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State of Tocantins  
Secretariat of Production (SEPRO -TO)  
Secretariat of Planning and Environment (SEPLAN -TO)

Japan International  
Cooperation Agency  
(JICA)

*ANNEX XXI*  
*DEVELOPMENT PLAN OF THE AGRICULTURE  
SECTOR OF THE NORTHERN REGION*

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## ANNEX XXI

### DEVELOPMENT PLAN OF THE AGRICULTURAL SECTOR OF THE NORTHERN REGION

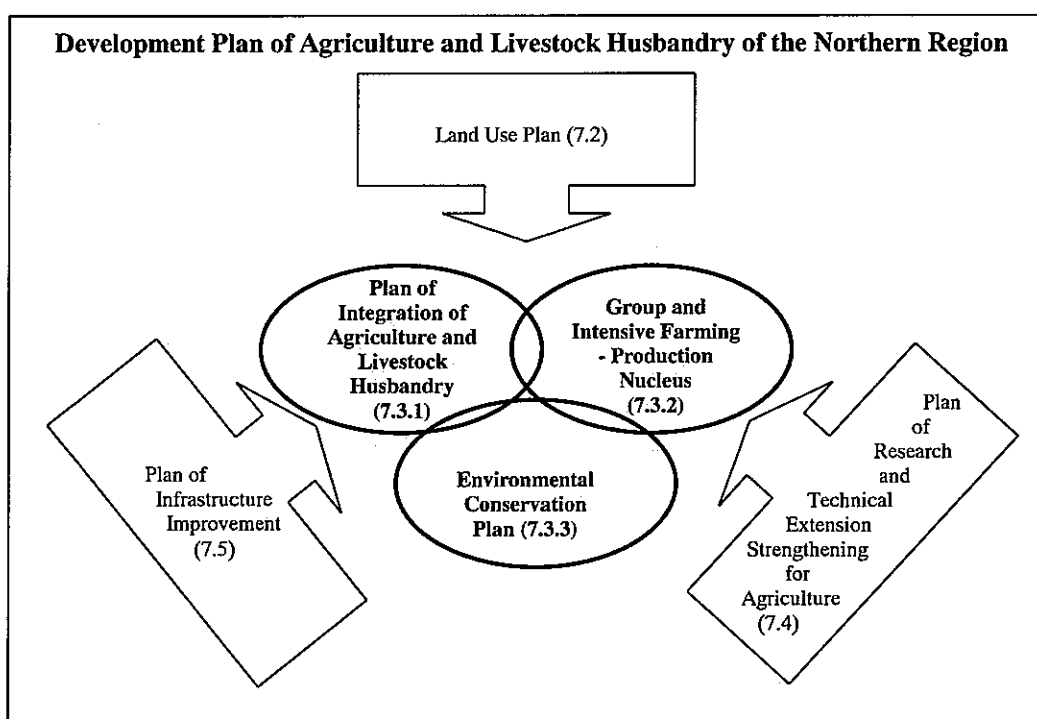
1.	Outline of the Development Plan.....	XXI - 1
	(1) Introduction .....	XXI - 1
	(2) Achievement Targets (short, medium and long terms) .....	XXI - 1
	(2.1) Long-term Targets (Year 2015) .....	XXI - 2
	(2.2) Medium-term Targets (Year 2010) .....	XXI - 2
	(2.3) Short-term Targets (Year 2015) .....	XXI - 2
	(3) Development Strategies .....	XXI - 3
2.	Land Use Plan.....	XXI - 3
	(1) Establishment of land use plan.....	XXI - 3
	(2) Present Land Use and Productivity Potential.....	XXI - 5
	(3) Land Use Plan.....	XXI - 5
	(3.1) Pasture land.....	XXI - 6
	(3.2) Existing Agricultural Land.....	XXI - 6
	(3.3) Cerrado area.....	XXI - 7
	(3.4) Forests.....	XXI - 7
3.	Regional Agricultural Development Plan .....	XXI - 9
	(1) Integration of agriculture and livestock .....	XXI - 9
	(1.1) Farming System.....	XXI - 9
	(1.2) Promotion Plan.....	XXI - 11
	(1.3) Target Areas .....	XXI - 12
	(1.4) Priority Areas for Development.....	XXI - 13
	(2) Production Nucleus.....	XXI - 15
	(2.1) Farming System.....	XXI - 15
	(2.2) Promotion Program .....	XXI - 17
	(2.3) Target Areas .....	XXI - 19
	(2.4) Priority Areas for the Development.....	XXI - 21
	(3) Environmental Conservation Project .....	XXI - 22
	(3.1) Project Formation.....	XXI - 22
	(3.2) Promotion Program .....	XXI - 25
	(3.3) Target Areas .....	XXI - 27
	(3.4) Priority Conservation Areas.....	XXI - 27
4.	Strengthening Plan of Agricultural Research and Technical Support .....	XXI - 32
	(1) Plan for the Human Resources Development.....	XXI - 32
	(1.1) Establishment of Agricultural High Schools in the Northern Region (Araguaína).....	XXI - 32
	(1.2) Training of Specialists: staff of SEPRO and RURALTINS.....	XXI - 32
	(1.3) Training of Farmers: Middle / Large Scale Farmers and Small Scale Farmers.....	XXI - 32
	(2) Strengthening Plan of Agricultural Extension.....	XXI - 32
	(3) Strengthening Plan of Agricultural Research .....	XXI - 34
	(3.1) Review of the Master Plan.....	XXI - 34
	(3.2) Urgent Technical Development for Tocantins Agriculral Development.....	XXI - 34
5.	Infrastructure Improvement Plan .....	XXI - 35
	(1) Transportation Facilities .....	XXI - 35
	(2) Storing Facilities.....	XXI - 35
	(3) Irrigation Facilities .....	XXI - 35
	(4) Rural Electrification .....	XXI - 36

