

3.7. Conditions of Agricultural Supports

3.7.1. Research

(1) National Institute for Agricultural Research of Mozambique (IIAM)

1) Organization

National Institute for Agricultural Research of Mozambique (IIAM) under the Ministry of Agriculture Direction of Support is responsible for agricultural investigation in the country. The Institute was created in 2004, by recommendation of the Brazilian Agricultural Research Corporation (EMBRAPA), by the unification of the 5 existing investigation institutes till then (Institute of Agricultural Investigation, Institute of Cattle Raising Investigation, Institute of Veterinarian Investigation, Institute of Rural Areas Development and Institute of Forestry Investigation) and it has a Planning, Administration and Finance Direction (DPAF), Direction of Agronomy and Natural Resources (DARN) the Animal Science Direction (DCA) and the Direction of Training, Documentation and Technology Transfer (DFDTT) (Figure 3.7.1). Besides, it has 4 units at local level: Southern zone center (Province of Gaza, Chokue, see below)¹⁷, Center zone center (Province of Manica, Sussundenga)¹⁸, Northwest zone center (Province of Niassa; Lichinga)¹⁹, and Northeast zone center (Province of Nampula; Nampula)²⁰ (Figure 3.7.2). The zones of this Study are under jurisdiction of the Northeast zone center (districts of Ribaué, Mulupala, Nampula, Mucaeté, Monapo, Meconda and Mogovolas) and the Northwest zone center (districts of Malema, Gurue, Cuamba and Manbimba). The Northeast zone center has also three agrarian experimental stations in the Study area (Namelil, Ribaué, Namapa) and a laboratory for analysis for soils and crops (Nampula), and the Northwest zone center has one agrarian experimental station (Mutuali). The laboratories of analysis are located in the headquarters of Maputo and in Nampula, but the capacity of analysis of the last is very limited and it does not conduct tests for physical properties of the soil. Maputo headquarters conducts analysis according to requests of IIAM and other institutions, private persons and companies but the number of analysis carried out during a year is very low²¹, and it does not have enough chemical reagents for tests, so it practically does not conduct tests based on chemical analysis of soils and crops.

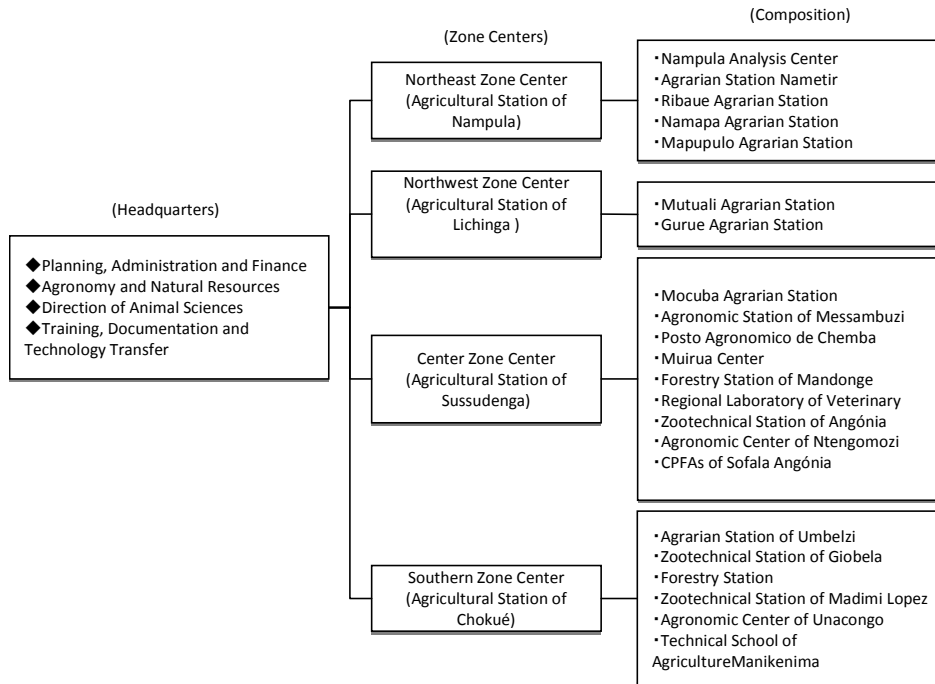
¹⁷ Centro Zonal Sul. Provinces of Maputo, Gaza and Iambane)

