CHAPTER 8 - FEASIBILITY STUDY ON THE ARAGUATINS MUNICIPALITY

8.1 Present situation of the Study Area

(1) Natural conditions

a. Climate

The climate in the municipal district of Araguatins area can be characterized, according to the Thornthwaite method, on which bases the Ecological-economical Zoning (SEPLAN, 1999), the humid / sub-humid with small hídrical deficiency (C2rA'a'). The potential evapotranspiração measured annual it i of 1.600 mm, and in the summe i around 410 mm along the three consecutive months with higher temperature.

Basing on the monthly medium precipitation data in Araguatins, it is had that the annual medium precipitation is 1.502,3 mm. This precipitation ponders in the period of November to April (84% of the annual medium precipitations), with the accentuated concentration from February to March (36% of the annual medium precipitations). The table to proceed presents the monthly medium precipitation.

Monthly Medium precipitation in Araguatins. 1996 to 1998 (mm)

Jan	Fev	Sea	Abr	Mai	Jun	Jul	Ago	Set	Out	Nov	Ten	Year
277,1	151,4	396,1	167,7	78,6	5,5	12,7	0,0	20,6	115,5	133,1	144,0	1.073,8

Source: DNAEE

Considering that Araguatins has climatic characteristics very similar to the one of the municipal districts of Marabá (PA) and Imperatriz (MA), it is supposed that the municipal district presents an annual medium temperature around 26oC. The table to proceed presents the monthly medium temperatures for the municipal districts of Marabá and Imperatriz.

Monthly Medium temperature in Marabá and Imperatriz (oC)

Station	Jan	Fev	Sea	Abr	Mai	Jun	Jul	Ago	Set	Out	Nov	Ten
Marabá	25,8	24,3	25,8	26,3	26,5	26,4	26,3	26,8	26,9	26,7	26,4	25,9
Empress	26,0	25,9	26,0	26,2	26,6	26,2	26,4	27,0	27,0	27,3	26,9	26,4

Source: INMET. Marabá (1973 to 1990) and Imperatriz (1976 to 1990)

b. Hidrografy

The system hidrográfico in the municipal district of Araguatins is almost inserted totality in the Basin of Araguaia, and to the south of the municipal district it is located the basin of the Piranhas river (A16). It leaves of the limits of the municipal district outline the divisor of waters among the Basins of Araguaia (A1) and Tocantins (T1), being with part of this in his domain.

The tables to proceed present the participation of the basins in the composition of the municipal district, the minimum flows and characterizations of the river Araguaia full, and the maximum flows and respective intervals of the river Araguaia appeal.

Basins Hidrográficas of Araguatins

Rio Araguaia (A1)		Rio Piranhas (A16)		Rio Tocantins (T1)		Other		Total area
Area (km2)	%	Area (km2)	%	Area (km2)	%	Area (km2)	%	(km2)
1.978,7	86,14	287,5	12,52	29,3	1,27	1,5	0,06	2.297,0

Source: SEPLAN (1999) and calculations of the Missão JICA (2000)

Characteristic flows in the Fluviometric Station of Araguatins

Sub-basin	Local	Period	Flows (m3/s)				
			Q5%	Q25%	Q50%	Q75%	Q95%
28	Araguatins. Rio Araguaia	1974 ~ 1995	16.489	10.023	4.745	2.184	1.008

Source: basic Data DNAEE. calculation ONA S.A. would Engineer (1997)

Maximum flows in the Fluviometric Station of Araguatins

Sub-basin	Local	Period	Q máx. (m3/s)		
			Tr = 100 years	Tr = 1.000 years	Tr = 10.000 years
28	Araguatins. Rio Araguaia	1975 ~ 1995	38.070	49.885	61.700

Source: basic Data DNAEE. calculation ONA S.A. would Engineer (1997)

c. Geomorphology

Of the municipal district of Araguatins territorial area (2.297 km2), most (1.724,9 km2) it presents relief whose topography was defined by the geological structure of origin, worked by morfo-dynamic processes, standing out to the most resistant layers, attributed to Pediplano Degraded Nude Levelings.

In order of greatness (231,7 km2), concentrated mainly the SO and CO of the municipal district, they follow the areas object of homogeneous Dissection with Features of the Convex Top, creating reliefs configured by the erosive agents' action, with different presentations.

In the position IF, they are the soils with defined reliefs for homogeneous Dissection with Features of the Top Tabulate (207,4 km2) where the erosive agents' action provoked lowering of the highest parts, doing with that the relief tended to the leveling.

The areas of Fluvial Accumulation of Plain (39,6 km2) they come to Rio Araguaia's margins, in the central area of the municipal district, being characterized by resulting reliefs of the sediments deposition and usually subject to inundations.

Finally, in the end-north the original reliefs of the Fluvial Accumulation of Plains and Terraces appear (32,1 km2), given by the sedimentary deposition and also subjects to floods.

They also happen other mechanisms of relief resignation in the municipal district (61,3 km2), being however that they are dispersed for the whole territory. Illustration 5.2: Geomorphology (Araguatins)

d. Soils

In Araguatins, as well as in Araguaína, the soils classes found are predominantly the sands quartzosas, latossolos and podzólicos, in decreasing proportions respectively. It is still verified the occurrence of soils litólicos, Gley and plintossolos. The picture to proceed presents in percentile the predominant soils classes in the municipal district of Araguatins.

Predominant Soils classes in Araguatins

Class of Predominant Soils	Area of Inclusion (km2)	% of the Area
Podzólicos (red and yellow podzólico. PV, dark red podzólico. PE and yellow podzólico. PA)	1.142,3	49,73
Latossolos (red and yellow latossolo. LV and yellow	605,8	26,37

latossolo. LA)		
Sands quartzosas. AQ	361,2	15,72
Plintossolo pétrico. PP	38,6	1,68
Soils litólicos. R	36,7	1,60
Gley - G	14,4	0,63
Other (rivers, lakes, urban area, indigenous area	98,2	4,27
TOTAL	2.297,2	100,00

Source: Data of SEPLAN, calculation of the Missão JICA (2000)

e. Erosion

For the study of the soils erosion the risks were considered conditioned to the mechanics of the soils, according to SEPLAN data (1999). The erosion was evaluated in function of basic soils documents, geology and altimetria. Second this study, the classes of potential erosion of the soils of the municipal district of healthy Araguatins presented in the table to proceed.

Potential Erosion of the Soils of Araguatins

Classes of Erosion	**Characteristic**	**Area (km2)**	**% of the Total area**
Quick	Soils varying strongly among well the drained, deep and with prevalence of steepness among 3 to 8%.	864,6	37,63
Moderate	Soils varying between deep and little deep and usually in wavy reliefs, from 8 to 20% of steepness.	744,1	32,39
Strong	Soils a little deep, with moderate drainage. They usually happen in wavy strong relief, with predominant steepness between 20 and 45%.	275,8	12,01
Very weak the weak	-	263,5	11,47
Very strong	Shallow and very shallow soils. The predominant relief is going from the mountainous to the sharp, with larger slopes or same to 45%.	40,5	1,76
Special	-	17,4	0,76
Other	-	91,1	3,97
TOTAL		2.297,0	100,00

Source: Given SEPLAN and calculation Missão JICA (2000)

In Araguatins, more than 70% of his area belong to the classes of quick and moderate potential erodibilidade of soils.

f. Vegetation

The area of the Bico do Papagaio, where it is located the municipal district of Araguatins, it is marked by the contact of the two larger provinces vegetacionais of Brazil: the Savannah and the Amazonian Forest. In the Savannah, the physiognomy domince is savannah in the restricted sense and of the cerradão, and in the Amazonian forest, the ombrófila forest opened with babaçu.

In the atmospheres where the vegetable covering is the savannah sensu stricto, the substratum is of sandy characteristic and well drained, the arboreal representatives acquire straight forms, however, with corticosa peel and small load.

The cerradão areas appear under the form of you imbed and more extensive areas, making the transition of the savannah to the forest. The substratum still presents sandy characteristic, however in smaller proportion. The arboreal representatives present larger load, varying between 8 and 12 m of height forming continuous dossal in those areas still preserved.

It is verified in the area a dominância of the forest ombrófila that recovers the areas of soil of good quality, rich in organic matter, providing the appearance and individuals' of great load development with to 25 m of height, standing out the Ipê-yellow (Tabebuia serratifolia) and a great variety of palm trees where stands out the babassu (Attalea speciosa). It is still verified in the area, atmospheres usually humid in the bottoms of valleys associated to small courses of water where it develops a covering dense forest denominated ciliary forests, in some cases happening gallery forests.

There are remainders of the primary formation isolated amid the pastures, or under the form of small agglomerates, and even in narrow strips along the courses of water of smaller dimension. Among those remainders they deserve prominence Cajazeiro (Spondias lutea), Simorouba (Simarouba sp), Chichá (Sterculia strita) and the Ipê-yellow (Tabebuia serratifolia).

g. Analysis of the Present Conditions through GIS

The current conditions of the study area went analyze through GIS. To proceed it comes some of the analyzed themes as:

- Slope

The municipal district of Araguatins, presents great majority of the areas with smaller steepness than 4%, as demonstrated in the figure 8.6, however due to the existence of great number of rivers and streams, a plane area in great dimension is rare. The areas classified in agreement with the steepness are presented accordingly below:

Types of Slope	Area (km2)
< 4%: mechanization possible	1,990.7
4 to 8%: mecanization with small restrictions	144.0
8 to 30%: difficult mechanization	69.3
30%: mecanization dificult	0.3
Other	92.6
Total	2,297

- Land Potential

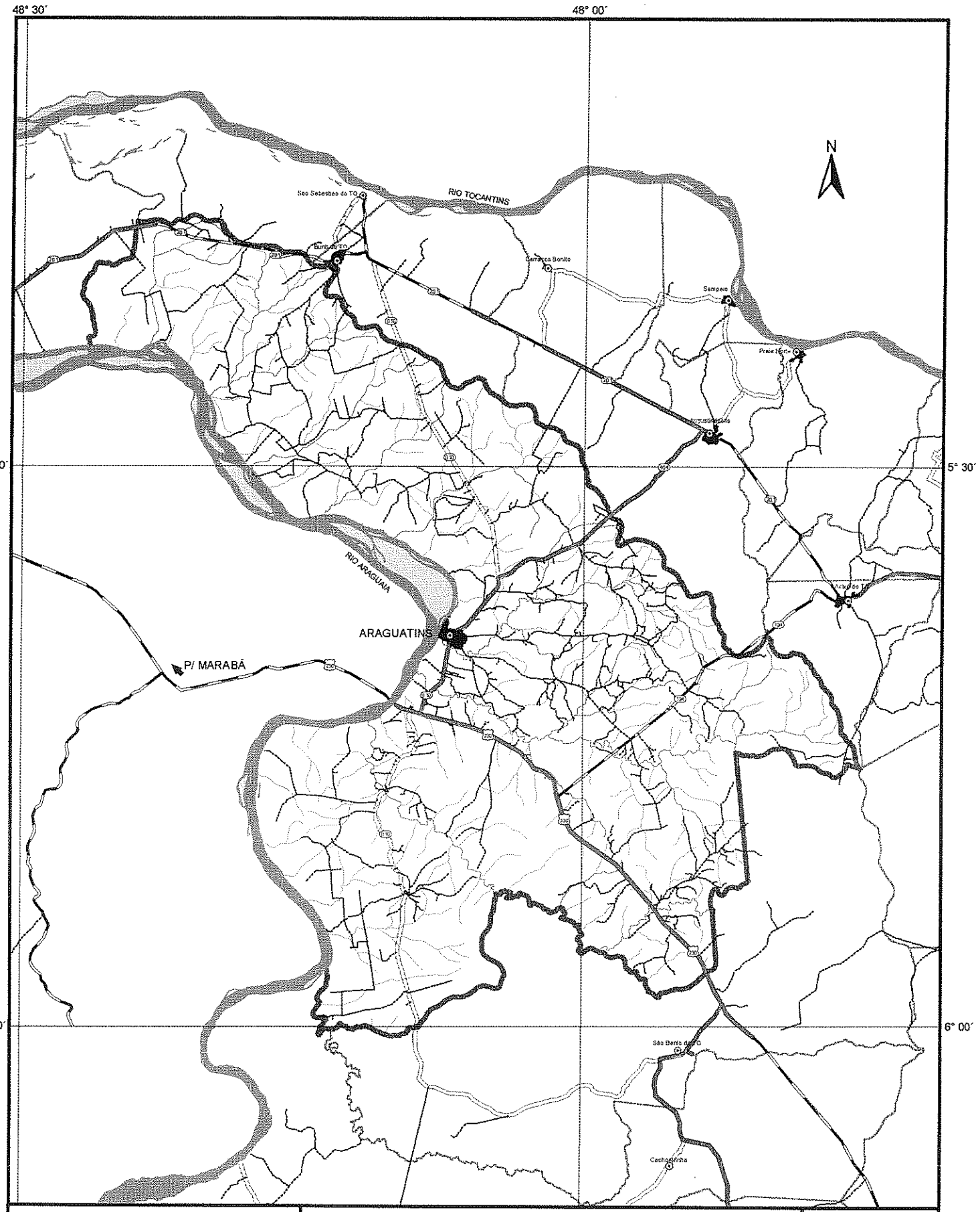
The areas classified in agreement with his potential are demonstrated in the figure 8.7. The areas of Potential 1 are dispersed in great extension for the whole municipal district. The areas of Potential 2 are located at the south part and east of the highway 230. The areas classified in agreement with their potentials are:

Potential	Details	Area (km2)
1	Soils with Intensive use of Mechanization capacity	1,557
2	Soils of reasonable fertility with mechanization possibility	520
3	Soils of medium intensive use, of difficult mechanization	43
4	Lands destined to the Forestry, Silvipastoris, Agroflorestais and reforestation activities	55
5	Land destined to Conservation	24
Other	Urban area, rivers, etc	98
Total		2,297

- Proposed Land Use

The proposed use of the earth is demonstrated in the Figure 8.8. Areas of Potentiality Agricultural I and II are dispersed in the whole area. The municipal district is characterized by having the area of larger Forestry than the area of potential II. This area is located in the south part of the municipal district. The classification is accordingly:

Proposed use	Content	Area (km2)
Potential I	Area with potential for Intensive Use	862.5
Potential II	Area with potential of Medium Use	151.0
Forestry (S)	Area with potential of Low Use or Family Agriculture	202.1
Silvipastoril (SP)	Area for Silvipastoril activity	30.0
I handle Forest (MF)	Area for Forest Handling activity	36.3
Conservation (C)	Area destined to Conservation	919
Other	Urban area, rivers, etc	95.9
Total		2,297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RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
São Sebastião do TO
Buriti do TO
Sampaio
Cachoeirinha
LEGENDA
Hidrologia
Rios Principais ..... 602 km
Rios Secundários ..... 907 km
Rodovias
Pavimentada (Estadual)
Pavimentada (Federal)
Em Obras de Pavimentação
Leito Natural (Estadual)
Leito Natural (Rural)
Limite de Municípios
Sede Municipal
Área Urbana
Rios, Lagos
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.1: Hydrology (Araguatins)
10 0 10 Kilometers
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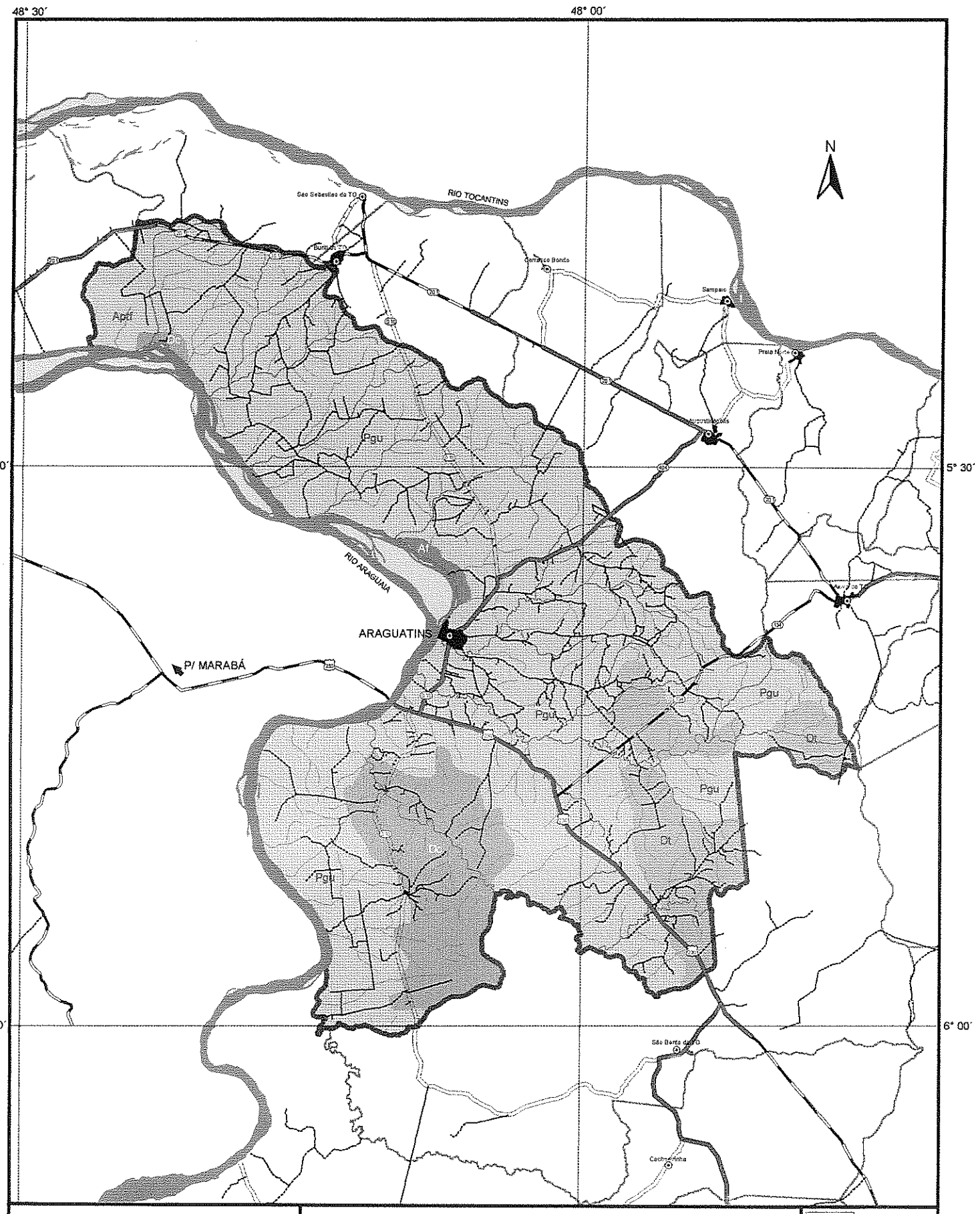
JICA
ESC. 1 : 500,000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LEGENDA
Modelados
Acumulação Fluvial de Planície 40 km2
Acumulação Fluvial de Planície e Terraço 32 km2
Aplanamento de Pedimento Degradado Desnudado 1 725 km2
Aplanamento de Pedimento Degradado Inumado 0 km2
Aplanamento de Pedimento Retocado Desnudado 0 km2
Dissecação em Ravinas 0 km2
Dissecação Estrutural ou Diferencial 0 km2
Dissecação Homogênea com Feições do Topo Aguçadas 0 km2
Dissecação Homogênea com Feições do Topo Convexas 232 km2
Dissecação Homogênea com Feições do Topo Tabulares 207 km2
Sede Municipal
Área Urbana
Rios, Lagos
Limite de Municípios
Rios Principais
Rios Secundarios
10 0 10 Kilometers
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.2: Geomorphology (Araguatins)
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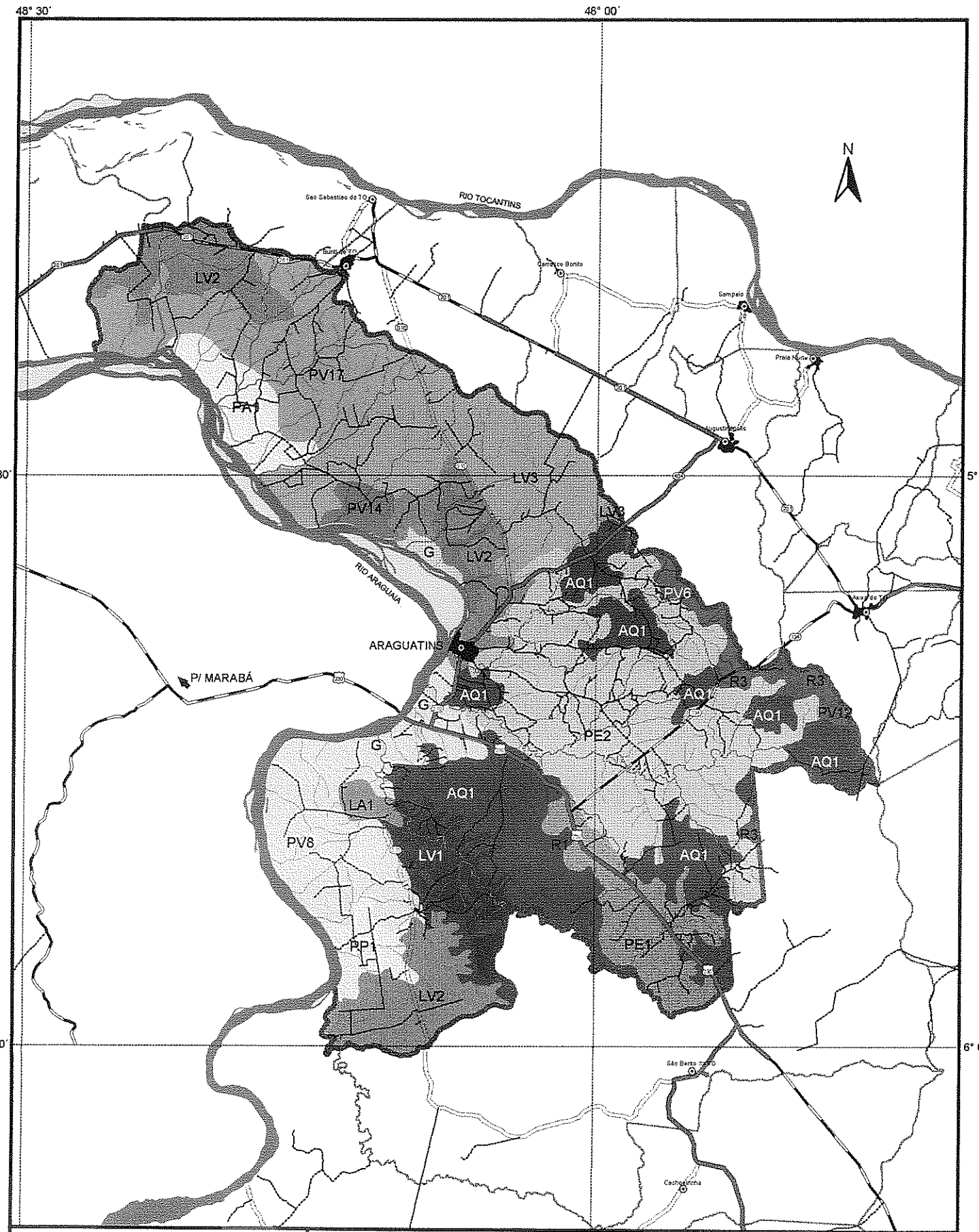
JICA
ESC. 1 : 500,000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RIO TOCANTINS
São Sebastião do TO
Carrasco Bonito
Sampaio
Praia Norte
Augustinópolis
RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
São Bento do TO
Cachoeirinha
LV2
PV11
PA1
LV3
PV14
G
AQ1
PV6
R3
PV12
PE2
LA1
PV8
LV1
PP1
PE1
LEGEND
AQ Areia Quartzosa
G Gleissolo
LA Latossolo Amarelo
LE Latossolo Vermelho-Escuro
LV Latossolo Vermelho-Amarelo
PA Podzolico Amarelo
PE Podzolico Vermelho-Escuro
PV Podzolico Vermelho-Amarelo
R Solo Litolico
(Obs.: Associacoes Vide Anexo 3 Tab. 3.6.1)
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.3: Soils (Araguatins)
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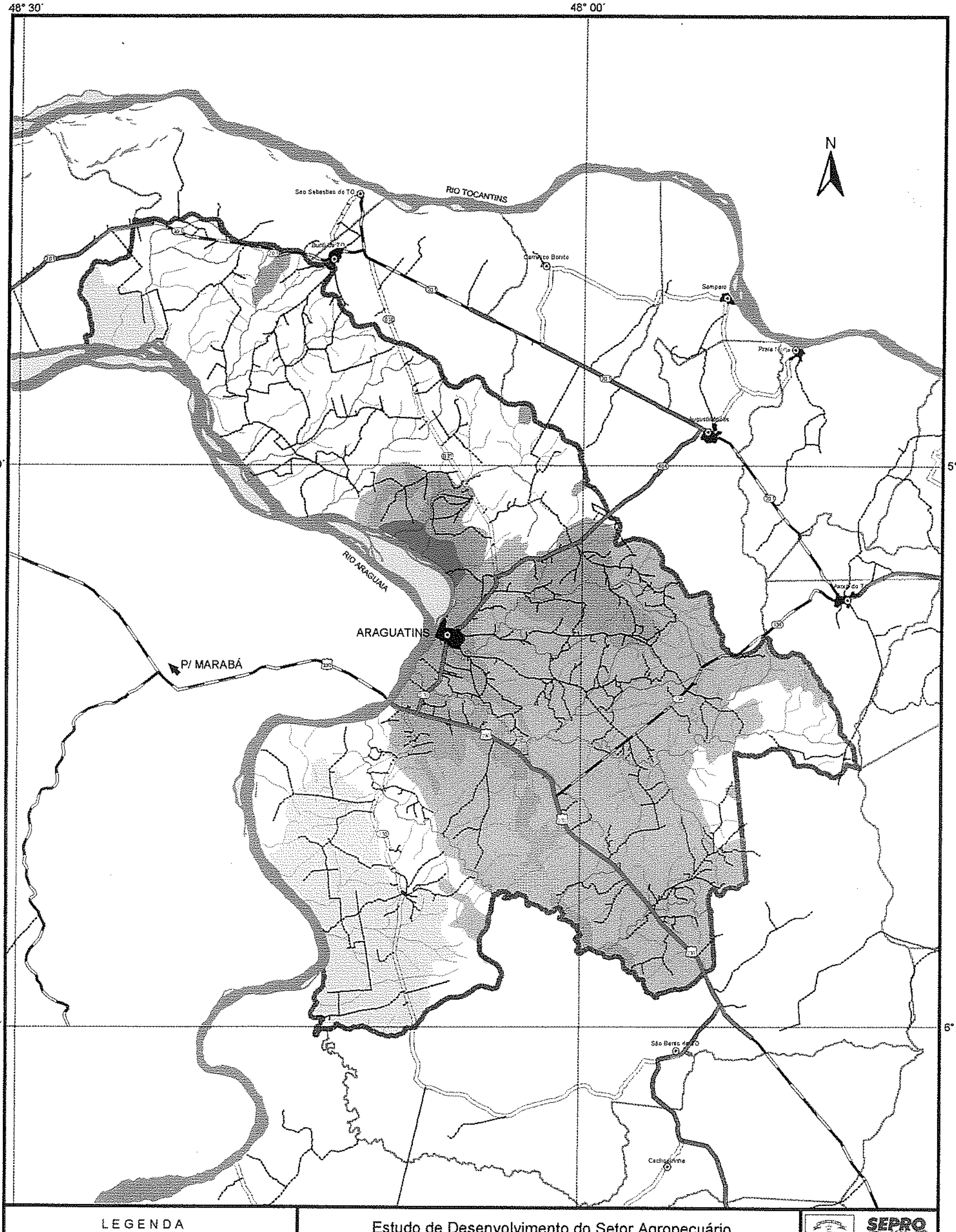
JICA
JAPAN INTERNATIONAL COOPERATION AGENCY
ESC. 1 : 500,000



LEGENDA

Classes

- Muito Fraca a Fraca 264 km2
- Ligeira 865 km2
- Moderada 744 km2
- Forte 276 km2
- Muito Forte 41 km2
- Especial 17 km2

Sede Municipal
Área Urbana
Rios, Lagos
Limite de Municípios
Rios Principais
Rios Secundarios

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

Fig. 8.4: Erosion (Araguatins)

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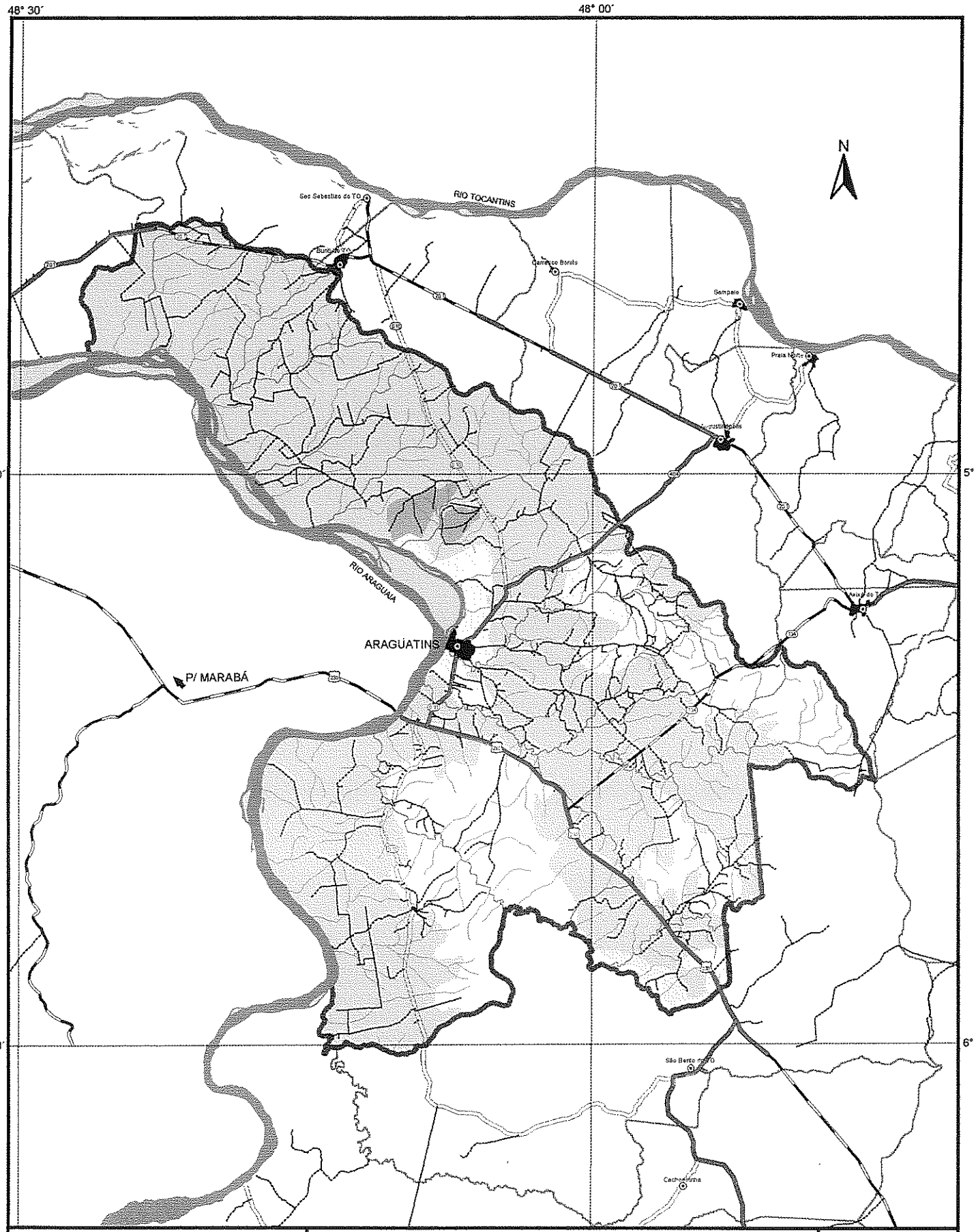
JICA