	(5) Processing Facilities.....	XXI - 36
	(6) Research and Extension Facilities.....	XXI - 36
6.	Project Implementation System.....	XXI - 36
	(1) Establishment of the Northern Region Agricultural Development Committee.....	XXI - 36
	(2) Establishment of the Municipal Development Committee (provisory name) .....	XXI - 37
	(3) Strengthening of RURALTINS Supporting System .....	XXI - 37
	(4) Participation of UEP .....	XXI - 37
7.	Implementation Schedule.....	XXI - 38
	(1) Basic Strategy of Implementation Schedule .....	XXI - 38
	(2) Implementation Schedule.....	XXI - 38

# 1 Outline of the Development Plan

## (1) Introduction

The main objective of this development plan is to activate the sustainable regional economy, allowing the improvement of producers' life conditions, under the rational use of land by promoting 3 major plans namely Integration of Agriculture and Livestock Husbandry, Group and Intensive farming (Production Nucleus), Environmental Conservation Project. The system that can be implemented by the initiative of producers based on the ideal land use plan is therefore presented. Since this program is based on crops compatible to appropriate land, the general land use plan is included in this development plan. Furthermore, other supporting plans such as strengthening plan of agricultural research and extension, establishment plan of infrastructure, provision of funds and implementation plan necessary to efficiently implement the 3 major plans are also included in this development plan.



The objectives for the 3 major plans are as follows;

Item	Objective
Integration of Agriculture and Livestock Husbandry	<ul style="list-style-type: none"> <li>➤ To promote productivity increase through integration of agriculture/livestock;</li> <li>➤ To activate the regional economy in order to alleviate poverty;</li> <li>➤ To promote effective land use;</li> <li>➤ To convert the region into a world supplier of food;</li> <li>➤ To increase the work opportunities through grains production.</li> </ul>
Group and Intensive Farming (Production Nucleus)	<ul style="list-style-type: none"> <li>➤ To convert from non-productive farmers into productive farmers;</li> <li>➤ To increase agricultural income through introduction of intensive farming;</li> <li>➤ To produce value added products creating specific products for the region;</li> <li>➤ To increase the work opportunities.</li> </ul>
Environmental Conservation Project	<ul style="list-style-type: none"> <li>➤ To fulfill the conservation standards of the Amazônia Legal region;</li> <li>➤ To increase the value of land through conservation, reforestation and incentive to natural resources exploitation activities;</li> <li>➤ To promote the sustainable agriculture through regional conservation.</li> </ul>

## (2) Achievement Targets (short, medium and Long terms)

The targets of the plan will be set according to short-term, medium-term and long-term phases and

each phase is set as follows;

Short-term: Year 2005  
 Medium-term: Year 2010  
 Long-term: Year 2015

(1) Long-term Targets (Year 2015)

The final target of this plan was set as sustainable development according to the factor analysis on preferable natural conditions, relatively advanced infrastructure, consequent geographic advantage and the condition as a poverty area in Brazil. Whereas, the practical target was set as the achievement of sustainable agriculture and the activation of regional economy.

