to recuperation of degraded areas</li> <li>• Increment to the rational use of natural resources</li> </ul>