¹⁸ Centro Zonal Centro. Provinces of Tete, Manica, Sofala and Zambezia

¹⁹ Centro Zonal Noroeste. Province of Niassa

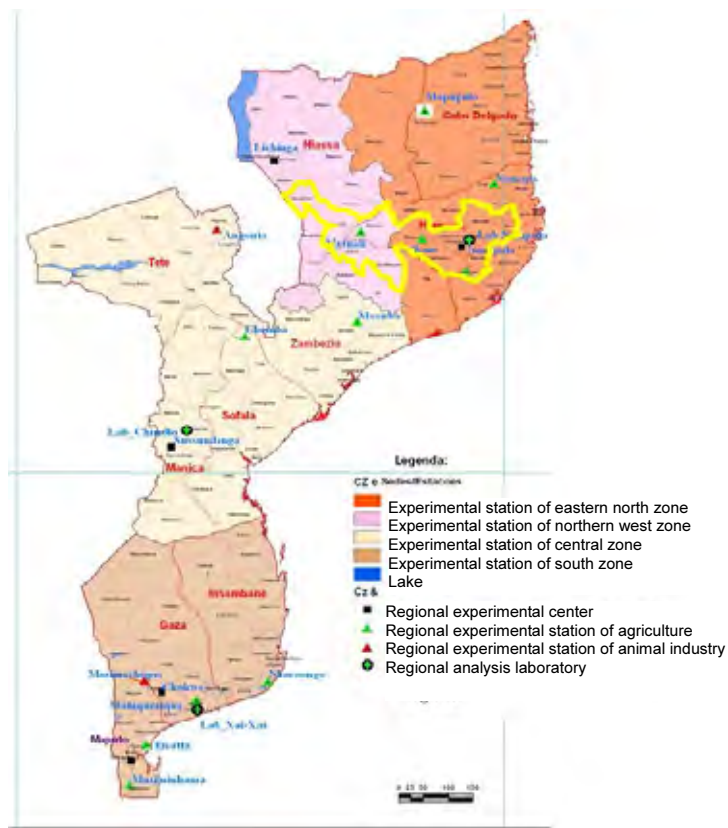
²⁰ Centro Zonal Nordeste. Province of Nampula and Cabo Delgado

²¹ Soil and water analysis are yearly conducted for 1000 to 2000 samples.



Source: JICA Study Team Report for the “Preparatory Survey for the Program of Economic Recovery and Regional Development in Mozambique (Promotion for rice cultivation”, JICA, 2007

Figure 3.7.1 Organization of Research Institutes at Mozambique



Source: Prepared according to <http://www.iiam.gov.mz/>, November 11, 2009

Figure 3.7.2 Location of Agriculture Research Institutes and Zone Centers at Mozambique

Table 3.7.1 Current Conditions of Agricultural Experimental Center in Target Area

