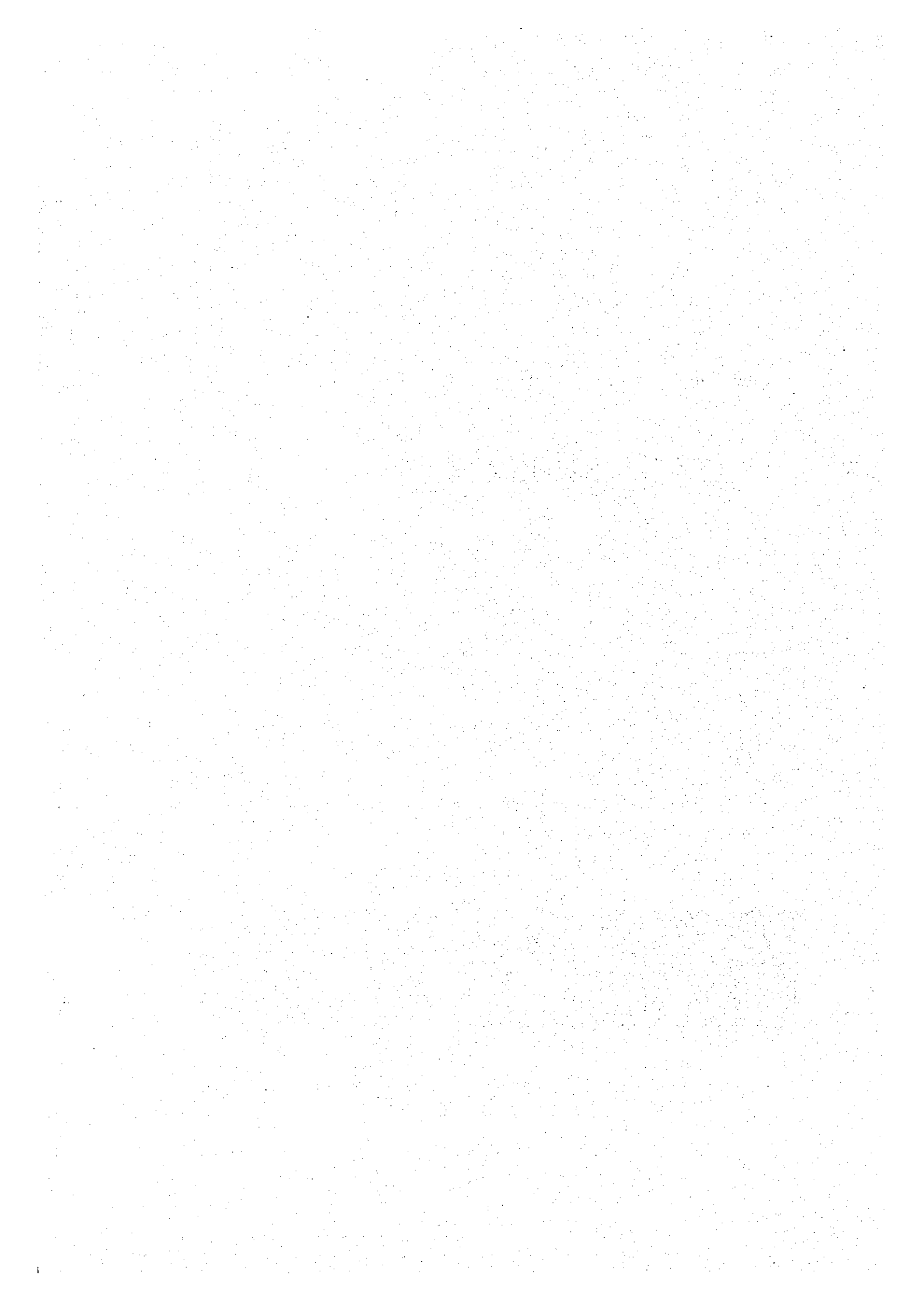


ANNEX X

**DEVELOPMENT CONCEPT FOR THE
INTEGRATED DEVELOPMENT OF
AGRICULTURE AND LIVESTOCK**



ANNEX X

DEVELOPMENT CONCEPT FOR THE INTEGRATED DEVELOPMENT OF AGRICULTURE AND LIVESTOCK

1 Background and Targets of the Development Scenario

1.1 Background of the Development Plan

Despite being endowed with highly potential natural resources consist of unexploited fertile land, immense hydraulic resources, favorable climate, etc. the agricultural sector has failed to realize horizontal (enlargement of cultivated area) and vertical (elevating productivity) expansion due to unconsolidated status of traffic infrastructure (roads and railroads) and agricultural infrastructure (irrigation and drainage system, marketing and processing facilities, etc.) in association with such social factors as inadequate provision of technical and financial supporting services to producers and insufficient human resources development system; furthermore, it is of worth to point out that the state government has not proposed appropriate and elastic policies responsive to federal government's agricultural structure reform policies composed mainly of decentralization, phasing out of public sector's intervention, encouragement of market-oriented economy and privatization.

The state government, due to the fact that the agriculture sector plays a vital role in economic performance of the state, is well conscious of the importance to encourage the sector so as to evade the prevailing under-development of the state's economy. Under the circumstances, an emphasis will be placed on efficient utilization of the resources available within the state and, for attaining this purpose, the formulation of the development plan with attention paid to external factors that facilitate the said efficient utilization of resources.

On the other hand, from the standpoint of the horizontal expansion of the agricultural land, the state will have a foreseeable future because the county is one of the few regions in which a considerable space remains for future expansion of the agricultural frontier in Brazil. It will be without doubt that this potentiality of the state should attract agricultural producers and entrepreneurs to invest in the state and, so as to tackle with such situation it is indispensable to formulate an agricultural development plan in harmony with the environment to enable sustainable development, taking account of an optimum utilization of resources under coordinated and systematic planning.

1.2 External Factors

In the past, the federal government's economic policy was targeted mainly on the control of inflation without paying attention to promotion of investment on social and productive sectors. This policy had negative impact on the country's macro-economic performance in such manner as to have debilitated the competitiveness of Brazilian products at international market and to have expanded social and spatial disparities

within the country. The incumbent government administration, in due reflection of the these past policies, have placed their important strategies on development of transport infrastructure and rectification of spatial and social imbalance within context of the reinforcement of industrial sectors' competitiveness.

In the realm of the transport infrastructure, the state of Tocantins is included in the federal government's high priority regions for development and, thus will be benefitted by the development of infrastructure to be undertaken by the federal government. This development is expected to save transportation cost of agricultural commodities.

In so far as social and regional disparities are concerned, in view of that fact that the state of Tocantins is reckoned as one of the least development states of the country and the majority of farmers are classified as poor farmers, the state is anticipated to be rendered more supports from the federal government to redress these social and regional disadvantages.

1.3 Development Potentials and Constraint

In formulating development plan of the present Master Plan, it is essential first of all to analyze adequately the potentials and constraints on development of the State, and then to forge measures to make optimize potentials and to ease constraints. Potentials and constraints of the State may be summarized in the following manner:

Potentials

- Far-reaching area of arable lands
- Favorable climatological and soil conditions on expanding grains production
- Abundant water resources

Constraints

- Under-development of infrastructure to motivate new investment
- Absence of studies and research on assessment of potentials on development
- Deficient revenue of the state government to increase investment on infrastructure
- Shortage of financial resources to launch investment (Private sector)
- Disordered development without proper farming technologies and deterioration of natural resources (fire at mountain areas, soil erosion, deforestation, etc.) due to less consideration on environmental conservation.
- Lack of proper technologies of agriculture and livestock suites to local conditions
- Rudimentary level of institutional supporting services to farmers including insufficient manpower training system

Subject to completion of traffic network consolidation projects undertaken by federal and state governments, it is anticipated that elevated transportation cost to forward agricultural produces to major markets of the country would be eased and comparative advantage in production of grains in Tocantins which entails large-scale transportation

system would be established accordingly. It is further verified that the State of Tocantins has superiority over other states located within the "Cerrado" region from agro-ecological standpoint, because grains can be produced in Tocantins even under rain-fed condition. In addition, great extension of virgin and fallow lands may serve as potentials for development of grains production which is anticipated to fulfill pressing demand of grains worldwide. Judging from these external factors the State of Tocantins has high potential in agricultural development, especially in production of grains.

It is of importance for the State of Tocantins to proceed with methods which accompany environmentally friendly and sustainable development of the agricultural sector and for attaining this objective, an accomplishment of the following components is vital.

- Implementation of research and study on assessment of potentials of natural resources, and formulation of projects for optimization of these resources.
- Institutional strengthening to realize sustainable agriculture
- Promotion of environmental conservation

Further study is required to identify potentials of natural resources and, in addition, measures to invigorate economic activities should be taken to motivate investment in these resources. It should be nevertheless taken into account that the State of Tocantins has shorter historical background in hastening sustainable agriculture, therefore reinforcement of necessary structure including strengthening of public institutions rendering supporting services to farmers and engaging in agriculture-related research is indispensable.

1.4 Anticipated Goals of Development

In due consideration of the above-mentioned background, the Master Plan for Integrated Development of Agriculture and Livestock in the Tocantins State with a target year of 2015 shall be formulated aiming at to accomplish the following targets, namely:

1. Activation of regional economy through promotion of agricultural production and agro-based industry as well as through development of necessary infrastructure.
2. Promotion of sustainable agriculture in harmony with the environment.
3. Environment Conservation.
4. Stabilization of farm operation supported by consolidation of productive infrastructure.
5. Income elevation of rural population and amelioration of rural living circumstances to serve rectification of regional and social disparities.

On the other hand, the role anticipated by this Master Plan in the realm of regional and national economy shall be: putting an end to under-development of the regional economy in the country, contribution to mitigate regional disparity in Brazil - the

primary concern of the federal government, optimum use of potential resources for agricultural production, and major advance of the regional economic sector to the international market.

2 Development Strategies

2.1 Development Targets and Basic Principles

(1) Development Target

As mentioned before, the development targets of the present Master Plan Study consist of: 1) Activation of regional economy, 2) Promotion of sustainable agriculture, 3) Environment Conservation, 4) Stabilization of farm operation and 5) Rectification of regional and social disparities, and these targets, in turn, have the following specific targets:

General Targets	Specific Targets
1) Activation of regional economy	<ol style="list-style-type: none"> 1. Expansion of grains production 2. Diversification of crop production 3. Modernization of livestock 4. Promotion of agro-industry
2) Environmental conservation	<ol style="list-style-type: none"> 1. Promotion of environmental conservation 2. Environmental monitoring and education
3) Promotion of sustainable agriculture	<ol style="list-style-type: none"> 1. Realization of crop production in accordance with land suitability 2. Upgrading research system to put sustainable agriculture into force
4) Stabilization of farm operation	<ol style="list-style-type: none"> 1. Establishment of appropriate system for extension services 2. Promotion of diversification for agricultural sector
5) Rectification of regional and social disparities	<ol style="list-style-type: none"> 1. Consolidation of social infrastructure in less development regions 2. Invigoration of agricultural production activity in less development regions

The Activation of the regional development aim to explore the potentialities of the natural resources and to expand the grain production, using the location comparatives advantages for the product which require mass transportation and climatic conditions. However to take consideration to the participation of small farmer in a development process is a fundamental factor, in order to no increase the social disparities. In this context, the introduction of diversified agriculture will act as an absorber of social problem, increasing the work opportunities and participation possibilities of small farmers. The modernization of the livestock activities aims to vitalize the economic activities through the improvement of the commercial conditions for market and the introduction of small animal. The promotion of agro-industries has objectives to promote the agricultural production's activities through the adding values of the product and to create the work opportunities.

The environmental conservation aims to prevent the deterioration of environmental conditions, through the decrease of the burning that is the major environmental

problems of the State. In this context, the implementation of environmental monitoring by the public sector is required to conserve the natural resources. And the participation of the private sector force is the fundamental.

The introduction of sustainable agricultural method is an basic factor to obtain the sustainable development. For the introduction of sustainable agriculture, implementation of agricultural research for the sustainable agricultural method and the introduction of adequate cropping technologies, will be required.

The promotion of the stable economies for farmers is basic concept to obtain the sustainable development. In this sense, upgrading the farmer's agricultural techniques to increase the productivity and achieving the sustainable agricultural method are the fundamental factors for the planning. Considering the debilities of the institutions, such as SAG, RURALTINS and ITERTINS, the strengthening of the institution will be required as a first step to upgrading the state productivity, in order to improve the extension and research services. Furthermore, the introduction of diversified activities will be required, particularly for the small farmers.

The alleviation of the spatial disparities, as principal policies by the Federal and State Government, is an important fact to take consideration in a planning. For this reason, the improvement of the social infrastructures and strengthening of the rural association in a poverty area will be require to included.

(2) General Considerations

In attaining development targets, care shall be taken to the following items.

1. Land use plan shall be forged in due consideration for long-term and efficient utilization of the resources as far as the circumstances permit.
2. Aiming at major participation of the non-traditional entities in the agricultural and livestock sector, an emphasis on formulation of development plan will be placed on development of infrastructure.
3. Major effort shall be made to procure financial resources for development from outside the state.
4. At the same time, programs to be financed by the private sector shall be proposed.
5. To propose an improvement of installations and equipment of institutions in charge of research and development of agricultural technology suitable to local environment.
6. To pay attention to basic education system and to improve social infrastructure as measures to fulfill the basic human needs.
7. The development plans to be delineated should not accelerate the grade of imbalance among regions of the country.
8. To lay emphasis on major participation of beneficiaries from planning stage of projects and to propose programs which enable to equip

beneficiaries with empowerment in the field of appropriate operation and management of project after their completion. To promote at the same time women's participation in social affairs.

