

## 5.7 Plan of Enterprise Execution and Cost Estimate

The activities included in the present plan, except those with high implementation possibility through federal and state resources such as production infrastructure and commercialization ways programs, shall be implemented through the Northern Region Development Fund, included in the Tocantins State Economic and Social Development Fund.

### 5.7.1 Enterprises Cost Estimate

The total cost, the producer demand plus the governmental resources, is presented as follows:

(Unit: thousand R\$)

	Short	Medium	Longo	Total
<b>Enterprises of the Agricultural Sector</b>				
Introduction of Grains Cultivation	65,802	363,034	807,665	1,236,501
Intensive Cattle Husbandry	44,609	173,810	363,120	581,539
Diversified Agriculture and Livestock Husbandry for Mini-/Small scale Producer	49,581	166,487	287,602	503,670
Sub-Total	159,992	703,330	1,458,388	2,321,710
Portion of Governmental Support	21,971	25,718	16,279	63,969
Agricultural Credit	68,784	322,085	652,453	1,043,322
Producers' Capital	69,236	355,527	789,656	1,214,419
Sub-Total	159,992	703,330	1,458,388	2,321,710
Producers Expenses	138,021	677,612	1,442,109	2,257,741
Program of Technical Assistance	37,823	46,936	26,624	111,383
Program of Subsidy to Agricultural Inputs	21,971	25,718	16,279	63,969
Program of Financial Assistance	14,588	78,237	160,796	253,621
Program of Producers Qualification	7,466	7,466	14,932	29,864
Program of Consulting Services Utilization	3,719	7,545	10,185	21,449
Governmental Expenses	85,567	165,902	228,816	480,285
Cost of Agricultural Sector Enterprises	223,588	843,514	1,670,925	2,738,026
<b>Enterprises of the Environmental Sector</b>				
Enterprises Cost	26,411	248,034	225,564	500,010
Portion of Governmental Support	17,276	16,878	15,878	50,031
Credit	8,222	208,041	188,718	404,981
Producers' Capital	914	23,116	20,969	44,998
Sub-total	26,411	248,034	225,564	500,010
Producers Expenses	9,135	231,157	209,687	449,979
Program of Technical Assistance	40	0	0	40
Program of Subsidies to Inputs	17,276	16,878	15,878	49,991
Program of Financial Assistance	2,960	77,855	142,833	223,648
Program of Consulting Services Utilization	1,012	4,737	7,936	13,684
Governmental Expenses	21,248	99,469	166,646	287,362
Environmental Sector Enterprises	30,383	330,625	376,333	737,341
<b>Development Plan of the Agricultural Sector</b>	<b>253,970</b>	<b>1,174,139</b>	<b>2,047,258</b>	<b>3,475,367</b>
Producers Expenses	147,156	908,768	1,651,796	2,707,720
Governmental Expenses	106,814	265,371	395,462	767,647

Remark: The values are those accumulated during a 5 years period, and the total refers to the necessary values for 15 years.

The demand of capital resources for the plan implementation is of R\$ 3,4 billions of Reais, with the producers participation of around 77.9% and the Government one of around 21.1%. At short term, 7.2% of the Plan shall be implemented and 34% at medium term.

## 5.7.2 Schedule of the Agricultural Development Plan

The schedule of the enterprises execution is presented as follows:

### Implementation Program of the Northern Region Agricultural Development Plan

	Short Term					Medium Term					Long Term					After				
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
<b>Administrative Plan</b>																				
Formation of the Northern Region Agricultural Development Committee	■																			
Formation of the Agricultural Development Committee in each Municipal District	■	■																		
Formulation of the Land Use Plan in each Municipal District			■	■	■															
Formulation of the Credit Procurement Plan					■															
Acquisition of Credit					■	■	■	■	■	■	■	■	■	■	■					
Utilization of Foreign Credit					■	■	■	■	■	■	■	■	■	■	■					
Utilization of Domestic Credit									■	■	■	■	■	■	■					
the Activity implementation (Northern Region Develop. Committee)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
<b>Agricultural Activities</b>																				
Introduction of Grains	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Development of Livestock Husbandry Diversification and Strengthening	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Development of Production Nucleus	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Activities of Industrial Processing	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Preparation of Production Infrastructure	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Irrigation																				
Roads	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Rural Electricity	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Technical Support																				
Model Farms																				
Strengthening of RURALTINS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Strengthening of ADAPEC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Strengthening of Agricultural Research	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Program of Support for the Promotion of Producers Associations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Program of Support for the Agricultural Inputs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Soil Improvement																				
Rental of Agricultural Machinery																				
Introduction of Buffaloes	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Program of Assistance to Credit																				
Fundo de Aval																				
Assistance for the Formulation of the Production Plan																				
Regional Special Credit																				
<b>Promotion of Conservationist Activity</b>																				
Promotion of Silviculture																				
Information about the Silviculture Promotion Plan in each Municipal District	■	■	■	■	■															
Plan of Seedlings Production					■	■	■	■	■	■	■	■	■	■	■					
Plan of Seedlings Distribution					■	■	■	■	■	■	■	■	■	■	■					
Cultivation Plan					■	■	■	■	■	■	■	■	■	■	■					
Program of Technical Assistance																				
Establishment of the Production System	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Installation of Model Fields					■	■	■	■	■	■	■	■	■	■	■					
Program of Support to Credit																				
Credit																				
Establishment of the Promotion System																				

Execution of Activities by the Producers  
 Preparation of the Assistance in the Plan  
 Application of the Plan  
 Activities beyond the State and Federal plans

### 5.7.3 Method of Enterprises Execution

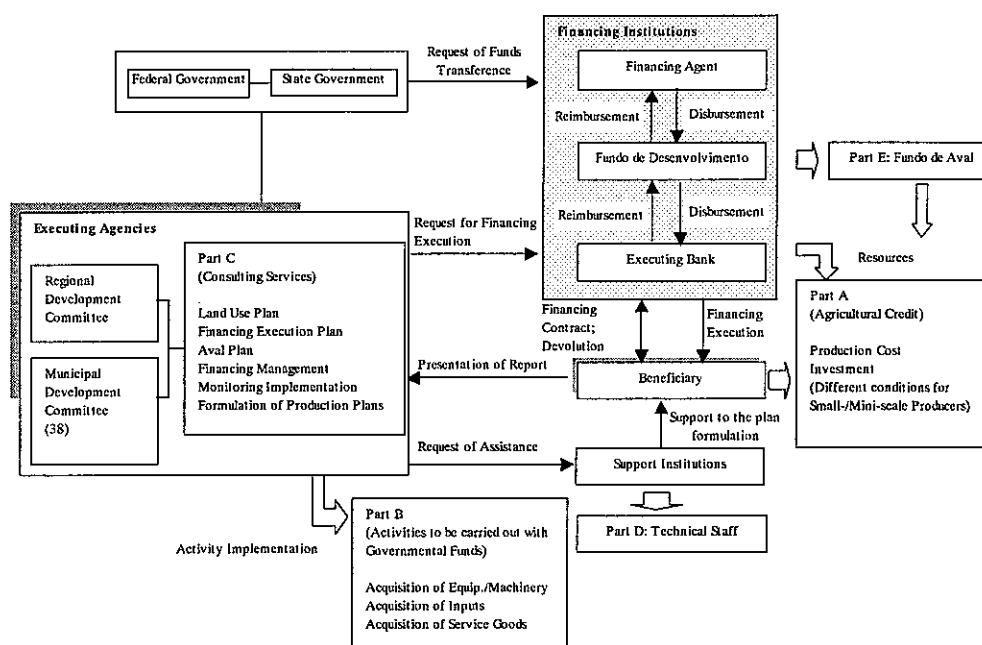
#### Utilization of the Fund for Agricultural Enterprises

Method of Project Execution: The project shall consider the characteristics of each activity being divided into the following parts:  
Project Division

PART	CONTENTS
PPART A (Agricultural Credit)	Credit to Producers
A1 (Rotation Capital)	Producers
A2 (Investment Capital)	Producers
PPART B (Government Investment)	
B1 (Acquisition of Equipment)	Acquisition of Vehicles and Equipment Acquisition of Buffaloes Habilitation of Offices Acquisition of Computing Equipment
B2 (Acquisition of Inputs)	Acquisition of Lime
B3 (Acquisition of Service Goods)	Qualification of producers Qualification of technical staff Seminars Campaigns
PPART C (Consulting Services)	
C1 (Support)	Support to Model Farms Elaboration of Land Use Plans
C2 (Support to Credit)	Support to the Credit Implementation Guidance of credit use to the producers Efficient operation of projects
PPART D (Government Technical Staff)	Assignment of ADAPEC Technical Staff Assignment of RURALTINS Technical Staff Assignment of SEPRO Technical Staff Assignment of the Development Committee Technical Staff
PPART E (Financial Support)	Cost of the Fondo de Aval Cost of Financing

The present project execution structure is as follows:

