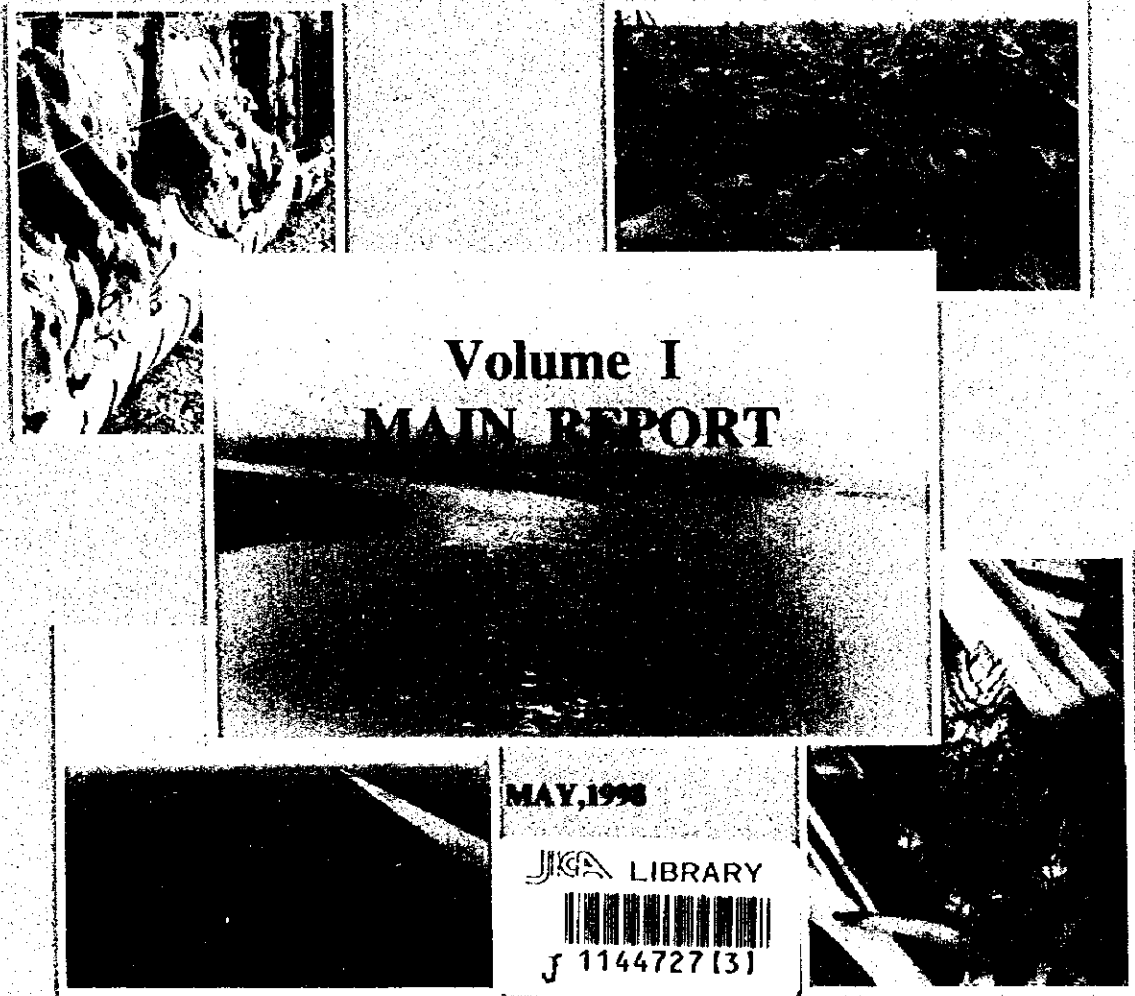


JAPAN INTERNATIONAL COOPERATION AGENCY

No. 2

FEDERATIVE REPUBLIC OF BRAZIL
STATE OF TOCANTINS
SECRETARIA DE ESTADO DA AGRICULTURA (SAG-TO)

**THE
INTEGRATED DEVELOPMENT
MASTER PLAN STUDY
FOR
AGRICULTURE AND LIVESTOCK OF
THE STATE OF TOCANTINS**



PACIFIC CONSULTANTS INTERNATIONAL

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**Volume I
MAIN REPORT**

MAY, 1998

PACIFIC CONSULTANTS INTERNATIONAL

Exchange Rate (As of November 1997)		
US\$ 1.00	=	R\$ 1.02
R\$ 1.00	=	US\$ 0.98
US\$ 1.00	=	Yen 126

PREFACE

In response to a request from the Government of the Federative Republic of Brazil, the Government of Japan decided to conduct a study for the Integrated Development Master Plan for Agriculture and Livestock of the State of Tocantins and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Brazil a study team headed by Mr. Satoru Kido, Pacific Consultants International, three times between March 1997 and February 1997.

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

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

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

May, 1998



Kimio FUJITA

President,

Japan International Cooperation Agency

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Sir,

Letter of Transmittal

We are pleased to submit the Final Report for "THE INTEGRATED DEVELOPMENT MASTER PLAN STUDY FOR AGRICULTURE AND LIVESTOCK OF THE STATE OF TOCANTINS" in the Federative Republic of Brazil.

The report contains formulation of the master plan for the integrated development of the agriculture and livestock sector, which has been made taking account of the advises and recommendations of the officials of public organizations of the government of Japan including your agency as well as reflecting the comments of the Brazilian counterpart agency presented during the course of the discussions on the Draft Final Report.

The State of Tocantins, which is the target area of the present master plan study, is located in the Northern Region of Brazil and the great majority of its territory belongs to the "Cerrado" area as well as to the Legal Amazonian Area. In this context, attention in formulation and implementation of the plan should be paid to its sustainability in harmony with environmental conservation. Endowed with extensive land resources and favorable climate conditions suitable for crop and livestock farming, the State of Tocantins has potential to be converted into a core supply base of agricultural commodities for both domestic and international markets with completion of on-going development project of traffic infrastructure. Under these circumstances, promotion of harmonious development with a focus on future performance of the market is essential.

This report comprises an Agricultural Production Supporting System Strengthening Program, an Environmental Conservation Program and other programs/projects needed for fostering agricultural sector, the central economic sector of the State of Tocantins with their justification for implementation from economic and social points of view. We anticipate that these programs/projects should be put into implementation as soon as possible following the implementation schedule set forth in the present report.

We wish to take this opportunity to express our sincere gratitude to the officials of your agency and the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fisheries of the Government of Japan for their valuable advises and recommendations for our master plan study. We are also grateful to the officials of the Ministry of Agriculture and Supply of the Federative Government of Brazil, the Secretary of Agriculture of the State Government of Tocantins and other public organizations involved in the Master Plan Study for their devoted cooperation and aggressive assistance extended to us in the course of our field survey.

Cordially yours,

May 1998




Satoru Kido

Team Leader

The Integrated Development Master Plan Study
for Agriculture and Livestock of the State of Tocantins

MAPS

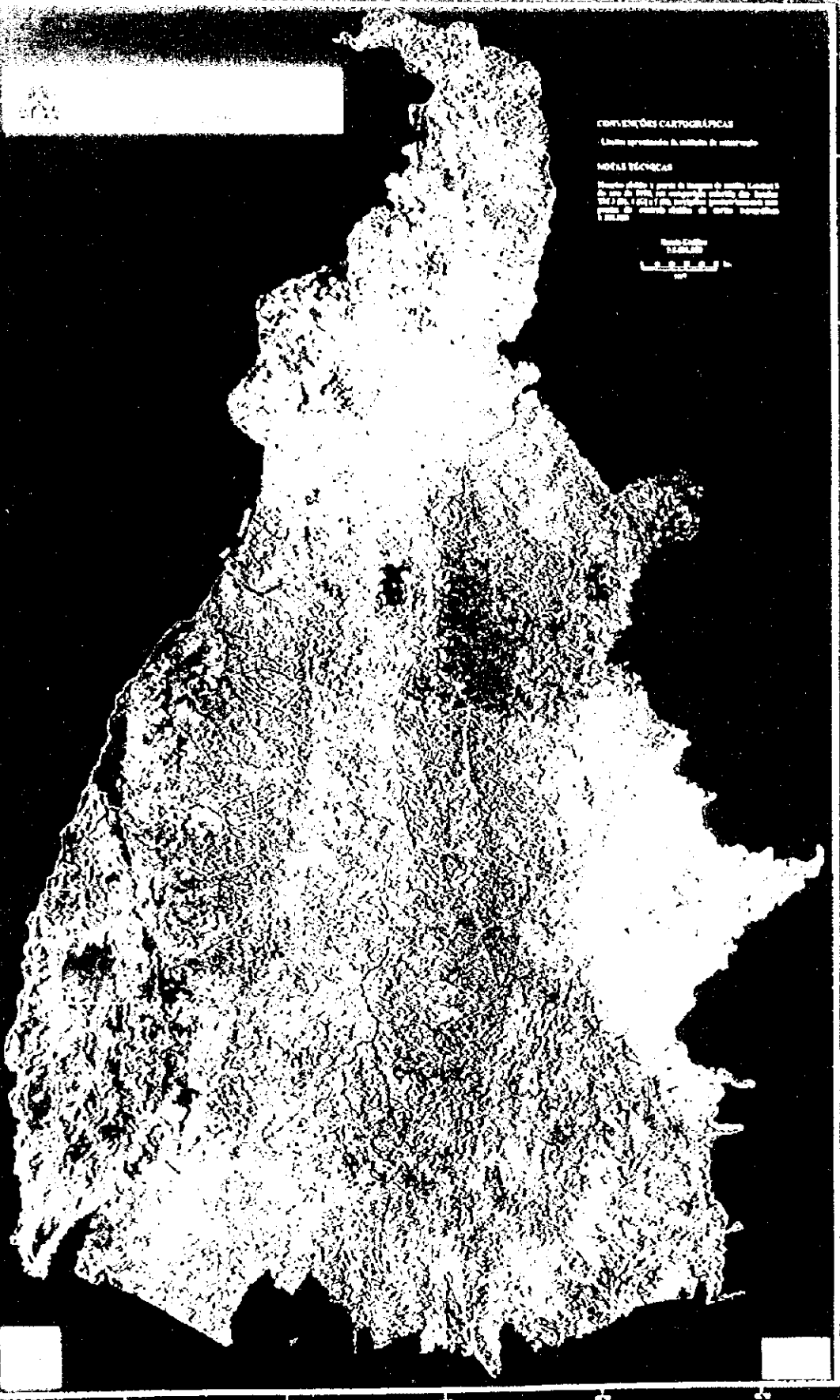
ESTADO DO TOCANTINS

**GOVERNAMENTO DO ESTADO DO TOCANTINS**
SECRETARIA DE AGRICULTURA, PECUÁRIA E ZOOTECNIA
SECRETARIA DE AGRICULTURA, PECUÁRIA E ZOOTECNIA

CONVÊNIO CARTOGRAFIA
Com o auxílio técnico do Instituto de Cartografia
NOTAS TÉCNICAS
Este mapa foi elaborado a partir de imagens de satélite Landsat
de maio de 1986, em escala de 1:500.000, com o auxílio
do Instituto de Cartografia do Estado do Tocantins
e do Instituto de Geografia da Universidade Federal
de Goiás.