ESC. 1 : 500,000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RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
LEGENDA
Floresta Estacional 0 km2
Floresta Ombrófila Aberta 1 640 km2
Floresta Ombrófila Densa 0 km2
Savana Gramíneo Lenhosa.....0 km2
Savana Arborizada 551 km2
Savana Florestada 19 km2
Savana Parque 25 km2
Sede Municipal
Área Urbana
Rios, Lagos
Limite de Municípios
Rios Principais
Rios Secundários
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.5: Vegetation (Araguatins)
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JAPAN INTERNATIONAL COOPERATION AGENCY
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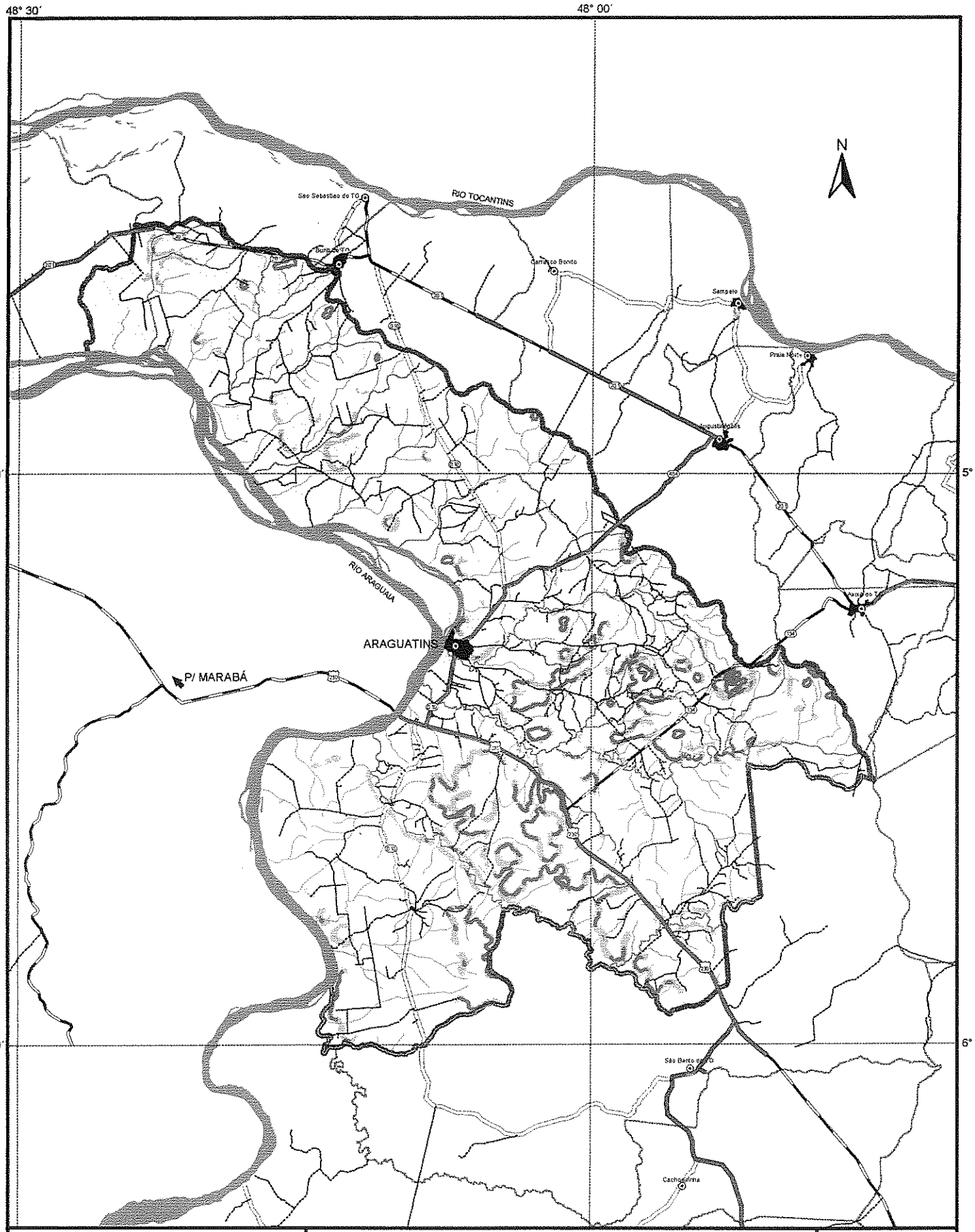

Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins

Fig. 8.6: Slope (Araguatins)

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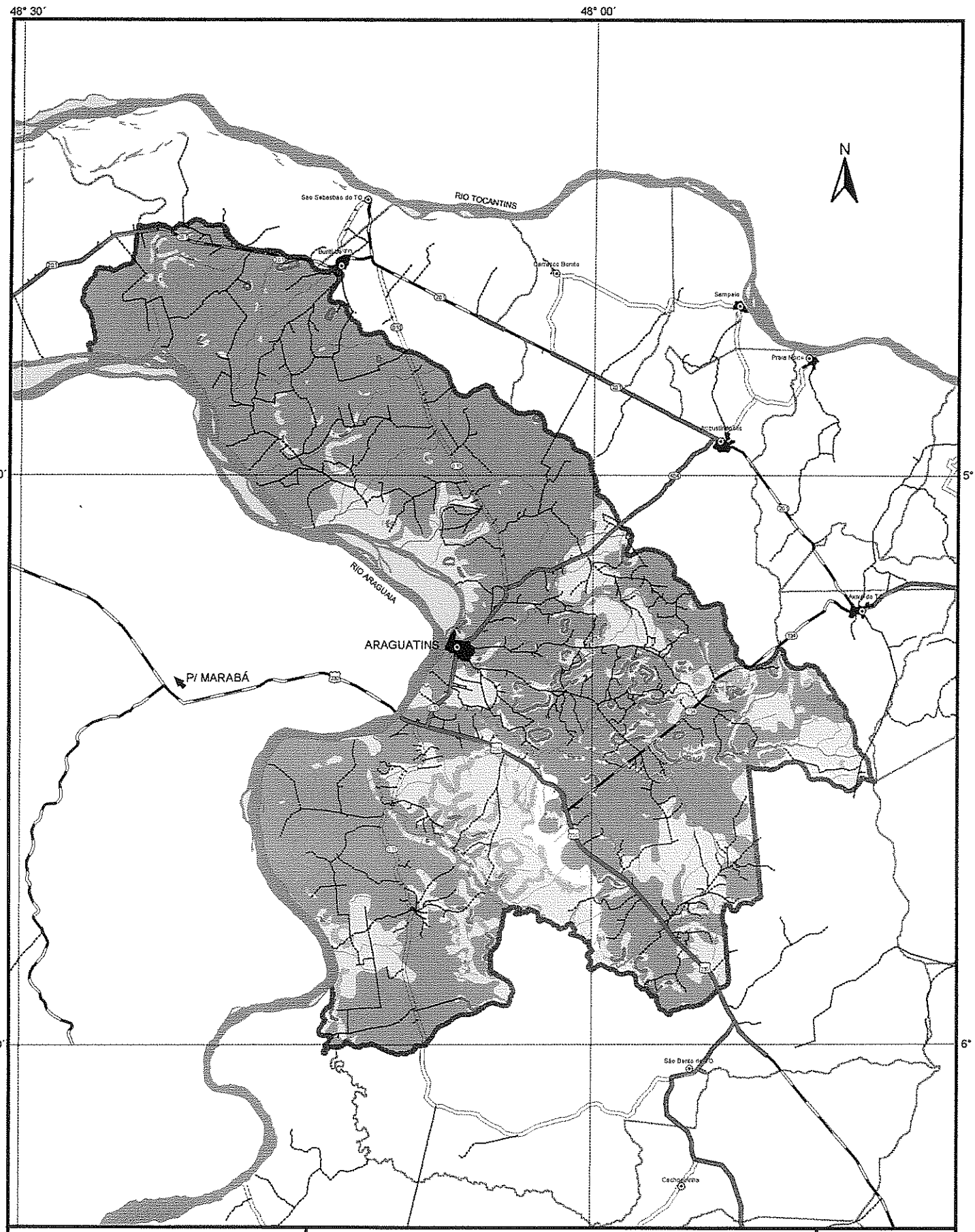

Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins

Fig.8.7: Land Potential (Araguatins)

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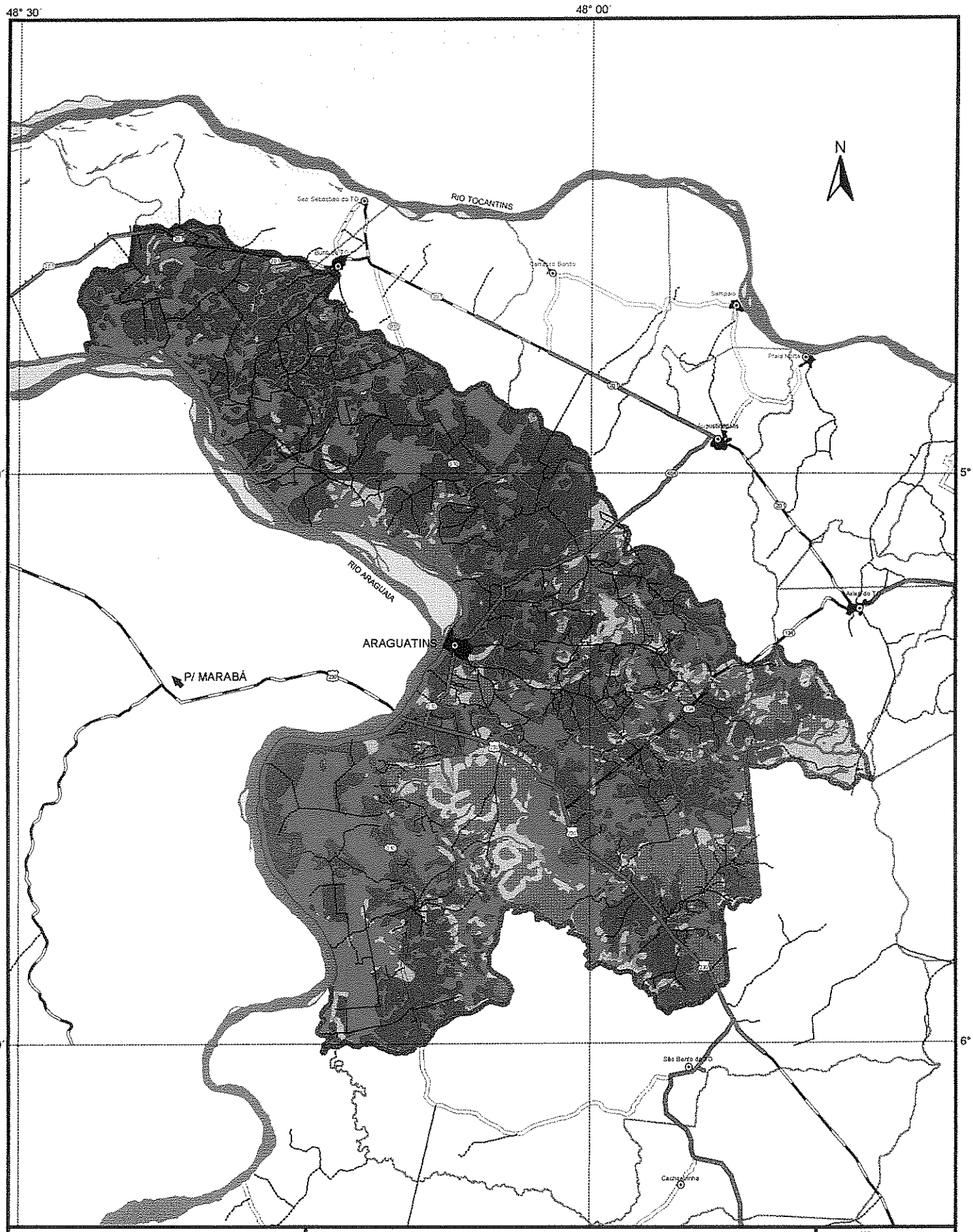
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RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
São Sebastião do Tocantins
Sampaio
São Bento do Norte
Cachoeirinha
LEGENDA
Agropecuária 1
863 km2
Agropecuária 2
151 km2
Silvipastoril
30 km2
Silvicultura
202 km2
Manejo Florestal
36 km2
Conservação
919 km2 (131 km2)
Pavimentada (Estadual)
Pavimentada (Federal)
Em Obras de Pavimentação
Leito Natural (Estadual)
Leito Natural (Rural)
10 0 10 Kilometers
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.8: Proposed Land Use (Araguatins)
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JAPAN INTERNATIONAL COOPERATION AGENCY
ESC. 1 : 500,000

(2) Social conditions

a. Introduction

Araguatins appeared in the century XIX for force of the abundant natural resources exploration in the area, having the river Araguaia communication and locomotion way.

Araguatins has been having a shy economical development, based on the primary section, with an accentuated presence of small properties. These small producers accomplish a production that has the family agriculture characteristics practiced in social situations of impoverishment. In this case, the proprietors without conditions to invest in the production, to hire external work or even to sell his own workforce sees each other forced to a production modality that they just maintain the families survival and not to the economical reproduction of the properties that are being maintained with the small surpluses of the production put at the local market. This happens mainly in the properties below 80 ha, in wich the cultivation areas don't pass from 2 to 4 ha, increasing their residents' precarious social conditions.

It is worth to say that Araguatins is the municipal district with larger concentration of establishment projects of the region I, that little contributes to his economical development, once many of them are locatet in the municipal district as little consolidated communities staying through the subsistence production besides culturally just destined to their families.

b. Structure of the Population

According the census 2000 preliminaries data, the population of Araguatins suffered an annual growth of 3,62%, passing from 22.558 in 1996 to 26.008 in 2000. As for the division among sexes, the proportion is 51,02% of men and 48,98% of women.

The vegetative growth and migration taxes, they are not still susceptible to calculation, since they were only published by IBGE data of 2000 regarding total population, residence area and sex.

The population growth of Araguatins in the last decade it is exemplified starting from the following numbers of IBGE: 28.021 (1991. Census), 22.558 (1996. Counting) and 26.008 (2000 Census).

In spite of Araguatins also to have lost in the last ten years part of his territorial area, due to the dismemberment of old districts that they passed to the municipal district category, the population growth was maintained. In 1996 he enrolled a current migratory of 7,28% for Araguatins, as presented in table to proceed.

Origin of the Migrating Population for Sex (01/09/91 to 01/12/96)

Municipal district	Population Total	Total of Migrating	Another Unit of the Federation *	Same Unit of the Federation
Araguatins	**22.558**	**2.041**	**1.399**	**641**
Men	14.200	1.076	742	333
Women	13.821	965	657	308
Percentile migration on the total population of 1996 (%)				
Araguatins		7,28	68,54	31,41

Source: Brazilian Institute of Geography and Statistics / Population Counting, 1996
Obs: * included the foreigners

In Araguatins the people's of other states arrival was also observed in detriment to the movement interns (inside of Tocantins), with a relative balance among the sexes, taking to the supposition that is due to the entrance of families.

As for the migration in the municipal district of Araguatins, it is visible the presence of migrants originating from of States of Pará and Maranhão, atracted mainly for the lands offer, especially for the establishments projects created in the municipal district starting from 1991.

Population second Situation of Home (1991-2000)

	TOTAL		URBAN				RURAL			
	1991	2000	1991		2000		1991		2000	
	Abs.	Abs.	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Araguatins	28.021	26.008	12.841	45,8	15.791	60,7	15.180	54,2	10.217	39,3
Tocantins	960.116	1.155.251	530.795	55,3	858.388	74,3	429.321	44,7	296.863	25,7

Source: Brazilian Institute of Geography and Statistics - IBGE, 2000

The urbanization tax was 45,8% in 1990 and 60,7% in 2000. As in Araguaína, to crescent tax of urbanization of Araguatins it doesn't mean that his population has become urban, since residence and work place usually are not coincident, and a lot of families of rural workers live in the urban areas looking for collective public services, to the which want to have more immediate access.

c. Health Services

The infrastructure of Araguatins health just assists the demand of the own municipal district and of small existent towns in the roundness. Even so, the net counts with a small infrastructure for the service, as shows the picture below.