Project Execution Structure



## Utilization of the Fund for Conservation Enterprises

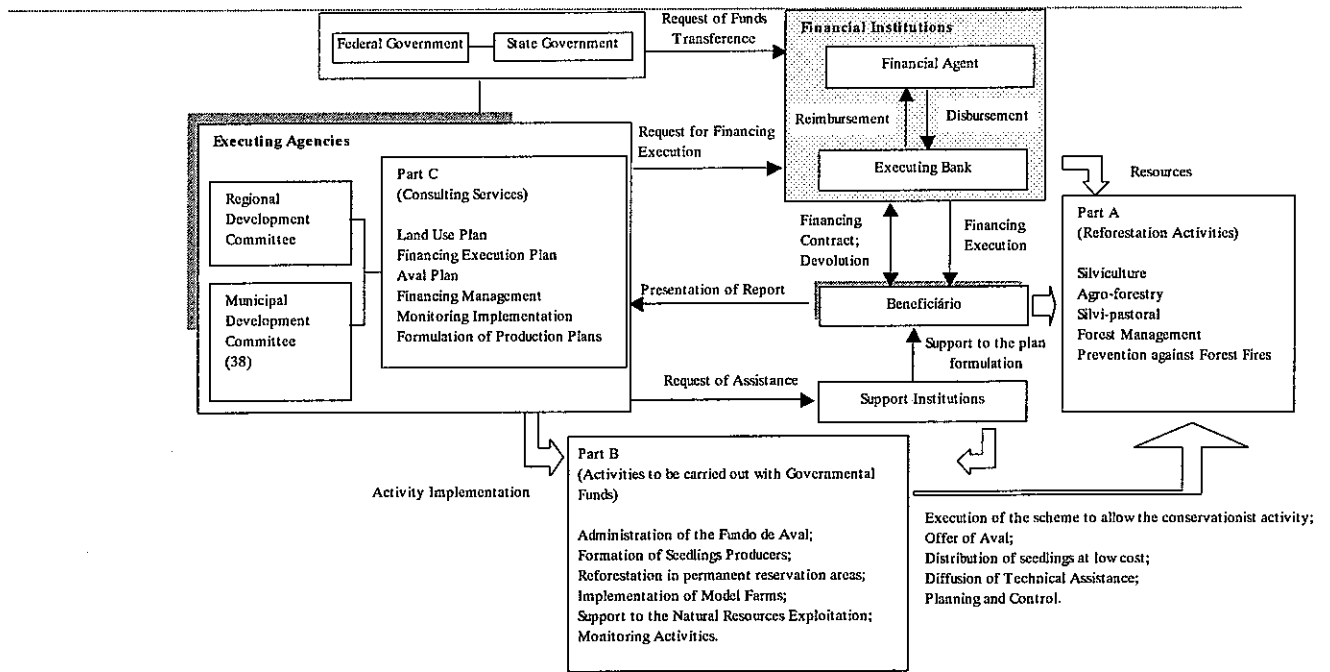
Method of Project Execution The enterprise execution shall be divided into 3 parts: environmental financing, governmental investment and administration through consulting services for the enterprise finalization.

Types of Enterprise in Phase 1

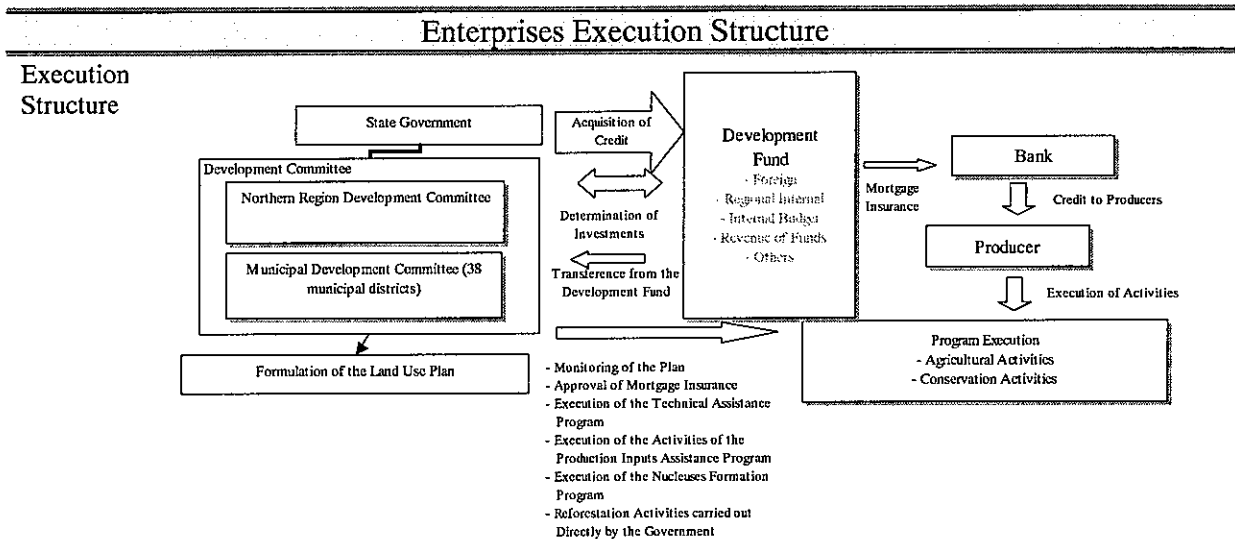
PART	CONTENTS
<b>PART A (Environmental Credit)</b>	Financing to Producers
A1 (Cultivation of Trees)	Cost of seedlings acquisition; Cost of cultivation (fertilizer, labor force, machinery, etc.); Maintenance cost until the trees growth.
A2 (Agricultural Machinery and Facilities)	Acquisition of agricultural machinery; Acquisition of facilities.
A3 (Fences and "Aceiros")	Installation of fences and "aceiros"
<b>PART B (Governmental Support)</b>	
B1 (Installation of Nurseries)	Necessary facilities.
B2 (Distribution of Seedlings)	Distribution of seedlings at short term; Distribution of seedlings at medium term (silvi-pastoral activity, forest management).
B3 (Reforestation in permanent reservation areas)	Cost of seedlings and their cultivation.
B4 (Implementation of Model Farms)	Implementation cost of model farms (cultivation, installation of fences and "aceiros", construction of the administrative area, etc.).
B5 (Support to the Natural Resources Exploitation Industry)	Support to the formation of associations related to the natural resources exploitation industry and remodeling of the existing facilities.
B6 (Strengthening of Monitoring)	Monitoring of forest fires; Environmental monitoring; Implementation of UCs.
<b>PART C (Consulting Services)</b>	
C1 (Elaboration of the Land Use Plan)	Elaboration of the most appropriate land use plan.
C2 (Financing Management)	Financing management; Presentation of proposals related to the utilization of resources destined to the producers; Implementation of the activities in a smooth way.
C3 (Implementation of Environmental Monitoring)	Implementation of the environmental monitoring execution scheme; Guidance on environmental monitoring.

Part A: producer; Part B: public works; Part C: items for the smooth progress of the enterprise.

Project Execution Structure The present project execution structure is as follows:



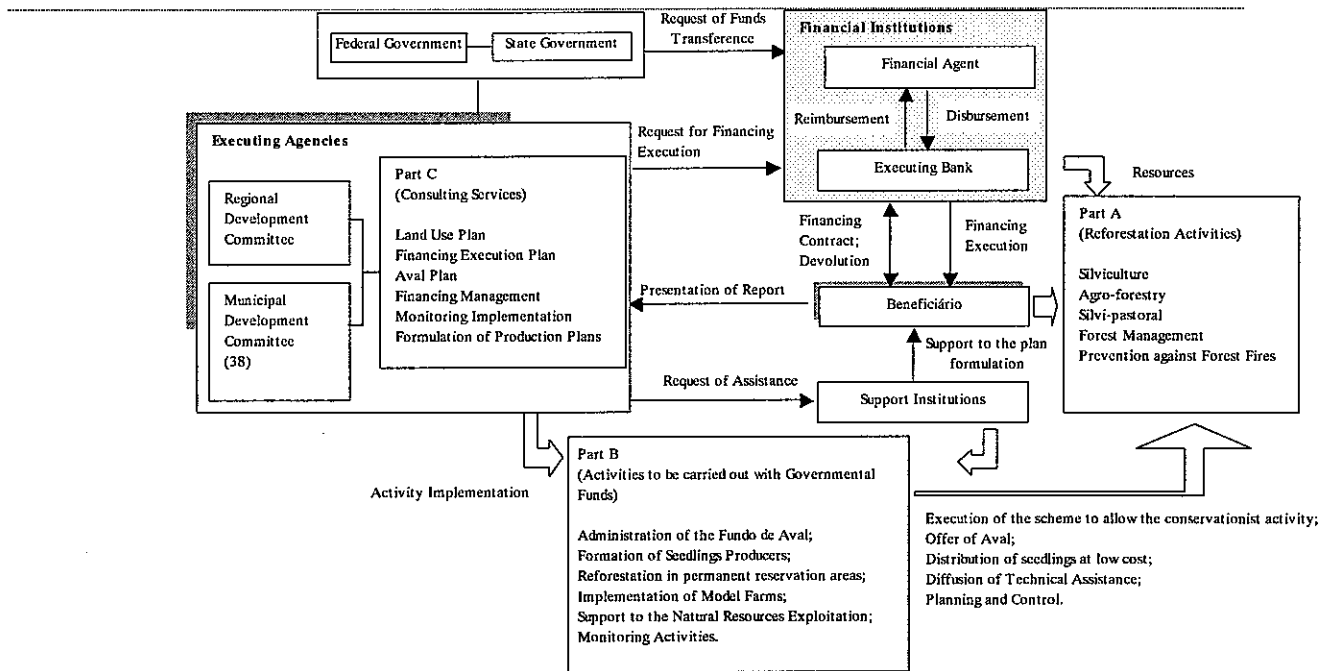
#### 5.7.4 Enterprises Execution Structure



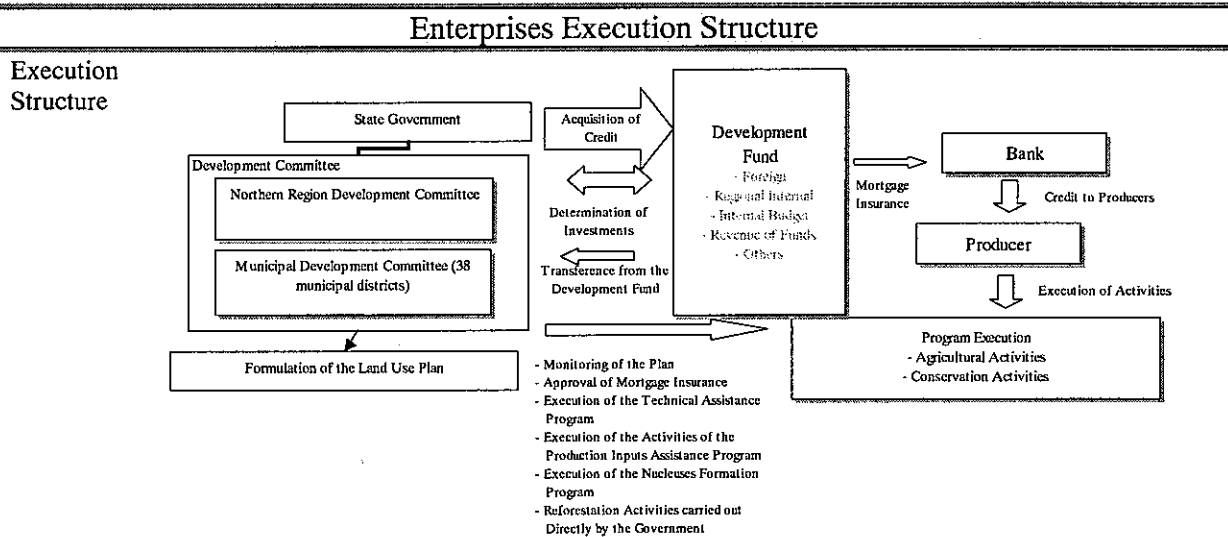
To establish an organism that unifies the development in cooperation with the concerning organisms, elaborating the land use plan of the northern region, besides the technical assistance and resources distribution plans. Also, the development shall be promoted by establishing municipal organisms of assistance to the producers and through the elaboration of land use plans according to the reality of each municipal district.