ESTADO DO TOCANTINS



INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA

CONVENÇÕES CARTOGRÁFICAS

Linhas representando o sistema de coordenadas

NOTAS TÉCNICAS

Mapa do Estado do Tocantins, Brasil, escala 1:100.000, elaborado pelo Instituto Brasileiro de Geografia e Estatística, em 1971. O mapa foi elaborado com base em dados de campo e em dados de outras fontes.

Paulo César

1971



Principal Traffic Network

SUMMARY

SUMMARY

1. PREAMBLE

1.1 Background of the Master Plan Study

The State of Tocantins, which belongs to the Northern Region of the country, has a territorial extension of 278 thousand km² and most of its natural resources are under-developed. The state government seeks to make an optimum utilization of these resources with attention paid to taking action for making them sustainable. To match an optimum utilization of natural resources an ordered formulation of the present Master Plan has as its goal the year 2015, thus, in the short term it intends to carry out priority programs such as structuring of agricultural production and conservation of the environment, and in the medium term the regional development program aiming at spatial expansion. In addition, to raise the prices of products in order to contribute to the increase in production, it intends to carry out programs of the private sector related to the processing of agricultural products, in the long term, raising the competitiveness of the state. In relation to the necessary resources, it intends, in the short term, to depend on external sources, and in the long term, resources possible to be generated within the state.

A development plan is vital, and the State Government thereby requested the Government of Japan for the implementation of the Integrated Development Master Plan Study of Agriculture and Livestock in the state of Tocantins, through the Government of the Federative Republic of Brazil, in August 1995. Upon this request, the Government of Japan decided to dispatch a preliminary study mission to Brazil through the Japan International Cooperation Agency (JICA), in September 1996. As a result of the discussions between the Japanese mission and the Brazilian side, the Scope of Works (S/W) for this Master Plan Study was signed on September 13, 1996.

Based on this S/W, JICA dispatched the Study Team to Brazil to carry out the field work in Brazil for three times from March, 1997 to February, 1998 for the purpose of carrying out the field survey, accumulating data and information which are necessary to formulate the Master Plan. After each of the field work, work was carried out in Japan and the master plan was formulated.

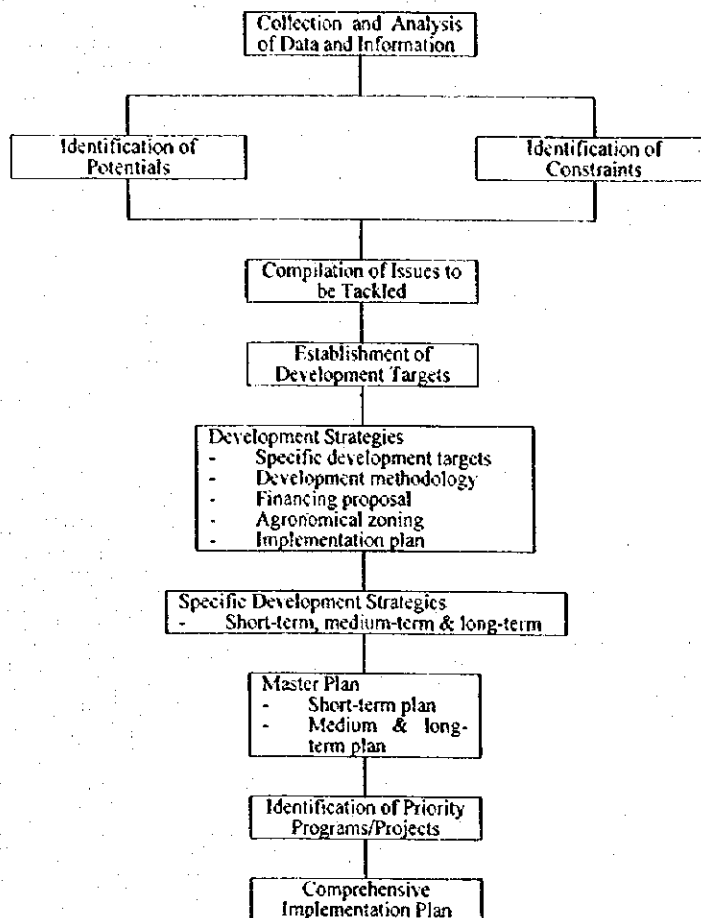
1.2 Objectives of the Study

The objectives of the Study are as follows;

- (1) To prepare an Integrated Development Master Plan of Agriculture and Livestock with the target year of 2015.
- (2) To carry out technology transfer to the Brazilian counterpart personnel through on-the-job training in the course of the Study.

1.3 Methodology for Formulation of Development Plan

The methodology employed for formulation of the development plan of the Master Plan is as illustrated hereinafter.



2. SOCIO-ECONOMIC BACKGROUND

The national political analysis has disclosed that the State of Tocantins may be eligible as the maximum beneficiary of the federal government's Multi-annual Plan. On the other hand, from the perspective on worldwide supply and demand of grains it is foreseen that the supply would become tight from 2010 onward. Under the circumstances, an optimization of unexploited land resources of the State would have a conspicuous influence over not only domestic market but also global one. National policies and international perspective on supply and demand of foodstuff pertaining to the present Master Plan are as resumed below.

Topics	Description
National Economy	<p>“Real Plan” comprising austerity budget and high-interest rate was put into force.</p> <p>Fruits: Control of inflation and enhancement of living standard of people</p> <p>Distortion: Worsening of balance of payment attributable to less competitiveness of national exports, payment of interest against extraordinary cash flow, decline in investment of fund for capital goods (especially for agricultural sector) from banking institutions, expansion of deficit in government’s budget.</p>
Multi-annual Plan	<p>Principal targets</p> <ol style="list-style-type: none"> 1. Fiscal equilibrium; as a part of anti-inflation policy and coverage of social debt 2. Growth target; as necessary condition for corporation of vast segment of population who are actually alienated from formal labor and consumption markets 3. External target; to take account of the necessity to maintain financing of the economy on sustainable basis and to drive the country into the world market. <p>(Agricultural Sector)</p> <ul style="list-style-type: none"> - Modernization of traffic infrastructure to save cost of agricultural exports - Enlargement of cultivated area, intensification of education and training to farmers, environmental conservation, etc. and measures for attainment of these targets (Extension of South-North Railroads, Improvement of BR 153, Araguaina-Tocantins Hydroway)
Agricultural Policies	<ul style="list-style-type: none"> - Modernization and efficiency of traffic infrastructure to work as incentive for invasion of international market of Brazilian commodities - Phasing out of government interference on marketing and development of infrastructure (promotion of privatization, exemption of tax on exports and capitals, etc.) <p>(Transitional proposal)</p> <ul style="list-style-type: none"> - To adjust prevailing agricultural policy to match actual macro-economic performance with focus laid on alleviation of governmental interference on economic activities and on encouragement of market-oriented agricultural produce (PGPM, rural credit, storage system, rural insurance) <p>(Long-term proposal)</p> <ul style="list-style-type: none"> - To reconstruct agricultural sector for free competition of the 21st century from the viewpoint that the agricultural sector plays a strategic role in expanding the share of Brazilian products at the international market.
Worldwide Perspective of Supply and Demand of Grains	<p>Internationally prestigious institutions have conducted forecast on supply and demand of foodstuff and these forecasts combined may conclude that, although distortion by country and by region exists, the food balance would be almost in equilibrium as of 2010, on condition that each country would not undertake set-aside policy. Nevertheless, bearing in mind that an increase of grains production per capita will not outstrip growth in population, it is likely to become tight in supply of food and thus optimum use of land resources is a pressing issue for consistent supply of food.</p>

The development of traffic infrastructure is expected to have positive impact on saving of cost for shipment of local agricultural produces to outside the State. On the other hand, the federal government has plan to foster the agricultural sector with provision of low-interest rural credit, which, in turn, would contribute to re-construction of the agricultural sector from the depressed situation prior to enforcement of the Multi-annual Plan.

3. THE STUDY AREA

3.1 Natural Conditions

The State of Tocantins, which became an independent state in 1989 – the latest state in Brazil, is one of the states of the country belonging to the Legal Amazonian Region. The State is endowed with favorable natural conditions (climate, hydrology and soil) in comparison with adjacent states, but confronting under-development of traffic and other infrastructure, the State is situated socio-economically as one of least development state of the country. Salient features of the State is as described subsequently.

Climate	Tropical climate (distinct delimitation between rainy and dry seasons) predominates. High temperature and humidity throughout the year in the northern part, while the southern part is featured by low humidity in the dry season. Annual precipitation is in the range of 1,200 – 2,500 mm; the highest precipitation area is found around the basin of the Araguaia river and the lowest one is located to the south of the State. Monthly average temperature is consistent all the year round (24 – 26°C).
Hydrology	The Tocantins and Araguaia rivers flow down in parallel from south to north and discharge to the Amazon river. Fluvial system is major source of water and discharges at principal rivers are abundant, although it varies considerably between rainy and dry seasons.
Soils	Lands in Tocantins are categorized by their suitability as follows: 28.8% (80,317 km ²) for crop farming, 15.2% (42,244 km ²) for pasture, 48.3% (134,420 km ²) for forest and the remaining 7.7% (21,439 km ²) is useless. Suitable lands for crop farming are less fertile with wide distribution of acid soil, so improvement of soils is essential in putting them into production.