Health basic infrastructure. number of professionals and hospitals.

Item of Infrastructure	**Amount**	**Relationship for inhabitants**
Infrastructure		*Inhabitants / Item*
Hospitals	2	13.004
Beds	55	473
Units Ambulatoriais	9	2.890
Professionals of Health		*Inhabitant / professional*
Medical	6	4.335
Nurses	2	13.004
Nursing technician	3	8.669
To aid of nursing	-	-
Dentists	1	26.008

Source: it would Secrete State of Health, 2000.

d. Education system

According to Education Census (2000) select data accomplished by the State General office of Education, in Araguatins exist 57 fundamental and medium schools, with a total of 9.447 enrolled students (7.978. fundamental, 1.469 medium). The service is accomplished by the state, municipal and private.

Enrolled students in the Education Net in 2000

ARAGUATINS								
Dependence	Pré - School	Class of Literacy	Fundamental teaching		Medium teaching	Special education	Education of Youths and Adults (Supletivo Total)	Education of Young and Adults (Fundamental)
			1st to 4th Series	5th to 8th Series				
State	137	-	1.923	2.238	1.066	11	-	-
Federal	-	-	-	-	403	-	-	-
Municipal	246	-	2.999	762	-	-	-	-
Private	115	55	56	-	-	-	-	-
Total	498	55	4.978	3.000	1.469	11	-	-

Source: Education Census - 2000.

In Araguatins exists Federal Agrotécnica School that it receives students from all the parts of Tocantins and of other states as Pará, Maranhão, Piauí and Mato Grosso.

The number of people without instruction or with less than a year of study, according to IBGE data (1996), it is of 34,87%.

e. Land reform

In Araguatins, it exists 18 establishment projects, with capacity for 1.371 families of rural producers. The family medium area is of 33,5 hectares. Still any establishment doesn't exist in emancipation phase.

Establishment Projects of the Araguatins Municipal district

Establishment Project	Families Capacity	Phase	Area (ha)	Creation Year	Area for Family
Água Limpa	23	2	801,9	1995	34,87
Atanásio	94	2	2.962,9	1996	31,52
Dona Eunice	81	2	2.492,7	1996	30,77
Marcos Freire	87	2	2.758,2	1996	31,70
Maringá	102	2	3.279,1	1998	32,15
Mutirão	65	2	1.626,4	1996	25,02
Nova Vida	17	2	484,3	1995	28,49
Ouro Verde	107	3	5.751,0	1989	53,75
Padre Jósimo	52	2	1.613,2	1996	31,02
Petrônio	20	2	613,7	1998	30,68
Professor Djanira	53	2	1.382,6	1996	26,09
Rancho Alegre	54	2	1.630,4	1997	30,19
Ronca	120	2	3.702,9	1995	30,86
Santa Cruz II	300	3	10.728,0	1989	35,76
Santa Helena	22	2	552,2	1996	25,10
São José (Araguaiana)	88	2	2.992,8	1995	34,01
Transaraguaia	60	2	1.793,2	1996	29,89
Trecho Seco	26	3	801,0	1989	30,81
Total dos 18 projetos	1.371		45.966,3		33,5

* 2. implantation; 3. Consolidation
Source: INCRA - 2000

(2) Infrastructure conditions

As for the transports infrastructure, the Araguatins municipal district possesses access through the highways presented in the table to proceed.

Type	Exist (km)	Paved (km)	Proportion (km/km2)
Federal	42.9	42.9	0.019
State	109.6	31.3	0.049
Municipal	996.8	-	0.441
Total	1149.3	74.2	0.509

Source: GIS data

As for the electric source, the municipal district is assisted by CELTINS - Tocantins State Electric Company.

(3) Current Use of the Earth

The current use of the earth in the Araguatins municipal district is presented in the table to proceed.

Forests		**Pasture**		**Agriculture**		**Savannah**		**Other**		**Total area**
Area (km2)	%	Area (km2)	%	Area (km2)	%	Area (km2)	%	Area (km2)	%	(km2)
783,5	34,11	1.035,8	45,09	0,7	0,03	376,6	16,39	100,3	4,37	2.297,0

Source: Data of SEPLAN, calculation of the Missão JICA (2000)

It fits to emphasize that the agriculture is still incipient, with low representativeness in the current use of the earth, representing around 0,03% of the total area.

Property earth - distribution	Area of producing micro	Small proprietors		Medium proprietor		Large proprietors		Total
		Producing	Not producing	..	...	..	...	
Amount property	266	35	223	17	63	4	28	636
Area exitente. (ha)	11,704	5,810	36,572	11,645	31,626	10,324	69,300	176,981
Area measured unitary. (ha)	44	166	164	685	502	2,581	2,475	278

Source. Date of INCRA

(4) Agricultural conditions

a. Agricultural production

The Araguatins municipal district possesses an area of 2.297 km2, equivalent to 0,8% of the State total area. Of these, 46% are pastures and 35%, forest areas. The municipal district possesses good soils, rich in organic matter due to the Amazonian Legal area own characteristics in the which is inserted. It exists native fruits like Bacuri and Cupuaçu, besides all the territory to be suitable for any planting type.

The main agricultural products are the rice, the cassava and the bean, and the cultivated areas, production and the productivity are presented in the table to proceed. This table presents the cultivated areas and the production in proportional terms in relation to the State. The cassava production and bean is big in the Area North Extreme of Tocantins, however the Araguatins municipal district presents small participation in this regional index, and however the unitary productivity is comparable to the state and national levels.

Agricultural production in Araguatins (harvest 1999/2000)

Cultivation	Cultivated area (ha)				Production (t)				Productivity (t/ha)			
	Araguatins		Study Area		Araguatins		Study Area		Araguatins	Study Area	Tocantins	Brazil
	ha	(%)	ha	(%)	t	(%)	t	(%)	t/ha	t/ha	t/ha	t/ha
Rice	1.600	1,0	9.150	5,7	1.920	0,4	10.780	2,5	1,20	1,18	2,67	3,08
Corn	1.200	2,1	6.365	11,2	1.512	1,3	7.440	6,2	1,26	1,17	2,10	2,54
Pineapple	17	1,3	39	2,9	238	0,5	556	1,1	14,00	14,26	38,76	47,24
Sugarcane	-	0,0	35	1,1	-	0,0	780	0,6	-	22,29	40,96	69,25
Cassava	210	1,7	2.335	18,7	2.730	1,4	32.330	16,9	13,00	13,85	15,27	13,09
Bean	180	4,3	1.685	40,1	72	5,1	624	44,6	0,40	0,37	0,33	0,67

Source: Systematic Rising of the Agricultural Production / IBGE (2000)

In the Araguatins municipal district, it is big the number of peoples coming from Northeast, with a proportion of 85% of micro and small producers in relation to the total producers. A lot of producers associations exist, however due to the low literacy index, besides other factors, most of them are not producing. The municipal district counts, however, with the Federal Agrotécnica of Araguatins School (EAFA), which generates a great expectation in orientation terms of agricultural production technological handling and on animals as the buffalos and the swine. The school has been developing new species of swine. It is in process also the buffalos creation project in the municipal district with good perspectives for the future.

b. Agricultural Administration Current conditions

The large producers in the municipal district are in small quantity, which possess a medium area of 2000~3000 ha destining mainly to the animals fattening. The the pastures capacity of support is 1,5 animal/ha. The activities of the medium producers are similar to the large producers. The cultivated pastures area represents 80% of the total of pastures, and these planted pastures are fertilized through BASA - Amazonian Bank. The micro and small producers that act around 85% of the total of producers produce grains, small animals and fruits for the own consumption, marketing only the surplus of the production. Some of these producers possess bovine cattle, with an average of 6~10 animals for family. 30% of the total are cattle for milk, being the milk transported to Tocantinópolis municipal district.

c. Existent Associations

They are 11 the number of Associations registered in SEPRO, constituted by 619 producers (Average number of members in each association 56)

(5) Livestock Conditions

The Araguatins area possesses larger pasture area. The bovine flock and swine of the area also blunts as the largest of the State, with larger number of rural producers registered in the state government, representing an area of great importance to the cattle activity in the Extreme-north.

In Araguatins exists, federal agriculture-technique a school, equipped with facilities for the creation of several varieties animals, presenting potential to turn a modernization pole and cattle diversification.

The bovine race in the area are the same of the Araguaína area.

Cattle flock	bovine	buffalo	swine	goat	sheep	birds	horse
Araguatins	105,420	24	1,795	66	317	4,268	1,294
% on E. north	27.18	7.02	18.36	7.83	18.90	6.23	12.50
Total E. north	387,795	342	9,779	843	1,677	68,509	10,355

Source. ADAPEC-TO, 2000.

Due to the part of the municipal district to belong to the Amazonian forest and to be glides, even in the times of the droughts the rains are constant allowing a good pastures development. The animals race for fattering are in most nelore and his mixture. It is not used in the moment the practice of the calves castration. For the case of animals for the exploration milk pan, the predominant races are mestizo of nelore with races Tabapuã, Dutch, Brown Swiss, Jersey, etc. In the drought time is characterized by the low production.

Bovine pasture area and pastures support capacities

Pasture ha	Number of Animal	Livestock (Unit)	Cap pasture
104,120	105,420	79,785	0.77

Source. ADAPEC, 2000 - calculation.

The infrastructure works (asphalted highways, electric power distribution, etc.) implemented by the federal government has been showing a significant recent progress, could be noticed that there was a great progress in comparison with the situation of 1996, when the M/S was accomplished. As for the chicken meat and the eggs, they circulate at the local market the products originating from of commercial farms, out of the Tocantins state.

The main cattle activities developed in the area are: the extensive livestock, cut cattle breeding and fattening bullock, developped by the small and medium producers, and production of dairy products and suinocultura, also implemented predominantly by small and medium producers.

According to statistical data, the number of animal units is low. However, there are indications of good perspectives for the future, as one can notice for the project of bubalinos creation, in system of pasture rotation in small climbs, recently implemented and driven by EAFA personnel. The same can also be verified by the price of the buffalo milk produced, that it is being marketed in the Araguatins municipal district at attractive prices. While the bovine milk is sold at R$0,25/liter, the buffalo milk is being marketed at better prices, such as R$1,20/liter, the one that comes generating great interest in the small and medium producers, with some of them substituting bovine for bubalinos.

The comparison of the productivity among the producers returned to the bovine cattle breeding and bubalino was done with research base in form of interviews, with results in the table presented to proceed. In agreement with the that data base, it is verified that, besides the price of sale of the milk, the buffalo is shown superior to the bovine cattle, also of the productivity point of view.

Comparison between the Bovine Cattle and the Buffalos

(based on interviews accomplished with producers)	Bubalinos	Bovine
Birth rate tax. first it creates	90%	75%
Age of the female in the first creates	34. 36 months	36. 40 months
Interval among you create	12. 14 months	14. 18 months
Age for the discount	24. 26 months	30. 36 months
% of losses for death (0-12 months)	2. 4%	5. 10%
% of losses for death (12. 24 months)	1. 2%	1. 3%
% of losses for death among adults	0. 1%	1. 3%
Average of the alive weight for discount	400. 450 kg	300. 400 kg
Production of milk for nursing	Plus than 2.500 kg	Plus than 1.500 kg
Tax of meat use	27. 30%	15. 20%
Females discard rate a year	10%	15. 30%
Expectation of economical life	15. 20 years	8. 10 years

Source: field Study accomplished by the mission JICA, 2000.

The predominance of the swine production in flock terms, is unanswerable in the Extreme-north area where Araguatins is located, overcoming in a lot the north area flock, in which

Araguaína is included. Although many of the small and medium farmers have great interest in implementing the swine activity, the extensive livestock prevails, and the varieties maids are quite diversified, having varieties of every type. In spite of the swine meat captive demand of the area to be big, the area slaughterhouses and exclusive processing factories for the swine dont exist. There is no technical support system structured for swine in the area, being the latest area of the technological point of view in relation to the other animal species.

(6) Conditions of the Regional Producer - Results of Workshop research

a. Workshop Participants

The workshop accomplished to obtain the situation and intention of the local producers counted with: total of 67 participants, being: micro and small producers 41, medium and large producers 5. The conditions of life of these producers, about 50% live in houses covered with tiles, block walls and concrete floors and in most with electricity in their houses. Therefore the other half lives homes covered with straw (babassu leaf), wood walls or beaten mud and earth floors, usually without electricity. A different division exists among producing with high education and situation of better life with the drop and poorer.
In the agricultural activity most (80%) it possesses their own cultivation area, half possesses some type of agricultural equipment, however the use of cattle managiment for the improvement of the earth or of pasture it is insignificant. The great majority still doesn't use certificated seeds and agricultural inputs (fertilizers and defensive).
The cattle farmers' great majority uses mineral salt and periodic vaccinations in their animals, however the foods supliment in the drought is not used.
Most of the commercialization is made to the local middleman or for the final consumer. The complaint of the producers is that in most of the cases (above 80%) the production costs are not covered by the sale value of their products.
They are half the producers that never received any technical support type.

Themes Discussion:

Due to most of the participants to be micro and small producers, the favorite theme of the discussion was regarding the Nucleus of Production, where due to the participation and explanation of the situation and perspectives on the buffalos creation for a veterinarian (producer) of the area it elevated a great interest of the other participants for this activity.

The main pointed problems for development of the production nucleus were: lack of activities technical information, difficult access to the financing, infrastructures deficiency (farm access road), market information lack and association force lack of the current existent associations (leadership capacity problems, vision of the future perspectives, motivation, etc..)

Environmental conservation - Main pointed problems are summarized in the concern of the Amazonian forest area decrease, besides the need of researches for the best use of the babaçu palam tree and extrativism source. The pointed alternatives as reforestations, agroforestry activities and silvipastoris, all the participant agree in the need of the environmental education implementation to the population in general.

b. Leader of Associations

The Araguatins municipal district possesses 21 registered associations now. Starting from the year of 1986, two associations are created annually, basically restricted to the need of obtaining of financial resources for the producers. As for the production equipments requests

for most of the associations are: tractor, conspires of improvement of rice and equipments of flour production. Most of the producers belonging to the associations possesses agricultural activities of cereals production (rice, corn, bean, etc) and milk production pan. The horticulture introduction in the municipal district wich has participation of some producers should turn one of the important activities in the area. The main pointed problems are the technical support deficiency, need of resources and infrastructure of roads.

(6) Agriculture-industrial and of Transports conditions

a) Agricultural Product

In Araguatins, the family agriculture characterized by the little investment in the production (low technological level and low productivity) that as consequence has little expressiveness in terms of income generation.
The main vegetable product produced in Araguatins, they stand out the group of tubers (cassava and potato), of the fruit (pineapple, banana, watermelon, coconut-dwarf and cashew) and vegetables (lettuce, tomato, green smell, green onion, cilantro, parsley and pepper). Beyond of those, the extrativismo exists with the economical use of the cupuaçu, babaçu, bacuri, açaí, buriti, pupunha and urucum.

The market Information of some agricultural products in the Araguatins Municipal district. June 2000

Product	Market	Sale price
Cassava-natural	Local market	R $33,00/t.
Cassava-flour	Local market	R $20,00/sc (flour)
Pineapple	Brasília	R $0,40/um
Banana	Local market	R $225,00/t.
Watermelon	Local market	R $0,20/kg
Cupuaçu (pulp)	Palmas/Belém	R $1,50/kg
Bacuri (pulp)	Palmas/Belém	R $2,00/kg

The vegetables are produced by small producers (without any the use of technological practice). They are marketed at local fairs.

Fish farming pilot's project developed under orientation of RURATINS and SEBRAE has the result expectation in medium period, whose production is destined to the provisioning of the internal market of Tocantins, today supplied by Tucurui dam product.
The alevinos are acquired in Balsas and Monte Alta - MA. The ration for feeding of the fish, comes from Goiás and São Paulo.

a. Agribusiness

In Araguatins, it is in construction phase a pharmacist industrial compound - PHARMACON. Inside of this project, it exists a research component and use of medicinal plants. The industrial compound will hold 5 pharmaceutical industries besides other facilities. The construction of the first industry is foreseen to finish in the year of 2001. The first stage of operation of this industry will be the production of chemical products and the second stage foresees the use of medicinal plants. This second stage will have the researchers' support and producers. In the moment, there are no researches being accomplished, but already seedlings of FAVA DANTA and SUCUPIRA are being planted.

b. Commercialization and Transports

Basic information on the market of some agricultural products of the municipal district of Ataguatins (TO), June 2000.