The Development Fund shall be established in order to supply resources to appropriate land use plans. Financing, governmental enterprises and assistance measures shall be supplied to the producers for the execution of agricultural and conservation enterprises, based on the Development Fund and on the Committee of Agricultural Development Promotion.

Committee of The Committee responsibility is as follows:  
 Agricultural • Coordination of the General Development Plan;  
 Development of • Elaboration of the Land Use concept (area, utilization level, etc.);



#### 5.7.4 Enterprises Execution Structure



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Committee of Agricultural Development	of	The Committee responsibility is as follows:
		• Coordination of the General Development Plan;
		• Elaboration of the Land Use concept (area, utilization level, etc.);

Necessary Resources to the Fund the Fund

The necessary resources to the Fund at short term would be 150 millions of Reais, out of which 120 millions of Reais would be for the agricultural sector and the remaining 30 millions of Reais, for the conservation sector.

Necessary Resources for the Fund (unit: thousand Reais)

	Short Term	Medium Term	Long Term	Total
<b>Agricultural Enterprises</b>				
Government Cost	78,101	158,436	213,884	450,421
Resources for Credit	33,560	237,164	608,994	608,994
Resources for Fundo de Aval	3,356	23,716	60,899	60,899
<b>Total</b>	<b>115,017</b>	<b>419,317</b>	<b>883,778</b>	<b>1,120,314</b>
<b>Conservation Enterprises</b>				
Government Cost	21,248	99,469	166,646	287,362
Resources for Credit	8,222	216,263	396,759	396,759
Resources for Fundo de Aval	822	21,626	39,675	39,675
<b>Total</b>	<b>30,291</b>	<b>337,357</b>	<b>603,080</b>	<b>723,797</b>
<b>Fund</b>				
Government Cost	99,348	257,905	380,530	737,783
Resources for Credit	41,782	453,427	1,005,753	1,005,753
Resources for Fundo de Aval	4,178	45,342	100,574	100,574
<b>Total</b>	<b>145,308</b>	<b>756,674</b>	<b>1,486,858</b>	<b>1,844,111</b>

## 5.8 Project Evaluation

The project evaluation shall be carried out in order to analyze quantitatively and qualitatively the socio-economic impact with the execution of agricultural enterprises in the northern region of Tocantins as presented as follows:

The quantitative evaluation shall be carried out in general and by enterprise. Although the general cost of the enterprises shall be taken into consideration, only the benefits generated by the agricultural sector shall be considered;

The economic results in case the enterprises are carried out conjointly shall be evaluated;

The economic possibility of execution, at the producer level, of each enterprise independently shall be evaluated;

In regard to the assistance enterprises for the producers, the solution for the obstacles for the proposed enterprises as well as the qualitative analysis of the positive factors shall be evaluated;

The indirect effects occurred when the targets are attained such as the environmental improvement and the alleviation of the social differences shall be evaluated;

The problems arise in case the enterprises are carried out separately shall be qualitatively evaluated.

### Quantitative Evaluation of the Project

General  
Evaluation of  
the Plan

The cost/benefit relation of all the project is presented as follows:

(unit: thousand Reais)

	Current	Short	Medium	Long	Acumulated
Cost (1)		246,504	1,166,673	2,032,326	3,431,820
Producer Part		147,156	908,768	1,651,796	2,707,720
Government Part		99,348	257,905	380,530	737,783
Benefit (2)					
Estimate Production Value	875,142	1,483,193	2,752,558	4,715,818	8,951,569
Production Value through Enterprises Execution		608,051	1,877,416	3,840,676	6,326,144
Value increased during the period		608,051	1,269,365	1,963,260	3,840,676
Accumulated Production Value		608,051	2,485,468	6,326,144	9,419,663
Investment Efficiency ((2)/(1))		2.47	1.61	1.89	1.84

Remark: The current agricultural production value was estimated through the number of cattle heads and the produced quantity in agriculture in 2000.

As observed, the benefit already surpasses the cost showing the high economic potential. This means that the improvement of cultivation conditions would be viable even with a land use regulated by the environmental laws of the Amazônia Legal region.

The results of the agricultural production increase can properly refund the costs that include the conservationist enterprises. Great results are supposed to be possible if there is governmental financial and technological assistance.

Results of  
the  
Economic  
Analysis of  
the Proposed  
Cultivation  
Methods

The higher investment efficiency is observed in the livestock husbandry sector, where a great improvement is expected through the transformation of the current extensive cattle husbandry into intensive cattle husbandry. However, this is possible only with the improvement of pastures through the introduction of grains cultivation and investment in the property. In case there is no introduction of grains, this investment efficiency will not occur.

The same can be said in regard to the investment efficiency for the mini- and small-scale producers. The introduction of necessary technology and inputs for the production would allow a great improvement in the cultivation method.



The present plan aims at promoting enterprises related to agriculture and livestock husbandry, agricultural processing and conservation, in parallel to the implementation of governmental enterprises and assistance. The expected results are as follows:

Enterprise	Economic Benefits Estimate	
	Contents	Quantitative Benefits (2015)
Agropecuário	Activation of the regional economy with the acquisition of production inputs.	<ul style="list-style-type: none"> <li>Production inputs such as agricultural machinery, products for soil correction, fertilizers and agro-chemicals (300,000 ha of grains cultivation area).</li> </ul>
	Activation of the economy through the sale of agricultural products.	<ul style="list-style-type: none"> <li>Grains and Livestock Products.</li> </ul>
	Increase of job opportunities in the commercialization sector.	<ul style="list-style-type: none"> <li>Transportation of grains and processing of meat.</li> </ul>
	Activation of financing.	<ul style="list-style-type: none"> <li>Execution of agricultural / environmental financing (estimate: 5.5 billions of Reais);</li> <li>Production commercialization.</li> </ul>
Introduction of Grains in Pastures	Increase of grains production	<ul style="list-style-type: none"> <li>Grains (1,100,000 t)</li> </ul>
	Construction of the foundation for the introduction of intensive livestock husbandry.	<ul style="list-style-type: none"> <li>Improved pasture (200,000 ha)</li> </ul>
	Integration of poultry and swine husbandry	<ul style="list-style-type: none"> <li>Increase of Participant Producers Income and Increase of Grains Market</li> </ul>
Introduction of Intensive Livestock Husbandry	Agricultural machinery, increase of agricultural inputs commercialization	<ul style="list-style-type: none"> <li>Acquisition of 350 units of agricultural machinery</li> </ul>
	Increase of livestock production (through the introduction of intensive livestock husbandry)	<ul style="list-style-type: none"> <li>Meat Bovine Cattle ( ± 270,000 t)</li> <li>Milk Bovine Cattle ( ± 200,000 m<sup>3</sup>)</li> </ul>
	Production of regional products	<ul style="list-style-type: none"> <li>Buffalo products (Muzzarella)</li> </ul>
Production Integration of Mini-/Small-scale Producers	Construction of the foundation for the agricultural processing sector	<ul style="list-style-type: none"> <li>Processing of dairy products, meat and fruits.</li> </ul>
	Increase of the production of grains, fruits and greenery.	<ul style="list-style-type: none"> <li>Pineapple, Banana, Passion Fruit, Cashew.</li> </ul>
	Development of Commercialization.	<ul style="list-style-type: none"> <li>Production of Fruits for Exportation.</li> </ul>
	Increase of Job Opportunities	<ul style="list-style-type: none"> <li>Production of Grains: 47,000 ha</li> <li>Production of Fruits: 6,000 ha</li> <li>Production of Cassava: 19,000 ha</li> </ul>
Agricultural Processing	Increase of life standards of the less privileged producers	<ul style="list-style-type: none"> <li>Income would increase from 0.5 to 3.0 minimum wages</li> </ul>
	Activation of commerce with the acquisition of inputs	<ul style="list-style-type: none"> <li>Equivalent to ± 300 millions of Reais</li> </ul>
	Increase of Job Opportunitites	<ul style="list-style-type: none"> <li>Dairy products, tomato industry, meat processing plants</li> </ul>
Conservation	Typical Products of the Region	<ul style="list-style-type: none"> <li>Bubaline Products</li> </ul>
	Wood Production	<ul style="list-style-type: none"> <li>Possibility of lumbering 6,000 ha per year</li> </ul>
	Increase of the Conservation Area	<ul style="list-style-type: none"> <li>To attain 40% of the level required by the Amazônia Legal region laws.</li> </ul>

## 5.9 Evaluation of Environmental Impact

Preliminary Environmental Impact for each Sectorial Plan	
Introduction of Grains Cultivation	<p>The present plan aims at introducing the grains production in traditional extensive pastures employing fertilizers, agro-chemicals and machinery. Therefore, the introduction of the following items is necessary to avoid negative effects to the environmental conservation.</p> <ul style="list-style-type: none"> <li>Introduction of cultivation methods that avoid soil erosion (sod seeding);</li> </ul>