3.2 Environmental Conditions

Environmental Conservation	Natural resources are being deteriorates due to disordered development and inappropriate farming practice. Virgin forest is scarcely exist and frequent outbreak of mountain fire to traced to impediment for natural recovery potentials of soils.
Environmental Constraints	<ul style="list-style-type: none"> - Conversion of virgin forest to pasture due to activation of livestock activity in the 70's and decrease in forest area. - Practice of burning off of natural vegetation and outbreak of mountain fire and soil erosion attributable to it. - Air pollution stemmed from burning off practice and water contamination originated from use of agro-chemicals and industrial sewage.
Environmental Reserves	<ul style="list-style-type: none"> - Environmental reserves account for approximately 2,450 thousand ha. - Seven indigenous reserves (2,170 thousand ha)

The practice for burning off of natural vegetation is indirectly causing traffic obstacle, public health problem among local population and global warning. The emission of CO₂ from transition of land use in Brazil represent 27% of the total amount of emission worldwide and the great majority of which is traced to burning off practice in the Amazonian Region. It is of particular interest that the State of Tocantins plays an important role in this environmental deteriorate despite the practice of burning off shows declining trend in number recently. Taking precaution against this bad practice is essential factor in formulating sustainable development plan.

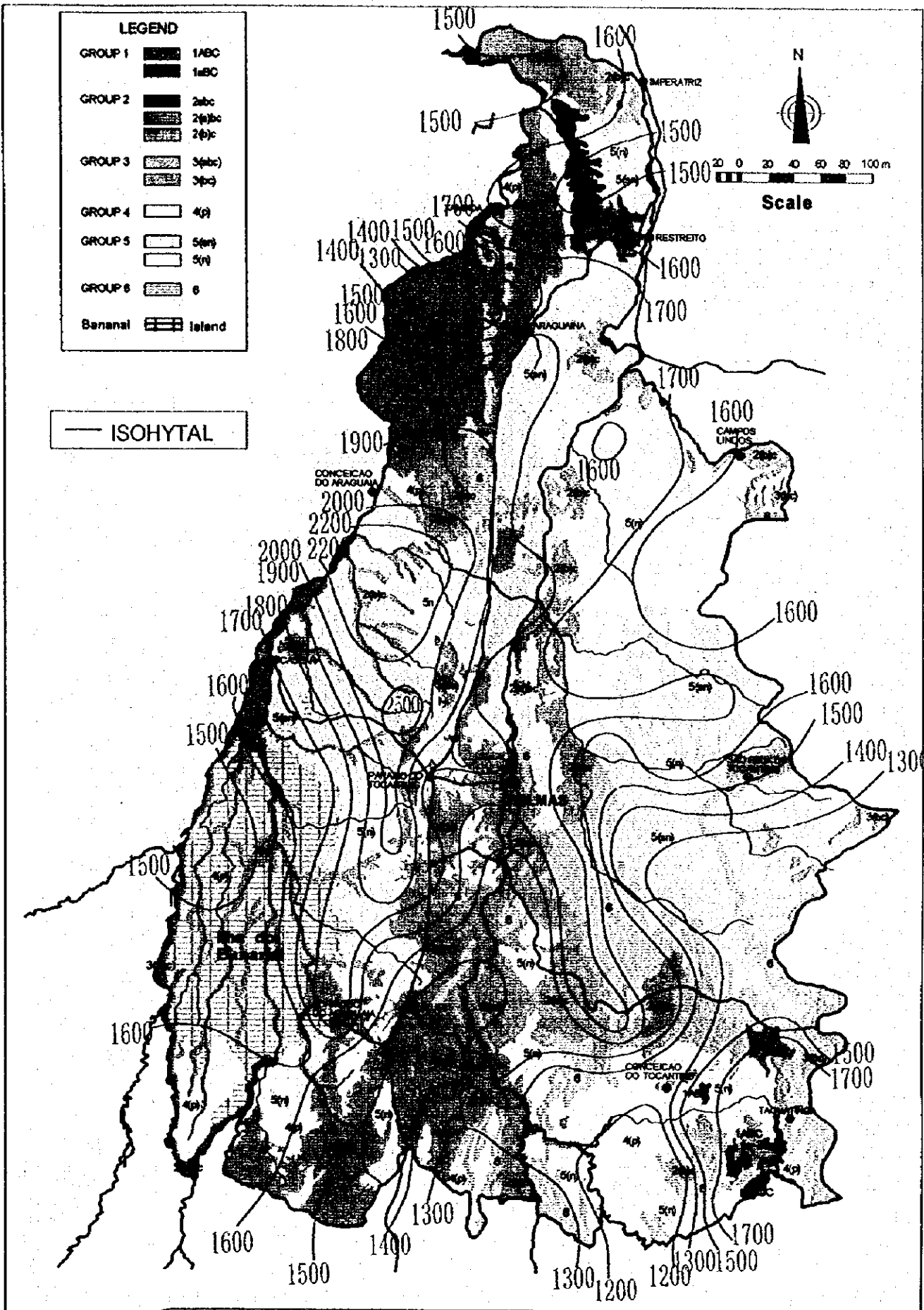


Fig. 1 Land Suitability and Isohytal Map of the Tocantins State

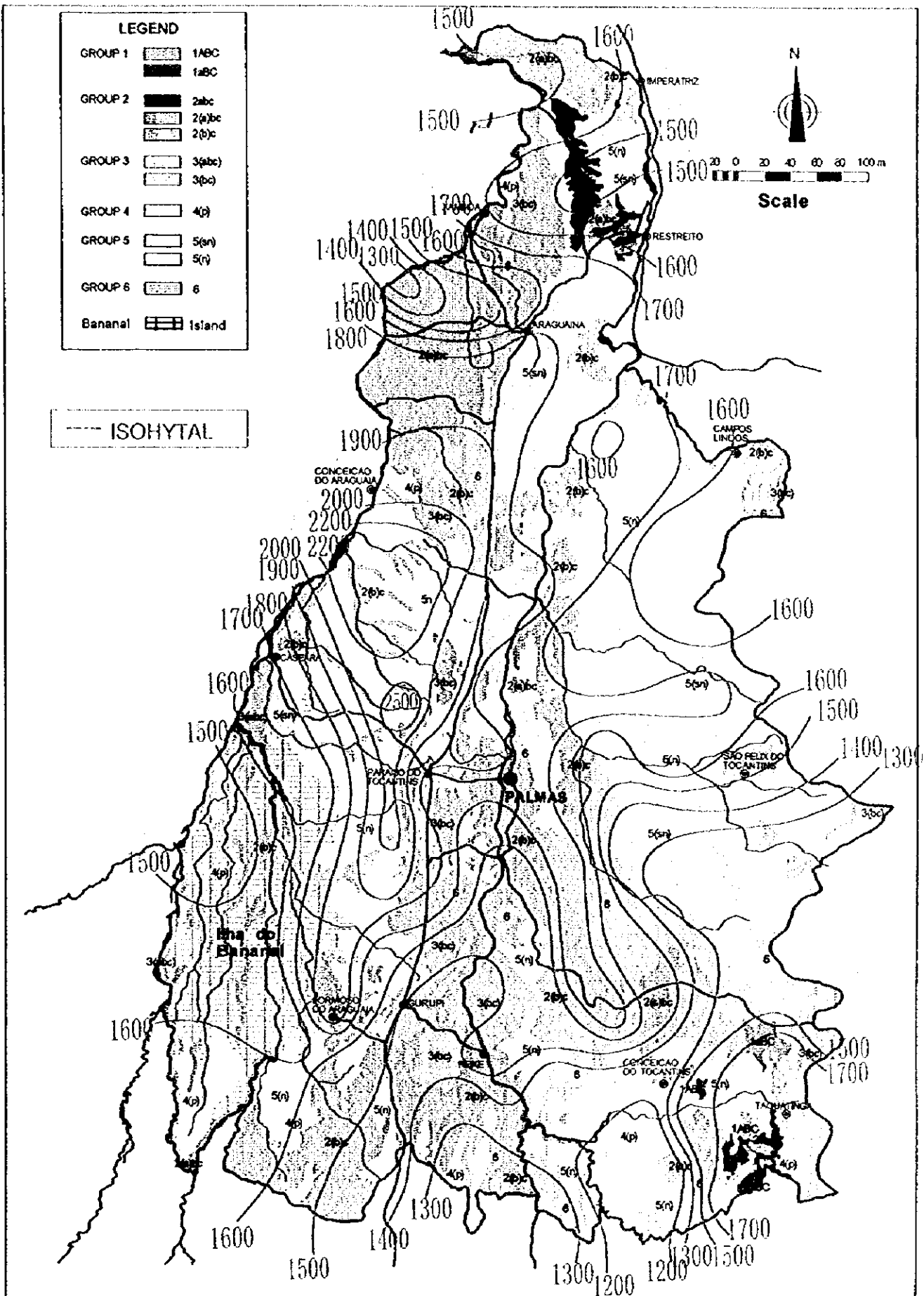
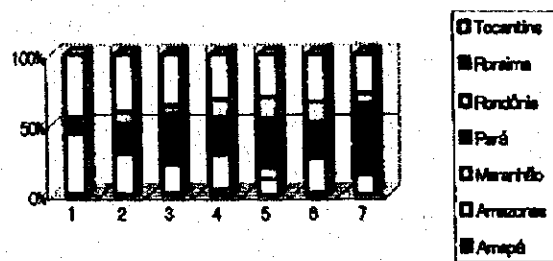


Fig. 1 Land Suitability and Isohytal Map of the Tocantins State



3.3 Socio-economic Conditions

Population & Income	The total population is 1,049,823 as of 1996 (0.66% of the national population), which had been grown at 3.32% per year. According to the minimum wage index (1996), the State (2.15) is far inferior to the national average (3.42) and this index is worsened in the rural area indicating high grade of poverty.
Education	Literacy rate is 69.25% on average (56.5% in rural area and 78% in urban area), which is inferior to that of national average in rural area – 75.06%.
Rural Society	In spite of agriculture-based state, the proportion of rural population is as low as 28%. This situation may be explained by the progress of rural-urban migration motivated by unfavorable rural living conditions. Regional disparity of living condition also prevails (Extreme North Region and Japapão area are an example of the least development area).
Gross Regional Products (GRP)	GRP per capita is R\$ 993, equivalent to 29.4% of the national average and 43.2% of the average of the North Region.
Fiscal Revenue	Major source of revenue of the state government is transfer of federal government's fund (close to 60% of the total revenue) and tax revenue (ICMC, etc.) and borrowing constitute some of other sources. Revenue from ICMC is increasing keeping pace with growth in economic activities.
Industrial Activities	Industrial structure is heavily dependent on the primary sector and the secondary sector is extremely insignificant. Of activities of the tertiary sector retailers represent 80% of the total number of the registered enterprises.