Usually, the production is marketed locally. The exception is the pineapple that is sold almost totally (90%) to the consuming market of Brasília, through middlemen of the Miracema area. The product is transported in bulk, in trucks truck, with the payment of a freight of R$ 27,00/t. The payment of the freight is usually made at the destiny place.

8.2 Agricultural Development Plan

8.2.1 Land Use Plan

(1) Legislation about the Environmental Conservation

Due to the location inside of the Amazonian Forest, the Use of the Earth Plan should obey the effective environmental conservation legislation.

	Area km2	Proportion occupation%
Areas of the municipal district	2,296.90	
Tropical forest	1,640.30	71.4%
Savannah	656.80	28.6%
Legal reserves		
Federal law	1,542.12	65.7%
State law	1,148.50	50.0%
Current use of earth conservation	1,241.00	54.0%
Necessary area to reach		
Federal	301.12	13.1%
State	92.50	15.9%

Source: Data of GIS for reservation area. Obs. The base of necessary area to the conservation: tropical forest 80 -%, Savannah 35%.

The possible area of development in agreement with the federal legislation is of 34,3% of the area.

(2) Use of Earth Potential

The Use of Earth potential for this municipal district represents 44,1% of the area for farming, according to the fig 8.10.

The Use of Earth potential areas obeying the environmental conservation legislation is demonstrated accordingly:

	Potential of Use		Environmental conservation	
	Area km2	Occupation proportion%	Federal	State
Area of the Municipal district	2,296.9	.	2,296.9	2,296.9
Development area	1,215.6	52.9%	787.6	1,148.5
Farming I	862.5	37.6%	585.5	862.5
Farming II	151.0	6.6%	0.0	83.9
Total	202.1	8.8%	202.1	202.1
Reservation	.	.	.	.
Virgin forest (current)	783.5	34.1%	783.5	783.5

Agroforestry/Silvipastoril	.	.	428.0	67.1
Silvipastoril	30.0	1.3%	30.0	30.0
Manejo.Florestal	36.3	1.6%	36.3	36.3
Accentuated steepness	4.4	0.2%	4.4	4.4
Ciliary forests	131.2	5.7%	131.2	131.2
Other	95.9	4.2%	95.9	95.9
Total	1,081.3	47.1%	1,509.3	1,148.5

(3) General Land Use

The areas of production potentials, Potencial I and II in agreement with the class of producers, they present accordingly:

	Number of producers	Areas
Farming I	.	86,250.0
Farming II	.	15,100.0
Total	.	101,350.0
Proprietors (registered)	636.0	.
Micro	266.0	11,574.0
Small	258.0	42,477.0
Medium	80.0	43,271.0
Big	32.0	79,627.0
Micro / Small	.	.
Farming I	23.5%	20,296.5
Farming II	23.5%	3,553.4
Medium / Large	.	.
Farming I	76.5%	65,953.5
Farming II	76.5%	11,546.6

The plan of earth use in agreement with the property size and production plan foreseen by period, it presents accordingly below:

(ha)	Current	Short Period	Medium Period	Long Period	Total
Municipal district	229,690.0	229,620.0	229,620.0	229,620.0	229,690.0
Farming Use	103,650.0	103,041.5	101,271.0	100,677.1	58,552.0
Pasture without improvement	103,580.0	98,761.4	73,997.3	38,267.4	0.0
Pasture with improvement	.	327.4	13,152.7	35,542.7	31,685.0
Area of cereal introdution	70.0	2,046.0	10,307.5	20,770.0	20,770.0
Small / micro producer	.	1,906.8	3,813.5	6,097.0	6,097.0
Environmental Conservation use	78,350.0	79,920.5	87,773.0	95,625.5	161,548.0
Refloretamento	.	673.7	4,042.0	7,410.3	20,210.0
Agroflorestal	.	223.8	1,343.0	2,462.2	42,798.0
Silvipastoril	.	100.0	600.0	1,100.0	3,000.0
Manejo Forestal	.	121.0	726.0	1,331.0	3,630.0
Current Forest	78,350.0	78,350.0	78,350.0	78,350.0	78,350.0
Ciliary forests	.	437.3	2,624.0	4,810.7	13,120.0
High Steepness area	.	14.7	88.0	161.3	440.0
Savannah	37,660.0	36,628.0	30,546.0	23,287.4	0.0
Other	10,030.0	10,030.0	10,030.0	10,030.0	9,590.0

8.2.2 Agricultural Development plan

(1) Summarize of the plan

Araguatins is characterized as a municipal district with larger earth area and consequently a larger area of pastures inside of the Extreme North area, being contrasted with the existence

of great number of micro and small producers. The area of potential Agricultural I and II represent 90.000 (85% of the total area) and 15.000 ha respectively, meaning larger easiness and smaller expenditure of resources for the improvement of the soil. Therefore bringing a larger viability for the cereals cultivation.

(2) Cereals Introdution Plan

a. Production Plan and Necessary Resources

Due to soil suitability for the cereal production in form of own production or in leasing system, short term is considered the planting of 1.000 ha of soybean and 506 ha of corn in the Agricultural potentiality I area. The agricultural potentiality II areas will be used as pasture in function of the available area (194 ha of soybean and 86 ha of corn) not to allow the minimum pattern and it climbs, of area stipulated in the plan for soybean production.
In year 2015, the rotation of the agricultural production area with the pasture in the proportion from 25 to 27%, is considered a production of 13.000 ha of soybean and 6.300 ha of corn (own and leased).

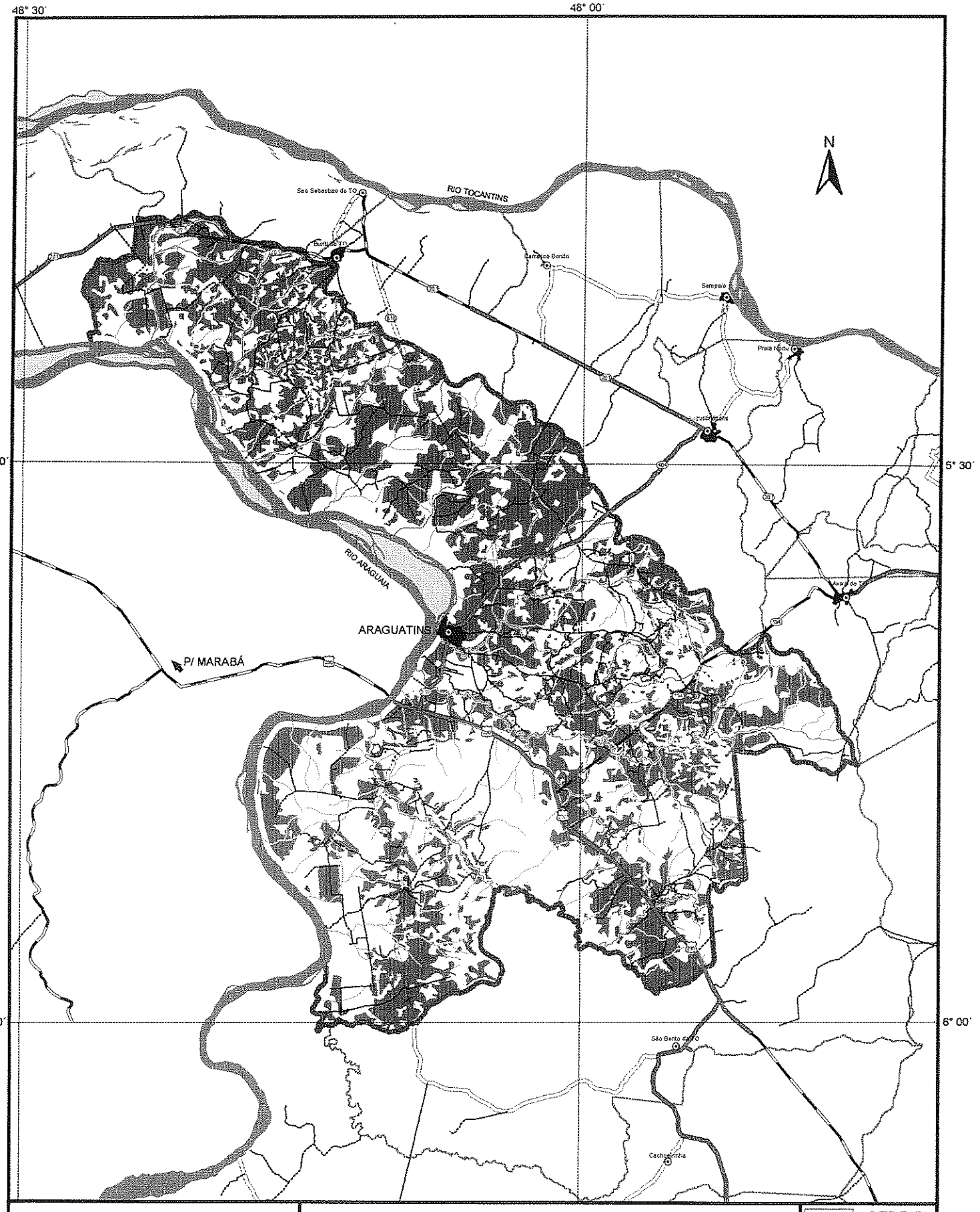
Plan of Cereal Production (ha)	Short Period - 5 years			Medium Period -5 years			Long Period - 5 years		
	Agrop I	Agrop II	Total	Agrop I	Agrop II	Total	Agrop I	Agrop II	Total
Soybean area	1,207	211	1,418	6,002	1,051	7,053	11,938	2,090	14,028
Corn area	534	94	628	2,770	485	3,255	5,738	1,005	6,743
Total	1,741	305	2,046	8,772	1,536	10,308	17,676	3,095	20,770
Own production	1,219	213	1,432	7,017	1,229	8,246	15,908	2,785	18,693
Leasing	522	91	614	1,754	307	2,062	1,768	309	2,077
New farming area	1,741	305	2,046	8,772	1,536	10,308	17,676	3,095	20,770
Pasture	1,567	274	1,841	7,895	1,382	9,277	15,908	2,785	18,693
Savannah	174	30	205	877	154	1,031	1,768	309	2,077

Capable areas to the cereals production are demonstrated in the figure 8.9 for Agricultural Potentiality I and 8.10 for the Agricultural Potentiality II.

b. Need of Production Inputs - Cereals Introduction Plan

The amounts of production inputs for the cereals introduction (limestone and fosfatado) this demonstrated as follows:

	Short Period	Medium Period	Long Period	Total
Production area	.	.	.	
Soybean area - annual average. (ha)	709	4,235	10,540	.
Corn area - annual average (ha)	314	1,895	4,999	.
Production input	.	.	.	.
Total area	2,046	10,308	20,770	.
Pasture area	1,841	9,277	18,693	.
Savannah area	205	1,031	2,077	.
Improvement of the soil	.	.	.	.
Limestone (t..	6,778	60,602	146,383	213,764
fosfate.t..	117	4,198	9,046	13,361
Machineries (set)	5	22	44	44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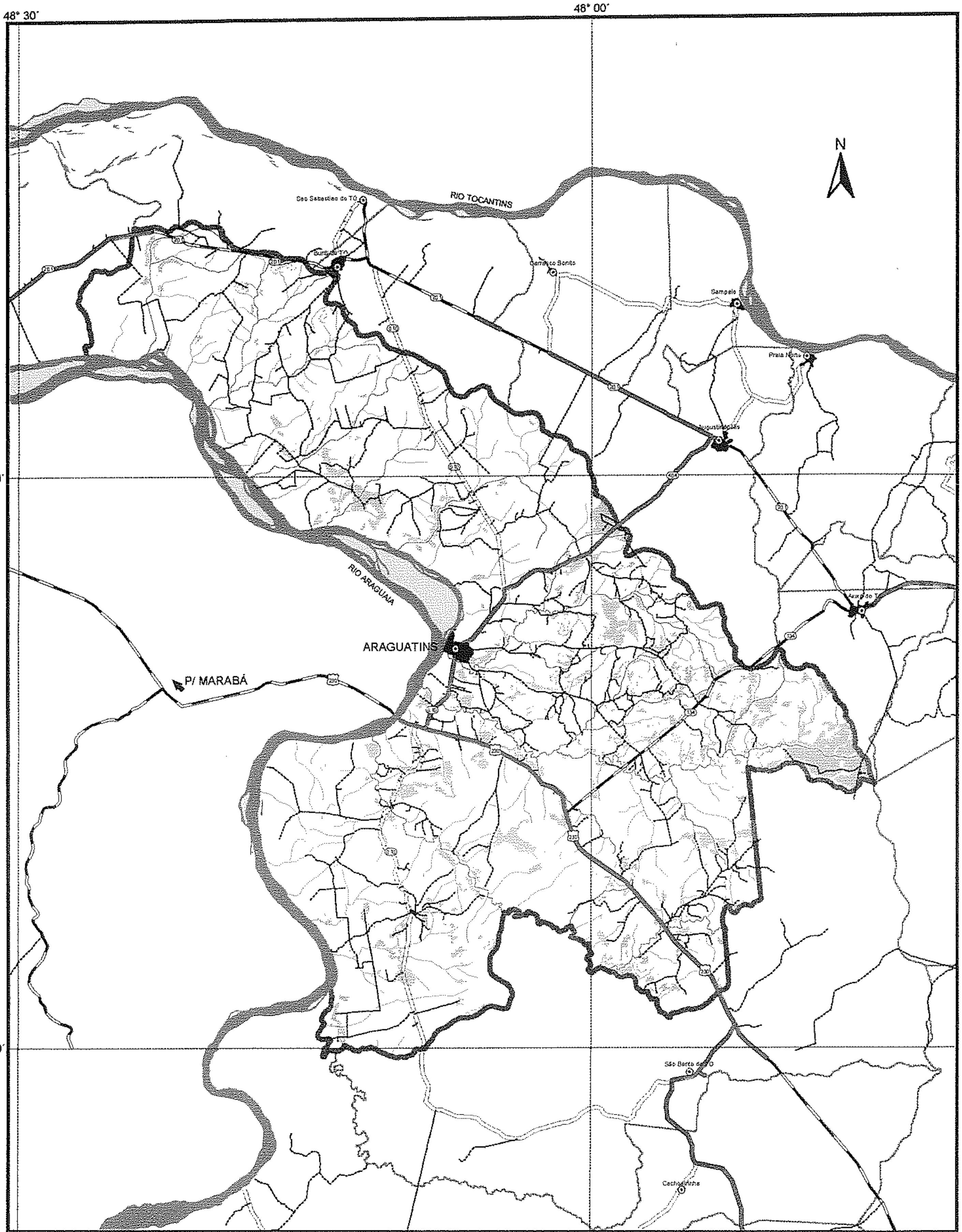
RIO TOCANTINS
RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
São Sebastião do TO
Sampaio
Xambioá
São Bento do TO
Cachoeirinha
LEGENDA
Rodovias
Pavimentada (Estadual)
Pavimentada (Federal)
Em Obras de Pavimentação
Leito Natural (Estadual)
Leito Natural (Rural)
Limite de Municípios
Rios Principais
Rios Secundarios
Agropecuária 1
863 km2
Sede Municipal
Área Urbana
Rios, Lagos
Estudo de Desenvolvimento do Setor Agropecuário
da Região Norte do Estado do Tocantins
Fig. 8.9: Agriculture Potential I
10 0 10 Kilometers
SEPRO
JICA
JAPAN INTERNATIONAL COOPERATION AGENCY
ESC. 1 : 500,000



LEGENDA

Rodovias
- Pavimentada (Estadual)
- Pavimentada (Federal)
- Em Obras de Pavimentação
- Leito Natural (Estadual)
- Leito Natural (Rural)
- Limite de Municípios
- Rios Principais
- Rios Secundarios

Agropecuária 2
- 151 km2

- Sede Municipal
- Área Urbana
- Rios, Lagos

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

Fig. 8.10: Agriculture Potential II

10 0 10 Kilometers

SEPRO

JICA

ESC. 1 : 500,000

c. Cereals Introduction Plan - Necessary Financial Resources

Resources Demand - Cereals Introduction	Short Period	Medium Period	Long Period	Total
Area of Production	.	.	.	
Annual average area - Soybean (ha)	709	4,235	10,540	.
Production area - Soybean (ha)	3,546	21,177	52,700	77,423
Production value - Soybean (R$1000)	1,697	10,137	25,227	37,061
Annual average area - Corn (ha)	314	1,895	4,999	.
Production - Corn (ha)	1,569	9,473	24,994	36,036
Production value - Corn (R$1000)	664	4,011	10,582	15,258
Total (R$1000)	2,362	14,148	35,809	52,319
.	.	.	.	.
Agriculture - opening area (ha)	.	.	.	.
Area of cereals	2,046	10,308	20,770	.
Pasture area	1,841	9,277	18,693	.
Savannah	205	1,031	2,077	.
Cost of pasture transformation in agriculture (R$1000)	92	464	935	1,491
Cost of transformation of Savannah in agriculture (R$1000)	104	526	1,059	1,689
Total cost (R$1000)	196	990	1,994	3,180
.	.	.	.	.
Improvement of soils	.	.	.	.
Limestone need / period (t.)	6,778	60,602	146,383	213,764
Limestone value (R$1000)	122	1,091	2,635	3,848
Fosfate need (t.)	117	4,198	9,046	13,361
Value of the fosfate (R$1000)	47	1,679	3,618	5,344
Total (R$1000)	169	2,770	6,253	9,192
.	.	.	.	.
Cost Total Soy and Corn (R$1000)	2,531	16,918	42,063	61,511

Obs. The cost of amortization of the equipment it is not included in calculations.