9. To lay out institutional services intensification programs including fostering human resources and expansion of facilities in relation with an improvement of land productivity.
10. To promote development of agro-based industry leading to activation of regional economy and creation of job opportunity so that projects' benefits might be distributed to as many people and as equitably as possible.
11. To ensure conservation of natural resources by mitigating negative outcome of project implementation on them such as water contamination, degradation of soil fertility, deforestation, etc. and thus to guarantee enforcement of sustainable agriculture and protection of living circumstances of regional population.
12. To devise an elastic project formation which may be reconstructed as required in response to change of external circumstances like world food supply and demand condition, reform of the federal government's agricultural policy, etc.
13. To forge development plan which entails comparative advantages of the Tocantins State in comparison with the rest of Brazilian states.

The schematic concepts of the development targets and the development strategies leading to accomplishment of targets are illustrated in Fig. X - 2.1 (1).

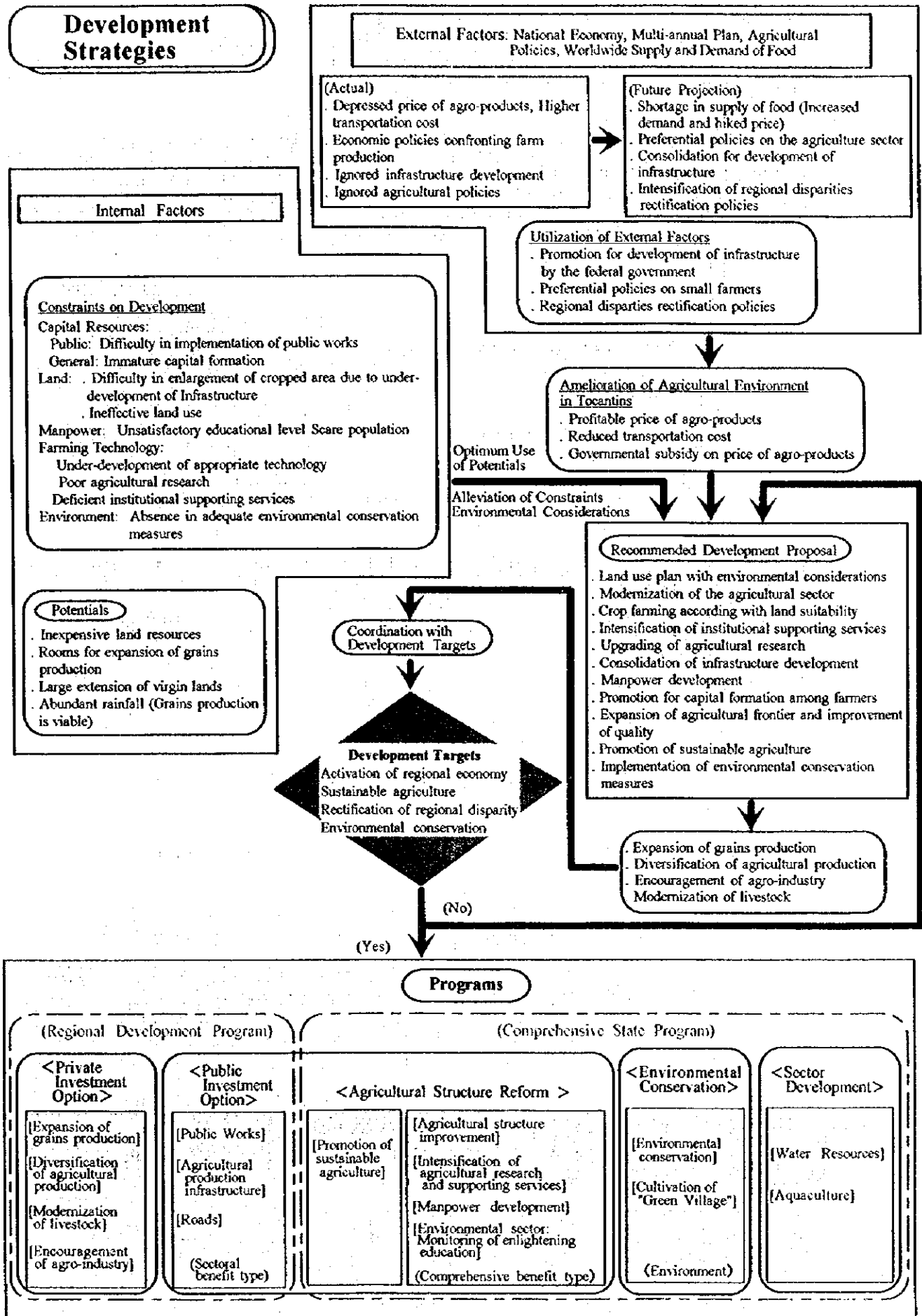


Fig. X-2.1(1): Development Strategies

2.2 Development Methodology

The state of Tocantins is situated amongst the least development states of the country without finding appropriate measures to make optimum use of abundant and fertile land resources. For alleviating this impasse, it is needless to point out that natural resources should be exploited effectively, and for this end, it is advisable to take the following measures.

(Utilization of Natural Resources)

1. Formulation of land use plan with major attention paid on environmental conservation (implementation of crop farming in conformity with land suitability).
2. Modernization of the agricultural sector to raise land productivity.
3. Selection of development entity to proceed development and proposal of incentives for this purpose (promotion of capital formation among existing farmers and invitation of new comers).
4. Improvement of marketing channel and infrastructure to facilitate comparative advantageous factors of the state.
5. Amelioration of rural circumstances to brake exodus of rural population to urban area.

(Environment Conservation)

1. Improvement of Environmental Conditions.
2. Incentives for the promotion of Investments in the fields of Environment Conservation.

(1) Implementation of Crop Farming in conformity with Land Suitability

The state of Tocantins is favored by natural conditions like rainfall and land fertility. Up to a couple of years before, the development of the state had been depressed due to disadvantageous geographic condition for marketing of agro-products, deficiency in accessibility, etc, but this disadvantageous situation has been eased recently owing to consolidation of infrastructure. Nonetheless, this is a partial evasion of under-development and is not the case to cover the whole area of the state.

In order to reinforce comparative advantage of the state in agricultural production, it is essential to save production and transportation costs as well as to establish farming technology suitable to national conditions of the region. In this sense, it is necessary to introduce farming practice to accord with natural conditions of the area.

According with land suitability classification, land with higher suitability may be used in order of the following purposes: 1) fruits and vegetables cultivation, 2) grains cultivation, 3) grazing and 4) reforestation, and the land use plan for the present Master Plan Study shall be delineated in conformity with this land classification method. It is

worth while to indicate that the selection of crops for respective land shall be also made taking geographical position into consideration.

(2) Modernization of the Agricultural Sector

The agricultural productivity in Tocantins remains comparative inferior both per area and per labor unit, which is particularly the case among small and medium farmers; the smaller the land holding of farmers are, the lower the productivity per area and per labor unit becomes. For attaining more agricultural returns, it is a matter of course to introduce instruments which contribute to raise the productivity in terms of both per area and per labor unit; the productivity per area may be improved with application of greater amount of agricultural inputs, strengthening of agricultural extension services and introduction of advanced cropping technology, meanwhile elevating productivity per labor unit can be made through realization of farm mechanization. In addition, it should be noted that an introduction of these technologies can not be attained unless upgrading of farmers' educational grade is made. In this context, the training program aimed at manpower development shall be proposed within the development plan of the present Master Plan Study.

(3) Selection of Target Beneficiaries and Promotion of Capital Formation among Farmers

Basically, target beneficiaries of development plans shall be farmers, who are expected to attain higher returns from farm activity. About half of farmers within the state hold lands in the range of 100 – 1,000 ha and the crop intensity rate of these lands is extremely low. By contrast, large holders enjoy higher agricultural returns than medium and small holders with practice of advanced farming system, although there still remains room for further improvement in their farming. To equip these farmers with an opportunity for capital formation and to encourage their farming activity and to raise crop intensity rate of their lands constitute important measures in expansion of grains and livestock output.

Apart from above proposal, attracting farmers and entrepreneurs from outside the state will be a promising measure in pursuit of further expansion of grains and livestock output as well as major participation of new comers for diffusion of renovated farming technology to farmers in the state and in the peripheral areas.

(4) Consolidation and Infrastructure and Expansion of Agricultural Frontier

Potentially arable lands are widely extended throughout the state, but development of these lands has been postponed up to date in an absence of indispensable infrastructure for this development. So as to secure the comparative advantage of the state, saving of transportation cost attributable to improvement of transport infrastructure shall be an indispensable factor.

(5) Strengthening of Supporting Services and Agricultural Research System

Without being incorporated agricultural research institutions within the state, the development of agricultural technologies suitable to local salient conditions has been put aside, despite they are requisite condition for promotion of the agricultural sector of the state. In view of the fact that the technological level among farmers is different according to the natural factors such as soils and climate as well as to the social factors, farming technologies to be employed and integrated by respective farmer shall produce higher effects if they are proposed in due consideration of local conditions. Therefore, the success of the agricultural and livestock development depends partially on development of locally suitable unconventional technologies, selection of crop varieties and development of cropping techniques applicable to each development area, establishment of an organization in charge of integrating developed technologies and reinforcement of extension services.

(6) Amelioration of Rural Circumstances

The rural population in Tocantins has decreased by approx. 18% for the last six years due to out-migration of these rural population to the urban area. Factors explaining this phenomenon are an aggravation of living circumstances in connection with under-development of social infrastructure and dull performance of farming activities caused by deficient provision of supporting services to farmers. Taking account of this situation, it is essential to consolidate rural infrastructure, to invigorate rural activities and to hasten manpower development for putting the brakes on out-migration of rural population.

(7) Improvement of Environmental Conditions

Despite the existence of abundant natural resources in the State, these resources are extremely deteriorated due to the lack of adequate conditions for their conservation. One of the main causes for this deterioration is the fire caused by "queimadas". Bearing this fact in mind, the Environment Conservation Program is given priority within the Master Plan.

(8) Incentives for the Promotion of Investments in the fields of Environment Conservation

Besides the public sector performance in the promotion of investments aiming at the Environment protection, the participation of the private sector is extremely important. For this reason, necessary measures to stimulate the participation of the private sector were taken into consideration.

The basic concepts and development model of the present Master Plan are presented in Figure X - 2.2 (1).

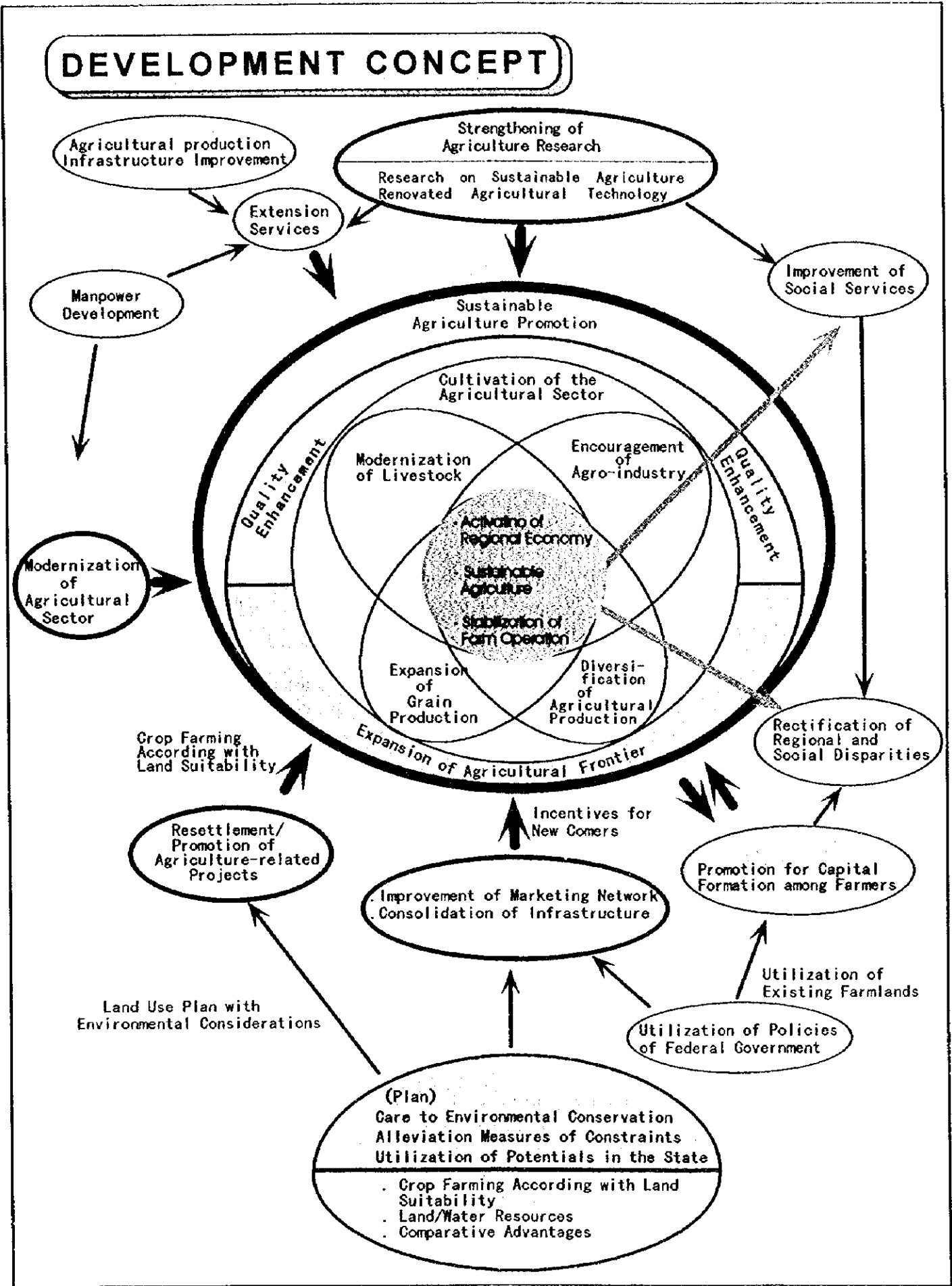


Fig. X - 2.2 (1) Development Concept

2.3 Sources and Procurement Method for Financing Development Projects

The present program shall be implemented on the basis of the development plans formulated for respective region and financing proposal for the program shall consist of the public investment option and private investment option. Prior to implementation of programs, a master plan will be prepared first of all, which is followed by implementation of a feasibility study, in view of decelerating disordered development of natural resources and optimization of these resources. Projects contemplated in the public investment option shall coincide basically with social infrastructure development, meanwhile projects relevant to the private investment option shall be such works as are required in connection with the resettlement program. The formulation of development projects shall be made with attention paid to the following aspects:

The State budget, owing to the undeveloped industries in the State, is not sufficient to promote new investment, and the farmer's level too does not capacitated to initialize new investment, exempt some grand landowner, with low level capitalization. For the development of the region, immense capital for the development will be required both in the public and private sector.