Rural poverty is conspicuous and it is closely related with low grade of education system. Fiscal budget is not sufficient enough to encourage new investment.

3.4 Agricultural and Livestock Production

Agricultural Production	About 4.7 farmers are engaging in cultivation of 237 thousand ha of land with average holding of 5 ha. Soybeans and paddy are produced by large holders, but their number is very limited.
Land Holding & Farming System	Most of farmers are large holders, but they are categorized as small farmers judging from their farming system. Land holding and farming system is represented by the following three categories: - Large holders engaging in livestock farming - Medium- and small holders engaging entrepreneur farming at recently developed lands - Extensive landholders engaging in but subsistence farming with practice of burning off Land holdings: 10 – 100 ha (36%), 100 – 1000 ha (49%), larger than 1000 ha (7.5%).
Rural Credit	Using fund of the federal government, rural credit is provided to farmers through the Bank of Brazil and the Amazonian Bank. Up to a couple years ago, rural credit in Brazil had been featured by hiked interest rate and lower proportion in amortization, but owing to new agricultural policy, favorable condition supported by lowered interest rate is presented. Farmers in the State are benefited by privileged loan condition due to the fact that the State belongs to the North Region. The greater portion of rural credit is earmarked to large holders, while small holders face difficulty in getting loan.

Livestock Production	Livestock production is widely conducted throughout the state, but intensity of this farming to maldistributed by region according to conditions of marketing, agro-ecology, land tenure and population density. Major animals are cattle, buffalo, hog and poultry. The number of cattle head has increased by 26% for the last 5 years from 4.4 million heads in 1991 to 5.3 million heads in 1995, while that of buffalo has grown considerably by 78% from 19,000 heads to 35,000 heads. Processed products are mainly exported outside the State represented by the Northeast Region.
Institutional Supporting Services	Institutional supporting services to farmers consist of: 1) Technical assistance and extension to farmers, 2) Research and development of adequate technologies, (3) Distribution of seed, seedlings and other inputs, (4) Rural credit, so on. These services are rendered by RURALTINS, banks, private sector, NGOs, church, agricultural cooperatives, etc.

Despite having far-reaching lands suitable for crop farming, actual production of crops remains very low under extensive livestock farming of shifting cultivation.

3.5 Marketing Conditions

General Conditions	Shipment of agricultural commodities is made mainly through the National Highway BR-153 and their leading domestic destination the Northeast Region by way of Brasilia or Belen/San Luis. Recent development of state road network has expanded shipment of commodities to the direction of east and west.
Marketing System	Marketing system of agricultural products is as follows: <u>Soybeans</u> : Mainly shipped to national and international oil extraction factories; approx. 80% of the output is used for processing edible oil. <u>Babacu</u> : One processing factory is located in the Extreme North Region of the State, but the efficiency of operation in this factory has declined significantly as a consequence of losing marketability of the product. <u>Rice</u> : Principal marketing destinations are local markets and the market of the Northeast Region; local products are relatively inferior in quality, categorized as medium-class economical rice. <u>Vegetables and fruits</u> : Local products are unable to match those of other state both in quality and marketability.
Inspection & Quarantine	Plants inspection is carried out by SAG with regard to 5 major grains and plants quarantine is put into force following prevailing acts in the MERSOSUL Region. Inspection of seeds and seedlings is under responsibility of relevant laws. Inspection on residues of chemical materials within agricultural commodities is enforced nationwide, but it is not consolidated at state level. Agro-products quarantine service is limited to issue of certificate due to absence of necessary equipment and installations.
Infrastructure	Owing to budgetary allocation of the state government, road network to hasten shipment of agricultural products has expanded satisfactorily. Fluvial transportation system, by contrast is extremely under-developed at present. The completion of Multi-modal Central-North Corridor is highly anticipated to accelerate shipment of local products both domestic and international markets.

Marketing system is under-developed and agricultural commodities exported to outside the State are limited to rice, soybeans and beef. On the other hand, most of foodstuff consumed locally are imported from other states. To comply with the policies of the state government, development of traffic infrastructure is underway and the North-South Railway has been constructed by the Federative Government to the point near the northern limit of the state. This development shall contribute to saving of transportation cost for soybeans and grains which call for mass transportation system.

3.6 State Development Strategies and Plans

Development strategies and main development plans are as explained hereinafter.

Development Strategies	Multi-annual Plan of the State Government aims to attain sustainable growth, consolidation of economic infrastructure, decentralization of development project, social development, fulfillment of welfare conditions, and economic development in harmony with proper management of natural resources.
Agricultural Policies	Bearing in mind that the agricultural sector is the most important sector relevant policies are oriented to: promotion of sustainable development, beefing-up of human resources, exchange of communication between public and private sectors, implementation of sustainable farming, evasion of conventional farming to launch innovating farming.
Environmental Policies	These policies consist of: control of deforestation and burning off of natural vegetation, preservation of fauna and flora, prevention of disordered exploitation of mineral resources, promotion for farming in accordance with land suitability, development of ecological tourism, etc.
Development Plans	<u>Agricultural sector</u> : The only project in progress is the Javaes Project; other projects are on paper level. <u>Power generation</u> : Lajeado project is under construction. <u>Rural electrification</u> : Project for rural electrification is underway with finance provided by the Government of Japan. Tourism: Ecological tourism with destination to the Bananal Island, Cantão Region and Javaés Region is promoted. Agro-industry: Projects such as ZPE, PROSPERAR, etc. are being formulated.

3.7 Potentials and Constraints on Agricultural Development

The potentials and constraints of agricultural development together with issues to be tackled for putting spurs to this development are discussed below.

Category	Potentials	Constraints	Issues to be Tackled
State budgetary system	<ul style="list-style-type: none"> Tax-related revenue is not sufficient but is growing steadily Investment on development projects is not exaggerated 	<ul style="list-style-type: none"> Inactive economic performance is associated with deficient tax-related revenue Dependence on state bonds is not healthy budget formation 	<ul style="list-style-type: none"> Increase of tax-related revenue by vitalizing regional economy Budgetary formation without dependence on state bonds Investment promotion from outside the state Activation of development investment
Agricultural policy	<ul style="list-style-type: none"> Encouragement to efficient farm management aiming at elevating productivity Revision of premium of rural insurance system will facilitate crop production in accordance with land suitability Improvement of crop quality owing to reinforced competitiveness Preferential policies on small farmers still remain in force 	<ul style="list-style-type: none"> Backwardness of protective measures Increasing cost of rural credit Difficulty in getting supports from federal research agencies 	<ul style="list-style-type: none"> Fostering competitive producers (in particular, medium farmers) Guidance to ensure crop farming according with land suitability Intensification of state-owned organization (UNITINS, RURALTINS) Expansion of rural credit services

Category	Potentials	Constraints	Issues to be Tackled
Investment environment	<ul style="list-style-type: none"> • Land price is less expensive • Potential labor force is abundant • Central - Northern Transportation Corridor Project and state road networks development project are in progress • Incorporation of ZPE and various preferential measures to invite investment to the state 	<ul style="list-style-type: none"> • Economic structure is not solid • Under-development of infrastructure (transport, energy, communication) • Manpower development and public health services are unsatisfactory • Environment to invite private sector in investment of infrastructure is immature 	<ul style="list-style-type: none"> • Vitalization of economic activities (increase and diversification of crop production) • Development of infrastructure and bottom-up of economic level • Acceleration of roads system development as well as electric and communication network
Natural resources	<ul style="list-style-type: none"> • High precipitation and high temperature to enable diversification of crop production • Development of tributaries can be made with less investment • Soils suitable for crop cultivation • High availability of hydric resources with quality and adequate climatic conditions 	<ul style="list-style-type: none"> • Seasonal distribution of precipitation is irregular • Rivers discharge vary notably by season; inundation at rainy season • Great investment is required for development of the major rivers • High acidity of soils which calls for improvement • Presence of temporary hydric sources 	<ul style="list-style-type: none"> • Implementation of hydro-logical investigation of river system • To conduct a detailed study on efficient use of natural resources • Increment of aquaculture
Crop farming/ Supporting services	<ul style="list-style-type: none"> • Favorable soils and climate conditions for crop cultivation • The existence of vast extension of uncultivated land makes it possible to conduct projected farming • Manpower at supporting institution are capable for executing their duties • Possibility of introduction of new crops 	<ul style="list-style-type: none"> • Actual crop farming does not coincide with soil suitability • Under-development of inputs and produce marketing channel • Farmers are reluctant to accept advanced farming technology • Inappropriate system to develop technology suitable to local conditions • Extension services are not rendered adequately due to lack of manpower and means of transport 	<ul style="list-style-type: none"> • Upgrading of technical services to farmers to convert their farming practice from subsistence crops to cash crops • Reinforcement of rural organization • Amelioration of living standards such as health care and nutritious conditions • Enhancement of rural infrastructure • Enlargement of rural credit services in par with expansion of cultivates area • Improvement of research institutions • Budgetary arrangement to enhance institutional services