The Balance between the production values and expense is demonstrated accordingly

:	Short Period	Medium Period	Long Period	Total
ISoybean and Corn total cost (R$1000)	2,531	16,918	42,063	61,511
.	.	.	.	.
Production of Soybean (t.)	10,637	63,531	158,100	232,268
Value of the production (R$1000)	3,032	18,106	45,059	66,196
Production of Corn (t.)	8,632	52,102	137,466	198,199
Value of the production (R$1000)	1,588	9,587	25,294	36,469
Total values of production (R$1000)	4,620	27,693	70,352	102,665
.	.	.	.	.
Balance R$1000.	2,089	10,775	28,290	41,154

The Cereals Introduction Plan therefore it shows the economical viability, being needed however the investment in financial resources for his implementation.

(3) Invigoration and Cattle Diversification Plan

a. Bovine

1) Pasture area

According to the Lands Use Plan, the pasture area is accordingly

:	Unit	Current	Potential	Short Period	Medium Period	Long Period
Area of Pasture (km2)		103,580.0	101,350.0	99,188.7	87,750.0	74,910.1
Current pasture	ha	.	.	98,761.4	73,997.3	38,267.4
Improved pasture	ha	.	.	327.4	13,152.7	35,542.7
Silvipastoril	ha	.	3,000.0	100.0	600.0	1,100.0
Medium and Big Producer		79,205.4	.	76,856.4	70,067.7	64,956.6
Current pasture	ha	.	.	76,452.6	56,456.2	28,572.7
Improved pasture	ha	.	.	327.4	13,152.7	35,542.7
Silvipastoril	ha	.	2,294.0	76.5	458.8	841.1
Small Producer		24,374.6	.	22,332.3	17,682.2	9,953.5
Current pasture	ha	.	.			
Pasture melhoarada	ha	.	.	22,308.8	17,541.1	9,694.7
Silvipastoril	ha	.	706.0	23.5	141.2	258.9

2) Pasture Support capacity

The evolution of the Pasture Support capacity, meaning number of animals for ha of area is demonstrated as follows:

	Production type	Short Period	Medium Period	Long Period
Medium and Big Producer				
Current pasture	Bovine Cut	0.7	1.2	1.5
Improved pasture	Bovine Cut	1.0	2.0	3.0
Silvipastoril	Buffalo	1.0	1.0	1.0
Small producer				
Pasture	Bovine of milk	90%	60%	20%
	Buffalo	10%	40%	80%
Improved pasture	Bovine of milk	1.0	1.0	1.0

Obs. The current pasture support capacity in the area is 0,48 animal/ha

3) Number of Animals - target

The number of animals to be introduced in the present municipal district are the following:

Number of animals in Araguatins - target

	Current	I tan Period	Medium Period	Long Period
Bovine of Cut	89,391	82,633	145,268	227,967
Pasture.	.	82,160	107,322	74,154
Improved pasture.	.	472	37,946	153,813
Bovine of Milk	16,029	21,545	20,081	4,981
Buffalos	24	3,537	14,305	21,608
Total	105,444	107,714	179,654	254,556

4) Improvement of the Animal Feeding - Alimentary Suplement in the drought

The need of silage production for the suplementation of the animals during the drought time

	Current	Short Period	Medium Period	Long Period
Evolution of the flock	105,420	107,415	177,024	252,648
Animals supported with pasture (cb)	93,222	89,270	78,975	67,419
Deficit of the pasture (cb)	-	18,145	98,049	185,229
Silage dependent animals (cb)	.	14,516	78,439	148,183
Picadeira need	.	.	266	258
number of animals fed with dried forage during the drought (cb)	.	3,629	19,610	37,046
Amount of necessary silage (m3/ano)	.	29,033	156,879	296,366
Need of silos	.	145	784	1,482
Destined area the forage production (ha)	.	181	980	1,852
Area of rotative pasture (ha)	.	.	13,153	35,543

4) Need of Financial Resources

For the development of the Cattle Diversification Plan, the financial resource need is demonstrated accordingly:

Need of Resources (1000R $)	Unit (R$)	Short Period	Medium Period	Long Period
Pasture improvement	.	49	1,973	5,331
Silage installation	.	.	.	.
Construction of silos	1,000	145	784	1,482
Cost of the dired forage (1000 t.)	1,000	73	465	1,133
Cost of the picadeira	1,600	0	426	413
Cost of silage production (for ha)	200	91	581	1,416
Cost of the pasture rotation	.	.	.	.
Electric fence equipment (for ha)	300	0	3,946	10,663
Zero grading	.	.	.	.
Simple hangar (for unit)	2,000	0	532	516
Total necessary resources	.	308	6,734	15,623

b. Swine Production

The swine production activity will be developed by the micro and small producer in such a form that short term 10%, the medium 50% and long term most of the producers are in the activity. In the calculation of the need of financial resources for the activity demonstrated below, the purchase of the ration is considered, however in the program the use of the by-products of the own property like cassava, rest of cereals and fruits, besides the whey will be used for swine feeding

Necessary resources of the Activity	Short Period	Medium Period	Long Period	Total
Construction of pigsties (un)	52	210	262	524
Number of female head (cb)	524	2,620	5,240	5,240
Pigsty (R$ 1000)	42	168	210	419
Cost of the ration (R$ 1000)	859	8,587	17,174	26,620
Total cost (R$ 1000)	901	8,755	17,383	27,039

c. Total of necessary Financial Resources and the Production Value estimated in the Cattle Diversification Plan.

1) need of Resources

For the development of the Plan of Cattle Diversification of the municipal district, the total of demanded resources is demonstrated accordingly below:

(R$1000)	Short Period	Medium Period	Long Period	Total
Pasture improvement	49	1,973	5,331	7,353
Improvement in the cattle creation	308	6,734	15,623	22,665
Genetic improvement and of the quality	354	469	339	1,162
Castration and descorna	1,030	1,799	2,859	5,687
Buffalos Introduction	800	0	0	800
Swine production	901	8,755	17,383	27,039
Total	3,442	19,729	41,535	64,706

2) Cattle Production value

The expected resultants with the implementation of the Plan of Invigoration and Cattle Diversification in the municipal district, it is demonstrated by types of activities as:

Bovine of Cut

.	Unit	Current	I tan Period	Medium Period	Long Period
Flock	head	89,391	82,382	143,901	228,715
Amount of discount	head	25,477	23,480	41,013	65,186
Amount produção/year	t.	5,350	4,931	8,613	13,689
Value production / period	R$ 1000	79,251	77,154	67,717	111,509

Obs. Period: 5 years.

Bovine of Milk

.	. Unit	Current	Short Period	Medium Period	Long Period
Flock (haed)		16,029	21,503	19,323	4,450
Number of cows	cb	4,536	6,085	5,468	1,259
Productivity	l/ano	1,000	1,000	2,000	3,000
Production of milk	m3/ano	4,536	6,085	10,937	3,778
Value of the production / period	R$ 1000	4,536	8,043	8,511	7,357
Animals for discount		.	.	.	.
Total		4,943	6,631	5,958	1,372
Production meat bovine/year	t.	1,038	1,392	1,251	288
Value of the production / period	R$ 1000	10,190	11,962	13,218	7,697
Total value of the production	R$ 1000	14,726	20,005	21,730	15,054

Buffalos production

	Unit	Current	Short Period	Medium Period	Long Period
Flock	head	54	3,530	13,800	19,482
Females in production	head	15	999	3,905	5,514
Productivity	l/year	2,000	2,000	2,000	2,000
Production of milk	m3/year	31	1,998	7,811	11,027
Value production / period	R$ 1000	34	2,248	11,035	21,193
Sell of males for discount	haed	14	883	3,450	4,871
Meat production	t.	3	185	725	1,023
Total value / period	R$ 1000	14	927	4,549	8,737

Swine Production

	Unit	I tan Period	Medium Period	Long Period
Female		524	2,620	5,240
Animal for discount / year	head	8,384	41,920	83,840
Animal for discount / period		25,938	155,628	389,070
Value of the production / period	R$ 1000	4,669	28,013	70,033

3) Total Investments and Productions Balance

The relationship between investment and value of obtained production, representing the viabilities of the plan activities, it is demonstrated as follows:

	Unit	Current	Short Period	Medium Period	Long Period
Production of the cut bovine	R$ 1000	79,251	77,154	67,717	111,509
Production of the bovine of milk	R$ 1000	14,726	20,005	21,730	15,054
Production of the buffalos	R$ 1000	49	3,175	15,584	29,929
Production of the swine	R$ 1000	0	4,669	28,013	70,033
Total of the productions	R$ 1000	94,026	105,002	133,044	226,526
Total of investments	R$ 1000	0	3,442	19,729	41,535
Balance		94,026	101,560	113,316	184,990

The municipal district of Araguatins, located inside of the climatic condition of the Amazonian forest possesses satiates readiness of water, periodic rains even at that time of the droughts and abundance of great volume of pastures not used for bovine, being suitable like this for the activity of buffalos creation . The plan foresees this way the partial substitution of the activity of the micro and small producers, from current bovine of milk for the production of cheese of the buffalos milk, with the use of the whey for feeding suína. This activity for his time possesses the advantages of needing: little resource of initial investment, capital fast rotation and possibility of the creation in a small earth area besides the possibility of use of family work hand in the creation. In short, the perspective of the use of this plan represents a good improvement alternative of the producing area life condition.

(4) Nuclei of Production Program

a. Production Area

The program seeks the condition of life elevation of the current micro and small producers, whose production is in most of low productivity and of subsistence, until the income level of 3 minimum wages as target.

The production program need for activity type, classified in types: cereal, fruits and vegetable are:

	Producer		Necessary area for cultivation (ha)		
	Micro	Small	Short Period	Medium Period	Long Period
Total area	266	258	1,907	3,814	6,097
Type Cereal	53	52	1,306	2,612	4,176
Type Fruit	80	77	78	157	251
Type Green vegetable	133	129	522	1,045	1,670

To reach objectives of areas above, the production plan will be accordingly:

	Proportion	Productivity		Short Period		Medium Period		Long Period	
		Short/médium	Long	Area	Production	Area	Production	Area	Production
.	.	.	.	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
. Type Cereal	.	.	.	1,306	.	2,612	.	4,176	.
Rice	5	2.4	4.0	653	1,567	1,306	3,134	2,088	8,352
Bean	1	1.5	2.4	131	196	261	392	418	1,002
Corn	2	5.0	7.0	261	1,306	522	2,612	835	5,846
Soy	2	2.4	3.5	261	627	522	1,254	835	2,923
Total	.	.	.	1,306	3,696	2,612	7,392	4,176	18,124
Type Fruit	.	.	.	78	.	157	.	251	.
Pineapple	3	30.0	.	24	705	47	1,410	75	2,255
Banana	3	25.0	.	24	588	47	1,175	75	1,879
Passion fruit	2	12.0	.	16	188	31	376	50	601
Cashew	2	1.0	.	16	16	31	31	50	50
Total	.	.	.	78	1,497	157	2,993	251	4,786
Vegetable type	.	.	.	522	.	1,045	.	1,670	.
Industrial tomato	1	60.0	.	52	3,134	104	6,269	167	10,022
Cassava	9	27.0	.	470	12,694	940	25,389	1,503	40,591
Total	.	.	.	522	15,829	1,045	31,657	1,670	50,613

The need of necessary capital resources to the production above planned:

(R$ 1000)	Short Period	Medium Period	Long Period	Total
Necessary resources	.	.	.	.
Type cereal	1,657	4,971	8,612	15,240
Type fruit	608	1,823	3,159	5,590
Vegetable type	1,972	5,917	10,252	18,142
Total	4,237	12,712	22,023	38,972
Cost of Materials	.	.	.	.
Type cereal	911	2,733	4,736	8,380
Type fruit	400	1,199	2,078	3,677
Type Green vegetable	813	2,439	4,226	7,479
Total	2,124	6,372	11,040	19,536

The production values and to resource needs it is demonstrated accordingly:

	Unit	Short Period	Medium Period	Long Period	Total
Type Cereal	.	.	.	.	.
Rice	337.5	2,645	3,967	9,692	16,303
Bean	750.0	735	1,102	2,614	4,450
Corn	193.5	1,264	1,895	4,092	7,251
Soy	278.5	873	1,309	2,908	5,091
Total	.	5,516	8,274	19,305	33,095
Type Fruits	.	.	.	.	.
Pineapple	266.7	940	1,410	2,444	4,794
Banana	230.0	676	1,014	1,756	3,446
Passion fruit	500.0	470	705	1,222	2,397
Cashew	2,000.0	157	235	407	799
Total	.	2,243	3,365	5,829	11,437
Vegetable type	.	.	.	.	.
Industrial tomato	100.0	1,567	2,351	4,073	7,991
Cassava	80.0	5,078	7,617	13,196	25,890
Total	.	6,645	9,967	17,269	33,881
Total values of the productions	.	14,404	21,606	42,403	78,413
Total costs	.	4,237	12,712	22,023	38,972
Balance	.	10,167	8,894	20,380	39,440

b. Production Nucleous Agricultural activities

The activities of agricultural production suggested in the production plan can be combined accordingly:

- Type cereal: Cereal + Livestock of milk (it includes buffalos) + swine (option)
- Type fruta.Frutas + Livestock of milk (it includes buffalos) + swine (option)
- Type Green vegetable: Green vegetable + Livestock of milk (it includes buffalos) + swine (option)

1) Cereal Type

Cereals production at the rains time in part of the area, destining other part to the buffalos production. The swine production is developed by the women. This combination makes possible the total income increase and the property economical and social life condition improvement. It still has the advantage of cereals remains use for the swine feeding.

As this activity needs mechanization, in short term it depends on the Company of agricultural mechanization rendered service, and in the future with the formation of association/cooperative, it makes possible the acquisition of their own equipment or machineries.

Cereal type production plan

	Micro producer (53 families)				Small Producers (52 families)			
	Short Period	Medium Period	Long Period	Final	short Period	Medium Period	Long Period	End picture
Property area (ha)	40	40	40	40	160	160	160	160
Cereals cultivation area (ha)	10	20	30	30	15	30	50	50
Cow milk pan (cb)	15	8	0	0	82	72	20	9
Buffalos (cb)	3	5	20	20	13	40	52	70
Swine (%)	10%	40%	45%		5%	20%	40%	

Obs. The buffalo is produced in the areas of pastures and silvipastoril, suplemented with the use of agricultural activity remained grasses and conservation areas. The swine has 10 female as unit pattern to be installed to the producers

2) Fruit Type

This type has the banana as main activity. Irrigation need at the medium and long period ia foreseen. As well as in the type cereal above mentioned, part of the area is destined the fruit production and the other the buffalos creation, these developed by the men and the swine production by the women. They promote the use of the fruit production remains for the swine feeding besides introducing at long term, fruit characteristics of the area such as cupuaçu, bacuri, assai, etc.