The long-term targets are the increase of producer's income and the consequent activation of regional economy based on the introduction of sustainable farming system through the incorporation of integration of agriculture and livestock, group and intensive farming (production nucleus) and environmental conservation project. The plan aims at the diversion from poverty condition, the conservation of nature and the correction of social gap through the combined introduction of aforementioned activities.

Long-term Targets – Year 2015

Item	Targets
Land Use Plan	➤ Farming will be practiced based on the land use plan.
Integration of Agriculture & Livestock	➤ Productivity of beef meat will be increased in 4 times (75kg/ha); ➤ Grains production will be carried out on 28% of pasture land (approx. 430,000 ha).
Group and Intensive Farming (Production Nucleus)	➤ Most farmers will be converted into productive farmers through intensive farming. Currently only 16.7% of them are productive; ➤ Farmers' income will be increased at least 3 times of the Minimum Wage; ➤ Special products of the region will be created.
Environmental Conservation Project	➤ Respect to the forestry codes in force and to the State conservation laws; ➤ Silviculture and wood production will be started in the forestry areas; ➤ Present green area (19.1%) will cover more than half of the Study Area.

(2) Medium-term Targets (Year 2010)

The following are the medium-term targets for the achievement of long-term targets.

Medium-term Targets – Year 2010

Item	Targets
Land Use Plan	➤ Most land owners will recognize the land use plan of each municipal district; ➤ Farming system based on the rational land use will be matured
Integration of Agriculture & Livestock	➤ Suitable technology for integration will be established. ➤ Half of the grains production target will be accomplished.
Group and Intensive Farming (Production Nucleus)	➤ Cooperative activities will be activated; ➤ Producers will establish the production technology; ➤ Group and intensive farming will be developed; ➤ Significance of the special products of each region will be recognized.
Environmental Conservation Project	➤ Conservation project for the conservation area will be developed; ➤ Half of the plan on reforestation, silvi-pastoral and agro-forestry activities will be performed.

(3) Short-term Targets (Year 2005)

This initial period is for the base preparation of project development through fixation of each farming system in the required area according to the land use plan. The main activities during this period is the

establishment of organization, formulation of land use plan for each municipal district, establishment of the farming system, formulation of reforestation plan and initiation of environmental conservation project. The short-term targets for each item are presented as follows;

#### Short-term Targets – Year 2005

Item	Targets
General	<ul style="list-style-type: none"> <li>➤ Project implementation organization will be established;</li> <li>➤ Supply of necessary funds will be initiated.</li> </ul>
Land Use Plan	<ul style="list-style-type: none"> <li>➤ Land use plan will be formulated for each municipal district.</li> </ul>
Integration of Agriculture & Livestock	<ul style="list-style-type: none"> <li>➤ Model farm for integration of agriculture/livestock will be set;</li> <li>➤ Integration of agriculture/livestock will be introduced.</li> </ul>
Group and Intensive Farming (Production Nucleus)	<ul style="list-style-type: none"> <li>➤ Farming model will be formulated by the association to be established;</li> <li>➤ Group and intensive farming model will be operated.</li> </ul>
Conservation Project	<ul style="list-style-type: none"> <li>➤ Environmental recuperation plan will be formulated for each municipal district;</li> <li>➤ Conservation and reforestation projects will be initiated</li> </ul>

### (3) Development Strategies

This development plan shall be implemented under the initiative of farmers themselves and the roles of the government are guidance and advice for the formulation of plan and the preparation of necessary infrastructure. The government should, however, implement the environmental conservation projects because the producers will not gain any direct income through such projects. The development strategy for each item is as follows;