For these reason, the gradual development method will be proposed, developing on where locate a comparatively advantageous for other region, capitalizing the State financial capacities for the next step.

In so far as the projects of the private investment option, care shall be taken to contribute to capital formation of existing farmers. Taking into consideration that the existing farmers has an advantage, owing the proper land and consequently requiring a comparatively low fund for investment, with newly participant, the incentive of the existing farmers for the participation of the new investment will be planned. However the participation of the new farmers will be required to introduce the innovated technologies/

Proposed sources of finance for this option shall, but not be limited to, the transfer of the federal government's fund and loan from foreign governments and international banking institutions.

(1) Procurement Method for the Development Fund required for Long Run

To procure the development capital required for long run is necessary to utilize the internal capital efficiently, introducing the external capitals by the following method.

Financing proposal for the private sector

A considerable extension of lands potential for grains cultivation exists in the state of Tocantins, which will promise a foreseeable future for the state taking pressing worldwide prospect for supply and demand of food in the near future. The completion of the South-North Railroad for the section Imperatriz – Estreito shall integrate it with the BR153 and the Carajas Railroad and form a consistent transport network leading to

the Port of Itaquí and this transportation network shall have positive effect on saving transportation cost of grains to be produced in Tocantins. This favorable outlook is expected to promote an attraction of investment from outside the state. Nonetheless, it is worth while to reflect prevailing situation for agricultural production that is resumed as :

- 1) Discouraged farmers' intention on conducting farming affected by large amount of rural credit-related debt,
- 2) Recession of the whole industrial sector due to decreased amount of investment in the agricultural sector and
- 3) Notable down-side trend of land price associated with dull performance of the agricultural sector and then to forecast the possibility of the participation of farmers/entrepreneurs of southern regions of the country in the agricultural production in Tocantins.

The following two alternatives may be conceived as a style of agricultural investment in Tocantins.

- A. Farmers and/or agricultural entrepreneurs realize farming activity with their own resources.
- B. Farmer and/or agricultural entrepreneurs realize farming activity with finance relying on credit rendered by others.

An example of the above alternative A is the PRODECER III which is just operated recently within the state and is expected to have a success in supporting unconventional agricultural structure of the state with introduction of soybeans cultivation. By contrast, no example for the Alternative B has been cited in the state up to date, although is the case among developed southern regions of grain production like the state of Minas Gerais where the practice of a loan from the buyers including grains majors is predominant. The program Caipira 63 is an incentive policy to attract an investment of foreign capitals, but this policy is generally utilized as a measure for commercial banks to get finance from foreign banks and to loan, in turn, this finance to the sales agents of fertilizers and agro-chemicals who give "pre-harvest" credit to farmers; thereby, no access to this program is made from the part of farmers at present. In any case, the Alternative B is accompanied by the productive activity and will come into fashion according with expansion of crop production.

The realization of the Alternative A, namely invitation of farmers and entrepreneurs endowed with technical and financial qualification, are a practical and the easiest way to attain an enlargement of agricultural production. And, so as to facilitate this realization, it is necessary that the state government should prepare incentives such as consolidation of infrastructure and exemption and/or reduction of taxes. Furthermore, in advance of preparing the said incentives aiming at the realization of the Alternative A, it is also prerequisite and effective way that the state government and existing farmers in the state should made efforts in increasing agricultural production and in yielding satisfactory achievements and to develop infrastructure such as transportation system, silos and agro-industry in line with these achievements.

(2) Capital Procurement Method for Short Run

Procurement of the capital in a short run for the activities of the agricultural production will be done utilizing the Federal Level's Agricultural Credit and the loan of the Foreign countries. Recent agricultural policies applied by the Federal Government is aiming to promote agricultural production, especially in the North region of Brazil, the Government are applying the good condition of credit. By these reason, the efficient utilization of the federal credit system should be considered.

Rural credit promotion plan

The federal government has disclosed its agricultural policy for the crop year 97/98 in June 11, 1997 and the rural credit program contemplated in this policy may be compared with that of the crop year 96/97 in the following manner.

	Crop Year 96/97	Crop Year 97/98
Interest rate	12%, 9%(PRONAF)	9.5%, 6.5%(PRONAF)
Amount to be credited	R\$ 5,200 million R\$ 574 million (PRONAF)	R\$ 8,500 million R\$ 1,650 million
Agricultural investment (ceiling amount)	R\$ 30,000	R\$ 40,000
Credit amount/crop or livestock	R\$ 30,000 (sorghum) R\$ 30,000 (soybeans) R\$ 30,000 (livestock and others)	R\$ 150,000 (sorghum, central and southern regions) R\$ 100,000 (soybeans, central, western and northern regions) R\$ 40,000 (livestock and others)

An outstanding increase of credit amount for soybeans from R\$ 30,000 to R\$ 100,000 shall make up an incentive for the crop's expansion in combination with the program PRE-CUSTEIRO which was put into force in the previous year. In addition, the increased ceiling amount for agricultural investment supported by extremely low interest rate of 9.5% is expected to bring about an acceleration of agricultural mechanization among farmers.

The interest rate for the PRONAF has lowered to 6.5%, but the problem relevant to this program falls on limited amount of credit (R\$ 5,000 for crop cultivation and R\$ 15,000 for agricultural investment). The proposal to overcome this problem is to conduct farming by forming an association or other kind of farming group, because the limited amount of credit for group hikes to R\$ 75,000, which will enable to access to holding agricultural machinery for participating grains production. Even though, large-scaled agricultural machinery represented by combine can not be purchased with that limited amount of credit, therefore it is advisable that some measures like an establishment of pilot-type mechanization center should be taken.

Although the credit conditions for the crop year 97/98 has become advantageous to farmers, the prevailing rural credit is not easily accessible by marginal and small peasants. Therefore RURALTINS or other governmental agencies should take some special cares to open way to rural credits among marginal and small peasants.

By the reason that the application of the Federal Government's credit system has some difficulties for the Tocantins State's farmers, the State Government are trying to create Proper credit system. In this purpose, the creation of State Development Bank are under planning, in order to loan for the State farmers in a low interest, through the procurement of the foreign loans with low interest. Through the creation of Development Bank, the State Government will promote the activation of the investment.

(3) Procurement Method for the Public Sector's Work

For the promotion of the private sector's investment, the constructions of the infrastructure, which enable to feasible the activities, are basic conditions, such as traffic structure and communication facilities. In case of the State, these type of investment were implemented by the effort of the State Government, and these conditions were improved significantly.

At present, the direction of the public sector investment is recommended to change, especially, in the strengthening of the research and extension service which enable to capacitate the farmer to change their traditional agricultural techniques. Consequently, the strengthening of the institutions is inevitable. Further more, the implementation of the studies will be required as to invest in a adequate method. The necessary study should be carried out by the public sector.

In so far as public financing option is concerned, various options (e.g. fiscal arrangement of federal and state governments including procurement of external loan, own finance of public enterprise, introduction of private finance for operation - concession, BOT, BOO, etc., private investment and so on) shall be presented for a wide variety of selection. At the same time, the share of the beneficiaries with respect to project investment shall be clarified. The development method shall also involve time schedule for implementation of projects/programs contemplated in the Master Plan. So as to enlarge so that the synergy effect of the Master Plan, projects and programs of the Master Plan shall consist of: 1) an integration of a general development proposal aiming at improving agricultural productivity of the state as a whole and 2) regional development proposal which benefits are anticipated to be diffused to peripheral areas.

Judging from the financial capacities of the State, implementation of the public works, which require more investment should not be adequate, at present. In a short run, the implementation of the works witch requires low unit cost per beneficiary will be recommended. Implementation of the high cost public work should be implemented a time when the State financial capacity is increased.

2.4 Development Zoning

In accordance with social features, land suitability for crop farming and amount of precipitation, the total territory of the state has been divided into the following six zones:

- Zone I: Bico do Papagalo
- Zone II: Northern area between the BR (National Route) 153 and the Araguaia River (From Araguaina to Colinas do Tocantins)
Central-south area extending alongside the Tocantins River to the south from Pedro afonso
- Zone III: Western area between the BR 153 and the Araguaina River (From Colinas do Tocantins to the south)
- Zone IV: Southeast area with relative high altitude
- Zone V: Northeast area and east area represented by Jalapão
- Zone VI: Ecological reserves represented by the Bananal island and indigenous reserves

The map, which delimits the agronomic zoning, is shown in the Figure X - 2.4 (1).

Tocantins State
 • Zone of production increase and environmental protection by intensification of the agricultural sector (rural extension, research activities).

Zone I
 • Zone of formation of mini and small farms by the development of the intensive agriculture and cattle breeding.

Zone II
 • Zone mainly for cereal production (soy bean, corn) and cattle breeding development.

Zone III
 • Zone mainly for paddy field and cattle breeding.

Zone IV
 • Zone for mini and small farms formation by fruit production and cattle breeding.

Zone V
 • Zone mainly for regional development of cattle breeding/ fruit production/silviculture.

A Extreme North
 B North
 C Northeast
 D Northwest
 E East
 F West
 G Central
 H Southeast
 I Southwest
 J South

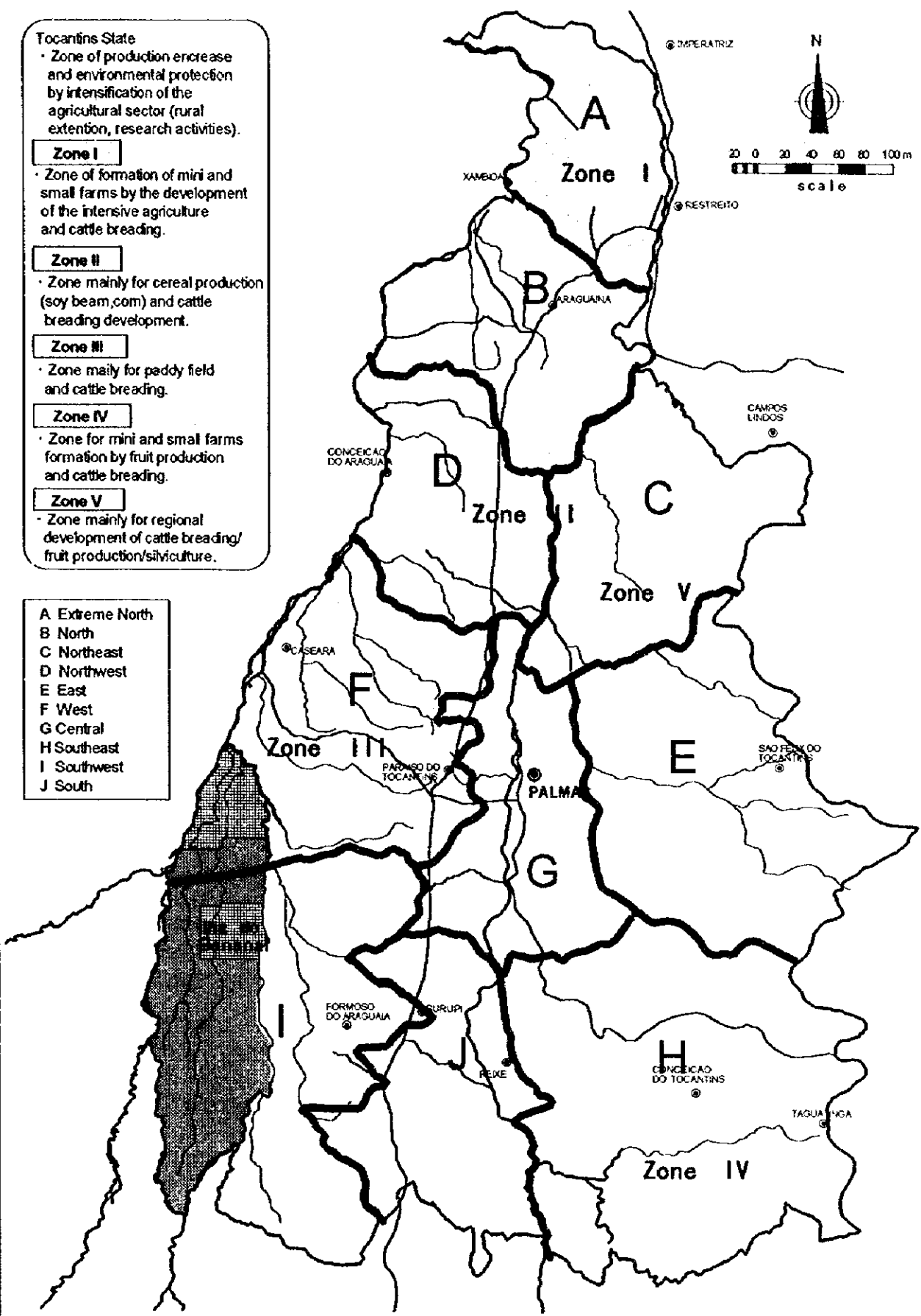


Fig. X-2.4(1) Agronomical Zoning

The salient features for each respective zone is resumed in the table below.