Fruit type - Plan of Production

	Micro producer (70 families)				Small Producer (80 families)			
	Short Period	Medium Period	Long Period	Final square	Short Period	Medium Period	Long Period	Final square
Area of the property (ha)	40	40	40	40	160	160	160	160
Fruit production (ha)	0.5	1.0	1.5	1.5	1.0	1.5	2.0	2.0
Cow milk pan (cb)	22	22	8	8	90	90	30	20
Búffalo(cb)	3	15	34	34	16	62	136	156
Swine (cb)	0%	20%	45%		0%	10%	20%	

3) Vegetable type

This type has the cassava production and industrial tomato as activities. Also as other types, in the not used land the creation of buffalos is promoted. The swine production takes advantage of cassava as ration.

Vegetable Type - Plan of Production

	Micro producer (129 families)				Small producer (133 families)			
	Short Period	Medium Period	Long Period	Final picture	Short Period	Medium Period	Long Period	Final picture
Area of the property (ha)	40	40	40	40	160	160	160	160
Vegetable production (ha)	1.6	3.2	5	5	2.5	5	8	8
Cow milk pan (cb)	22	22	8	8	90	90	30	20
Buffalos (cb)	3	14	30	30	15	60	116	120
Swine (cb)	25%	60%	70%		10%	60%	60%	

c. Measures for the Agricultural Administration Promotion recommended

The need of increase of the economical activity of the municipal district requests the acceleration of the implementation of the nuclei translated in trainings to make possible the technical support reception, implementation of the invigoration of the plan of sales, etc..
The association activity however, the implementation should be slow, being necessary for the implementation of the production plan the following measures:

- Invigoration of the associativism base for production structures improvement promotion, as roads.
- To look through the cooperativism the necessary scale for the united acquisition of production inputs, processing and commercialization of the production.
- To make possible the bank financing access with institution of mutual warranty systems as Solidary Guarantee.
- Creation of activities extra production to the associates - social activities.

Use of the associations as means for the plan implementation. For so much there is the need of:

- Promotion of seminary on the associativism for the area specialists.
- The technical support to the producers due to his efficiency should be accomplished in groups or together in the nucleus, where the possibility of diffusion of the acquired knowledge is larger. On the other side it should settle down forms of contact between the associations for knowledge change and mutual experiences.
- To promote visits to production places in more advanced apprenticeship.
- To create a system where the bank financings projet necessarily has the knowledge and the approval of RURALTINS, in such a way that makes possible to the even the subsequent attendance. The special financings is conditioned, coming of Fund of the Development of the State (even in system of Fundo de Aval) the need of the producer to belong to an association.

d. Feminine Activity Development

- The women should represent an important paper for the development of the combined activity in the property, helping in the creation of small animals (swine) or even individually or collectively to institute the small milk sub product industry in the area. For so much, the formation of women's groups is idealized.
- In agreement with the proposition above, orientations on by-products of milk techniques of

production, nutrition, hygiene condition, etc.. Promotion still of the communication among the women's groups formed with the same objectives, it is important.

8.3 Cheese Factory investment - Araguatins

a. Objective:

The cheeses production and others derived of the buffalo milk it has as objective explores the market potentiality, due to his favorable nutritious characteristic, high commercial value product to be marketed at the main consumption markets of the country, therefore with great economical advantage in relation to the livestock traditional milk pan. It still has the objective of the use of the whey, as source of animal protein with the other by-products picked in the property as the cassava and crumb of rice for the swine creation being fomented therefore the activity diversification and increase of the small producer family income of the area.

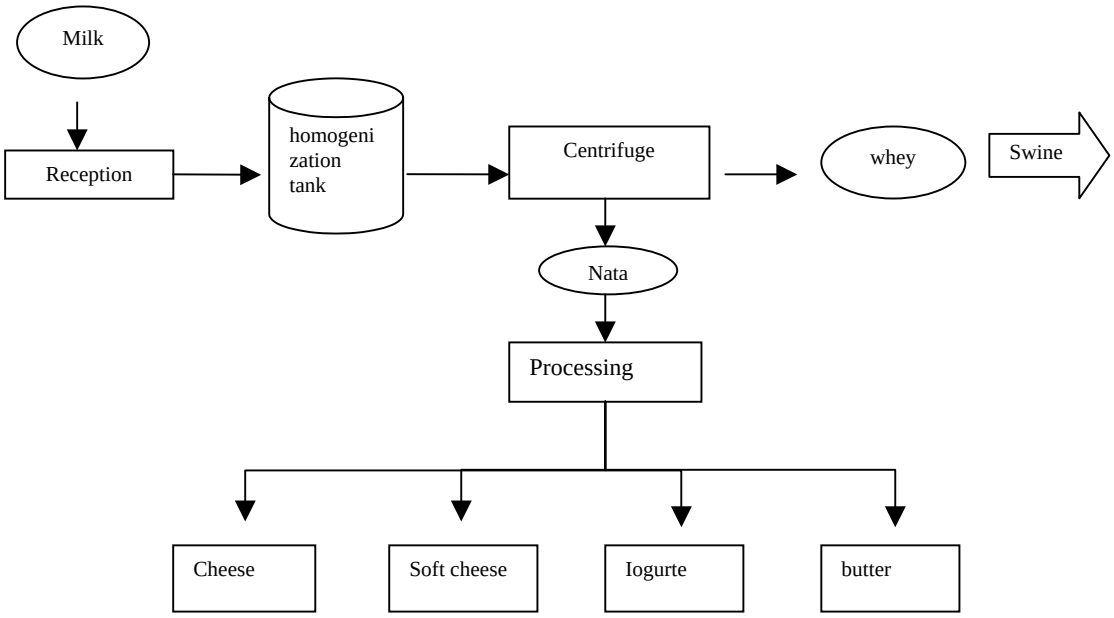
Estimated production in Araaguatins and need of investments:

	Short period	Medium period	Long period
Flock (cb)	3.537	14.305	21.608
Animals in nursing (cb)	1.001	4.048	6.115
Total production (m3/ano)	2.002	8.097	12.230
Cheese production (t. / year)	333	1.350	2.038

Productivity: 2000 liters of annual milk.

Due to the existent production nuclei location logistics in the area the investments of each of the industrial units should be composed for about 50 producers or an initial flock (short period) of 1000 animals. Therefore it intends to establish 3 or 4 units in the municipal district of Araguatins.

b. Basic layout of one manufactures of cheese:



c. Facilities and necessary equipments to each industrial unit:

Usually the cheeses manufactory plant of the state are coupled to the dairy products plan, that is, due to the flotation of milk daily reception amount for several reasons besides the flotation due to the time (rains and of the drought), the dairy products plan need to have his own cheese manufactures as a regulator mechanism between the reception and demand of his milk to the market.

In the case of the buffalos milk, due to all the production are destinated to the production of the cheese, the following facilities will be necessary:

	Value in R$ 1,00
1. Acquisition of land of 1000 m2	15.000
2. Civil work and electric installation for construction of hangar of 500 m2	75.000
3. Equipments	
Reception tanks and homogenization	
Centrifuge	
Processing tank and prensagem tables	
Rest shelves and storage	
Kettle for pasteurization and higienização	
Total cosst of the equipments	160.000
Total cosst of the manufacture unit	250.000

Like this the investment for 3 industrial units... R$ 750.000,00

d. Container and System of collection of milk of the producers:

The used container will be brasses of plastic with 50 liters of capacity, usually in use for the milk dairy products plant, of the property of the cheese manufactures.
The collection of milk will be similar to the system used now by the program" Bacia Leiteira" that uses third part trucks and contracted by the dairy products that possess each one a defined collection route. The values of the tax of use of the container and of the transport cost in the collection are discounted in the accounts rendered done monthly or biweekly to the producers.
The cheese manufactures will have the incumbency of the wash and assepting the brasses to be returned to the producers. In the case of the eventual use of the whey for the producers, this incumbency will be of responsibility of the same ones.

e. Cheese Manufactures Administration

The commercialization of the manufactured product requests a juridical personality. Therefore the constitution of cooperative of production is need to take care of the interests of the producers besides of the cheeses manufactures administration. The cooperative structure requests from the producers acknowledment of the obligations and responsibilities before the society to be created, being therefore training theme to be elaborated for the area.

8.4 Road Development Plan

(1) Current conditions

Although highways exist relatively in great density in Araguatins, part of the state highway and the totality of the municipal roads are not asphalted. As an use plan will be implemented addressed to the production nucleus in this municipal district, the highways should be improved in the sense of assisting these production that should be distributed inside of the

municipal district. At the short term it planned to asphalt the state highways and the medium and long periods to render the remaining.

(2) Short Term

Short term they would be asphalted the state highways: TO-201, TO-010 and TO-134 adding 100,5 Km. Like this, the conditions of the highways would be as display the table below and the illustration 8.12.

Highways and Density (Short Term)

Type	Km	Km/km2
Paved Federal	42.9	0.019
Paved State	130.0	0.057
LeitoNatural (Rural)	996.8	0.434
Total	1,169.7	0.509

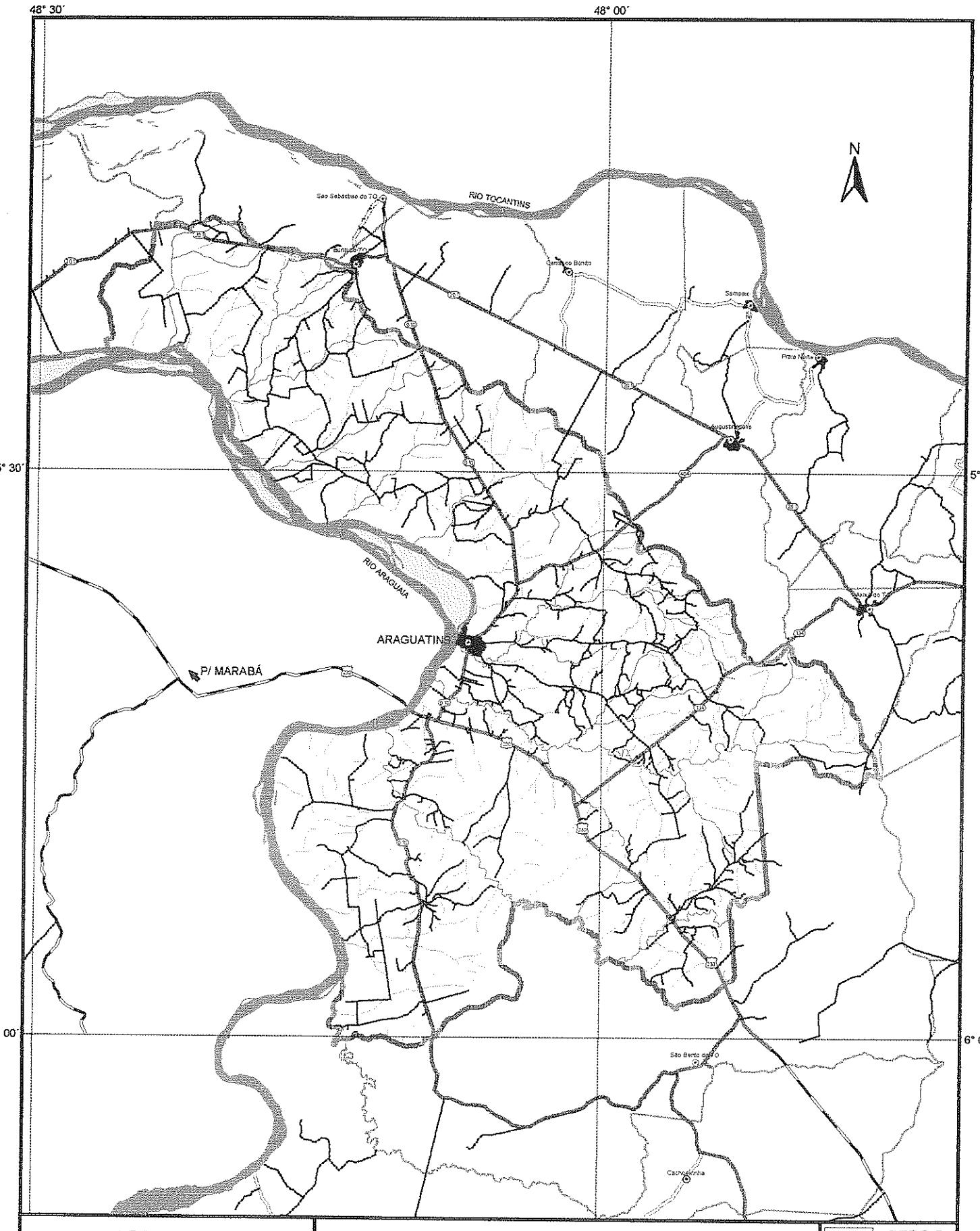
(3) Medium Term

Medium term it would be necessary to fill out the gaps carted by the deficiency of highways in the municipal district. He/she intended like this the construction of 49,2 Km of new highways with natural bed.

Among the new highways, the main would be to create the extension of TO-134 to the south, creating a route between TO-010 and BR-230. Like this TO-134 would start to have 45,6 Km instead of 22,9 Km, inside of the municipal district of Araguatins. With that he/she opens the possibility of this area to call to Imperatriz city - MA.

Highways and Density (Medium Term)