	<ul style="list-style-type: none"> <li>• Management in the application of agro-chemicals;</li> <li>• Prohibition of total deforestation made easier by the promotion of mechanization.</li> </ul>
Intensification of Livestock Husbandry	<p>Although the occurrence of negative environmental influences are not expected since the intensive utilization of land already being utilized is expected, there is the possibility of appear large income differences among the producers. The items to be environmentally considered are as follows:</p> <ul style="list-style-type: none"> <li>• To create conditions for that the producers receive technical and financial assistance well distributed for the smooth progress of the conservation areas increase as the result of the livestock husbandry intensification;</li> <li>• To conserve the appropriate number of buffaloes per area unit, considering that these animals raising shall be promoted in silvi-pastoral activity areas and where the pastures are degraded;</li> <li>• To avoid water pollution caused by swine husbandry.</li> </ul>
Production Integration of Mini-/Small-scale Producers	<p>The present plan aims at promoting an integrated production combining the production of grains/fruits/greenery with bubaline and swine husbandry. The production manner would be shifted from the present extensive manner to an intensive manner, utilizing fertilizers and agro-chemicals, besides the residues of the swine husbandry production. The environmental items to be considered are as follows:</p> <ul style="list-style-type: none"> <li>• To technically instruct about the utilization of agro-chemicals and fertilizers (how to use, how to discard, etc.);</li> <li>• To introduce measures that increase the conservation area, instructing about the appropriate cultivation in appropriate land;</li> <li>• To technically instruct for that the production residues are utilized as much as possible as swine foodstuff.</li> </ul>
Conservation Enterprises	<p>The present enterprise proposes the commercial silviculture, agro-forestry and silvi-pastoral activities, forest management, silviculture for conservation and control of forest fires. The proposed activities are measures to attain the environmental standards of the Amazônia Legal region, except the commercial silviculture, and that would launch the environmental improvement in the Study Area. The environmental items to be considered are as follows:</p> <ul style="list-style-type: none"> <li>• To carry out uniform financing and technical assistance in order to avoid the creation of economic disparities among the producers;</li> <li>• To cultivate native trees rather than exotic ones;</li> <li>• To give guidance for that the environmental standards required by the Amazônia Legal region can be attained;</li> <li>• To make the residents participation possible;</li> <li>• The commercial silviculture shall be carried out as much as possible with the cultivation of several species in order to fulfill the environmental standards;</li> <li>• To instruct about the appropriate cultivation in compatible land so that the conservation areas are increased as much as possible;</li> <li>• To carry out a silviculture does not affect the existing trees ecosystem.</li> </ul>

## 5.10 Environmental Monitoring

### Construction of the Environmental Monitoring System

Construção do Sistema	<p>The environmental information obtained by each Municipal Development Committee shall be delivered to the Northern Region Development Promotion Committee that would transform it in GIS information. Through this information, the necessary analysis to the environmental monitoring would be carried out. The information shall be renewed each 6 months by sending the data to the data management department of the Northern Region Development Promotion Committee. Thus, the environmental monitoring shall be carried out by utilizing the most recent data as possible. Besides, this information shall be the basis for the Northern Region Committee to define the quantity of credit to be supplied through the Fundo de Aval and the Agricultural Credit System.</p>
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### Definition of Environmental Monitoring Items

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Monitoring Items	The environmental monitoring has the objective to evaluate the possible environmental effects caused by the execution of plans and necessary measures. The monitoring items are: variation of land use, variation of vegetation, land use by property, conditions of regional roads, division of grains cultivation land by cultivation method, conditions of conservation progress in areas to be preserved, conditions of recuperation progress in legal conservation areas, conditions of existing forests, location of pigsties and agricultural industries that are water pollution sources, number of families settled and settlements locations, locations of forest fires points, conditions of the establishment of forest fire containment strips, silviculture area by year and objective, water quality of rivers, areas with animals under extinction hazard, etc.
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### Construction of the Data Bank for Environmental Monitoring Execution

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GIS Data Bank	The construction of a GIS data bank including information on natural and social conditions, allowing a general analysis, would be very important for an efficient monitoring. The GIS elaborated in the present study shall be improved and revised through new information collected at the municipal level.
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The current GIS data were elaborated at the northern region level, being necessary to improve them at the municipal level. This municipal level information shall be elaborated by the Northern Region Development Committee, then transferred to the Municipal Committee of Development after due training about the GIS. The municipal data to be transformed into GIS data are mainly about land, agricultural land, pastures, vegetation, housing conditions, infrastructure, industry, water quality, etc.

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### Execution of Environmental Monitoring based on GIS

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Execution of Monitoring	The following items shall be monitored for each municipal district so that the Northern Region Agricultural Development Committee can carry out an annual evaluation, defining the investment measures for the following year.
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Improvement conditions of the legal conservation area (improvement of  $\pm 30,000$  ha per year in the northern region);

Conditions of silviculture progress (14,500 ha per year of reforestation in the northern region);

Number of forest fires occurrences and their conditions;

Variation of water quality.

With the execution of environmental monitoring, the regulation capacity of guarantees and agricultural credit to be carried out in the present plan shall be utilized in order to promote the region's environmental improvement.

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## Chapter 6 Selection of Priority Areas

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Selection Method	The evaluation of municipal districts in order to establish their aptitude either to the introduction of grains or to the production nucleus was carried out through the analysis of a GIS including natural and social conditions information about the region. Thus, the selection of the most apt municipal districts was carried out as a result of this analysis, considering; 1) residents willingness, 2) expected results, 3) development results, and 4) technical assistance.
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Selection of the Area through the Region Typification	The region typification was carried out through GIS analysis that included information on land aptitude, declivity in order to know the possibilities of mechanization, distribution of producers, present land use, etc. The main items to be considered are as follows:
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Item	Introduction of Grains Production	Production Nucleus
Soil Aptitude: 5 levels	Aptitude above C	Aptitude above A and C
Declivity: 4 levels	< 8%	< 8%
Present Land Use	Agriculture, pasture, cerrado	Agriculture, pasture
Potential Land Use	> 33% of the Area with Agricultural Potential I and II	> 33% of the Area with Agricultural Potential I
Size of Registered Properties	No. of properties >320 ha	No. of properties <320 ha
No. of Bovine heads	>200,000 heads	
No. of Producers		> 1,000 families
Producers' Associations		Existing

Remark: the land use potential was defined through land aptitude, declivity and present land use information. The soils with agricultural potential II are less fertile than the potential I soils, but these last ones are likely to be mechanized and are now used for pastures.

**Selection of Priority Area** After typification, the municipal districts were evaluated as their aptitude for the introduction of grains and for production nucleuses. Through this evaluation, the first 5 municipal districts were classified according to the following 6 items:

	Municipal District	Producers Intention	Demonstration Effect	Model	Develop. Feasibility	Organiz. Infrastruc.	Commerc. Infrastruc.	Total Points	Classification
Introdução da Produção de Grãos	Araguaína	8	10	10	10	10	8	56	1
	Babaçulândia	3	3	4	6	1	4	21	4
	Ananas	6	5	7	7	2	6	33	2
	Filadélfia	3	6	4	6	1	5	25	3
	Palmeirante	4	3	2	5	1	4	19	5
	Wanderlândia	5	5	2	3	1	2	18	6
	Santa Fé	4	4	1	2	1	2	14	7
Núcleo de Produção	Araguatins	8	10	10	10	10	7	55	1
	Esperantina	5	6	6	7	3	5	32	2
	Sítio Novo	4	6	6	6	3	5	30	3
	Itaguatins	5	5	6	6	2	4	28	5
	Nazaré	4	6	4	6	4	5	29	4

With these results, Araguaína was selected as the model municipal district for the introduction of grains, and Araguatins for the introduction of production nucleuses.

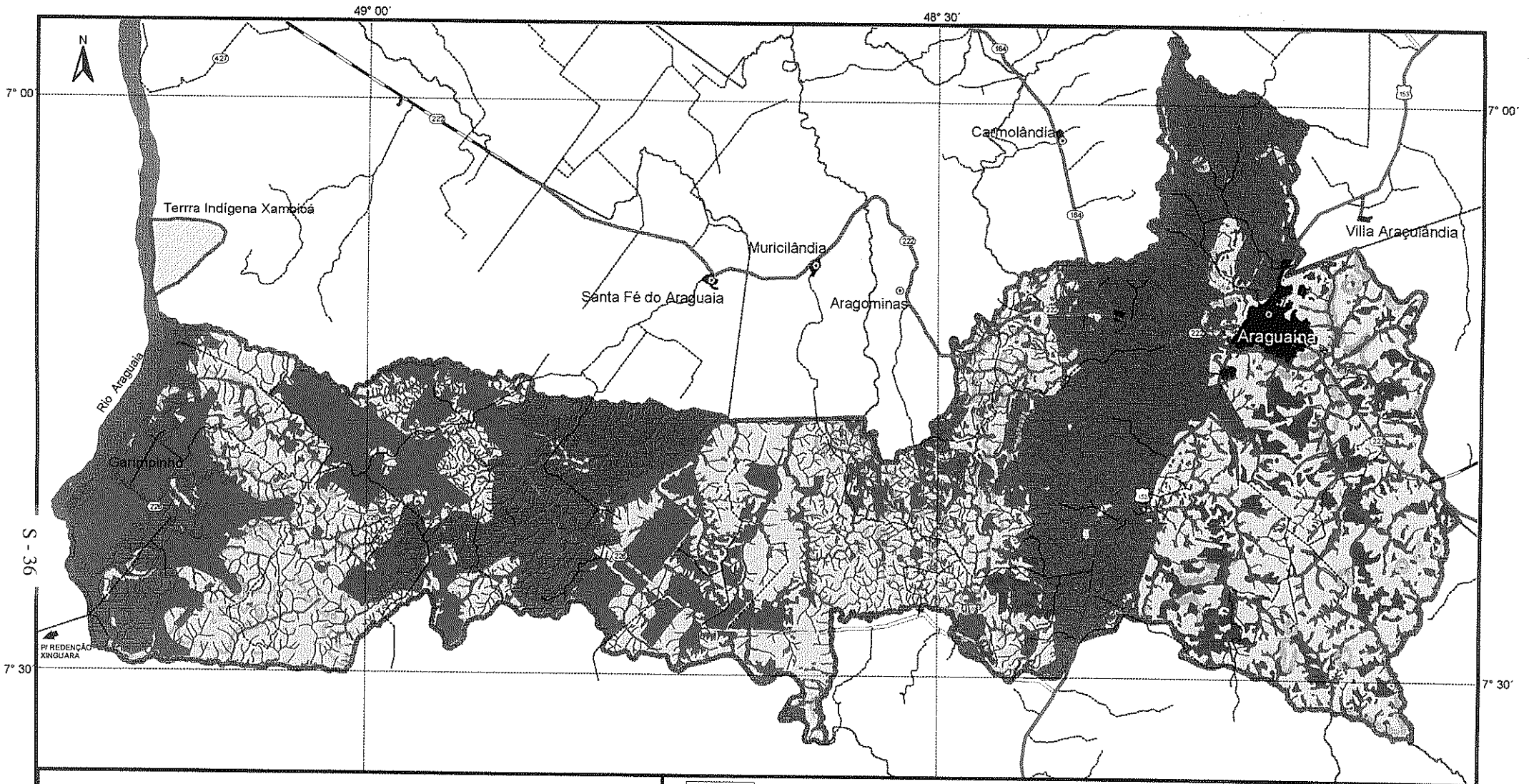
**Definition of Priority Area** The municipal districts of Araguaína and Araguatins were selected as the models for the plans of Introduction of Grains and Production Nucleus. It can be said that Araguaína is the main municipal district of the northern region and Araguatins, of the extreme-northern region. Both municipal districts have relatively good infrastructure for the execution of enterprises.