#### Development Strategies

Item	Development Strategy
General	<ul style="list-style-type: none"> <li>➤ Development for the maximum use of land resources and existing infrastructure;</li> <li>➤ Implementation of the plan based on the environmental law;</li> <li>➤ Development aiming at the increase of income through farming improvement;</li> <li>➤ Plan to be implemented by the producers' own capital as much as possible;</li> <li>➤ Plan for facilitating the project implementation by the use of financing system.</li> </ul>
Land Use Plan	<ul style="list-style-type: none"> <li>➤ Maximum observance of the present land use;</li> <li>➤ Directing the plan to increase the economic value of the land;</li> <li>➤ Plan for facilitating the initiative of municipal districts and residents participation.</li> </ul>
Integration of Agriculture & Livestock	<ul style="list-style-type: none"> <li>➤ Plan for the maximum use of the regional advantages;</li> <li>➤ Plan for the increase of the investment efficiency;</li> <li>➤ Plan for the mitigation of the investment risks;</li> <li>➤ Plan for the increase the land productivity and the conversion of low productivity area into conservation area;</li> <li>➤ Plan for the collaboration between land owners and grains cultivation producers.</li> </ul>
Group and Intensive Farming (Production Nucleus)	<ul style="list-style-type: none"> <li>➤ Plan for the improvement of producers' farming practices;</li> <li>➤ Plan for the maximum participation of the residents;</li> <li>➤ Plan for the creation of special (specific) products for the region;</li> <li>➤ Plan for the promotion of sustainable agriculture;</li> <li>➤ Plan that is independent from the government.</li> </ul>
Environmental Conservation Project	<ul style="list-style-type: none"> <li>➤ Plan that contributes to the observance of the environmental laws;</li> <li>➤ Plan to maximize the green area;</li> <li>➤ Plan to minimize the government participation;</li> <li>➤ Plan to promote the participation of residents as much as possible.</li> </ul>

## 2 Land Use Plan

Land use plan was established according to the existing land resources potential of the Study Area as follows;

### (1) Establishment of Land Use Plan

The Land Use Plan shall be directed to the economic and environmental maximization of land resources basically according to the present land use. Since this area belongs to the Amazônia Legal

region, however, the standards of the forestry law shall be fulfilled. Major 3 proposed plans can be further classified into the following 7 classes, according to the GIS results presented in item 3.10.1. Integration of Agriculture and Livestock can be implemented in rather flat pasture land for the introduction of mechanized system. Group and Intensive Farming (Production Nucleus) can be implemented in rather fertile area where farming is possible either mechanically or manually. Pasture land is not included. Silvi-pastoral activities can be implemented in rather sloped area of pasture land. Agro-forestry activities can be introduced into sloped agricultural land where manual farming is difficult. Reforestation can be introduced into Cerrado area with less slope. The areas with steep characteristics and with frequent inundation damages shall be conserved.

- Agriculture and Livestock Integration
  - Area for Crops Rotation System I - High Fertility
  - Area for Crops Rotation System II - Medium Fertility
- Production Nucleus
  - Area for Production Nucleuses
- Environmental Conservation
  - Area for Silvi-pastoral Activities
  - Area for Agro-forestry Activities
  - Area for Reforestation
  - Areas for Conservation

The development strategy through the existing land use plan encompasses the introduction of Agriculture and Livestock Integration only in pasture land, and Group and Intensive Agriculture (Production Nucleuses) in agricultural and Cerrado areas. On the other hand, the environmental conservation shall be part of each plan, according to the needs.

Development Plan for Existing Land Use

Land Use	Development Strategies
Pasture land	<ul style="list-style-type: none"> <li>➤ Introduction of crop rotation system I</li> <li>➤ Introduction of crop rotation system II</li> <li>➤ Introduction of Silvi-pastoral activities</li> <li>➤ Conservation Areas</li> </ul>
Agricultural land	<ul style="list-style-type: none"> <li>➤ Introduction of group and intensive farming</li> <li>➤ Introduction of Agro-forestry activities</li> <li>➤ Conservation Areas</li> </ul>
Cerrado	<ul style="list-style-type: none"> <li>➤ Introduction of group and intensive farming</li> <li>➤ Promotion of reforestation</li> <li>➤ Conservation Areas</li> </ul>
Forest	<ul style="list-style-type: none"> <li>➤ Conservation</li> </ul>