Type	Km	Km/km2
Paved Federal	42.9	0.019
Paved State	152.7	0.067
Natural bed	1,023.3	0.453
.	1,218.9	0.540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Carrasco Bonito
Sampaio
Praia Norte
Augustinópolis
Xambioá
São Bento do Tocantins
Cachoeirinha
LEGENDA
Rodovias
Pavimentada (Estadual)
Pavimentada (Federal)
Em Obras de Pavimentação
Rodovia com Revest. Primário
Leito Natural
Limite de Municípios
Rios Principais
Rios Secundarios
Sede Municipal
Area Urbana
Rios, Lagos
Estudo de Desenvolvimento do Setor Agropecuario
da Região Norte do Estado do Tocantins
Fig. 8.11: Road Improvement Plan (Short Term)
10 0 10 Kilometers
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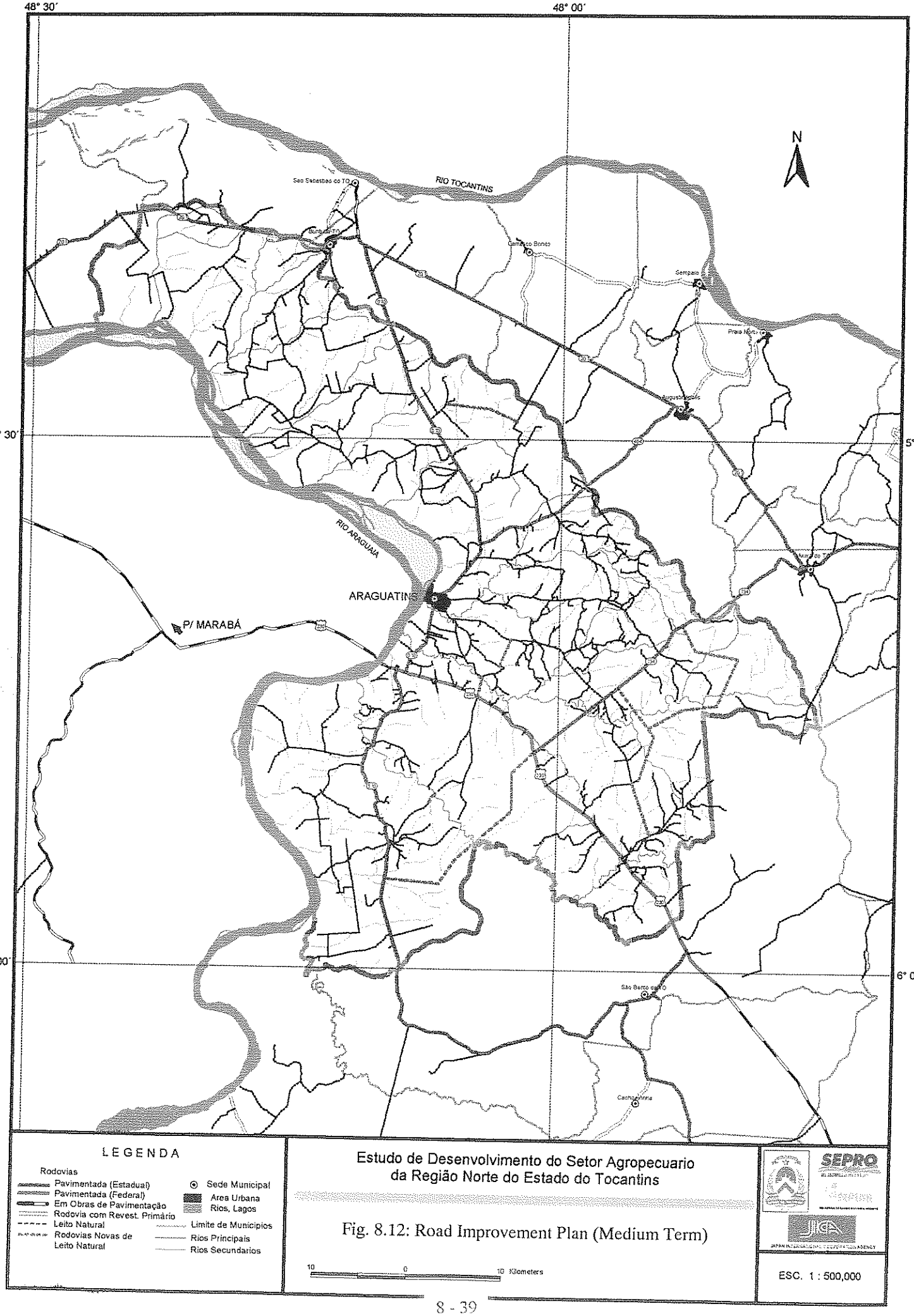
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ARAGUATINS
P/ MARABÁ
Sampaio
Augustinópolis
Praia Norte
São Bento do Tocantins
Cachoeirinha
LEGENDA
Rodovias
Pavimentada (Estadual)
Pavimentada (Federal)
Em Obras de Pavimentação
Rodovia com Revest. Primário
Leito Natural
Rodovias Novas de Leito Natural
Sede Municipal
Area Urbana
Rios, Lagos
Limite de Municipios
Rios Principais
Rios Secundarios
Estudo de Desenvolvimento do Setor Agropecuario da Região Norte do Estado do Tocantins
Fig. 8.12: Road Improvement Plan (Medium Term)
10 0 10 Kilometers
SEPRO
JICA
ESC. 1 : 500,000

(4) Long Term

The main goal long term would be to pave (primary covering) the main highways to facilitate the displacement. Like this, the main highways to be paved would be the extension of TO-134, the highway to the north of the municipal district that would call, through a highway in arch form, TO-010 and Buriti of Tocantins, and finally the highway that would leave Araguatins going to TO-134. He/she intends like this to asphalt 93,8 Km of highways. He/she also intends to improve 270,7 Km through primary covering the mesh of asphalted highways.

Highways and Densities (Long Term)

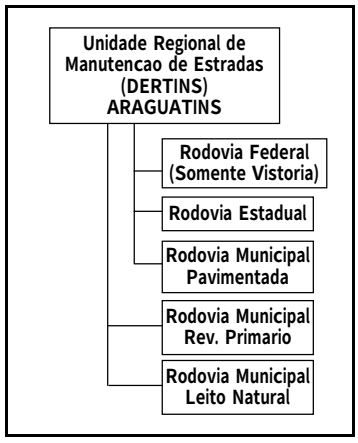
Type	km	Km/km2
Paved Federal	42.9	0.019
Paved State	152.7	0.066
Paved Municipal	71.1	0.031
Natural bed	952.2	0.422
Total	1,218.9	0.531

8.4.5 Maintenance

As in Araguaína, the maintenance ë an item that could be considered more important than the construction of new highways. The maintenance form would be the same of that mentioned for Araguaina: the Periodic and Sporadic.

A regional unit of DERTINS should be created in Araguatins that will have the responsibility of inspections of the highways of the own municipal district, haul of the highways of the neighboring municipal districts.

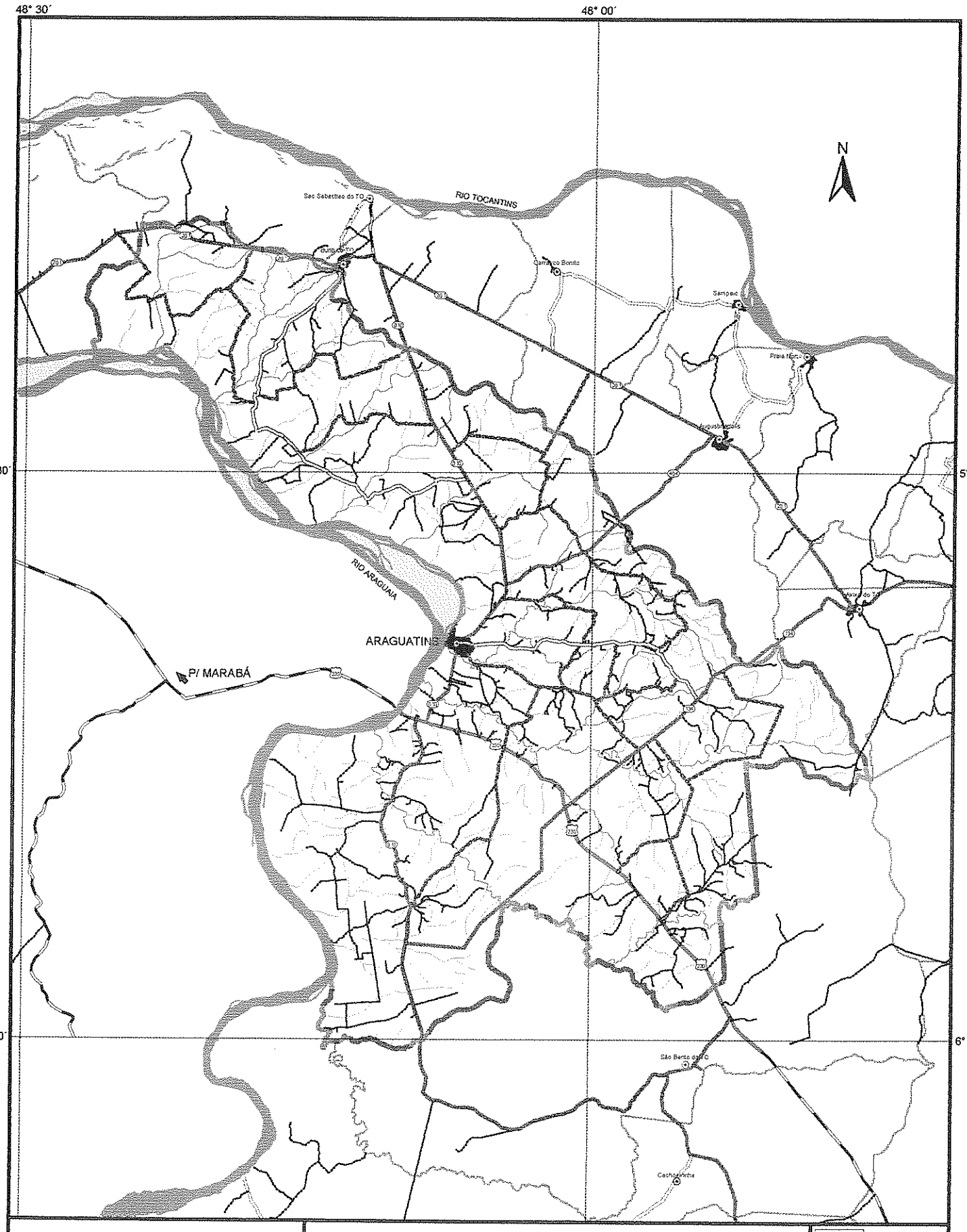
Organization chart of the unit of Maintenance in Araguatins



8.4.6 Necessary resources

The estimate of the necessary resources for the improvement of the road mesh is presented to proceed

Municipal district		Short Period			Medium Period			Long Period		
		km	Type	R$	km	Type	R$	km	Type	R$
Araguatins	Municipal		.		49.2	Natural bed	2,952,000	71.1	Asphalt	21,330,000
	State	98.7	Asphalt	29,598,000	22.7	Asphalt	6,810,000			
Total		98.7		29,598,000	71.9		9,762,000	71.1		21,330,000


48° 30´
48° 00´
5° 30´
6° 00´
N
RIO TOCANTINS
RIO ARAGUAIA
ARAGUATINS
P/ MARABÁ
Sampaio
Cachoeirinha
LEGENDA
Rodovias
Pavimentada (Municipal)
Pavimentada (Estadual)
Pavimentada (Federal)
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Estudo de Desenvolvimento do Setor Agropecuario da Região Norte do Estado do Tocantins
Fig. 8.13: Road Improvement Plan (Long Term)
10 0 10 Kilometers
SEPRO
ESC. 1 : 500,000

8.5 Project Evaluation

The costs and value of production of each section are presented as follows:

Costs of the Agricultural Section (thousand Real)

	Short	Medium	Long	Total
Introduction of cereals	.	.	.	.
For New Areas of Prod.	196	990	1,994	3,180
Cost of Improvement of the Soil	169	2,770	6,253	9,192
Costing of Production	2,362	14,148	35,809	52,319
.	1,520	5,472	6,992	13,984
(Mechanization)	912	1,642	1,049	3,602
Sub-total	4,247	23,379	51,048	78,675
Livestock Diversification				
Improved pasture	49	1,973	5,331	7,353
Improvement in the Creation	308	6,734	15,623	22,665
Improvement Genétic/Quality	354	469	339	1,162
Castration/Descorna	1,030	1,799	2,859	5,687
Buffalos Introduction	800	0	0	800
Swine Introduction	901	8,755	17,383	27,039
Sub-total	3,442	19,729	41,535	64,706
Nucleus of Production	.	.	.	.
Type cereal	1,657	4,971	8,612	15,240
Type fruit	608	1,823	3,159	5,590
Type vegetal	1,972	5,917	10,252	18,142
Sub-total	4,237	12,712	22,023	38,972
.	.	.	.	.
Total	11,927	55,820	114,607	182,354

Value of Production (thousand Real)

.	Short	Medium	Long	Total
Introduction of Cereals				
Value of Prod. of Soybean	3,032	18,106	45,059	66,196
Value of Prod. of Corn	1,588	9,587	25,294	36,469
Sub-total	4,620	27,693	70,352	102,665
Cattle diversification				
Value Prod. of Bovine cut	77,154	67,717	111,509	256,380
Value Prod. of Bovine milk	20,005	21,730	15,054	56,789
Value Prod. of Buffalos	3,175	15,584	29,929	48,688
Value Prod. of Swine	4,669	28,013	70,033	102,714
Sub-total	105,002	133,044	226,526	464,572
Nucleus of Production				
Type cereal	5,516	8,274	19,305	33,095
Type fruit	2,243	3,365	5,829	11,437
Type vegetal	14,404	21,606	42,403	78,413
Sub-total	22,163	33,244	67,538	122,944
.				
Total	131,784	193,981	364,416	690,181

Efficiency of Investment of Each Section (thousand Real)

	Current	Short Period	Medium Period	Long Period	Total
Introduction Cereal	.	.	.	.	.
(1) Production value	0	4,620	27,693	70,352	102,665
(2) Increase production	.	4,620	23,073	42,659	70,352
(3) Production accumulated	.	4,620	32,313	102,665	.
(4) Cost for production	.	4,247	23,379	51,048	78,675
(5) Accumulated cost	.	4,247	27,627	78,675	.
Eficiency=(3)/(5)	.	1.09	1.17	1.30	1.30
.	.	.	.	.	.
Cattle diversification	.	.	.	.	.
(1) Planned value of production	68,311	105,002	133,044	226,526	464,572
(1) Production value	.	10,976	39,019	132,500	182,495
(2) Increase production	.	10,976	28,043	93,481	132,500
(3) Production accumulated	.	10,976	49,995	182,495	243,466
(4) Cost for production	.	3,442	19,729	41,535	64,706
(5) Accumulated cost	.	3,442	23,171	64,706	.
Eficiencia=(3)/(5)	.	3.19	2.16	2.82	7.18
.	.	.	.	.	.
Nucleus of Production	.	.	.	.	.
(1) Planned value of production	4,196	22,163	33,244	67,538	122,944
(1) Production value	.	19,379	30,461	64,755	114,595
(2) Increase production	.	19,379	11,081	34,294	64,755
(3) Production accumulated	.	19,379	49,840	114,595	183,814
(4) Cost for production	.	4,237	12,712	22,023	38,972
(5) Accumulated cost	.	4,237	16,949	38,972	.
Eficiency=(3)/(5)	.	4.57	2.94	2.94	2.94
.	.	.	.	.	.
Total	.	.	.	.	.
(1) Planned value of production	72,507	131,784	193,981	364,416	690,181
(1) Production value	.	34,975	97,172	267,607	399,755
(2) Increase production	.	34,975	62,197	170,435	267,607
(3) Production accumulated	.	34,975	132,148	399,755	566,878
(4) Cost for production	.	11,927	55,820	114,607	182,354
(5) Accumulated cost	.	11,927	67,746	182,354	.
Eficiency=(3)/(5)	.	2.93	1.95	2.19	2.19

As figure above demonstrated, the efficiency of the investment is larger in the cattle production activities. This efficiency however it occurs with the pasture areas improvement promoted by the agricultural production.

8.6 Environment Conservation evaluation

The items of environmental impact in the future for the activities to be developed in the plan are: Highways paving; Cheese manufactures; Cereals silos implantation ; Development of the production above 1000 ha for the great producers; etc. besides several other current problems of the activities development should be considerated.

Like this, the main evaluation items to be considered regarding the Environmental Conservation in the implementation of the Development Plan in Araguatins, they are:

Items of Evaluation	Items to consider
1. Social life	
The inhabitants' life	Due to most of the population, mainly rural area, they are poor it is necessary to create development chances
Population problem	Existence in the neigbour municipal districts in worse situations. Development with the plan implementation, immigration of those areas to Araguatins is possible.
Economical activity	Possibility of emergence of social differences with plan implementation. It should be taken into account this aspect in the elaboration of the plan.
2. Hygiene and Health	
	Appropriate orientation to the producers: Contamination for the use of agricultural defensive in the horticulture and agriculture. Contamination for the defensive products packing. Swine production can cause contamination of the water of the rivers.
3. Extrativism and Use of Earth	
	. To consider the preservation of the babaçu palm tree in the Plan of Use of Earth. A lot of family has his exploration as source of family income. . Araguatins, for being margin of the river Araguaia in almost all his extension possesses countless animals, that they have this area as their habitat. To preserve. . Belonging to the Amazonian forest area, it is important to have a monitorization system concerning the enviroment conservation to be proposed
4. Rare Alive beings	
	. Due to his location, between Amazonian forest and savannah, Araguatins has besides the babaçu mentioned previously, several types of native tropical fruits as bacuri, cupuaçu, etc - to preserve. . Appropriate orientation to the producers against agriculturtal defensive use in the transformation of pasture to agricultural area.
Species in Extinction	. Appropriate orientation to agricultural materials wich can kill, provoque mutation in animal and vegetal rare especies.
Illnesses	The activities foreseen in the Plan of Development should not bring new illnesses to the people or you encourage of the area.
Flooded areas	. The area possesses great number of small flooded areas. The use of the earth plan should consider these areas as areas of Conservation.
5. Earth and Soil	
	. To guide about the possibility of residues of defensive in the soil for these products use increase in the agriculture. . Mata natural - planning to preserve
6 Hidrology and water quality	
Flood	. O fluxo e refluxo of Araguaia river - plano deve ser feito de tal forma não estancar estas águas - fortalecimento de monitoração.
Water quality	. Orientation about agricultural defensive use to prevent contamination of the water. . Swine production - idem.