## Chapter 7 Feasibility Study in Araguaína

### 7.1 Present Conditions of Araguaína

Natural Conditions	
Climate	Humid tropical climate (B1wA'a') with mean annual rainfall of 1,800 mm
Hydrology	5 basins, 92% comprehended by the rivers Lontra, Araguaia and Muricizal
Topography	<ul style="list-style-type: none"> <li>Central Region: undulated</li> <li>Araguaia river margins: accumulation formations (40.9 km<sup>2</sup>)</li> </ul>
Soils	Mainly sandy soils, followed by red-yellos latosol and dark-red latosol;
Soil Erodibility	67% of the land appropriate for the agricultural sector present average erodibility.

Vegetation	Cerrado and Open Rain Forest
Land Use Potential	55% of the municipal district área is appropriate for the agricultural sector. Figure S-1.
<b>Social Conditions</b>	
General	The municipal district has developed after the inauguration of the Belém-Brasília and Transamazônica highways. The main revenue source is livestock husbandry, mainly meat bovine cattle.
Population	<ul style="list-style-type: none"> <li>• Population Growth: 1.79 per year; 105,019 inhab. (1996); 112,762 inhab. (2000)</li> <li>• By gender: Men (48.84%) and Women (51.19%).</li> </ul>
Health Services	The health services not only cover the northern region but also neighbor states such as Pará and Maranhão.
Education	125 schools (including high-school) with 37,147 students (middle high-school: 29,607 students, and high-school: 7,540 students)
Land Reform	4 settlements with 343 families in total.
Infrastructure Conditions	<ul style="list-style-type: none"> <li>• Construction of an airport connecting to the main centers of the Country;</li> <li>• Utilization of the Belém-Brasília highway.</li> </ul>
Land Use Conditions and Registration of Properties	<ul style="list-style-type: none"> <li>• Most land used as pasture, only 0.4 km<sup>2</sup> used for agriculture;</li> <li>• 12% of land owners who are large-scale ones possess 58% of the land.</li> </ul>
Present Conditions of Agriculture	<ul style="list-style-type: none"> <li>• Total area of 3,920 km<sup>2</sup>, corresponding to 1.4% of the State area;</li> <li>• 67% is utilized as pasture, this being the main activity;</li> <li>• 974,017 heads (bovine) in 1999;</li> <li>• Large production of maize and increase of pineapple production</li> </ul>
Management Conditions	<ul style="list-style-type: none"> <li>• Most of the large-scale producers carry out cattle fattening and production of calves;</li> <li>• The médium-scale producers carry out milk production and sale of calves;</li> <li>• The mini-/small-scale producers (62%) mainly carry out the production of grains for self-consumption. Some of them produce milk.</li> </ul>
Producers' Associations	13 associations with 413 members.
Livestock Husbandry Conditions	<ul style="list-style-type: none"> <li>• Area specialized in bovine cattle fattening with 17% of the State herd;</li> <li>• The calves for fattening are purchased in auctions from middlemen from outside and inside of the State;</li> <li>• Most of the animals for fattening are Nelore and their crossbreds. The majority is not castrated;</li> <li>• The milk production is carried out mainly by medium- and small-scale producers. The main races are the crossbreds of Tabapuã and Nerole with Holandesa, Pardo-Suíço and Jersey. The milk production of these animals drops during the dry season.</li> </ul>
Conditions of Agricultural Products Commercialization and Processing	<ul style="list-style-type: none"> <li>• Bovine meat – pieces of processed meat: most of the animals are commercialized alive;</li> <li>• Milk: 2 dairy products plants. The milk collection is carried out with trucks (4 t) and is commercialized in neighbor regions;</li> <li>• Poultry production: Agrolândia</li> <li>• Agricultural processing: there are tomato and cassava processing facilities.</li> </ul>



**LEGENDA**

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li> Rodovias Pavimentada (Estadual)</li> <li> Pavimentada (Federal)</li> <li> Em Obras de Pavimentação</li> <li> Leito Natural (Estadual)</li> <li> Leito Natural (Rural)</li> <li> Limite de Municípios</li> <li> Sede Municipal</li> </ul> | <ul style="list-style-type: none"> <li> Agropecuária 1 817 km<sup>2</sup></li> <li> Agropecuária 2 1344 km<sup>2</sup></li> <li> Silvopastoril 136 km<sup>2</sup></li> </ul> | <ul style="list-style-type: none"> <li> Silvicultura 193 km<sup>2</sup></li> <li> Manejo Florestal 15 km<sup>2</sup></li> <li> Conservação 1360 km<sup>2</sup> (379 km<sup>2</sup>)</li> </ul> |
|--|--|--|



Estudo de Desenvolvimento do Setor Agropecuário da Região Norte do Estado do Tocantins



Figure S-2: Land Use Potential (Araguaína)



ESC. 1 : 520,000

## 7.2 Plan of Agricultural Development of Araguaína

### Land Use Plan

Legal Conservation Area This municipal district is located in the Amazônia Legal region thus requiring a Land Use Plan based on the required environmental standards. The legal conservation area is presented as follows:

Land Division	Area (km <sup>2</sup> )	%
Conservation Area based on the Environmental Laws		
Federal Laws	2,702	68.9
State Laws	1,960	50.0
Current Conservation Area	1,241	31.0
Deficit to Fulfill the Environmental Laws		
Federal Laws	1,461	37.3
State Laws	719	18.3

Land Use Potential The area by land use potential for Araguaína is presented as follows:

Item	Area (km <sup>2</sup> )	%
Municipal Area	3,920.0	
Agricultural Potential I	817.2	20.8
Agricultural Potential II	1,344.3	34.3
Sub-Total	2,161.5	55.1
Silviculture	192.9	4.9
Silvi-pastoral	136.0	3.5
Forest Management	14.6	0.4
Conservation	980.7	25.0
Water protection areas	378.5	9.7
Others	55.8	1.4
Sub-Total	1,758.5	44.9

General Land Use Plan The land use plan by period for each land use potential, legal conservation area and property scale is presented as follows:

	Current	Short Term	Medium Term	Long Term	Final
Municipal Area	392,000.0	392,000.0	392,000.0	392,000.0	392,000.0
Agriculture and Livestock Husbandry	262,040.0	259,437.1	248,742.8	240,754.2	107,310.0
Traditional Pasture	262,000.0	251,669.7	190,629.2	103,862.8	0.0
Improved Pasture		752.8	30,245.5	81,732.9	52,151.5
Grains Introduction Area	40.0	4,704.9	23,702.8	47,762.1	47,762.1
Property of Mini-/Small-scale Prod.		2,309.7	4,165.4	7,396.4	7,396.4
Conservation	95,700.0	99,500.3	118,502.0	137,503.7	279,110.0
Silviculture		643.0	3,858.0	7,073.0	19,290.0
Agro-forestry		1,314.7	7,888.0	14,461.3	108,840.0
Silvi-pastoral		453.3	2,720.0	4,986.7	13,600.0
Forest Management		48.7	292.0	535.3	1,460.0
Forest (Current)	95,700.0	95,700.0	95,700.0	95,700.0	95,700.0
Water source protection areas		1,261.7	7,570.0	13,878.3	37,850.0
Strong Declivity		79.0	474.0	869.0	2,370.0
Cerrado	28,400.0	27,202.6	18,895.1	7,882.2	0.0
Others	5,860.0	5,860.0	5,860.0	5,860.0	5,580.0

## Plan of Grains Introduction

**Targets** The plan of each crop introduction by period (short, medium and long terms) is presented as follows according to their aptitude for agriculture and livestock husbandry and for own cultivation or contracted one.

	(ha)		
	Short Term	Medium Term	Long Term
Soybean	3,261	16,218	32,257
Maize	1,444	7,485	15,505
Grains	4,705	23,703	47,762
Own Cultivation	3,293	18,962	42,986
Cultivation by Rental	1,411	4,741	4,776
Area to be Open	4,705	23,703	47,762
Existing Pasture	4,234	21,333	42,986
Cerrado	470	2,370	4,776

**Necessary Inputs to the Introduction of Grains Production** Agricultural machinery sets necessary: 11; Lime: total of 82,000 t during 5 years; Super-phosphate:  $\pm$  5.000 t; Seeds: 2,000 t of soybean, 400 t of maize; Fertilizer: 16,000 t.

**Introduction of Grains with the Attraction of Experienced Producers** Grains producers from the Country southern region shall be attracted to raise the grains production techniques in the region. This would still be insufficient for the grains production. Necessary measures for the promotion of contract cultivation: the cultivation by contract can make use of advantages for both parties such as the planned renew of degraded pastures on one side, and the expansion of grains cultivation area to utilized the vacant capacity of the grains producers' machinery.

**Necessary Subsidy from the Government** Technical and financial assistance would be necessary from the State government. The State and municipal governments shall administratively support, in cooperation with the private sector, the repair works of roads during the rainy season, establishment of silos, distribution structure of seeds / fertilizers / agro-chemicals and repair / maintenance of machinery. Governmental incentive measures shall be taken during the first 5 years (short term) in order to promote the crops rotation. EMBRAPA is supposed to carry out the assistance in regard to soil analysis, selection of varieties and technical assistance. Also an active participation of the State government, RURALTINS, UNITINS, and agricultural high-schools is expected.