Category	Potentials	Constraints	Issues to be Tackled
Marketing/ Agro-industry	<ul style="list-style-type: none"> • Perspective for expansion of agricultural output • Agro-based raw materials for processing may be diversified • Increased production of grains will enable to make use of by-products for processing • Being located at central part of the country, various options as destination of produce are considered • Incentives to invite industry by the state government (ZPE, tax exemption, etc.) 	<ul style="list-style-type: none"> • Except for some crops, output is not enough to provide raw materials for processing • Quality of crops for processing is not satisfactory • Deficient demand for agricultural products due to low population intensity and depressed level of income • Under-development of road network • Lack in quantity and quality of electric energy 	<ul style="list-style-type: none"> • Study on comparative advantages of the state's marketing circumstances • Research on combination of various raw materials for processing • Promotion for development of transport and other infrastructure such as road network and electric energy system • Improvement of agro-industrial section of UNITINS • Organization and strengthening of research, control and follow-up sector for the products commercialization in the State • Improvement of the zoosanitary inspection and fiscalization conditions.
Rural society	<ul style="list-style-type: none"> • Proportion of rural population is higher than the national average • Improvement of rural infrastructure is in progress • Existence of Rural Qualification Programs 	<ul style="list-style-type: none"> • Decreased rural population • Young population's reluctance to farming • Under-development of infrastructure • Depressed level of farm income • Low literacy rate among rural population and inadequate education facilities 	<ul style="list-style-type: none"> • Amelioration of rural circumstances (electricity, water supply, sewerage, housing, public health) • Enhancement of education system • Encouragement for participation of rural population in community circle (including women's circle) • Continuity of rural Qualification Programs
Environmental Conservation/ Sustainable agriculture	<ul style="list-style-type: none"> • Owing to regulation on land use, degradation of soil fertility may be evaded, which contributes to realization of sustainable agriculture 	<ul style="list-style-type: none"> • Land use for crop farming is not at farmers' disposal. 	<ul style="list-style-type: none"> • Preventive measures to evade soil erosion and water contamination to be caused by expansion of crop cultivated area • Incentive to recuperation of degraded areas • Increment to the rational use of natural resources

4. DEVELOPMENT CONCEPT OF THE MASTER PLAN

The comparative advantages of the State of Tocantins consist of: favorable climate conditions for crop and animal husbandaries, abundant water resources, extensive capable lands for agriculture and livestock and geographical positioning to facilitate marketing of agricultural commodities. Despite these advantages, economic activities of the state is in slack due to under-development of various infrastructure, fragile structure of administrative and financial system, inappropriate educational system, etc. Another issue which the state government has to tackle immediately is the degradation of natural environment caused by burning of natural vegetation and other factors. Thus, the formulation of the Master Plan should be directed to rational utilization of the comparative advantages cited before in combination with taking measures to alleviate constraints on development. In this connection, analysis of potentials and constraints on development is prerequisite in formulating the Master Plan.

4.1 Background and Development Targets of the Master Plan

Background	As measures to get rid of under-development, an economic development with emphasis laid on promotion for growth of the agricultural and livestock sector is of importance, and for this purpose, planning of ordered development (optimization of natural resources, sustainable development to match environmental conservation) is anticipated.
External Factors	The completion of Multimodal Central-Northern Transportation Corridor will benefit greatly the State of Tocantins in so far as saving in cost of transportation for agricultural commodities to be shipped outside the State. Farmers of the State are also eligible to be beneficiaries of privileged policies of the federal government.
Potentials	Far-reaching arable and unexploited lands, suitability (climate and soils) for grains production and abundant water resources are major potentials.
Constraints	<ul style="list-style-type: none"> - Under-development of infrastructure - Absence of detailed studies on assessment of development potentials - Shortage of financial resources of the state government as well as of the private sector - Disordered development and deterioration of natural resources - Absence of technologies research system to match local conditions. - Inappropriate institutional supporting services to farmers
Development Methodology	<ul style="list-style-type: none"> - Implementation of study on assessment of potentials and formulation of development plan to make optimum use of these potentials. - Organizational consolidation to hasten sustainable agriculture - Promotion of environmental conservation and implementation of agricultural development projects
Development Targets	① Activation of regional economy, ② Promotion for sustainable agriculture, ③ Stabilization of farm operation, ④ Rectification of regional and social disparities

The flowchart of the agricultural development model is presented in figure 2, that has the year of 2015 as objective, where is pretended to reach a sustainable agriculture. As a project, more than a spacial increase, it pretends a qualitative improvement to reach this sustainable agriculture.

As a long period will be necessary to reach the pretended qualitative improvement, a basic development must be executed since the initial stage of the Master Plan. Mainly, generalized results are necessary, farther on punctual results. So, a structural improvement in the agricultural production must be carried out to help this sector, further on capacity strengthening of the human resources. Also, for a sustainable utilization of the natural resources, it is necessary to know this resources for an adapted research development, extending the results till the farmers level.

A detailed knowledge of the production potential of the agricultural and livestock sector will be necessary for a spatial increase. The gradual realization of the feasibility study, transportation system and agricultural production infrastructure will be necessary, increasing the cereal and livestock production, stimulating the private sector investment. So, the structural improvement of the responsible organisms is necessary, further on the solution of the land titling problems, common in the state, with a modernization of the state agriculture.

The elevation of the products prices, that will increase quantitative and qualitative the results, it is necessary the introduce the agricultural products processing sector, activating the state economy.

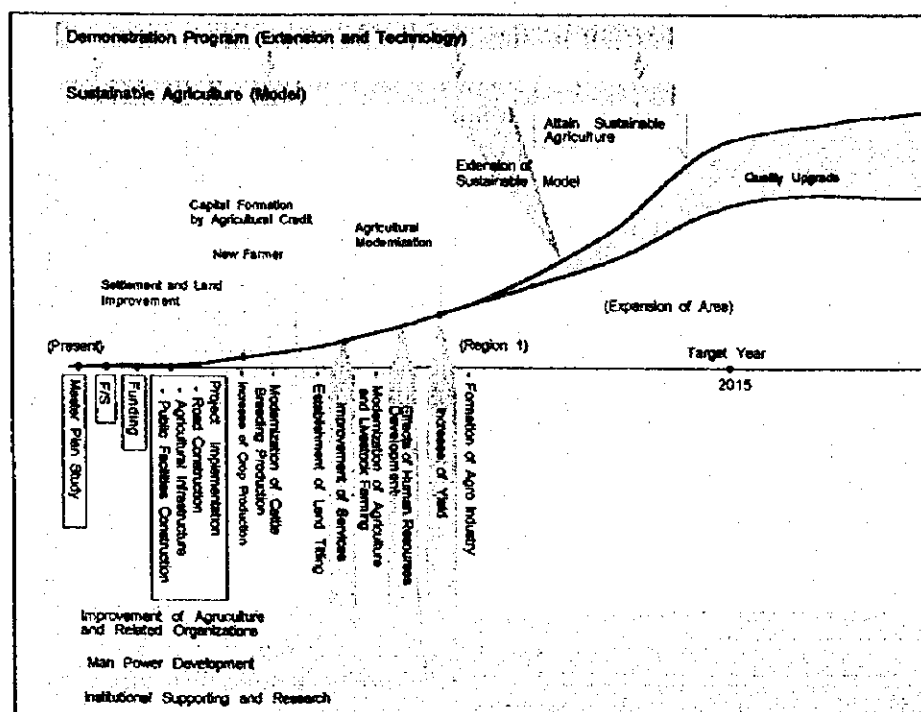


Fig 2: Agricultural Development Model

The development strategies are presented in figure 3. The definition of the potential and adversity is essential in the strategies elaboration, as that, in the utilization and elimination process of them, there are factors that the state can solve by itself, but others that are affected by the federal and world-wide factors. So, these factors can be divided in internal and external respectively. Knowing sufficiently the internal factors and using the external one, it will be possible to analyze the necessary items to the state development.

As an internal factor we can cite the big potential in water and soil resources, that was not effectively used till the moment due to the lack of financial resources, not structured land titling, lack in human resources, environment and technology, that can be considered as restriction factors.

As an external factor we can mention the various development policies of the federal government, favourable to the state, principally the transportation infrastructure development, that in on execution, reducing the transportation costs. Further, the financial policy of the federal government is volted for the small scale agriculture development, that is favourable for the state development too. So, the development strategies must consider these external factors.

For the long term development of the agricultural and livestock sector of the state will be

necessary an increase in the cereal production, diversification of the production, introduction of the processing sector and modernization of the livestock sector, elaborating strategies for a sustainable agriculture that consider the environment too. This program pretends to activate the state economy, reducing the regional differences and preserving the environment, and so that the programs are going to be elaborated. The program consists in a spatial development through the regional development program and qualitative through the general program.

The infrastructure development will be necessary through a public investment, to achieve the spatial development, and for the production increase, activate the private sector investment. So, the successive elaboration and implementation of regional development programs are necessary. But in the moment, it will be essential to develop the specific sector program, to know more about the state potential.