The Plan of Use of the Earth will maintain as base the current use of the earth, addressing him/it to increase the economical and environmental effects of the soil resources. However, as the area it is inserted in the area of the Amazonian Legal, the criteria of the forest laws should be satisfied. The plan of use of the earth will be divided in the following 7 classifications, in agreement with the results of SIG presented in the item 3.10.1. That is, the Agricultural Integration will be introduced in areas relatively plane with mechanization possibility, the Nuclei of Production will be introduced in fertile soils with mechanization possibility or of manual cultivation. The Silvi-pastoral activity will be promoted in pasture areas with certain steepness, the activity Agroflorestral, in areas with agricultural activity and accentuated relief, difficult of be cultivated even manually. The areas of Conservation will be promoted in areas with remaining forests and critical areas.

- Grains-Livestock Integration
  - Crop Rotation Areas I - High Fertility
  - Crop Rotation Areas II - Medium Fertility
- Nucleus of Production
  - Nuclei of Production Areas
- Environment Conservation
  - Silvipastoral Activities Areas
  - Agriforest Activities Areas
  - Reforest Areas
  - Conservation Areas

The development strategy through the plan of use of the existent earth includes the introduction of the Agricultural Integration only in pastures and the Nuclei of Production, in areas with agriculture and savannah. On the other hand, the environmental conservation should be part of each plan, in agreement with the need.

Plan of Development for the Use of the Existent Land

Use of the Land	Beginnings of Development
Pasture	Introduction of Culturas Rotation; Introduction of the Rotation of Cultures II; Promotion of the Atividade Silvistoril; Areas of Conservation.
Agriculture	Introduction of the Intensive Agriculture; Introduction of the Atividade Agroflorestal; Areas of Conservation.
Savannah	Introduction of the Intensive Agriculture; Promotion of the Reforestation; Areas of Conservation.
Forest	Conservation

(2) Present Land Use and Productivity Potential

According to the present land use of the Study Area, more than half of the area is used as pasture land, followed by the cerrado and forest areas as shown as follows;

Area of Each Land Class in the Study Area (km<sup>2</sup>)

	Water Bodies	Pasture	Cerrado	Forest	Urban Area	Cultivated Area	Total
REGION I- ARAGUATINS	149.9	1,892.9	1,345.1	1,401.4	6.2	65.5	4,861.00
REGION II- AUGUSTINÓPOLIS	45.5	1,224.3	241.9	577.0	9.1	51.2	2,149.00
REGION III-TOCANTINÓPOLIS	82.1	2,496.1	3,537.8	570.0	11.3	63.7	6,761.00
REGION IV- XAMBIOÁ	82.4	3,620.6	445.0	1,331.5	4.2	36.3	5,520.00
REGION V- ARAGUAÍNA	193	10,517.1	3,692.3	3,162.0	42.8	153.8	17,761.00
Study Area	552.9	19,751.0	9,262.1	7,042.0	73.6	370.4	37,052.00
Percentage (%)	1.49%	53.31%	25.00%	19.01%	0.20%	1.00%	100.00%

Following is the land use potential based on GIS analysis.

Area of Each Land Use Potential Class in the Study Area (km<sup>2</sup>)

	Crop rotation I	Crop rotation II	Group / Intensive	Silviculture	Silvi-pastoral	Hazardous	Conservation	TOTAL
REGION I- ARAGUATINS	1,308.8	368.5	298.8	817.0	20.0	928.0	1,082.5	4,823.60
REGION II- AUGUSTINÓPOLIS	838.0	148.8	62.0	201.5	234.0	131.3	555.3	2,170.90
REGION III-TOCANTINÓPOLIS	980.0	1,191.3	621.8	1,598.0	91.8	1,508.5	518.0	6,509.40
REGION IV- XAMBIOÁ	2,643.3	208.0	157.8	280.5	294.3	731.3	1,111.8	5,427.00
REGION V- ARAGUAÍNA	3176.3	5,050.5	193.5	3,188.0	1,676.5	812.5	3,446.3	17,543.60
Study Area	8,946.4	6,967.1	1,333.9	6,085.0	2,316.5	4,111.5	6,713.8	36,474.20
Percentage (%)	24.53	19.10	3.65	16.68	6.35	11.27	18.40	100.00%

(3) Land Use Plan

The land use plan of the Study Area was delineated according to the present land use and land use potential as shown below. The total area of crop rotation and intensive farming was calculated not to exceed 50% of the total land area.