## Diversification / Strengthening of Livestock Husbandry

**Method of Livestock Husbandry Strengthening** In regard to large-scale producers, the conversion of raising methods into more efficient ones is expected, providing financing systems for the introduction of such measures. On the other hand, regarding to mini-/small-scale producers, their production conditions are expected to be improved, increasing significantly the milk production through an appropriate method of bovine milk production and introducing buffaloes according to the scale of these producers.

**Large-scale Producer** Expansion of techniques utilized by those producers carrying out a modern agriculture. This can be said mainly as for the following items:

- Establishment of credit lines for the improvement of pastures;
- Promotion of sugar cane production for its utilization as foodstuff during the dry season;
- Promotion of silage utilization to cover the foodstuff deficit during the dry season and establishment of credit lines;
- Promotion of pasture production for the dry season and establishment of credit lines;
- Execution of pasture rotation and establishment of credit lines for the introduction of confinement raising;
- Promotion of early castration of calves destined to meat production with the aim of improving their quality, as well as the promotion of dehorning to facilitate the creation.

**Mini-/Small-scale Producer** Replace the traditional extensive raising through the following measures:

- To convert the milk bovine cattle husbandry into bubaline husbandry. The bubaline cattle is easier to raise and more adapted to tropical climate;
- To promote the sugar cane as foodstuff during the dry period;



- To promote the utilization of green pasture and to establish credit lines to support the acquisition of forage choppers;
- To promote the “zero-grazing” method and to support the necessary facilities for so;
- To carry out the program for oestrus synchronization and to assist the promotion of AI;
- To establish credit lines for the construction of pigsties and utilization of cassava and dairy production residues as foodstuff for pigs.

To raise the willingness to produce allowing investments on the part of mini-/small-scale producers.

- Selection and mediation of swine race and special credit for the initial acquisition of reproducers;
- Consolidation of a technical assistance structure for a modern swine husbandry;
- Consolidation of measures against swine diseases;
- Construction of a public processing plant for swine;
- Technical assistance in regard to swine by-products at the producer and the association levels.

Number of Raised Heads The number of cattle heads based on the land use plan is presented as follows:

	(Heads)			
	Current	Short Term	Medium Term	Long Term
Meat Bovine	200,562	224,419	376,005	559,081
Traditional Pasture		223,267	283,454	183,927
Improved Pasture		1,152	92,551	375,154
Milk Bovine	35,963	41,644	39,925	10,888
Bubaline	55	7,182	30,778	51,180
Total	236,580	273,245	446,708	621,149

### Promotion of Production Nucleus

Cultivated Area There are 631 mini- and small-scale producers in the municipal district of Araguaína. The majority is poor and demands assistance. Thus, changing their production condition from only self-consumption and increase their income to at least 3 minimum wages is necessary. The necessary cultivation area for this purpose is as follows:

Type of Production	Target Producer		Necessary Cultivation Area (ha)		
	Mini	Small	Short Term	Medium Term	Long Term
General	311	320	2,310	4,619	7,396
Grains Type	62	64	1,582	3,164	5,066
Fruits Type	93	96	95	190	304
Greenery Type	156	160	633	1,266	2,026

### Plan of Roads Improvement

Improvement of the Roads Network Considering that most of the roads are state and municipal roads without paving, at short term the state road that transversally crosses the municipal district shall be paved. The municipal roads that converge to this state road shall be improved (graveled) at medium term, and at long term the main municipal roads shall be asphalted besides the construction of some new roads.

Type	(km)			
	Present	Short Term	Medium Term	Long Term
Asphalt (Federal)	50.7	50.7	50.7	50.7
Asphalt (Municipal)	62.4	165.0	165.0	165.0
Asphalt (Municipal)	0	0	0	179.5
Gravel	102.6	0	0	537.5
Non Paved (Municipal)	572.4	572.4	868.5	151.5
Total	788.1	788.1	1,084.2	1,084.2

Roads Maintenance Structure	The periodic maintenance shall be carried out annually for the non paved or graveled roads, and each 5 years for the paved ones. However, maintenance works shall be carried out if verified the necessity of such works through periodic inspection or through information from users. The maintenance shall be the responsibility of the regional office of DERTINS in Araguaína.
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### Plan of Silos Strengthening

The public sector participation is planned to take place only at short term, being replaced by the private sector at medium and long terms. For this, the following measures are necessary:

- Short Term: Construction of facilities with capacity for the production planed at short term;
- Medium Term: Transference to the private sector through incentives.
- Long Term: Total transference to the private sector (transference to the private sector even of the facilities constructed at short term).

### Project Evaluation

Investment Efficiency The production, investment and investment efficiency estimate in regard to the agricultural sector is presented as follows:

	Short Term	Medium Term	Long Term	Accumulated Value
<b>Introduction of Grains</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	6,607	61,955	161,780	230,341
Investment (x10 <sup>3</sup> Real)	4,623	41,501	104,727	150,850
Investment Efficiency	1.43	1.49	1.54	1.53
<b>Diversification/Strengthening of Livestock Husb.</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	28,370	115,235	178,494	322,098
Investment (x10 <sup>3</sup> Real)	6,270	35,538	76,579	118,387
Investment Efficiency	4.52	3.24	2.33	2.72
<b>Production Nucleus</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	24,063	37,486	79,109	140,658
Investment (x10 <sup>3</sup> Real)	5,133	15,398	26,702	47,233
Investment Efficiency	4.69	2.43	2.96	2.98
<b>Total of the Agricultural Sector</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	208,768	392,773	712,715	1,314,256
Investment (x10 <sup>3</sup> Real)	16,025	92,436	208,008	316,469
Investment Efficiency	3.68	2.79	2.73	2.73

### Preliminary Evaluation of Environmental Impacts

#### Items to be Environmentally Considered in Araguaína

Evaluation Item	Items to be Considered
<b>1. Sociology</b>	
Life of Residents	• Necessity to elaborate a plan that utilized the vitality of the region's residents.
Population Problems	• Considering that the occurrence of imigration is expected in the region, a plan shall be elaborated to increase the job opportunities in the rural zone.
Residents Economic Activity	• Elaboration of measures that prioritizes the low income population.
Habits	• A location for meetings shall be considered when the associations' activities are activated.
<b>2. Health</b>	
	• Instruction about the due utilization of agro-chemicals to avoid water pollution with the increase of such products utilization;
	• Instruction to the workers in how to spray the agro-chemicals;
	• Adoption of measures for the storage, management and washing of equipment after the use of agro-chemicals.
<b>3. Destruction or Damages to Historical Sites</b>	
	• Instruction to avoid tropical forests deforestation.
<b>4. Human Beings and Important Habitats</b>	
Changes in	• To avoid the deforestation of existing tropical forests along the Araguaia river;

Vegetation	<ul style="list-style-type: none"> <li>To instruct for the preservation of trees as much as possible during the preparation of land for agriculture.</li> </ul>
Influence over native fauna/flora	<ul style="list-style-type: none"> <li>To carry out a land use plan taking into consideration ways with vegetation so that the fauna can transit on them.</li> </ul>
Diversity of Species	<ul style="list-style-type: none"> <li>To preserve as much as possible the existing vegetation which is the source of food for the existing animals, thus avoiding the extinction of such animals due to development.</li> </ul>
Introduction of Harmful Beings	<ul style="list-style-type: none"> <li>Take into consideration measures that avoid the influence on the existing species of the introduction of bubaline cattle.</li> </ul>
Destruction of Swampy Areas	<ul style="list-style-type: none"> <li>To preserve some existing swampy areas in the region.</li> </ul>
<b>5. Land / Soil</b>	
Soil	<ul style="list-style-type: none"> <li>Introduction of agronomic methods that do not cause soil erosion;</li> <li>Cultivation of trees for protection against wind to avoid eolian erosion;</li> <li>Utilization of agronomic methods to avoid the compaction of soils due to the use of agricultural machinery.</li> </ul>
Land	<ul style="list-style-type: none"> <li>Adoption of necessary measures in areas where the recuperation of nature is difficult.</li> </ul>
<b>6. Hydrology / Water Quality</b>	
Conditions of superficial waters and their level variation	<ul style="list-style-type: none"> <li>To avoid water catchments that damage the water course conditions;</li> <li>When collecting water for irrigation, elaborate plans that take into consideration the use of downstream water.</li> </ul>
Conditions of groundwater and its level variation	<ul style="list-style-type: none"> <li>To strengthen the groundwater monitoring in order to avoid its level variation with the use for irrigation.</li> </ul>
Occurrence of floods	<ul style="list-style-type: none"> <li>To evaluate the possibility of floods occurrence with the construction of roads.</li> </ul>
Degradation of Water Quality	<ul style="list-style-type: none"> <li>To carry out a management in order to avoid water degradation;</li> <li>To instruct to avoid water pollution due to swine husbandry.</li> </ul>

## Chapter 8 Feasibility Study in Araguatins

### 8.1 Present Conditions of Araguatins

<b>Natural Conditions</b>	
Climate	Humid Tropical Climate (C2rA'a'), Annual Evapotranspiration: 1,500 mm, Mean Rainfall: 1,500 mm
Hydrology	86% belongs to the Araguaia river basin
Topography	Topography with slight undulations, occurring large amount of eolian erosive forms.
Soil	High concentration of quartzose sand followed by latosols and podzols in lower regions.
Soil Erodibility	70% has erodibility smaller than the average being proper to agricultural activities.
Vegetation	Transition area from cerrado vegetation to cerradão vegetation.
Land Use Potential	More than 44% of the municipal district has aptitude for agriculture. See Figure S-2.
<b>Social Conditions</b>	
General	Most of the farmers carry out familiar agriculture with low productivity due to low technology and lack of resources. This production is mainly oriented to self-consumption, with low profitability.
Population	<ul style="list-style-type: none"> <li>Growth Rate: 3.62% annual, 22,558 inhab. (1996) and 26,008 inhab. (2000);</li> <li>By gender: men (48.92%) and women (51.02%).</li> </ul>
Health	The health system covers the municipal district and neighboring rural areas.