Regions (Zones)	Salient Features
Extreme-North (Zone I)	<ul style="list-style-type: none"> • The class II lands are concentrated with higher proportion • High intensity of fluvial system and potential area for small-scale hydraulic resources development • Higher population density and abundant potential labor force • Major concentration of new immigrants as well as landless peasants without land titling • Under-development of infrastructure compared with the number of municipalities, thus development of road infrastructure is critical for development
North (Partial)/ Northwest(Partial) (Zone II)	<ul style="list-style-type: none"> • Greater majority of the territory is occupied by the class II lands • Large holders predominate, so capital formation of farmers is relatively high. • Higher density of road network and easily accessible to the city of Estreito, a future entrepôt of agricultural commodities
Northwest(Partial)/ Central-west/ Southwest (Zone III)	<ul style="list-style-type: none"> • Suitable lands for crop production are extended over plains along rivers. • Higher precipitation • Paddy cultivation is a common practice • State roads to be united with the BR153 is being constructed
Central/South/ Southeast(Partial) (Zone II)	<ul style="list-style-type: none"> • Class II lands are widely distributed over plains along the Tocantins River • Under-development of road network except for northern sector
Southeast(Highland) (Zone IV)	<ul style="list-style-type: none"> • Located at relatively high altitude • Class I lands are sparsely found • Difference between daily high and low temperature is notable
East/Northeast/ North (Partial) (Zone V)	<ul style="list-style-type: none"> • Low density of population and less active of agricultural industry in comparison with the remainder of the state • Sandy soils which are less suitable for crop production are widely distributed • Potential lands for development are scattered • Least development regions with respect to consolidation of infrastructure
Environmental Reserve (Zone VI)	<ul style="list-style-type: none"> • Environmental and indigenous reserves

In view consideration of the salient features mentioned above, the development proposal for each zone shall be formulated in principle with the combination of the following development alternatives and on the basis of the administrative regions established by the state government.

1. Expansion of grains production
2. Rectification of disparities and increase of crop and livestock production among marginal and small farmers
3. Modernization and expansion of livestock industry
4. Encouragement of agro-industry
5. Amelioration of rural circumstances
6. Environmental conservation and sustainable agriculture

Meanwhile, farming proposal for respective zone is described below.

Zone	Farming Proposal
Whole Tocantins	Expansion of production owing to strengthening of the agricultural sector (Extension services and research and development)
Zone I	Upgrading marginal and small farmers with introduction of intensive farming
Zone II	Concentrated farming of grains (soybeans and maize) and livestock
Zone III	Concentrated farming of paddy and livestock
Zone IV	Fostering marginal and small farmers with introduction of fruits cultivation and horticulture
Zone V	Core development with introduction of livestock, fruits cultivation and reforestation

2.5 Implementation Method of the Master Plan

(1) Implementation Phasing

Bearing territorial extension and under-development of infrastructure into mind, an implementation phasing for development of the Master Plan is prerequisite for activation of state industrial sectors. The present Master Plan is a long-term planning task with a target year of 2015 that comprises various development components, thereby the projects/programs contemplated in the Master Plan should be put into implementation in conformity with the phasing order to be set following the grade of importance and urgency by sector and by region.

The under-development of the state's agricultural sector is due greatly to inappropriate utilization of land and water resources. In planning development projects/programs, focus shall be laid on improvement of agricultural productive infrastructure and social infrastructure that will enable rational and optimum utilization of resources, and expansion and diversification of agricultural production as well as improvement of living standard shall be realized in accordance with the phasing order mentioned before.

The implementation phasing of the Master Plan shall consist of: short-term (starting 5 years), medium term (6th – 10th years) and long term (remaining 5 years).

The development projects/programs can be divided into two categories: public investment option and private investment option; the former is further classified into three sub-categories: 1) those which cover the whole state in producing benefits, 2) those which are developed regionally and 3) those which are developed in harmony with environmental conservation, and higher priority shall given to sub-categories 1) and 3). Meanwhile, the priorities for the projects/programs classified as 2) shall be set referring to the following criteria:

1. Economic returns
2. Regional and social urgency
3. Direct and indirect effects of implementation
4. Environmental conservation
5. Investment cost

(2) Development Entities

Taking account of limited financial resources available for development of projects/programs of the state government as well as the federal government's reformed policy on investment of public works, effort shall be made to incorporate strategic development core sites as far as possible. In principle, the development entities shall be the local governments with participation of proposed beneficiaries, but for some projects that can not be implemented by local governments due to nature of their components, an implementation entity shall be created for each project.

2.6 Environmental Considerations

The state of Tocantins is a prospective state, which is expected to accomplish higher development in the near future, and, so as to enable this development sustainable, it is essential that devoted environmental considerations on evading negative effects of development projects should be taken. Land use plan to contemplate crop farming in conformity with the land suitability shall be thus forged prior to project implementation; on the basis of this land use plan, resettlement plan for new comers and land use plan for existing farmers shall be incorporated. In view of mitigating negative effect of project implementation on environment as far as possible, environmental monitoring system shall be proposed. Within this context, proposal will be also made to regulate the practice for burning grassland. The specific development strategies together with measures following these strategies are as resumed hereinafter.

2.7 Specific Development Strategies

The specific development strategies together with measures following these strategies are as resumed hereinafter.

Specific Strategies		Measures (Specific proposals)
Targets	Description	
Expansion of grains Production	To expand grains represented by maize, soybeans and rice and to aim at participating in the world market contributing to offset deficiency of grains worldwide in the future. Also to encourage an investment from outside the state.	<ul style="list-style-type: none"> • Preferential policies (taxation, land, etc.), to accelerate investment • Incentive measures to attract investment (taxation, land distribution, etc.) • Establishment of sustainable production system for grains • Participation of small holders in grains production • Development of agricultural infrastructure (irrigation system) • Research on production of hybrid seeds
Diversification of crop farming	To attain more stable farming operation with introduction of horticulture	<ul style="list-style-type: none"> • Introduction and promotion of fruit culture • introduction and promotion of vegetables culture
Modernization of livestock industry	To diversity livestock activity and to establish proper animal health protection system	<ul style="list-style-type: none"> • Improvement of animal breeding system and establishment of free zone for animal health protection • Encouragement of swine and poultry farming • Promotion of buffalo raising among medium farmers • Modernization of small and medium-scale slaughter house and improvement of inspection system

Development of agro-industry	To lay foundation stone for producing fertilizer within the state by optimum use of mineral resources available in the state. The challenge also involve development of agro-based industry for processing locally available produce so as to maximize value-added of commodities, to activate regional economy, and to general job opportunity.	<ul style="list-style-type: none"> • Reorganization of Exports Processing Zone (ZPE) • Incentive instruments for participation of private sector in investment • Better use of mineral resources (limestone) compatible with crops cultivated area • Utilization of by-products of grains (rice bran, soybean meal, etc.) • Intensification of producers' organization • Consolidation of transport infrastructure • Creation of animal feeds production industry
Improvement of marketing network	Aiming at reinforcement for competitiveness of the state, to improve transportation system represented by road and railroad and to consolidate logistics of agricultural commodities to invigorate marketing of commodities	<ul style="list-style-type: none"> • Improvement of transport infrastructure (road, railroad, waterway) • Modernization for logistics of commodities
Rectification of regional disparities and enlargement of agricultural production due to fostering of marginal and small farmers	In so far as soil and climate conditions permit, to aim to produce vegetables and fruits, consumption of which is heavily dependent on importation from outside the state.	<ul style="list-style-type: none"> • Colonization of landless marginal peasants • Strengthening of farming technology research and development system • Enhancement of extension services to farmers • Incorporation and intensification of farmers' organization (sharecropping, marketing)
Amelioration of rural environment	To provide comfortable rural infrastructure to serve ameliorating of rural living standard and thus to impede an exodus of rural inhabitants to urban area.	<ul style="list-style-type: none"> • Construction of social infrastructure (electricity, water supply, school, public health facility, community center) • Promotion of rural social activities • Incorporation of small-scale rural industry
Environmental conservation and sustainable development	To evade negative effects of project implementation on natural and social environment and to propose development plan which enables to sustain development benefits as long as possible	<ul style="list-style-type: none"> • Soil and water quality conservation • Environmental enlightenment education • Implementation of agro-forestry and social-forestry project • Establishment of environmental monitoring system • Protection of biological diversity
Fostering of small farmers	To provide existing small farmers with technical and financial assistance to upgrade these small farmers to the level of medium farmers	<ul style="list-style-type: none"> • Expansion and revision of NPA • Enlargement of technical assistance • Strengthening of rural credit services
Upgrading supporting services to farmers	To reinforce agricultural research system for development of crop farming technology suitable to local conditions	<ul style="list-style-type: none"> • Establishment of proper land tilling system • Improvement of quarantine and disease control system • Upgrading research system • Provision of adequate supporting services
Manpower development	To raise educational standard of local population to contribute technical renovation of agricultural sector.	<ul style="list-style-type: none"> • Upgrading vocational training • Consolidation of educational institutions

3 Development Framing and Identification of Beneficiaries

Phased development shall be proposed and the time span up to 2015 shall be classified into three terms: short, medium and long, and each term shall have a target year of fifth, tenth and fifteenth years from commencement of the Master Plan, respectively. Development framing for respective time shall be as follows:

(Short-term)

1. Implementation of projects/programs which can reduce social problems and insert inactive producers in productive activities.
2. Manpower development and supply of facilities and equipment for improvement of agricultural technology research system.
3. Formulation of institutional supporting program to farmers
4. Formulation of implementation program for regional development projects in areas where are highly suitable for agricultural production, less constrained from negative factors and are anticipated to produce highest returns.
5. Improvement of inspection, fiscalization, standardization and classification of agriculture and livestock products.

(Medium-term)

1. Implementation of highly benefited projects with eye laid on future outlook regarding supply and demand of food in the world.
2. Presentation of development proposal and formulation of projects implementation program for less developed areas.
3. Enforcement of policies to encourage development of agro-industry.

(Long-term)

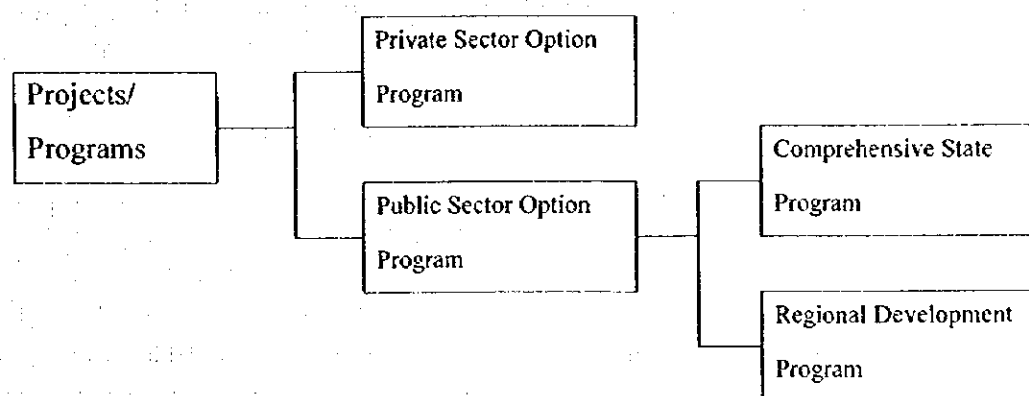
1. Exposition of projects in areas where are potential for agricultural production.
2. Development of agro-industry.
3. Implementation of a study on rational use of natural resources.

Beneficiaries of projects/programs of the Master Plan are defined as follows:

Term	Direct Beneficiaries	Indirect Beneficiaries
Short	<ul style="list-style-type: none"> • Farmers living in the region where is highly potential for agricultural production (north region) • Marginal peasants living in the suburbs of urban areas. 	<ul style="list-style-type: none"> • Peripheral inhabitants of project implementation area
Medium	<ul style="list-style-type: none"> • Farmers living in less developed regions. • Farmers living in remaining regions with high potentiality for agricultural production 	<ul style="list-style-type: none"> • Farmers covering the whole state
Long	<ul style="list-style-type: none"> • Farmers covering the whole state 	

4 Development Concepts of Projects/Programs

The development projects/programs conceived in the Master Plan can be divided into two categories: public investment option and private investment option; the former is further classified into two sub-categories according with the coverage of projects' benefits: 1) comprehensive state program and regional program. Furthermore, the comprehensive state program shall consist of environmental conservation, agricultural research/extension, manpower development, while the regional program shall be an integrated regional development.



(1) Comprehensive State Program

The comprehensive state program is composed of the programs, the covering area of which is extended throughout the state and the program comprises projects related with environmental conservation and expansion of agricultural production.

1) Agricultural Production Supporting System Strengthening Program

As the programs related to the increase of the agricultural production, the strengthening of the agricultural sector' institutions, the modernization of the livestock activities, strengthening of the research and development of the human resources are the necessary factors to improve the agricultural activities.

(Institutional Reform)

Presently, the state is not equipped with agricultural research and extension services system to be suited to local conditions and farmers are not adequately enlightened on farming. This situation justifies to propose strengthening of agricultural education and research/extension system as well as to proceed development of human resources to be engaged in the agricultural sector.