Zonal Center		Zonal Center Northeast (Office in Nampula)		Zonal Center Northwest (Office in Lichinga)	
Experimental Station		Agronomic Post of Nampula-Office		Agronomic Post of Mutuali	
Location		Agrarian Station Ribaué		Agrarian Station of Gurué	
Location		Latitude south: 15° 09' Longitude east : 39° 20'	Latitude south: 14° 09' Longitude east: 38° 16'	Latitude south: 14° 53' Longitude east: 37° 03'	Latitude south: 15° 29' Longitude east: 37° 00'
Altitude		432 m	535 m	570 m	788 m
Area		355 ha	2,572 ha	3,000 ha	—
Soil		<ul style="list-style-type: none"> • Red and yellow soil, rich in sesquioxides or acuous mineral soil. • Flat terrain • Water drainage: good–bad. 	<ul style="list-style-type: none"> • Red and yellow soil, rich in sesquioxides or gray soil. • Sandy soil, sandy marl, marl. • Many mild inclinations • Water drainage: good– regular 	<ul style="list-style-type: none"> • Forestal soil, acid mineral soil, acuous mineral soil, (low land). • Flat terrain. • Water drainage:–: bad 	<ul style="list-style-type: none"> • Acid soil of organic origin (reports of 17% contains of organic substance, pH (H₂O) 3.5).
Annual average temperature	Average	24.5 °C	23.9 °C	23.8 °C	21.4 °C
	Maximum	30.4 °C	30.2 °C	31.1 °C	—
	Minimum	18.5 °C	17.6 °C	16.5 °C	—
Annual rainfall		1,114 mm	1,120 mm	968 mm	1,516 mm
Number of rainy days		84 days	90 days	88 days	—
Personnel		<ul style="list-style-type: none"> • Researchers: 32, and others 	<ul style="list-style-type: none"> • Grafters: 3 • Personnel in field: 1 • Security : 2 	<ul style="list-style-type: none"> • Director (researcher): 1 • Others: 19 	<ul style="list-style-type: none"> • Director (researcher): 1 • Personnel in field: 3 • Security: 1
Functions		<ul style="list-style-type: none"> • Cultivation • Cultivation of products (cassava, mapira, peanuts) • Botanic pathology (cashew nuts) • Insects • Study of seeds • Utilization of agriculture products (cashew nuts and cassava) • Production of seeds • Veterinaty • Soil • Silviculture 	<ul style="list-style-type: none"> • Sales of mango grafts and citrics. • Production of maize seed. • Start of tests for adaptation of wheat variety from this year 	<ul style="list-style-type: none"> • Adaptation test of the variety. • Production of seeds (maize, mapira, soya, peanuts, cassava, string beans) • Animal farming 	<ul style="list-style-type: none"> • Adaptation test of the variety. (batata inglesa, arroz). • Production of seeds (maize, potato, string bean, rice, soya).
Others		<ul style="list-style-type: none"> • Research collaboration with INCAJU²⁵. • International Projects: a) AGRA²⁶ (control of soil fertility and mapira cultivation). b) EU²⁷ (investigation and extension of cashew nuts, cassava and sweet potato). 	<ul style="list-style-type: none"> • Established in decade of 1960 as experimental station of cotton, presently it does not handle this product 	<ul style="list-style-type: none"> • Not have a laboratory • Some illegal occupants in its premises. 	<ul style="list-style-type: none"> • Established as experimental station of Zambézia province (in 1945), later an entity under the IIAM. • Due to the strike of the power energy company, did not receive electric light for three years. • Possui laboratório, que não funciona.

²⁵ Instituto Nacional do Caju (National Institute of Cashew nut)

²⁶ International NGO Alliance for Green Revolution in Africa

²⁷ European Union

2) Workers

The Direction of Agronomy and Natural Resources of IIAM headquarter has a total of 52 workers but at the Northeast and Northwest zone centers there are 31 and 12 workers respectively, a much reduced number (Table 3.7.2). At the headquarter, approximately 60% of workers has some doctor or master academic degree but at the northeast and northwest zone centers the percentage does not reach 30 per cent. The average age of workers is²⁸ between 30's (zone centers) and 40's (headquarters) and personnel is younger at the zone centers, but only two workers were in the 20's (Southern zone center). All researchers are experts related to agronomy and at the northeast and northwest zone centers more than 70% of researchers are agricultural experts; the responsible for the pest prevention was absent, and at the department of soil fertilization there was only one person. At the interior, after the agronomists, there are more veterinarians in number²⁹, and their functions are limited to the attention of crops and animal health at a local level, without capacity to attend specific issues in each plot.

It is necessary to increase the number of researchers, a balance in the number of experts and to improve their capacities, but presently the country does not count on with a long term plan to improve the number of researchers. Also, the unfavorable working conditions are an impeding factor to improve the situation. Besides, the research installations and equipment are limited, especially at the zone centers, but there is no plan to boost said centers.