Education	57 schools (including high-school) with 9,447 students (middle high-school: 7,978 students, and high-school: 1,469 students)
Land Reform	18 settlements (1,371 settled families with an average area of 33.5 ha per family)
Infrastructure Conditions	<ul style="list-style-type: none"> <li>• The Transamazônica highway crosses the municipal district and the roads are under paving works.</li> </ul>
Land Use Conditions and Properties Registration	<ul style="list-style-type: none"> <li>• 5% of the land owners possess 45% of the land;</li> <li>• 83% are mini-scale producers, but possess only 7% of the total municipal area.</li> </ul>
Conditions of Agriculture	<ul style="list-style-type: none"> <li>• The main crops are rice, feijão bean, maize and cassava.</li> <li>• 85% are mini- and small-scale producers;</li> <li>• Araguatins is the main center of the extreme-northern region as for agricultural techniques extension since has a federal agricultural highschool.</li> </ul>
Cultivation Conditions	<ul style="list-style-type: none"> <li>• The large-scale producers (5%) have in average 2,000 to 3,000 ha and carry out meat bovine cattle fattening;</li> <li>• The medium-scale producers (10%) also carry out meat bovine cattle fattening;</li> <li>• The mini-/small-scale producers (85%) produce mainly grains and fruits for self-consumption, commercializing the surplus;</li> <li>• Part of the small-scale producers carry out bovine cattle husbandry, and have in average 6 to 10 heads per family. 30% of these animals are oriented to milk production which is commercialized in Tocantinópolis.</li> </ul>
Producers' Associations	There are 11 associations with 619 members.
Livestock Husbandry Conditions	<ul style="list-style-type: none"> <li>• Main livestock husbandry area in the extreme-northern region;</li> <li>• The cattle races raised are the same as in Araguaína, mainly the Nelore and its crossbreds;</li> <li>• The races for milk production are Tabapuã and Nerole crossed with Holandesa, Pardo-suíço and Jersey, with drop in the milk production during the dry season.</li> <li>• In case of swine husbandry, Araguatins has a larger number of animals compared to Araguaína. The small- and medium-scale producers are very interested in this activity although they carry out the traditional extensive swine husbandry of several races.</li> </ul>
Commercialization and Agricultural Processing Conditions	<ul style="list-style-type: none"> <li>• Grains production for self-consumption with the commercialization of the surplus;</li> <li>• The producers around Araguatins produce tubercles (cassava, sweet potato), fruits (pineapple, banana, watermelon, cashew) and greenery (lettuce, tomato, small onion, pepper), commercializing the production in the region's markets, although in small amounts.</li> </ul>

48° 30'

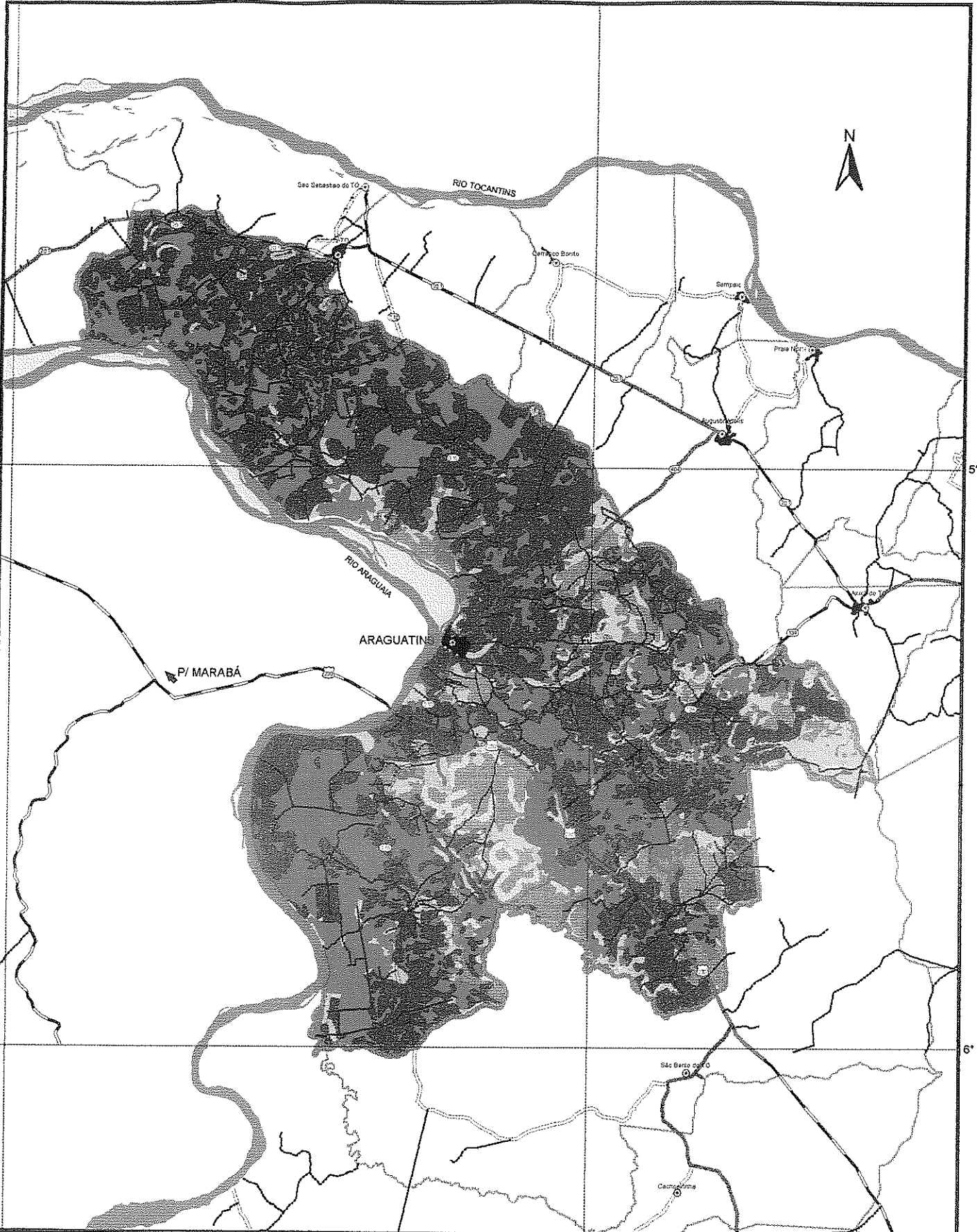
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LEGENDA

Agropecuária 1 863 km <sup>2</sup>	Silvicultura 202 km <sup>2</sup>
Agropecuária 2 151 km <sup>2</sup>	Manejo Florestal 36 km <sup>2</sup>
Silvipastoril 30 km <sup>2</sup>	Conservação 919 km <sup>2</sup> (131 km <sup>2</sup> )
Pavimentada (Estadual)	Rodovia com Revest. Primário
Pavimentada (Federal)	Leito Natural
Em Obras de Pavimentação	

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Figure S-3: Land Use Potential (Araguatins)

10 0 10 Kilometers



ESC. 1 : 500,000

## 8.2 Agricultural Development Plan of Araguatins

### Land Use Plan

Legal Conservation Area This municipal district is located in the Amazônia Legal region thus requiring a Land Use Plan based on the required environmental standards. The legal conservation area is presented as follows:

Land Division	Area (km <sup>2</sup> )	%
Conservation Areas based on the Environmental Laws		
Federal Laws	1,509.3	65.7
State Laws	1,148.5	50.0
Present Conservation Area	783.5	34.1
Deficit of Area to Fulfill the Environmental Laws		
Federal Laws	725.8	31.6
State Laws	365.0	15.9

Land Use Potential Araguatins potential is presented as follows:

Item	Area (km <sup>2</sup> )	%
Municipal Area	2,296.9	
Agricultural Potential I	862.5	37.6
Agricultural Potential II	151.0	6.6
Sub-Total	1,013.5	44.1
Silviculture	202.1	8.8
Silvi-pastoral	30.0	1.3
Forest Management	36.3	1.6
Conservation	783.5	34.1
Water Sources	131.2	5.7
Others	95.9	4.2
Sub-Total	1,279.0	55.7

General Land Use Plan The land use plan per period and calculated based on the targets to be attained by each producer scale and production potential are as follows:

	Current	Short Term	Medium Term	Long Term	Final
Municipal Area (ha)	229,690.0	229,620.0	229,620.0	229,620.0	229,690.0
Agricultural Activity	103,650.0	103,041.5	101,271.0	100,677.1	58,552.0
Traditional Pasture	103,580.0	98,761.4	73,997.3	38,267.4	0.0
Improved Pasture		327.4	13,152.7	35,542.7	31,685.0
Grains Introduction Area	70.0	2,046.0	10,307.5	20,770.0	20,770.0
Mini-/Small-scale Properties		1,906.8	3,813.5	6,097.0	6,097.0
Conservation	78,350.0	79,920.5	87,773.0	95,625.5	161,548.0
Silviculture		673.7	4,042.0	7,410.3	20,210.0
Agro-floresty		223.8	1,343.0	2,462.2	42,798.0
Silvi-pastoral		100.0	600.0	1,100.0	3,000.0
Forest Management		121.0	726.0	1,331.0	3,630.0
Forest (Present)	78,350.0	78,350.0	78,350.0	78,350.0	78,350.0
Water Sources		437.3	2,624.0	4,810.7	13,120.0
Strong Declivity		14.7	88.0	161.3	440.0
Cerrado	37,660.0	36,628.0	30,546.0	23,287.4	0.0
Others	10,030.0	10,030.0	10,030.0	10,030.0	9,590.0

### Plan of Grains Introduction

Target The introduction of each crop by period, divided into own cultivation and cultivation by contract, and per area is presented as follows:

	(ha)		
	Short Term	Medium Term	Long Term
Soybean	1,418	7,053	14,028
Maize	628	3,255	6,743
Grains	2,046	10,308	20,770
Own Cultivation	1,432	8,246	18,693
Cultivation by Contract	614	2,062	2,077
Area to be Opened	2,046	10,308	20,770
Existing Pasture	1,841	9,277	18,693
Cerrado	205	1,031	2,077