In the case of the State Secretary of Agriculture, furthermore the strengthening of the organization, the strengthening of the fit sanitary and plant guaranties are required in order to prevent the invasion of the disease and secure the quality of the agricultural product.

(Livestock Sector Modernization)

Taking into consideration that the livestock production is one of the important industry, the stabilization and increasing of the livestock productivity is key factor for the stabilization of the State economy. Paticullary, the stabilization of the livestock product through the freedom from disease which difficult the exportation and valorization of the product will contribute the stabilization of the economy, enabling to export to other countries with aggregated price. These freedom of disease will contribute to improve the small farmer's economic conditions to valorizing the product. Furthermore, the free zoom from disease, strengthening of the inspection of animal disease and qualities control will be require for its achievement.

(Agricultural Technology Research and Extension Organization)

At present, research activities related to the agricultural sector are carrying out by the faculty of agronomy and veterinary of the UNITINS with the poor facilities, some time the research activities are difficult to realize by the reason that the equipment are not sufficient. For the development of the research activities of the State, the collaboration of the UNITINS are fundamental factor. Furthermore, the installation of the research center which enable to carry out the sufficient and advanced research should be considered, especially to promote the introduction of the sustainable agricultural techniques.

(Human Resources Development)

In a promotion of the State development, the human resources development is an inevitable factor. However the State structure does not equipped to educate the human resources. In the course of the development, at a first stage, the strengthening of the education of the agricultural technicians for the extension of the innovated techniques will be recommended.

Strengthening of the agricultural sector shall be attained through the following steps:

1. Investigation on necessary equipment and installations and on the scope for improvement
2. Formulation of strengthening programs/projects (human resources development, agricultural education, agricultural research, extension services, etc.)
3. Consolidation of infrastructure
4. Implantation of Civil Works
5. Implementation of programs/projects (education and research)
6. Intensify extension services

The programs/projects to be formulated are as numerated below.

Public Investment Option: Programs of High Public Interest	Projects
Institutional reform	<ul style="list-style-type: none"> - Land titling and registration system improvement - Structural reform of organizations - Plants inspection system and agro-products inspection system
Livestock sector modernization	<ul style="list-style-type: none"> - Establishment of animal disease-free zone - Strengthening of animal health
Agricultural technology research and extension organization	<ul style="list-style-type: none"> - Strengthening of UNITINS agricultural division at Gurupi - Promotion of school of veterinary medicine of UNITINS
Human resources development	<ul style="list-style-type: none"> - Agricultural vocational training - Educational institutions strengthening - Farmers' organization promotion

2) Environmental Conservation Program

As a program for the conservation of the environmental factors, attention to the following factors will be paid.

1. Forest fire caused by practice of burning off
2. Deforestation due to disordered development
3. Water contamination stemmed from sewage of agro-industry

For the prevention of the natural resources deterioration, comprehensive measure composed by the implementation of public investment and participation of the private sector will be required. The public sector role is to control the deterioration and private sector's role is to contribute the improvement of the environmental condition.

The contents of the Program are summarized as follows;

Public Investment Option: Programs with Major Component of Environmental Conservation	Projects
Environmental conservation	<ul style="list-style-type: none"> - Promotion of sustainable reforestation - Control of burning off natural vegetation - Mitigation of water contamination - Environmental enlightening and education

	- Establishment of environmental monitoring system
Green village	- Improvement of rural environment - Sustainable farming model - Distribution of seeds and seedlings

On the basis of the utilization of the private sector force to improve the environmental conditions, the project required the implementation by the public sector will be planned as a public sector implementation. For the utilization of the private sector force, special credit line will be established.

(2) Regional Development Program

The development program shall be formulated regarding the following then (10) regions divided by the state government.

1. Extreme-North Region (Zone I)
2. North Region (Zone II & Zone V)
3. Northwest Region (Zone II & Zone III)
4. Northeast Region (Zone V)
5. Central-West Region (Zone III)
6. Central Region (Zone II)
7. East Region (Zone V)
8. Southwest Region (Zone III)
9. South Region (Zone II)
10. Southeast Region (Zone II & Zone IV)

The expansion of agricultural output for respective region shall be by means of various measures relevant to grains, fruits and vegetables cultivation together with promotion of livestock sub-sector. Various measures shall comprise, but not limited to, the following items, namely:

1. Identification of potentials for each regions to comply with the results of the Master Plan Study
2. Implementation of the feasibility study on development of infrastructure in connection with potential development areas
3. Formulation of development projects
4. Implementation of development projects
5. Operation of infrastructure and commencement of productive activities
6. Rendering extension services
7. Provision of rural credit
8. Encouragement of agro-industry
9. Introduction of livestock projects

Projects/programs to be taken up for the regional development may be summarized in the following manner.

Regional Development Program	Description of Sub-programs
1. Extreme-North Region (Zone I)	- Expansion of grains production
2. North Region (Zone II & Zone V)	- Diversification of productive activities

3. Northwest Region (Zone II & Zone III)	<ul style="list-style-type: none"> - Promotion for improvement of livestock - Encouragement of agro-industry - Improvement of marketing network - Consolidation of social services
4. Northeast Region (Zone V)	
5. Central-West Region (Zone III)	
6. Central Region (Zone II)	
7. East Region (Zone V)	
8. Southwest Region (Zone III)	
9. South Region (Zone II)	
10. Southeast Region (Zone II & Zone IV)	

(3) Private Investment Option

Programs to be included in the private investment option shall be combined with those of the public investment option so that expected effects of project implementation may be multiplied. Proposed programs in this category are as listed below.

Programs	Sub-programs
Incentive program for exports	<ul style="list-style-type: none"> - Exportation processing zone- ZPE - Installation of in-land port
Modernization of the agriculture and livestock products commercialization	<ul style="list-style-type: none"> - Creation of commodities stock market - Wholesale market of vegetables and fruit
Promotion for processing industry of agricultural products	
Promotion for use of by-products of grains	<ul style="list-style-type: none"> - Promotion for attraction of entrepreneurs for the ZPE - Introduction of private investment
Promotion for effective utilization of agricultural inputs	<ul style="list-style-type: none"> - Local supply of lime - Local supply of chemical fertilizers
Improvement of livestock products	<ul style="list-style-type: none"> - Modernization of slaughterhouse of swine

5 Agricultural Development Plan

5.1 Brief Description of the Agriculture and Livestock Development Plan

The formulation of the Master Plan for the Agriculture and Livestock will be carried out for the following components for the target year of 2015.

- Regional Development Program
- Agriculture Production Supporting System Strengthening Program
- Environmental Conservation Program
- Technologies Development Program for Sustainable Agriculture and Livestock
- Private Sector Program

Regional Development Program will be planned for the 10 regions in which the state was divided by the government, taking into consideration the economic and social priorities of each region. The implementation of the program will be carried out gradually according to its priority. In the Planning, the projects will be classified as private sector projects and public sector projects. In the implementation schedule for the public sector project, the economic and social aspects of each project will be examined. Based on the results of the economical and social studies, the priority of each project will be determined, taking into consideration their contribution for the alleviation of the social discrepancy problem. Regarding the private sector projects, consideration will be given to the promotion of investments and farmers capitalization, promoting the expansion and diversification of agricultural production as well as the modernization of the livestock production.

The objectives of the Agriculture Production Supporting System Strengthening Program are to assist the agricultural production activities through the strengthening of the agricultural extension and research services and the human resources fostering plan. Considering the long term period necessary for the Program to achieve its objectives and its importance to increase the agricultural production, the implementation of this Program is highly recommended to be carried out at an early stage and in due consideration of the State Budget conditions.

The objective of the Environmental Conservation Program is to promote the harmonious development of the State together with environmental conservation activities. This Program is composed of two subprograms, one is the environmental conservation program and the other one is the so called "Vila Verde" program. This last subprogram objectives are to study alternatives for the sustainable agricultural development which can be implemented utilizing agricultural credit.

The objective of the Technologies Development Program for Sustainable Agriculture and Livestock Farming is to demonstrate the alternatives for a sustainable agriculture aiming the future regional development. This program shall be implemented prior to the implementation of other programs, through the installation of a model farm where the

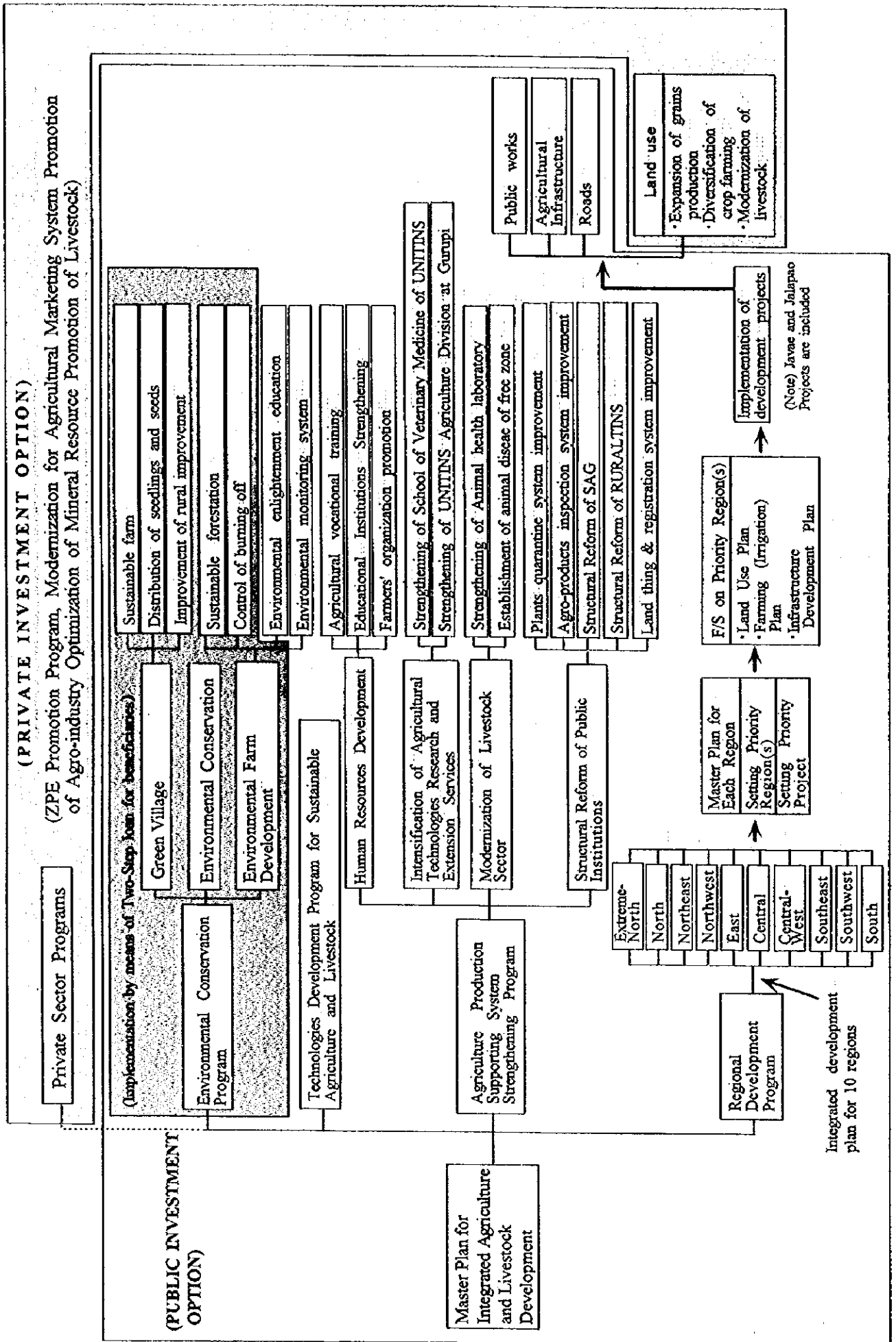
experiences are going to take place. In this model farm, the introduction of new innovative agriculture methods and agricultural extension services will be studied.

The Private Sector Program is composed of subprograms which will be financed by the private sector. In the implementation of the Program, alternatives to increase propensity for investments will be studied.