### Agriculture Related Land (km<sup>2</sup>)

	Crop Rotation I (a)	Crop Rotation II (b)	Intensive Farming (c)	Total (a)+(b)+(c)	Percentage (%)
REGION I- ARAGUATINS	1,308.8	368.5	298.8	1,976.10	40.7%
REGION II- AUGUSTINÓPOLIS	838.0	148.8	62.0	1,048.80	48.8%
REGION III-TOCANTINÓPOLIS	980.0	1,191.3	621.8	2,793.10	41.3%
REGION IV- XAMBIOÁ	2,602.2	0	157.8	2,760.0	50.0%
REGION V- ARAGUAÍNA	3176.3	5,050.5	193.5	8,420.30	47.4%
Study Area	8,946.4	6,967.1	1,333.9	17,247.40	46.5%

The data in this stage were calculated from the existing GIS information. This GIS data were prepared based on the topographic map of the scale 1:250,000. The actual land use plan shall be formulated based on the data of higher accuracy.

The Land Use Plan at the present stage is as follows;

#### (3.1) Pasture Land

There are 19,751km<sup>2</sup> of pasture land in the Study Area and some areas not suitable for grazing are partially utilized as pasture land too. Such an unsuitable area shall be converted into silvi-pastoral or conservation area. The land use plan for the pasture land is as follows;

#### Land Use Plan for Pasture Land

Use	Area (km <sup>2</sup> )	Grains Production Area (km <sup>2</sup> )	Pasture Land (km <sup>2</sup> )	Conservation Area (km <sup>2</sup> )
Present pasture land	19,751.0	-	-	-
Crop rotation area I	8,946.4	2,505.0	6,441.4	0
Crop rotation area II	6,967.1	1,950.8	5,016.3	0
Sivipastrilarea	2,316.5	0	2,316.5	0
Conservation area	1,521.0	0	0	1,521.0
Total	19,751.0	4,455.8	13,774.2	1,521.0

By introducing crop rotation system into pasture land, grains will be cultivated in a area of about 4,500 km<sup>2</sup> annually. Furthermore, the introduction of improved pasture will increase the production of beef meat.

#### (3.2) Existing Agricultural Land

The existing agricultural land is approximately 370 km<sup>2</sup> that is about 1% of the total area. However, there are agricultural activities in some sloped areas that are not suitable for agriculture. Agro-forestry system will be introduced to such areas and the area with more slope will be converted into conservation area. Since the existing agricultural land is very limited according to the GIS information, the result of the analysis is not very clear on the map scale 1:250,000. All the existing agricultural land is, therefore, planned for intensive farming at this stage. The characteristics of each field will be examined in the stage of F/S.

#### Land Use Plan for Existing Agricultural Land

Use	Area (km <sup>2</sup> )
Existing agricultural land	370.4
Group and intensive farming area	370.4
Agro-forestry area	0
Conservation area	0

### (3.3) Cerrado area

Cerrado area occupies 25% of the Study Area and the total area is about 9,262.3 km<sup>2</sup>. Although this area is not utilized at this moment, there is enough potential for the future development of agriculture and forestry. In the current plan, intensive agriculture will be introduced into fertile areas and silviculture project will be promoted in relatively less fertile areas. Conservation activity will be promoted for the areas to be protected. The land use plan for Cerrado area is as follows;

Land Use Plan for Cerrado Area

Use	Area (km <sup>2</sup> )
Present Cerrado vegetation area	9,262.3
Group and Intensive agriculture area	963.5
Reforestation area	6,085.0
Conservation area	2,213.8

### (3.4) Forests

The existing forest area in the Study Area is about 7,042 km<sup>2</sup>. There will be no development program in this area and all the existing forest shall be conserved in this plan.

The land use plan at the present stage is shown in Fig. 21.2.1.