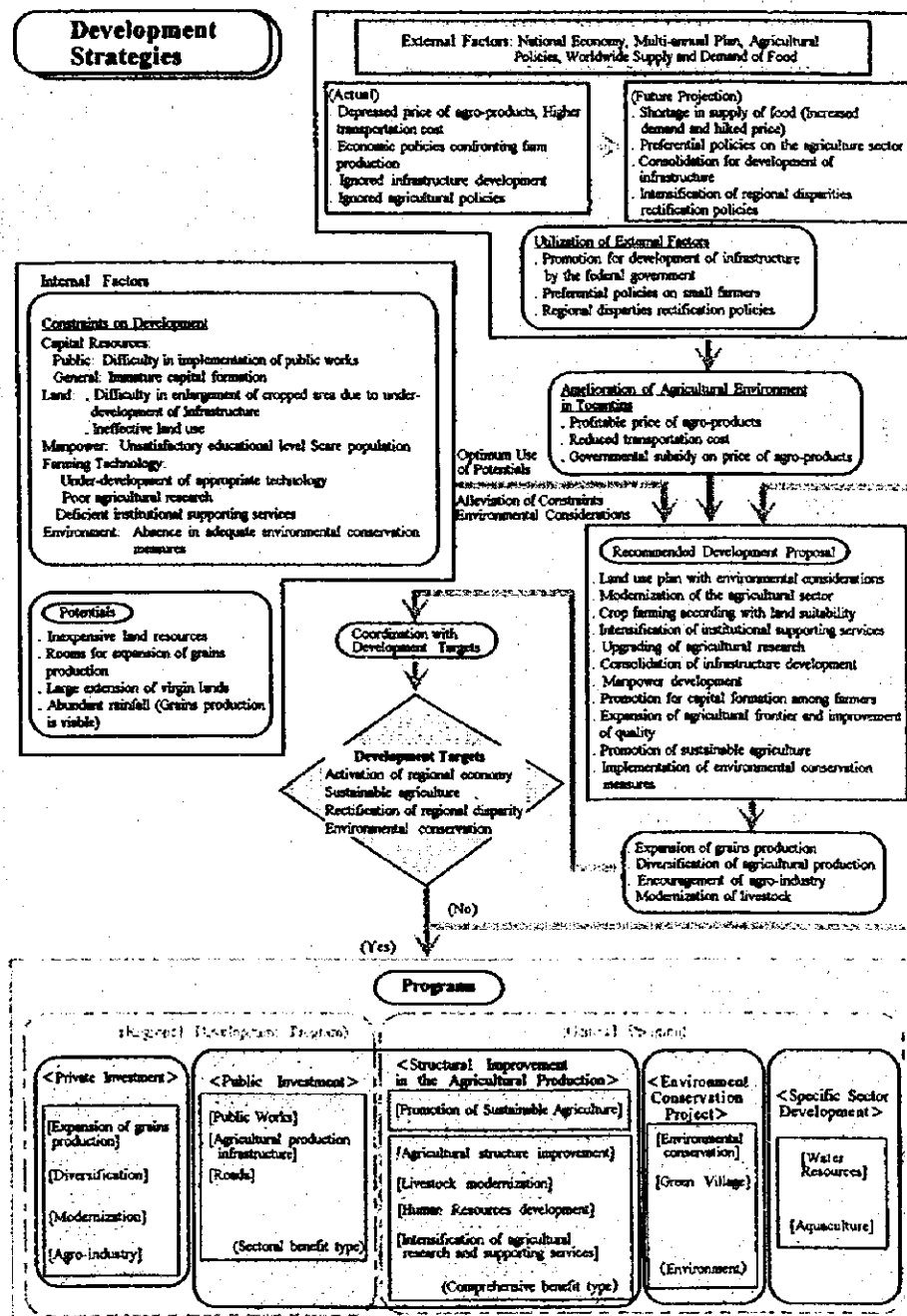


Fig. 3: Development Strategies

In the figure 4 is presented the basic concepts for the development, that pretends to activate the regional economy, reducing the regional differences and improving the social services.

And for the utilization of the private sector, it will be necessary a favourable policy to the sector. In long terms, it will not be sufficient only the production sector strengthening to reach a sustainable agriculture, but a policy where the environment is properly considered.

The production increase will be essential for the spatial and qualitative amplification. For the spatial increase it will be necessary to promote the settlement in the properties, improve the marketing and infrastructure network. Further more, for the utilization of the private sector, it will be necessary the implementation of the farmers economic capacity. For a qualitative improvement, it will be necessary to strength the research sector and modernize the agriculture.

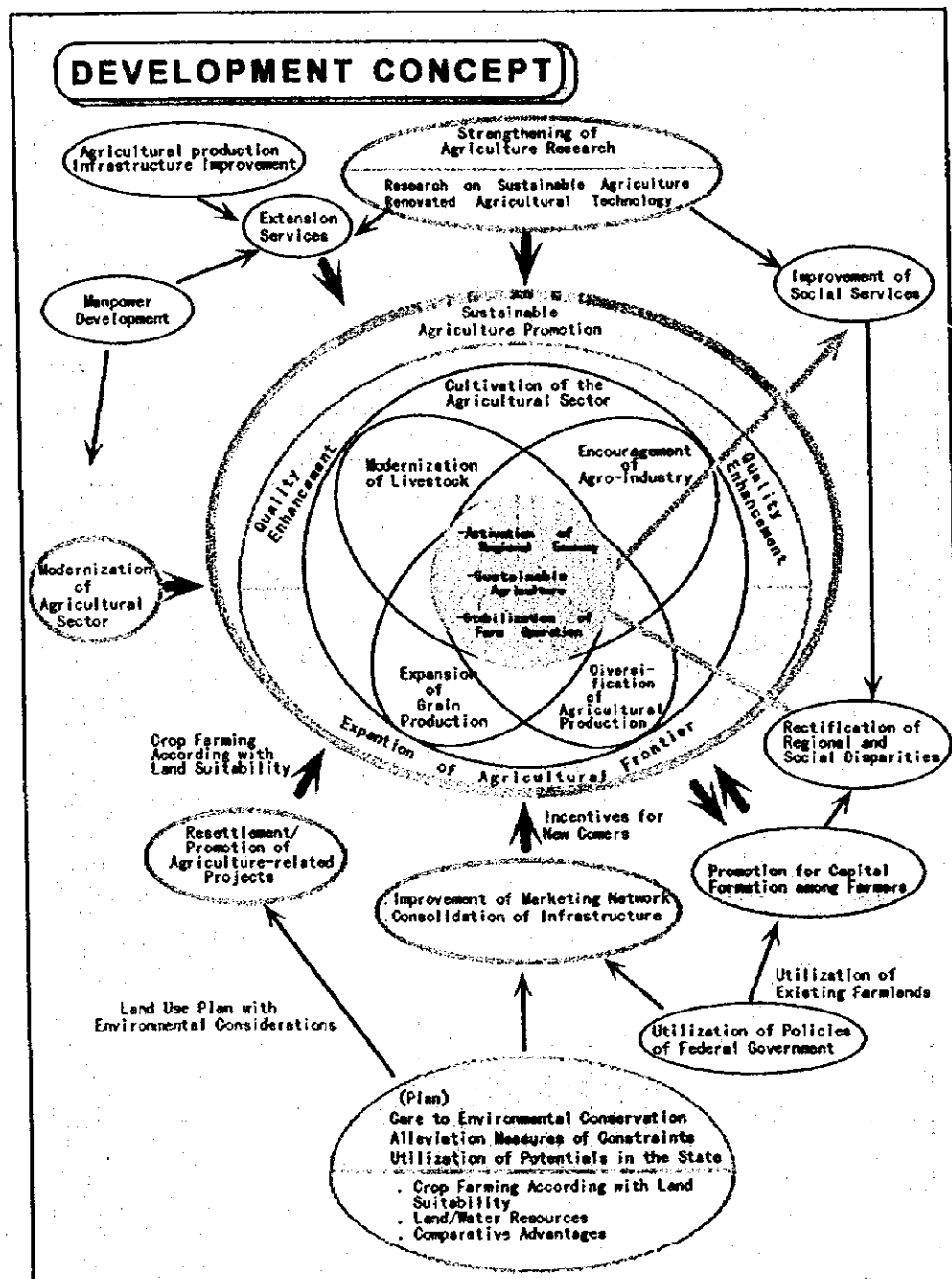


Fig. 4 Development Concept

4.2 Development Strategies

Pursuant to the development target for realization of sustainable agriculture, a formulation of harmonious development plan to comprise not only promotion for production activities but also environmental conservation shall be made. In so far as finance of the Master Plan is concerned, procurement of external finance is envisaged at the primary phase of the Master Plan; with this finance, rural credit to farmers shall be rendered aiming at invigoration of production activities. And, at the time when invigoration of production activities is attained, flowering of investment is anticipated attracting investors making advantage of economical cost in transportation of agricultural commodities.

As to concrete proposal for development, special measures for agricultural credit shall be taken in view of encouragement of investment in the State of Tocantins; at the same time, reinforcement of agricultural research and extension system to support realization of sustainable agriculture shall be promoted so as to make longer utilization of natural resources. Furthermore, in order to mitigate negative impact of production activities on environment, projects to serve coordination between production and environment shall be put into implementation. The involvement of the state government over procurement of finance for the programs of the Master Plan shall be minimized as far as possible so that participation of the private sector in investment of programs shall be encouraged.

Specific Development Targets	<ul style="list-style-type: none"> ① Expansion of grains production, Diversification of crop production, Modernization of livestock, Promotion of agro-industry ② Realization of crop production in accordance with land suitability, Upgrading research system to put sustainable agriculture in force ③ Establishment of appropriate system for extension services, Promotion of diversification for agricultural sector ④ Consolidation of social infrastructure in less developed regions, Invigoration of agricultural production activity in less developed regions.
Development Proposal	<ul style="list-style-type: none"> - Formulation of land use plan with major attention paid to environmental conservation (Implementation of crop farming in conformity with land suitability) - Agronomical zoning to be used for formulation of development plan - Modernization of agricultural sector - Selection of development entity and motivation for relevant entity - Consolidation of infrastructure and enlargement of cultivated area - Strengthening of institutional supporting services and research system - Amelioration of rural circumstances - Improvement of environmental conditions - Incentives for promotion of investment in the field of environmental conservation
Financing	<ul style="list-style-type: none"> - Budgetary arrangement of the state government to enable phasing in development - Acquisition of external loan - Capital formation among farmers and promotion for participation of new comers - <u>Long-term</u>: Establishment of independent credit system of the state government to accelerate comparative advantage of the State of Tocantins - <u>Short-term</u>: Encouragement for utilization of existing rural credit, creation of state development bank - <u>Public investment</u>: Formulation of development plan to mach financial availability of state government, acquisition of loan from external source

Development Framing	<p>Short-term: Implementation of priority projects (Environmental conservation and Structural reform of public institutions)</p> <p>Medium-term: Implementation of projects contributing to rectification of regional disparity</p> <p>Long-term: Implementation of projects aiming at expansion of agricultural output.</p>
Development Concept	<p>The present Master Plan consists of Private Investment Option Programs and Public Investment Option Programs and the latter is further divided into Comprehensive Development Programs and Regional Development Programs; the former ones which comprise programs related with strengthening of agricultural production structure and environmental conservation, will have beneficiaries throughout the state, while the latter ones proposes to conduct development dividing the state into 10 regions. The Private Investment Option, on the other hand, seeks to proceed projects giving incentives to the private sector.</p> <div data-bbox="427 667 1326 947" style="text-align: center;"> <pre> graph LR A[Projects/Programs] --> B[Private Sector Option Program] A --> C[Public Sector Option Program] C --> D[Comprehensive State Program] C --> E[Regional Development Program] </pre> </div>

4.3 Composition of the Master Plan

The Master Plan has two type of programs: comprehensive programs to cover the whole state and regional development programs and the former is composed of six programs (Regional Development, Agricultural Production Supporting System Strengthening, Environmental Conservation, Technologies Development for Sustainable Agriculture and Livestock, Specific Sectors Development and Private Sector).