The details of the Master Plan are shown in Fig. X – 5.1 (1) This program aim to achieve the sustainable development through the mutual interaction of each program. The detail of the each program are as follows;

Program	Subprogram
Regional Development Program	<ul style="list-style-type: none"> • Extreme-North Region Development • North Region Development • Northeast Region Development • Northwest Region Development • East Region Development • Central West Region Development • Central Region Development • Southeast Region Development • Southwest Region Development • South Region Development
Agriculture Production Supporting System Strengthening Program	<ul style="list-style-type: none"> • Structural Reform of Public Institutions • Modernization of Livestock Sector • Intensification of Agricultural Technologies Research and Extension Services • Human Resources Development
Environmental Conservation Program	<ul style="list-style-type: none"> • Environmental Conservation • Green Village • Demonstration Farm Development
Technologies Development Program for Sustainable Agriculture and Livestock Farming	<ul style="list-style-type: none"> • Promotion for Technological Development for sustainable Agriculture and Livestock Farming
Private Sector Program	<ul style="list-style-type: none"> • Incentive for Exports Processing Zone • Modernization for Marketing of Agro-products • Encouragement of Agro-industry • Promotion for Use of By-products of Grains • Promotion for Effective Utilization of Agricultural Inputs • Improvement of Livestock Products

Fig.X-5.1(1) Composition of the Master Plan for Integrated Agriculture and Livestock Development



5.2 Regional Development Program

The objectives of the Regional development program are to promote the vitalization of regional economic activities through the formulation of a regional master plan study for the agriculture and livestock sectors, establishing an adequate land use plan, increasing crop production and diversification of agricultural activities, promoting the livestock sector modernization and the agro-industrial activities. Prior to the implementation of the program, it is necessary to carry out a Master Plan study in order to investigate the adequate development method. The Studies will be carried out for the 10 regions defined by SEPLAN. The main characteristics of each region are as follows;

Region	Characteristics
Extreme-North Region	<ul style="list-style-type: none"> • Existence of vast areas with a Land Suitability of class II • River density is high and it is possible to make use of the water resources through small scale development works • Population density is high as well as the labor force number • Great number of new residents and workers without land ownership (sem-terra) • Great number of extractive activities • Inefficient infrastructure, specially road network
North Region	<ul style="list-style-type: none"> • Existence of vast area with a Land Suitability of class II, especially the area between BR-153 and Araguaia river • Great number of large land holders with a comparatively high capitalization capacity • Moderately good conditions of road network, and good location in relation to the future embarkation site "Estreito"
Northeast Region	<ul style="list-style-type: none"> • Land suitability for agricultural use is not good, except for some parts. A future suitable activity for this region is silviculture. • Road access to BR-153 is not good because of the Tocantins River. In a future development, the construction of bridges over the river aiming to flow out the agricultural production is necessary
Northwest Region	<ul style="list-style-type: none"> • Existence of an area with a Land Suitability of class II in the northern part of this region • Geographically, this region is located close to the future embarkation site "Estreito" • Existence of paddy land suitable areas • High precipitation is verified
Central West Region	<ul style="list-style-type: none"> • Existence of land suitable for agriculture purposes along the Tocantins River margins • High precipitation is verified • Paddy cultivation is already being carried out
East Region	<ul style="list-style-type: none"> • Sparsely populated and small scale agriculture and livestock activities are carried out • Great distribution of sandy land, presenting low suitability for agricultural use due to low fertility • The infrastructure, specially road network, is extremely precarious
Central Region	<ul style="list-style-type: none"> • Great area of suitable land for agricultural use along the Tocantins River margins • Inefficient road network, except northern part of this region
Southwest Region	<ul style="list-style-type: none"> • Existence of suitable land for agricultural use along the river margins • High precipitation is verified • Existence of paddy cultivation • Existence of a M/P study (Javaés Project) • Installation of road network is in progress
Southeast Region	<ul style="list-style-type: none"> • High elevation is verified • Existence of Land Suitable Area Classified as I • High Variation of Daily Temperature
South Region	<ul style="list-style-type: none"> • Existence of suitable land for agricultural use along the Tocantins river margins • Good conditions of road access to BR-153
Environmental Preservation Area	<ul style="list-style-type: none"> • Environmental Preservation and Indigenous Reservation Areas

In the Regional Development Program, the Study for the North Region, which has a high prosperity for the development, will be carried out at the first stage and the implementation of the program will be carried out as follows;

1. Clarification of the Program contents, through the M/P and F/S Studies
2. Determination of the Implementation Organization and budget accommodation
3. Implementation of the Project (Public Sector)
4. Invitation for the private sector investments

The contents of the M/P or F/S Study are as follows;

1. Land Use Plan
2. Agriculture Infrastructure Plan
3. Agro-Economy Plan
4. Livestock Improvement Plan

(1) Land Use Plan

1) Land Suitability for Agricultural Use

It is important that the agriculture and livestock development should be planned based on the suitability of land which include soil characteristics, topography etc. At present, the land use in the State of Tocantins is mainly focused on livestock farming and still there is a high potential for agriculture and livestock development. Especially the farms with less than 1000 ha area should diversify the farming by cultivation of crops other than pastures in order to increase the agricultural production.

As shown in Fig.X – 5.2(1), land suitable for agriculture and livestock production can be divided to land suitable for agriculture, animal husbandry, and silviculture. Land suitable for agriculture can be further divided into land suitable for upland agriculture and low land agriculture. Ecological reserves and Indian reserves will be kept as reserved areas. Although the land classes with high land suitability (classes 1 and 2) are classified as agriculture lands, these areas are also suitable for livestock farming. Although the class 3 lands also have a restricted suitability for agriculture, high level of technology is required for these areas and therefore agricultural farming in these lands are not profitable. Therefore these areas can be recommended for livestock farming. The total areas covered by these categories are shown below :

Land Suitability Classification	Area (1,000 ha)	Proportion to Total Area (%)
Total Area	27,842	100.0
Agriculture	8,809	31.3
Livestock ^{1/}	12,469	44.8
Forest ^{2/}	23,434	84.2
Conservation Area and Unusable Area	4,407	15.8

Note: 1/ includes suitable area for agriculture

2/ includes suitable area for both agriculture and livestock

LEGEND

- Up Land Agriculture
- Low Land Agriculture
- Cattle Breeding
- Silviculture
- National Park
- Indian Reserve
- Future Reserve Area
- Zoning Boundary

A EXTREME-NORTH
 B NORTH
 C NORTHEAST
 D NORTHWEST
 E EAST
 F CENTRAL-WEST
 G CENTRAL
 H SOUTHEAST
 I SOUTHWEST
 J SOUTH

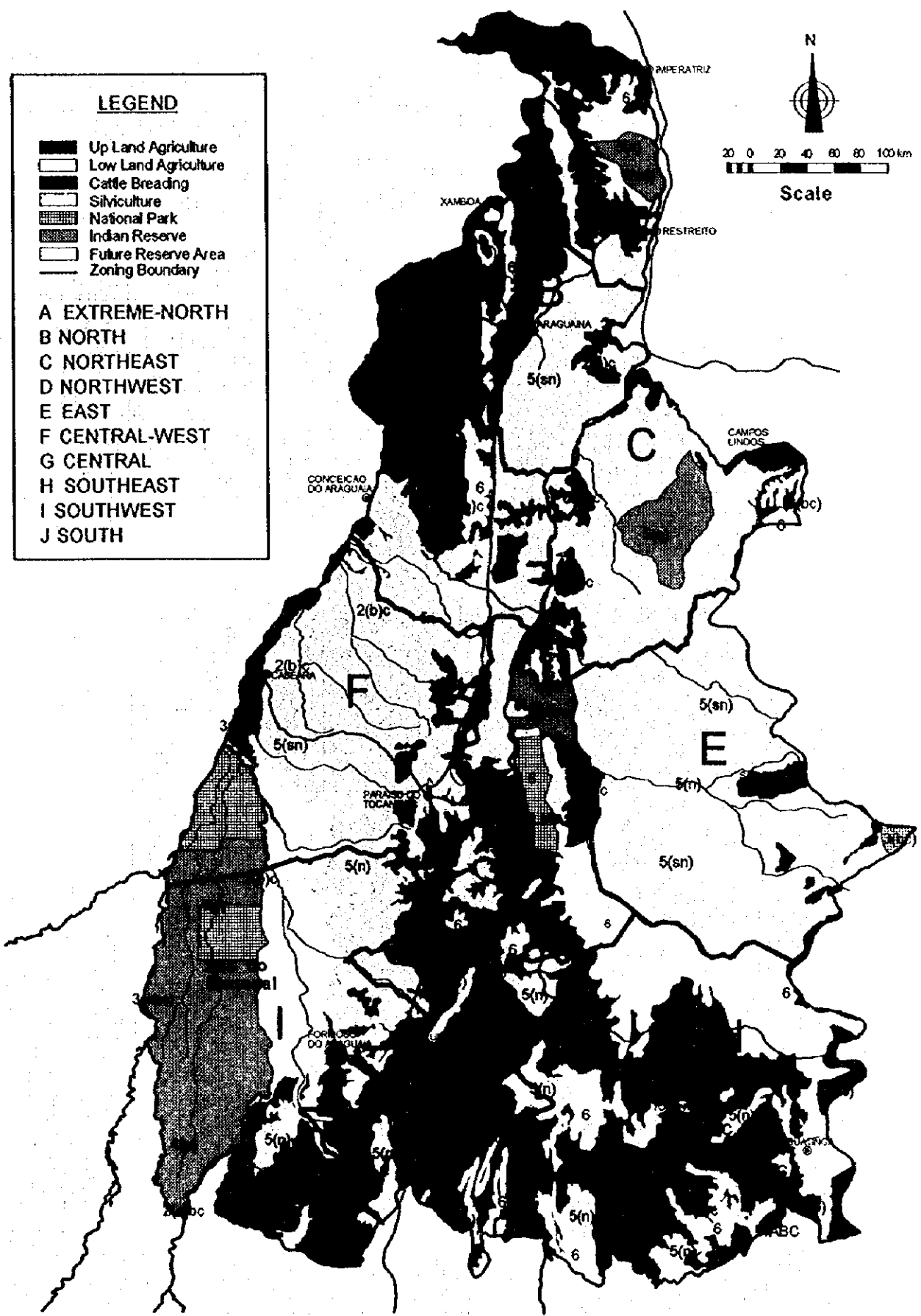
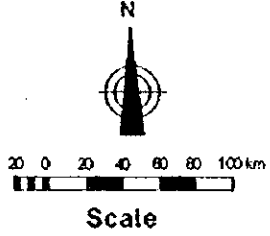


Fig.X-5.2(1) Land Use Plan

Distribution of the land suitability for each region are as follows;

Unit: ha

Regions/ Suitability	Total	Agriculture	Livestock 1/	Forest 2/	Useless Area	Conserva- tion
External North	1,596,720	895,000	921,060	1,429,293	148,100	19,327
North	2,108,210	1,087,560	1,087,560	2,010,890	0	97,320
North -- East	2,403,281	382,900	382,900	2,043,303	350,200	9,778
North- west	1,908,099	919,820	982,770	1,785,350	0	122,749
East	3,411,320	204,654	204,654	3,134,478	34,130	242,712
Central West	3,045,930	607,928	733,520	2,590,488	444,490	10,952
Central	2,307,940	1,083,310	1,083,310	2,017,490	290,000	450
South East	4,743,290	1,504,490	2,867,600	3,675,310	0	1,067,980
South West	4,049,679	491,915	2,373,653	2,582,979	1,466,700	0
South	2,267,601	1,632,140	1,832,580	2,165,120	0	102,481
Total State	27,842,070	8,809,717	12,469,607	23,434,701	2,733,620	1,673,749

Note: 1/ includes suitable area for agriculture

2/ includes suitable area for both agriculture and livestock

Calculated area under the Legal Amazon regulation for each region is as follows;

Unit:ha

	Total	Agriculture	Livestock 1/	Forest 2/	Useless Area	Conserva- tion
External North	1,596,720	447,500	460,530	968,763	148,100	19,327
North	2,108,210	543,780	543,780	1,467,110	0	97,320
North - East	2,403,281	191,450	191,450	1,851,853	350,200	9,778
North- west	1,908,099	459,910	491,385	1,293,965	0	122,749
East	3,411,320	102,327	102,327	3,032,151	34,130	242,712
Central West	3,045,930	303,964	366,760	2,223,728	444,490	10,952
Central	2,307,940	541,655	541,655	1,475,835	290,000	450
South East	4,743,290	752,245	1,433,800	2,241,510	0	1,067,980
South West	4,049,679	245,958	1,186,827	1,396,153	1,466,700	0
South	2,267,601	816,070	916,290	1,248,830	0	102,481
State	27,842,070	4,404,859	6,234,804	17,199,898	2,733,620	1,673,749

Note: 1/ includes suitable area for agriculture, 2/ includes suitable area for both agriculture and Livestock

In the arable land, a high priority should be given to the land with the land suitability classification of 1 and 2 and these classes occupy an area of 0.6% (1577 km²) and 19.4% (54,198 km²) respectively. Especially the extreme north and northern region have a high percentage of land suitable for agriculture followed by southeast, southwest and southern regions. In the eastern Jalapao region, most of the lands have suitability only for silviculture. Most of the low land agriculture areas are mainly concentrated in the central west and southwestern region.

2) Land Use Plan

In order to make an effective land-use plan, not only the land suitability but also other factors such as the socioeconomic conditions, road infrastructure and climatic conditions should also be considered. Besides, the zoning, which was made by SEPLAN, is also used as the basis of the land use plan. The land use plan for the 10 zones are briefly described.

- **Extreme North Region:** Agriculture lands are highly concentrated in this area. And there is a high population density with abundant labor force. Besides, landless peasants and new immigrants are also concentrated in this area. However there is a poor infrastructure development in this area. The annual precipitation in this area falls in the range of 1500-1700 mm. considering all these factors, it is suggested that an intensive agriculture plan shall be carried out in this region. Apart from the cultivation of food crops such as rice, feijao, cassava, soybean, the intensive agriculture should also include vegetable cultivation, fruits (banana, pineapple, orange etc.) so that the labor force can be used more effectively. An intensive livestock farming shall include rearing of pigs, chicken etc. This type of farming can be carried out as family agriculture, by which the adult members of the family can be engaged in intensive agriculture. The agricultural research on the intensive agriculture and livestock farming shall be carried out at the Federal Agriculture School in Araguatins.
- **North Region :** Similar to the extreme northern region, the western part of the northern region is also concentrated with lands of high land suitability. Besides, the large holders predominate in this area. There is a higher density of road net work in this region with the big city Araguaina being located at the center of the region. The rainfall in this area range from 1300-1800 mm. In this region, commercial farming with soybean and maize shall be followed. Livestock farming shall also be carried out at a bigger scale. And the Araguiana city shall be commercial center of the region for the marketing of agriculture and livestock products.
- **Northeast Region :** This region has pockets of lands suitable for agricultural production in the western areas at Itapiratins, Santo Mario do Tocantins, and Pedro Afonso. Besides, there are also suitable lands in the eastern areas at Campos Lindos. Other than these pockets of lands, most of the area is suitable for silviculture and some of the areas are kept as Indian reserve areas. The annual rainfall in this area is around 1600-1800 mm. In the above mentioned areas where the lands are suitable for agriculture, cultivation of annual and perennial crops shall be carried out. Silviculture is more suitable for most of the region and this area is also suitable for livestock farming with pasture cultivation.
- **Northwest Region :** In the northern part of the northwestern region, there are lands suitable for agriculture cultivation. This region also has areas suitable for livestock farming and silviculture. At present, livestock production is the main economic activity in the region. In some of the areas rice, corn and feijao beans are cultivated.