### Livestock Husbandry Diversification / Strengthening

Livestock Husbandry Target The number of heads calculated according to the land use plan is as follows:

	(Heads)			
	Current	Short Term	Medium Term	Long Term
Meat Bovine	89,391	82,382	143,901	228,715
Milk Bovine	16,029	21,503	19,323	4,450
Bubaline	54	3,530	13,800	19,482
Total	105,474	107,415	177,024	252,647

### Promotion of Production Nucleus

Cultivated Area There are 524 mini- and small-scale producers in the municipal district of Araguaína. The majority is poor and demands assistance. Thus, changing their production condition from only self-consumption and increase their income to at least 3 minimum wages is necessary. The necessary cultivation area for this purpose is as follows:

Crop	Target Producers		Necessary Area (ha)		
	Mini	Small	Short Term	Medium Term	Long Term
General	266	258	1,907	3,814	6,097
Grains	53	52	1,306	2,612	4,176
Fruits	80	77	78	157	251
Greenery	133	129	522	1,045	1,670

Demand of Resources The demand of resources for cultivation is as follows:

(Unit: thousand Reais)

Demand	Short Term	Medium Term	Long Term	Accumulated Total
Demand (thousand Reais)	4,237	12,712	22,023	38,972
Grains	1,657	4,971	8,612	15,240
Fruits	608	1,823	3,159	5,590
Greenery	1,972	5,917	10,252	18,142
Mechanization (thousand Reais)	2,124	6,372	11,040	19,536
Grains	911	2,733	4,736	8,380
Fruits	400	1,199	2,078	3,677
Greenery	813	2,439	4,226	7,479

Concept of the Production Nucleus Promotion The following items shall be carried out in community:

- Communal activity related to the improvement of infrastructure (rural roads, etc.);
- Jointly sale of products and acquisition of inputs;
- Procurement of agricultural credit;
- Improvement of life conditions.

The following measures are proposed to activate the associations:

- Strengthening of educational activities;
- Efficient technical assistance;
- Excursions to successful production locations;
- Correct utilization of credit lines;
- Formation of leaders.

Organization of Women in the Rural Environment

- Organization of producers' women who carry out integration of cassava cultivation and milk cattle husbandry;
- The women group shall carry out at home the raising of small- and medium-scale animals, and the jointly production of dairy products;
- This women group shall make the exchange of experience with other women groups in the region to close the circle.

### Promotion of Agricultural Products Processing

Plan of Establishment of Cheese Factories

3 to 4 units shall be installed in Araguatins. Since the buffaloes milk shall be destined mainly to cheese production, the following is necessary:

	(Real)
1. Area of 1,000 m <sup>2</sup>	15,000
2. Electricity and Civil Works for 500 m <sup>2</sup>	75,000
3. Equipment Reception and homogenization tanks; Centrifuge; Processing and pressing Tank; Resting and storage shelves; Pasteurization and hygienization chain, etc.	160,000
<b>Total</b>	<b>250,000</b>

### Plan of Roads Improvement

Conditions of the Roads Network

Most of the roads are municipal roads without paving.

	(km)			
Type	Present	Short Term	Medium Term	Long Term
Asphalted (Federal)	42.9	42.9	42.9	42.9
Asphalted (State)	31.3	130.0	152.7	152.7
Asphalted (Municipal)	0	0	0	71.1
At Work (State)	38.4	0	0	0
Graveled (Municipal)	60.3	0	0	0
Non Paved (Municipal)	996.8	996.8	1,023.3	952.2
<b>Total</b>	<b>1,169.7</b>	<b>1,169.7</b>	<b>1,218.9</b>	<b>1,218.9</b>

Structure of Roads Maintenance

A new DERTINS regional office shall be established in Araguatins. Since Araguatins is located in the center of the region, only one office is enough.

### Project Evaluation

Investment Efficiency

The production, investment and investment efficiency estimate of the agricultural sector is presented as follows:

#### Investment Efficiency of the Agricultural Sector (Araguatins)

	Short	Medium	Long	Accumulated
<b>Introduction of Grains</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	4,620	27,693	70,352	102,665
Investment (x10 <sup>3</sup> Real)	4,247	23,379	51,048	78,675
Investment Efficiency	1.09	1.18	1.38	1.30
<b>Diversification/Strengthening of Livestock Husb.</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	10,976	28,043	93,481	132,500
Investment (x10 <sup>3</sup> Real)	3,442	19,729	41,535	64,706
Investment Efficiency	3.19	1.42	2.25	2.05



Investment Efficiency	3.19	1.42	2.25	2.05
<b>Production Nucleus</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	19,379	30,461	64,755	114,595
Investment (x10 <sup>3</sup> Real)	4,237	12,712	22,023	38,972
Investment Efficiency	4.57	2.40	2.94	2.94
<b>Total of the Agricultural Sector</b>				
Growth of the Produced Value (x10 <sup>3</sup> Real)	131,784	193,981	364,416	690,181
Investment (x10 <sup>3</sup> Real)	11,927	55,820	114,607	182,354
Investment Efficiency	2.93	1.95	2.19	2.19

## Preliminary Evaluation of Environmental Impacts

### Items to be Environmentally Considered in Araguatins

Evaluation Items	Items to be Considered
<b>1. Society</b>	
Residents' Live	<ul style="list-style-type: none"> <li>Most of residents live in poverty conditions, thus the increase of job opportunities is necessary.</li> </ul>
Population Problems	<ul style="list-style-type: none"> <li>Increase of the job opportunities number in the rural zone through the incentive to intensive agricultural practices.</li> </ul>
Residents Economic Activity	<ul style="list-style-type: none"> <li>Measures to equalize opportunities are necessary.</li> </ul>
Habits	<ul style="list-style-type: none"> <li>A location for meetings shall be considered when the associations' activities are activated.</li> </ul>
<b>2. Health</b>	
	<ul style="list-style-type: none"> <li>Instruction about the management of agro-chemicals;</li> <li>Technical instruction to swine raisers in order to avoid water pollution.</li> </ul>
<b>3. Destruction or Damages to Historical Sites</b>	
	<ul style="list-style-type: none"> <li>The management of forests along the Araguaia river is necessary.</li> </ul>
<b>4. Important Beings and Habitats</b>	
Changes in Vegetation	<ul style="list-style-type: none"> <li>Babaçu and tropical fruits which are important income sources shall be preserved;</li> <li>Technical instruction shall be rendered to avoid the babaçu extinction with the use of herbicides.</li> </ul>
Influence on native flora / fauna	<ul style="list-style-type: none"> <li>Due care shall be taken not to influence the fauna with the utilization of herbicides;</li> <li>The several conservation areas shall be preserved by enforcing the existing municipal laws.</li> </ul>
Species Diversity	<ul style="list-style-type: none"> <li>A proper management shall be carried out to avoid the influence of the agro-chemicals utilization over the aquatic animals.</li> </ul>
Introduction of harmful beings	<ul style="list-style-type: none"> <li>Take into consideration measures that avoid the influence on the existing species of the introduction of bubaline cattle.</li> </ul>
Destruction of Swampy areas	<ul style="list-style-type: none"> <li>The preservation of small existing swampy areas is necessary.</li> </ul>
<b>5. Land / Soil</b>	
Soil	<ul style="list-style-type: none"> <li>Instruction shall be rendered to avoid toxic residues due to the utilization of large amounts of herbicides.</li> </ul>
Land	<ul style="list-style-type: none"> <li>A land use plan shall be elaborated to allow the continuation of babaçu preservation.</li> </ul>
<b>6. Hydrology / Water Quality</b>	
Occurrence of Floods	<ul style="list-style-type: none"> <li>To elaborate a land use plan for the rivers margins, and strengthen their control.</li> </ul>
Degradation of Water Quality	<ul style="list-style-type: none"> <li>To render technical instruction in order to avoid water pollution by agro-chemicals;</li> <li>To avoid water pollution by swine husbandry.</li> </ul>

## Conclusions and Recommendations

The present Study on Agricultural Development of the Tocantins Northern Region, with target year in 2015, aims at promoting a sustainable agriculture utilizing the region's advantages in terms of natural resources and transportation infrastructure. In parallel, the environmental standards of the Amazônia Legal region are expected to be attained.

The Study includes enterprises to be carried out by the producers, governmental programs that aim at supporting these enterprises, and necessary projects to the execution of these programs. The Study aims at activating the agricultural sector, which is the basis of the regional economy and is stagnated at present, raising the life standards of producers and creating harmony with the environment. Besides, social impacts are expected through direct and indirect benefits, contributing for a socio-economic development in the northern region.

The following actions are recommended for the execution of the present Study contents.

### (1) Expeditious Execution of the Development Plan in the Priority Regions

The Agricultural Development Plan of the Municipal Districts of Araguaína and Araguatins, where the Feasibility Study was carried out, has to be urgently concretized and executed. The cooperation of the Federal and State Governments is thus strongly necessary.

### (2) Executing Agency

The main Executing Agency is SAG. However, considering that it depends on the cooperation of other organisms such as SEPLAN, RURALTINS, NATURATINS, UNITINS, etc., the active participation of each of them is necessary for the smooth progress of the enterprises.

### (3) Credit Lines

The local producers due to low economic capacity carry out an unstable monocultural agriculture. In order the producers can get rid of such situation, the production intensification and diversification is necessary. This shall be possible with the supply of low interest rates credit utilizing the Development Fund. The Tocantins Government has to elaborate a new credit line in view of its responsibility, such as providing guarantees, besides evaluating the existing credit lines.

Furthermore, the structure of the Development Fund shall have to be urgently improved and concretized in order to receive foreign resources.

### (4) Elaboration of the Land Use Plan

The Government has to urgently elaborate the Land Use Plan in order to avoid the disordered and fast development likely to occur with the improvement of the roads and railway networks.

### (5) Responsibility of the Government

The introduction of a new agricultural sector in the region will depend not only on the participation of producers but also on governmental incentives and on the participation of new grains producers.

### (6) Technical Assistance

The strengthening of assistance is highly necessary for the smooth progress of producers' enterprises. For that, the jointly participation of concerned organisms related to rural extension is necessary considering that the integrated cultivation to be introduced with grains production, intensive livestock husbandry, intensive agriculture, etc., are completely new techniques for the producers.