Participation of the state government in these programs shall be limited to such roles for incorporation of foundation to facilitate agricultural production in harmony with environment as environmental education, establishment of environmental monitoring system, human resources development through implementation of the Agricultural Production Supporting System Strengthening Program, strengthening of agricultural research and extension system, structural reform of public organizations responsible for provision of institutional supporting services, and conducting studies on formulation of regional development programs. Hence, the state government shall not have a great influence on programs/projects directly related with production activities. This stance of the state government is also applied to the Environmental Conservation Program, in which no participation but in establishment of special credit line to encourage investment on environment-related projects is envisaged.

As for the regional development program, the state government shall take part only in the process for formulation of the content of the program and development of public infrastructure; the projects which benefit specific limited number of persons/organizations are to be financed by beneficiaries by themselves.

Taking measures to make better utilization of comparative advantages which the State of

Tocantins enjoys, procurement of necessary financial resources for the regional development program shall be made, although introduction of external finance to be used for development of productive infrastructure is conceived at the initial stage for implementation of the regional development program. Overall concept of the Master Plan is as illustrated in the next page.

The regional development program is based on the state division realized by SEPLAN, where a successive study of the 10 regions are necessary for the works execution. Each region's priority will be defined according to the estimated economic and social results. Each selected region will need the feasibility study, land use plan, agriculture management plan, installation plan, etc., utilizing as much as possible the private sector, reducing the government participation.

The structuration program of the agricultural production pretends to elaborate, through it's development, an efficient regional development plan and makes possible the farmers assistance in the research and extension sector. So, it will be necessary to improve the structure of the agriculture related organisms, modernize the livestock to elevate the products price, strength the assistance and research, further the elevation of the persons capacity related to the agriculture, through the human resources development program.

The environmental conservation program pretends to mitigate the fire and deforestation problems, combined with the introduction of a sustainable agriculture, for the realization of a harmonic development of the production and environment. As the program pretends to increase as much as possible the farmers participation, where the private sector can participate, it will be necessary a credit line, and the government participation will be on the environment education and monitoring. Through this program is pretended to increase the knowledge of the environment importance between the region's inhabitant.

The program of sustainable agriculture promotion pretends to introduce it in a long term, establishing the realization of the researches, introduction of technology and new technology development.

The program of the specific sector development pretends the development of the water resources and aquaculture.

The private sector program pretends to realize the exportation promotion, modernization of the agriculture and livestock commercialization, promotion of the agricultural production processing, promotion of a efficient utilization of the agricultural inputs and quality improvement of the products. But, as the state production is low, it will be necessary to establish the basic conditions first, before giving importance to this program.

The Master Plan composition is as follows.

Fig.5 Composition of the Master Plan for Integrated Agriculture and Livestock Development

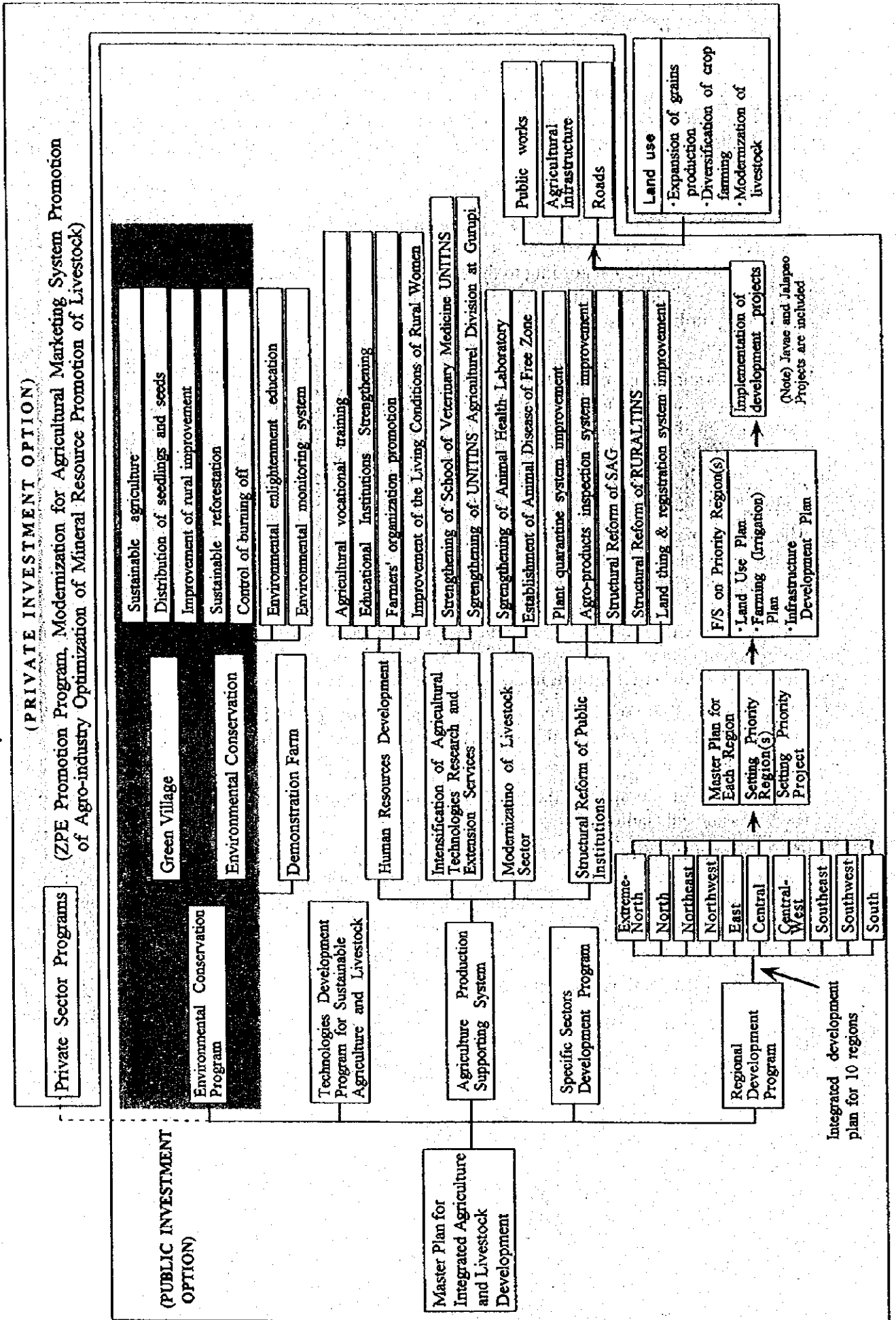
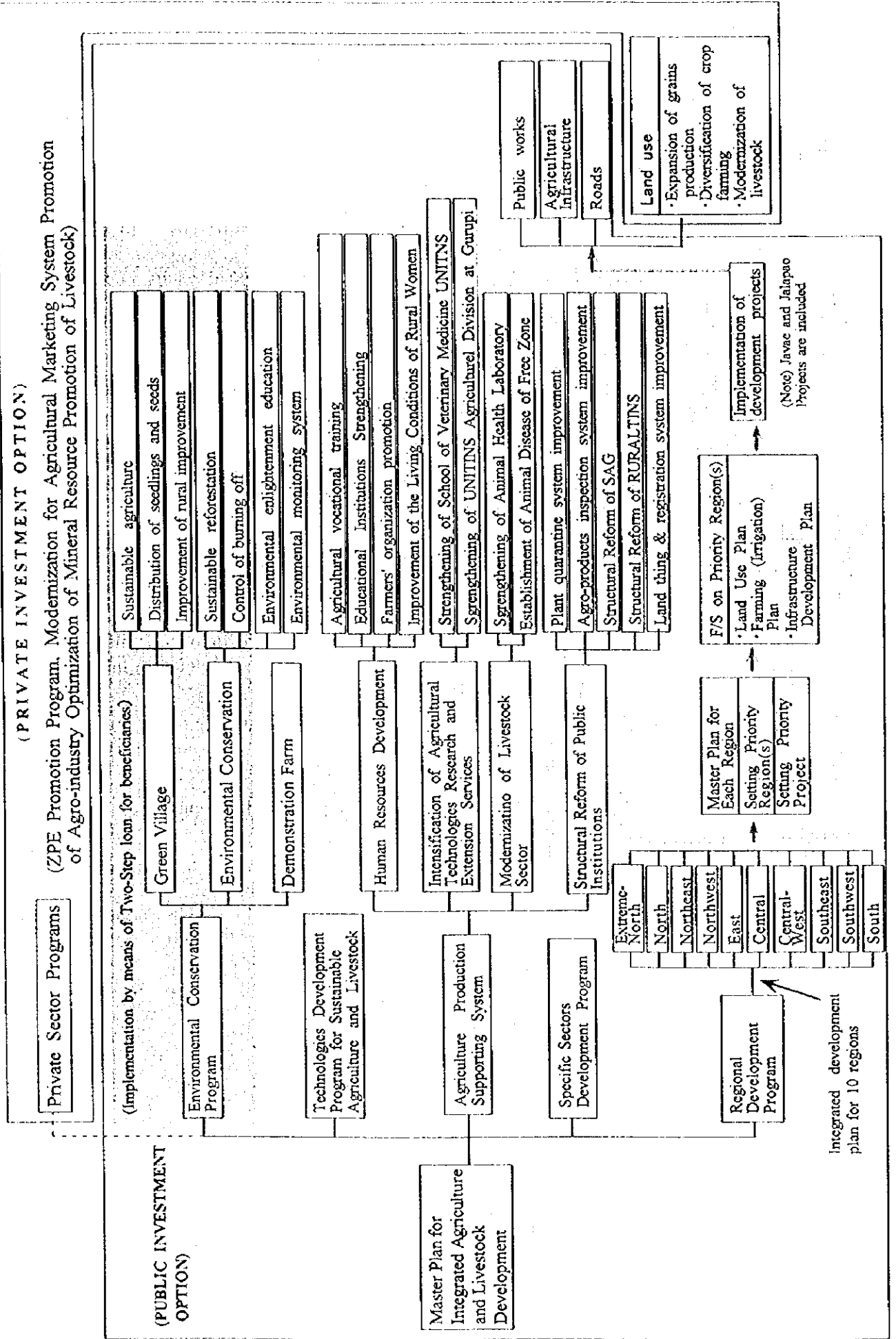


Fig. 5 Composition of the Master Plan for Integrated Agriculture and Livestock Development



4.3.1 Regional Development Program

The regional development program is a core program of the present Master Plan, but development plan to hasten investment has not been materialized in Tocantins yet. In any case, such development should be forged with attention paid to the harmony between development and environment. Public finance available for development programs/projects is so limited in Tocantins that prioritization of development in terms of investment impact among regions of the state is of importance. The North Region has comparative advantage over the rest of regions with regard to soil and climate conditions as well as shipment of agricultural produce to outside the state, so the highest priority in development is given to this region and participation of the private sector in investment of development projects to be formulated in this region shall be encouraged.