Rainfall in this area amounts to 1800 - 2200 mm. Livestock farming is carried out extensively and milking cattle is widely spread out. The milk is sold to the nearby municipality or delivered to milk processing plants in the region. Poultry is also practiced for self consumption. Therefore, upland cultivation and paddy cultivation (some low lying areas) combined with corn and soybean and livestock farming shall be recommended for this region.

- **Central-West Region** : In western region, there are suitable lands along the rivers. These areas also have a higher precipitation of 1700 - 2200 mm. Lowland paddy cultivation is recommended for these areas. Besides, corn and feijao beans can also be cultivated. At present, most of the areas are occupied with pastures with small use of annual and perennial crops. Furthermore most of the lands are still kept as fallow land. In this region, paddy cultivation combined with corn and soybean shall be recommended. Besides livestock farming and poultry are also recommended.
- **East Region** : The eastern region which is mainly represented by Jalapao covers a wide area with a land use of mainly silviculture. There are many areas which higher altitude. These areas receive an annual rainfall of 1300-1600 mm. There are some areas around the municipalities of Sao Felix and Mateiros which are more suitable for livestock farming. In Jalapao, Buriti trees can be found in most of the areas near the water courses. With suitable irrigation facilities, fruit cultivation can also be carried out in these Municipalities. At present, this area has a poor road net-work. In the future, when the road infrastructure is developed in the region, fruit cultivation and cultivation trees of Buruti and coconut can be carried out near the water courses.
- **Central Region** : In this region, the lands suitable for agriculture are extended along the Tocantins river. This area has a rainfall of 1600-1800 mm. The Capital city Palmas is located in the center of the region and it can be considered that this region has a high potential for marketing of vegetables and fruits. A green belt of agricultural farms shall be established around the Palmas city. There are also areas in the western and northern part of the region which are suitable for livestock farming and silviculture respectively.
- **Southwest Region** : The western part of the region is mainly covered with the Bananal Island. And there are wide areas which are suitable for irrigated rice cultivation. There are also areas suitable for upland cultivation in the southern part of the region. Silviculture and livestock farming can be carried out in the eastern part and southeastern part of the region. Livestock farming mainly concentrates on bovine and poultry. The annual rainfall in this area range from 1500-2000 mm. This region shall mainly focus on rice cultivation and livestock farming.
- **South Region** : This region has an annual rainfall of 1300-1500 mm. Most of the region fall in the land suitability classes of class 2 and 3. Besides, the national high way BR-153 also runs through this region. The agronomy department of UNITINS is also located in the region. Agriculture and livestock farming shall be carried out more extensively in this area. Besides, agriculture research areas and some pilot

farms shall also be selected in the southern part of the region which can be easily accessible to the UNITINS Gurupi Center.

- **Southeast Region** : This region also has a high percentage of lands suitable for agriculture which are distributed in the middle-northern part and southeastern part of the region in the municipalities of Natividade, Almas, Chapada. This region also has highly suitable land of level 1, in the municipalities of Aurora do Tocantins, Novo Alegre, Novo Jardim and Taipas do Tocantins. This region receives an annual rainfall of 1200-1700 mm. At present, livestock farming is carried out extensively in the area and therefore pasture cultivation is carried out in most of the area. There are also other cultivations such as rice, corn, feijao, sugarcane and cassava at a lesser scale. Agriculture areas should be developed more in the region, especially where the lands with high suitability (land class of 1). Besides vegetable cultivation should also be increased more in the region.

(2) Agricultural Infrastructure Improvement Plan

At the M/P Study, the agricultural infrastructure improvement plan will be established, from the point of irrigation and drainage facilities, road facilities, storage facilities, marketing facilities and social facilities. In the Study, consideration to the alleviation of the financial factor for the State Government will be taken.

(3) Farming System Development Plan

The main basis of the agricultural production plan is sustainable agriculture production while focusing on the following major objectives :

- 1) Increasing the agricultural yield and the total production of the State
- 2) Improving the farmers income and the standard of living
- 3) Provision of employment opportunity for the landless farmers

In order to achieve the sustainable agriculture production, the agriculture and livestock plan should keep the concept of maintaining the production at the same level or at a better level. The improvement in production can be achieved only through the implementation of new technology and therefore new technological research on the suitability of new & innovative technology which can be adopted to local soil, climate and hydrological conditions becomes important. It can be achieved through new researches to be conducted through pilot farms which can be carried out by UNITINS and other similar research institutions. The research should focus on new varieties, cultivation technology and the crops such as fruit crops which are suitable for the local conditions. In order to carry out an effective research, the betterment of the facilities of UNITINS and other research institutions becomes necessary. The new cultivation technology should also be disseminated to the following through proper extension of RURALTINS and therefore strengthening of RURALTINS also becomes important.

Another important factor to achieve sustainable agricultural production is to maintain

the soil fertility and preventing the soil degradation and soil erosion. Soil organic matter is the most important criteria with regard to soil fertility. It has a significant influence on the physical properties of the soil and strongly influence its chemical and biological properties. Soil organic matter acts as nitrogen reservoir and furnishes a large portion of soil phosphorus and sulphur. One of the possible ways to improve the soil organic matter is by carrying out combined agriculture and livestock farming. At present livestock farming is carried out extensively even in areas where the lands are very suitable for agriculture cultivation such as class 1 lands in Aurora do Tocantins. If combined agriculture and livestock farming can be carried out, it not only will increase the agricultural production, and benefits to the farmers but also will maintain the soil fertility. The basic strategy of combined agriculture and livestock farming development is mentioned below :

The field will be divided into two parts where one half will be used for agriculture and the other half will be used for animal husbandry. In the agriculture field, the grains such as corn, soybean and feijao can be carried out. Through the introduction of suitable irrigation system, the cultivation can be carried out even during the dry season. In the other half of the field, pasture shall be grown which will be fed to the livestock, especially the beef cattle. After a period of four or five years, the farming should be interchanged and the agriculture field should be converted to livestock farming and vice versa. Because of the livestock farming, the soil organic matter in that half of the field will increase more during the 4 or 5 years period, which will be effective for increasing the agriculture production. The soil fertility which was lost by agricultural cultivation can be replenished by shifting the livestock farming to this half of the field. By this way, the sustainable agriculture and livestock production can be continued.

Another type of farming which is suggested is vegetables and fruits production combined with pig and poultry farming. This type of farming shall be carried out near the suburb of the towns (such as Araguaina, Palmas, Gurupi) which can be developed as green belts. The products of these farms such as fresh vegetables, fruits, pigs and poultry can be easily marketed to the major towns.

Intensive agriculture is recommended for the areas with high population density with abundant labor force such as the extreme-north region. Intensive agriculture also provides employment opportunity for the landless farmers. Intensive agriculture should include vegetable cultivation (water melon, tomato, onion etc.) fruits (banana, pine apple, orange etc.) so that the labor force can be used more effectively. An irrigation system such as drip irrigation or sprinkler irrigation is suitable for these areas. Intensive livestock farming shall include rearing of pigs, poultry etc. These type of farming can also be carried out as family agriculture, by which the adult members of the family can be engaged in intensive agriculture. The agricultural research on the intensive agriculture and livestock farming shall be carried out at the Federal Agriculture School in Araguatins.

One of the areas which needs more improvement is the eastern Jalapao region. At present, this area has a poor road net work. This is a semi-arid area which is mostly

suitable for silviculture. There are many areas which has higher altitude. In this region, livestock farming can be carried out around the municipalities of Sao Felix and Mateiros. And with suitable irrigation facilities, fruit cultivation (cashew nuts, buriti, biqui, coconut etc.) can also be carried out in these Municipalities. Considering the future development when the road infrastructure is developed in the region, it can be extended to other parts of the region based on the results of the pilot farms.

Formation of associations and rural cooperatives is also important in the agriculture and livestock development plan. Unlike the big landholders, the small landholders and marginal farmers can not keep their own farm machinery. The farm machinery and farm inputs can be supplied to the farmers through these associations and the farm products can also be sold through these associations. Therefore formation and strengthening of these associations should also be included in the agriculture development plan.

Development of infrastructure facilities such as irrigation facilities, road net work, rural roads are also important parts of the agriculture and livestock development plan. Without a proper transport net work, it would be difficult to market the products within the state and out of the state. Suitable storage facilities are also necessary. A more detailed discussion on individual projects based on the agriculture development plan are provided in section 9.4.

(4) Livestock Development Plan

Livestock industry is one of the most important sectors of the Tocantins State economy and this situation is considered not to change hereafter. Since livestock activity has been practiced in all over the state, most of the farmers earn their living from it. Thus, it is quite important to improve the livestock industry in order to develop the economical situation of the state. Future development measures should be taken as follows:

1) Development Measures for Cattle

a. To improve stocking rate

Production per unit of land is an important measure for efficient use of pasture. The stocking rate may vary depending on the farm scale. In general, smaller-scale farms raise one mature cattle in 5 to 6 ha while larger-scale farms are capable to keep it in 2 to 3 ha. Production per unit area of pasture can be dramatically increased when the carrying capacity is improved. To improve the stocking rate, the following measures should be taken.

To improve calving and weaning rate

It is recommended to improve nutrient and health condition of the cattle herd by upgrading the calving rate (up to 60-70%) and weaning rate (up to 80%). To achieve this target, training system of the SAG and RURALTINS must be strengthened so that local

veterinarians and AI technicians can improve their diagnosis and treatment abilities for reproductive disorder of cattle.

To supply adequate feed during the dry season

When struggling a feed shortage due to scarceness of pastures or green grasses in the dry season, converting natural grassland to improved pasture land is one of the effective measures to be taken. However, it is more recommended to utilize Andropogon grass, which exists all over the state, as a forage grass. Comparing to other grasses, Andropogon has extremely high yield performance, 100 ton/ha per year, as it can be harvested six times a year. Andropogon can be used in the form of silage (when considering current high cost of construction materials and farm implements in Tocantins, the trench or bunker silo is recommended for silage storing), hay, or whatever crop residues available. In order to sustain much increased livestock production, measures, such as increasing fodder crop production for zero-grazing or stall grazing, expanding controlled pasture area, and improving quality feed supplement, must be taken together with a feeding program. Therefore, extension services of the SAG and RURALTINS need to train farmers more effectively by improving their programs. The training programs must include selecting grasses, managing pasture, as well as practicing proper feeding. Moreover, smaller tractors or grass choppers may be needed in group working.

To promote extra feed preservation during the dry season

In order to supply feed in the dry season, we can utilize alternative resources such as farm waste (rice straw, corn stovers, soya stovers, sugar cane top, etc.) and farm by-products (grained rice and beans, damaged fruits, etc.), which are constantly available. This will result in increasing the capacity at farms by preventing weight loss of cattle in the dry season. Thus, it is necessary to promote this alternative feeding supply among local cattle producers.

To promote natural grassland improvement

Since the productivity in native grassland is low, it must be improved in order to increase its nutritive value and productivity by raising Brachiaria or Napier at smaller farms. There are usually many spring waters and damp areas even in smaller farms, so cultivating these grasses may not be very difficult. Introduction of these grasses may result in high annual cattle production as yield performance of green fodder will be highly increased.

b. To promote terminal crossing

In this country, it has been more and more popular to perform crossbreeding system in which two purebreds are crossed to produce F1 (first filial generation) crosses, as this system produces high quality beef in relatively short growing period. In addition, it produces a cattle with resistance to disease, heat, and ticks is considerably high.

Continuous single crossing or systematic crossing will produce F1 by taking advantage of heterosis in the crosses. A terminal crossing between temperate and tropical breeds is recommended as one of the simple crossing system. In this system, European purebred bull is used. SAG or RURALTINS technicians should improve their capability for the Artificial Insemination. The feasibility and combination of breeds in smaller farms and the region deserve further study.

c. **Animal disease repulsion**

To promote calf pneumonia prevention measures

In general, June through October is a dry season which falls on calving season. Calf mortality in the state becomes significantly high during this season as its first cause, pneumonia often outbreaks while a calf is suffering from scours due to sudden changes in the environment temperature and humidity. In order to decrease the mortality rate, pregnant cattle and new-born calves must be abundant in barns or corrals. This gives both mothers and calves proper treatment under strictly controlled environment. As crossbred calves have higher resistance to diseases, promoting a crossbred production must be the first prevention measure to reduce calf mortality rate.

To promote parasite control

The parasitic disease, which especially brings aggravate result to reproductive physiology and growth rate, often outbreaks due to combined several parasites and a low nutritive value. Periodical deworming, dipping, and spraying are recommended as practical prevention measures. These measures are also effective to shorten cattle growing and feeding periods at smaller farms, which usually take 4-5 years to raise their cattle to 400 kg. Regular farm visit by SAG or RURALTINS technicians should also be highly encouraged.

2) Measures for Another Livestock Industry

Tocantins livestock products are less competitive within the country because of its high transportation cost. This also results in increasing its production cost. Therefore, it is necessary to improve new livestock field (including hogs, local chicken, buffaloes, and possibly goats) and farming system (both for backyard and commercial) which have not been performed systematically in other states. Buffalo production is especially important as it produces mozzarella cheese and low cholesterol buffalo meat which are popular in world-wide market. Also, establishment/enhancement of commercial enterprises for local poultry meat and eggs must be encouraged, because these products have large potential to increase when targeting the middle class consumers. In particular, demand for mozzarella cheese has been exceeded its supply, as it is gaining world-wide popularity. Its demand has increased even in Brazil. Since current systematic buffalo production is limited mostly in the southern states, it is expected to develop this production in Tocantins, which has a quite suitable climate for raising buffaloes.

Although swine industry has consistently dominated other livestock products in the world in terms of volume, value of production, and trade, it has not been well practiced in Latin American countries. However, following industrialization and increment of GNP in these countries, processed pork is now enjoying its great popularity in Brazil as well as in other South American countries. It is expected that swine industry in Latin America would grow more and more in the near future. Because Tocantins is known for its rice and soy bean production, it has a great possibility to become a competitive feed producing state when maize production is introduced. In spite of its high transportation cost, Tocantins has other advantages to offset such problem and to decrease production cost; i) its climate eliminates the necessity of heating system in winter, ii) it has a capability for farm waste treatment in their extensive land. Particularly, the waste treatment has become serious problem in other countries where swine production are more advanced. Because of pig's high fertility and growth rate, swine industry can yield a relatively rapid return to the capital employed. It is thus recommended to develop the industry in the state, as there is an enormous potential of the growth.

(5) Social Infrastructure

It is not long since the Tocantins State was established, and the living environment in the rural area is underdeveloped. The disparities of health, education and the quality of life between urbane and rural areas are remarkable. Among the rural people, malnutrition, high morbidity, and low literacy rate come out of undeveloped rural community. Further these circumstances bring about an outflow of rural people to the urbane area, and accelerate the decline of rural community. In order to improve these situations, the solution of these problems will be made through the community development of the rural people including provision of the basic infrastructure for rural life. Accordingly, the concept of the development will set the point in educational levels, health conditions and living skills, and the schemes consisting of (1) social infrastructure, (2) rural community development, and (3) rural home industry will be formulated.

1) Social Infrastructure Improvement Plan

In accordance with the agriculture and livestock development plan, provision of the rural infrastructure which will promote farmers' positive activities relating to improvement of health and welfare, education, and agricultural productivity will be considered. These infrastructures are proposed as follows:

Municipal/Village Roads and Farm Roads

Lack of traffic and transporting system restrains to improve farming and to diversify crops, and impedes marketing of farm outputs and inputs. Concerning the existing road condition within the state, the rate of asphalt pavement of the whole road network in the state is very low as 22.1%, as mentioned in 4.4.1(1). Furthermore, road in the rural area

is not practically maintained, so that it is hard for the access of road in the rainy season to transport. Consequently, it will give a preference for improvement of existing road network (municipal/village road).

Presently, there are farm roads, mostly constructed and maintained by farmer themselves, but the condition of these roads is very poor; in other words, almost like foot path. Therefore, improvement of these roads is also important for the transport of farm outputs and inputs.

Improvement and rehabilitation of the road network (municipal/village roads) will provide not only permanent access from BR153 and the state roads to each village, but also allow continued access to light traffic to serve the agricultural and social needs of the rural people. This scheme will be proposed to be implemented following the development schedule of the agriculture and livestock development plan.

For the master plan study, design standards commonly applied to rural roads and farm roads in Brazil is applied.

Domestic Water Supply

There are no village and rural community which has rural domestic water supply system, and they depend on the water resources from nature. Rural domestic water supply will reduce the work load of rural women and girls who take a job on water fetching, and clean water means good health. At present, supply of clean water is able to depend on the status of nature. In the scheme, considering such conditions as hydrogeology, topography, availability of electricity and number of farm households, the following three water supply systems are proposed.

- a. Gravity flow piped water system
- b. Village water supply system by tubewell and elevated tank using electricity
- c. Tube well with hand pump

In the village of group housing type, the gravity flow piped water system is the most suitable if the water is available within an economical distance from the village. In the system the construction of an intake structure with a sand filter tank is proposed for a continuous supply of clean water. Where a gravity flow system is not suitable due to topographical conditions and a village size is over 50 farm households, a village water supply system with elevated tank using electricity should be considered.

In the village of scattered housing type, the tube well with hand pump is the best suited. Improvement of existing well by installing hand pump and diffusion of simple filtration system recommended by the Secretariat of Health will be promoted.

Rural Electrification

Regarding the rural power supply in the state, aiming to deliver electric power to the distanced locations, at present supplied by diesel generators, the rural electrification project by PERTINS, which shall attend 9,000 rural families through the installation of 18,000 km of LT, shall be executed between 1997 and 1999. For the rural area which is out of the project, the study on potentials of micro-hydropower generation development from hydrogeologic and topographic views will be proposed. As a result of the study, it is desirable to materialize the micro-hydropower generation development according to the agriculture and livestock plan.

Educational Facilities (Primary School)

Although the most rural communities and settlements have primary schools, the majority of the school facilities have very poor conditions with only one classroom for a basic series-four year schooling (combined class). The most school buildings are constructed by thatched roof, clay wall and earth floor. There are few schools with tiled roof, brick-built wall and cement floor. But school facilities in the INCRA's settlement are constructed by brick-built. However, rehabilitation of school facilities is not going up caused by the budget shortage of the state.

The master plan aims to rehabilitate and reconstruct existing school facilities to permanent building as brick-built. The proposed primary schools rehabilitation includes sufficient space, necessary equipment, water supply facilities and latrines. In addition, provision of sufficient educational materials and facilities for providing school meals will be considered. Owing to realize the rural community improvement as the agriculture and livestock development plan implemented, it is to be desired that the scheme is carried out in line with the development schedule. Besides, the improved school facilities will be used not only children's education, but also adult education for improve literacy level.

Health Facilities

Rural health posts are familiar health facilities to rural people. However, village which has not a rural health post is widely distributed in the rural area of the state. In addition, medical supplies in existing posts are insufficient because of limited budget, so that health control and medical services for farmers are poor in substance.

On this account, in the master plan, the posts will provide under the schedule to the annual target of the state. Rehabilitation will provide sufficient space, necessary medical equipment and supplies, water supply facilities and latrines. Further health services will complete through the strengthening of PACS (Community health agent program).

Community Hall

There is no community hall as exclusive facilities which is made full use for community activities. In the settlements, settlers conduct their community activities at the hall used of former temporary school facilities. Community halls at village level are not only for social communication among the villagers, but for agricultural development activities such as marketing of agricultural outputs, farmer's training and farmers' association.

In the master plan, it is proposed that one community hall should be constructed in each village with necessary equipment and furniture such as tables, benches and blackboards. The community hall will use for community works, agricultural extension, farmer's training, health services, meeting, rural life improvement and women's activities for improving their social status.

Rural Community Development Plan

SAG and RURALTINS have a responsibility of rural community development, but the development target could not attained because of lack of staff and low quality of staff. Consequently, augment of the staff and strengthening of staff training will be proposed. Through the cooperation with social assistance experts trained by Projeto Lumiar and NGOs, improvement of rural community's environment will be promoted. Community development will implement by the programs which include the improvement of the living standard, such as food and nutrition, hygiene, etc., increase in cash income, and the security of water resources for domestic use and irrigation.

Short-Term

The model area for rural community development will be established. In the model area, the following points are necessary to secure improvement of income level and stability of living standard by the agricultural development.

- To start the community development program along the priority of the model area
- To strengthen the supporting services for rural community development
- To rehabilitate and or construct farm roads, school facilities, health facilities, rural domestic water supply system and community hall

Medium- and Long-Terms

In the medium and long terms, main foundation of agricultural production is assumed to be improved with the progress of socio-economic development of the state. A success of rural community development is easily influenced by provide the basic rural life infrastructure. Accordingly, for this purpose, villager's participation to the community activities is essential, namely, development and enlightenment for community awareness of rural inhabitants is required. In terms of community development, improvement of living conditions by the community activities is necessary.

2) Rural Home Industry Promotion Plan

In order to generate supplementary income which assists farm income indirectly, promotion of rural home industry will be proposed. As mentioned in 9.3.4(3), in the Extreme North region, collection, marketing and processing of babacu coconut are carried out systematically by rural women. The income derived from their works is under control by women, and contribute the improvement of the social status of rural women. On the other hand, production of handicraft (traditional textiles, daily necessities), secondary farm products (confectionaries, liquors, preserves), dairy products (cheese, butter), etc., is made in part of villages in collaboration with RURALTINS and NGOs. This earning makes valuable income source for rural women.

The objectives of the scheme are to obtain the income resource which contributes to rich rural life, through the generation of rural home industry (handicraft, secondary farm products, herbal medicines and dairy products) which makes the best use of regional characteristic of agriculture and livestock, in order to contribute the improvement of the social status of rural women. On this account, technical and marketing assistances for promote rural home industry by RURALTINS' staff and grass-root supporting activities by NGOs will be expected. The scheme will be conducted being a link of the rural community development activities as mentioned in section (2).

5.3 Agricultural Production Supporting System Strengthening Program

This Program aims to assist the regional development program in the form of upgrading the agricultural production techniques, trough the improvement of the research and extension service by the State Government. This program is composed of the followings 4 components;

1. Structural Reform of Public Institutions
2. Modernization of Livestock Sector
3. Intensification of Agricultural Technology Research and Extension Services
4. Human Resources Development

(1) Structural Reform of Public Institutions

To assist the agricultural activities, the following measures are necessary;

1. Land Titling and Registration System Improvement
2. Structural Reform of SAG
3. Structural Reform of RURALTINS
4. Plants Inspection System and Agro-products Quarantine System Improvement

1) Land Titling and Registration System Improvement

One of the serious social problems in Tocantins State is the invasion of land, caused

many times by the lack of land registration. The recent creation of the State and the absence of an organized administration are the main reasons for land registration problem. Furthermore, the lack of definition of land ownership restrains the procurement of bank financing by farmers and provokes conflicts related to land. To carry out the land registration it is fundamental the registration in the town notary public's office based on the land cadastral map. However, nowadays this service is hindered by bureaucracy and lack of administrative definition in the local governments (municipalities). This Program aims to stabilize the rural population life conditions, reducing the problems before mentioned through the establishment of a Land Registration System. The description of this program is made thereafter.

Realizing regional development efficiently and promptly in accordance with the plan that has been laid down requires a condition in which land transaction can be performed freely and safely based on indisputable land ownership.

Since completion of land registration for all the land that exists in the state is important for putting forward development of the state, the improvement project is for solving this problem.

2) Structural Reform of SAG

Due to the recent emancipation of the State, the state government organization structure is still not yet well defined. It doesn't present a sufficient and capable human resources to elaborate the agricultural and livestock development policy nor a necessary laboratory to carry out the analysis of agrochemical and animal health. This fact can be clearly verified in the regional offices where, sometimes, even the refrigerators for vaccines storage are damaged. Therefore, it will be necessary the elaboration of a restructuring plan for SAG, thus assuring a minimum administrative level.

In the State, there is no experimental farm which is vital for the improvement of the agricultural production. In the past, the today extinct Cooperative of Cotia, although being just a cooperative, constructed, for the Cerrado Project, two experimental farms in Bahia State and other two in Minas Gerais State, aiming to classify the appropriate species to the region and to carry out training of the cooperative members.

It is foreseen, in this Program, the institutional improvement of the veterinarian and agronomy departments of UNITINS aiming to strength the research organism.

Therefore, there is an urgent need, in the medium and long terms plan, to give institutional support to the regional offices of SAG and to the RURALTINS rural extension activities, installing agricultural and livestock experimental fields in the most important regions of the State.

3) Structural Reform of RURALTINS

RURALTINS have 7 regional offices and 54 local offices, to which 80% of its staff is

assigned. The RURALTINS activities comprehend, besides the technical assistance and rural extension, activities held with the farmers in agricultural production, as well as the elaboration of documents for the small farmers in order to obtain rural credit. The Agricultural Production Nucleus program, NPA, carried out by the state government is also responsibility of RURALTINS. Therefore, with the emancipation of this program, foreseen for the future, it will be necessary an increase in the organization staff.

The RURALTINS activities directly contribute to the State agricultural development. Therefore, it is necessary to provide an adequate structure, reevaluation budgetary and structural aspects. The institutional restructuring is also a prior item to the start of the rural extension activity development.

4) Plans Inspection System and Agro-products Quarantine System Improvement

In Brazil inspection standards for agricultural produce and plant quarantine system are enacted in federal laws. In preparation for liberalization of trade within the area of MERCOSUR, recently there is an urgent need in Brazil to establish and standardize inspection system for agricultural produce and plant quarantine system in order to promote its marketing. Presently, coordinating works are proceeding among related countries. In overseas markets, problems in plant quarantine hamper export of Brazilian agricultural produce.

The federal government is presently emphasizing the importance of improvement in plant quarantine system among their agricultural policy. In view of these circumstances, this project aims at strengthening the operations of existing institutions in the State.

In the state of Tocantins, SAG is the executing organization for agricultural produce inspection and plant quarantine. Inspection of standards for agricultural produce not only guarantees the grade and uniformity and facilitates its marketing but also accelerate quality improvement.

It also secures safety of the produce against residue of agricultural chemicals. For importing countries, safety of foods against human body is very important and often they demand the strict inspections to be carried out in producing areas. On the other hand, establishment of plant quarantine system and its complete enforcement are also important in the producing areas for continuous production and production increase of the agricultural produce. The plant quarantine is also important for consuming countries in order to protect their domestic agricultural produce. Therefore they strongly demand the improvement of plant quarantine system in the producing countries. Presently, there are 29 quarantine officers in SAG and it maintains 13 inspection offices. This project contains strengthening of organizations, increasing and training of staff members, technical cooperation and building laboratories.