Development Proposal	The regional development plan, which shall be put into implementation by phasing according with prioritization for development, shall be carried out in the following order. <ol style="list-style-type: none"> 1. Definition of scope of work for implementation based on the result of F/S and M/P. 2. Establishment of project executing agency and financial arrangement 3. Implementation of the projects (Public investment option) 4. Formulation of incentives to attract private investment
Land Use Plan	Land use plan shall be formulated taking account of land classification data, socio-economic conditions, climate conditions, progress for development of infrastructure, etc. (Refer to Fig. 4.5)
Agricultural Infrastructure Development	At the opportunity of implementation of the master plan, component of agricultural infrastructure to be developed shall be determined after local farming features will have been analyzed.
Crops Farming Plan	Contemplating an introduction of sustainable farming system, crop farming plan shall be forged aiming at attaining the following targets. <ol style="list-style-type: none"> 1. Expansion of regional agricultural production attributable to elevated unit yield. 2. Enhancement of rural living condition owing to increase in farm income. 3. Creation of job opportunity among landless farmers. <p>Crop farming system shall be based on crop-pasture rotation. Core crops to be cultivated are grains and they will be cultivated under irrigation system to make intensive use of land. To comply with crop-pasture rotation system, lands dedicated to crops cultivation shall be converted into pasture after 4-5 years in view of elevating proportion of organic materials in soil to improve fertility.</p>
Livestock Farming Plan	<ul style="list-style-type: none"> - Improvement of stocking capacity of pasture (Improvement in fertility rate and weaning rate, procurement of concentrated feed in the dry season, optimum use of agricultural by-products, introduction of improved pasture) - Promotion for mixing of local Nelore breed with European hybrid breeds - Eradication of diseases other than FMD - Encouragement for raising animals other than cattle (buffalo, swine, poultry, etc.)
Social Infrastructure Development	Social infrastructure to help farmers with fulfillment of welfare among rural population shall be proposed in line with farming systems development plan.

The land utilization plan is based on the soil suitability, showed in figure 6. Each suitability was selected through the soil fertility level. So, as example, it is possible to cultivate in soils with suitability for pasture, but it will be very anti-economic, so it was selected as land with suitability for pasture.

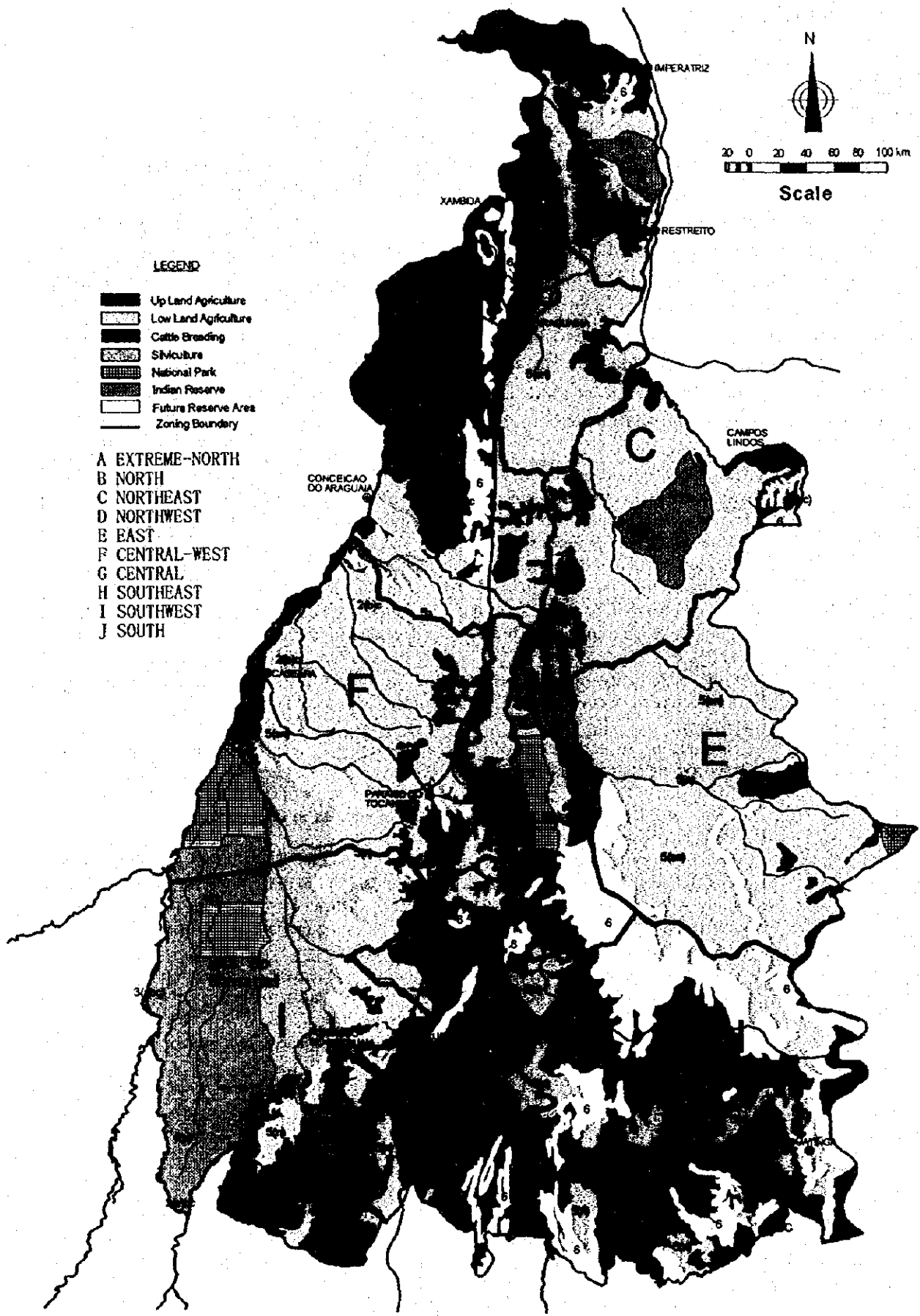


Fig.6 Land Use Plan

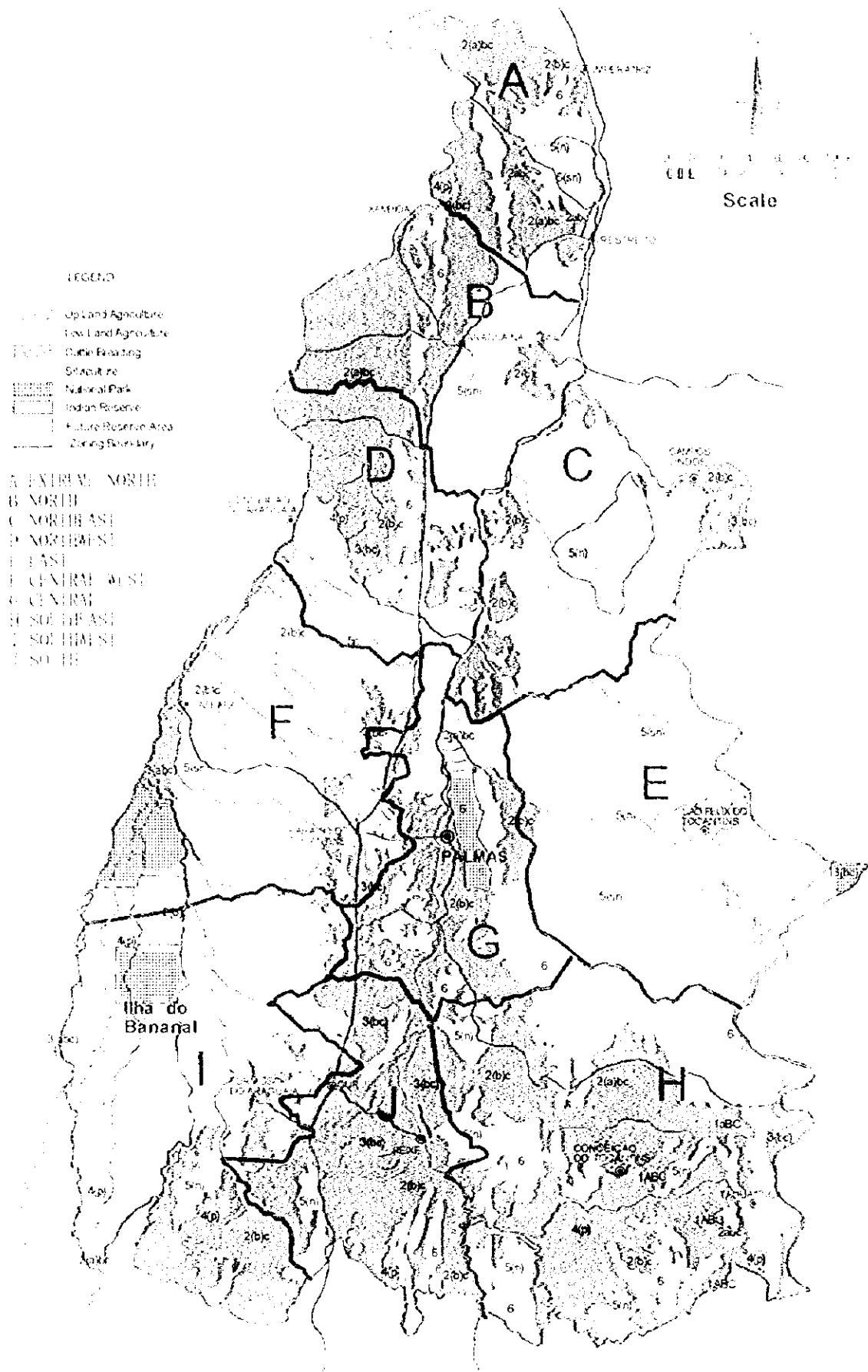


Fig.6 Land Use Plan