²⁸ Only for regions with available data (See Table 3.6.1)

²⁹ At IIAM headquarters they belong to the Direction of Animal Science (DCA)

Table 3.7.2 Workers of IIAM^{Obs.}

Item	Central	Zone Centers				Total
	Direction of Agronomy and Natural Resources	South	Center	Northwest	Northeast	
Workers(no.)	52	30	18	12	31	143
Men (no.)	33	24	14	9	29	109
Women (no.)	19	6	4	3	2	34
Average age	43.4	39.6	-	37.3	-	-
Title						
Doctor	11	1	1	0	2	15
Master	18	3	3	2	7	33
Undergraduates	23	26	26	10	22	107
Field						
Biology	5	1	1	0	1	8
Genetics	2	0	0	1	0	3
Development of varieties	6	1	2	1	2	12
Agronomy	13	16	5	8	22	64
Plant diseases	1	1	2	0	0	4
Pest prevention	2	0	0	0	0	2
Post harvest	1	0	0	0	0	1
Soil fertilization	2	0	0	0	1	3
Soil classification	2	0	0	0	0	2
Use of soil	1	0	0	0	0	1
Agriculture Economy	2	0	0	0	2	4
Hydrology	2	0	0	0	0	2
Forestry Engineering	4	0	2	0	1	7
Geography	3	0	0	1	0	4
Veterinary	0	7	5	1	1	14
Animal Fertilization	0	1	0	0	0	1
Mathematics	1	0	0	0	0	1
Others	3	1	1	0	1	6

Source: JICA Study Team Report for the "Preparatory Survey for the Program of Economic Recovery and Regional Development in Mozambique (Promotion for rice cultivation", JICA, 2007

Obs.: Some workers belongs both to IIAM headquarters and the center zone center

(2) Universities

Agronomy courses in the country are offered by the National University Eduardo Mondlane (Maputo) and at the Catholic University (Cuamba) and both have soil analysis laboratories. The National University Eduardo Mondlane has professors that are also researchers at the IIAM headquarters and there is an exchange between the two institutions but they do not have an exchange system of information and results with other institutions related to agricultural issues. It is necessary to conduct more studies about the activities of agricultural research centers.

3.7.2. Extension

(1) Extension Department of the Ministry of Agriculture

The Agricultural Extension Department of the Ministry of Agriculture is responsible for the entities of agricultural extension but with the decentralization policies in course, many attributions of extension are being transferred to the provinces and districts. However, the capacities of the local governments are still in a very incipient stage.

1) Organization and workers

The Agricultural Extension Department of the Ministry of Agriculture, with the support of the Department of Agrarian Services of the same ministry, coordinates the assistance from abroad related to agriculture and so it is responsible for the formulation and execution of agriculture extension policies in the country. There is a plan to increase the number of promoters to nine in each district (total of 1,152 in 128 districts), by 2010 but it seems a very difficult goal to achieve.

At the districts of the Study area, there are in average 6 promoters, superior to the national average (Table 3.7.3). In the last years, promoters were transferred to the provinces³⁰ and according to the Agriculture Direction of the districts, they were assigned to the district services of economic activities³¹, (Figure 3.7.3). However, the district services of economic activities in almost all provinces do not have vehicles and the work of the promoters is very limited. The department of agrarian extension is looking for methods to improve the transportation means of promoters and it has started from the southern provinces, closer to the capital, using several types of subsidies, but the application of measures are still delayed for the northern provinces, at the area of the present Study. The Direction of Agrarian Extension aims to improve mobilization of promoters sending the means from Maputo to all provinces simultaneously, based in the proportion of number of promoters in each province. Measures are delayed to all provinces because means are insufficient, including provinces in the North, object of the Study. The country makes a simple calculation and considers that one promoter should attend to 250 families, but reality does not work like this for only an average of 8% of farmers in the whole country answered that they received some kind of assistance from promoters (2008)³².

³⁰ To the moment, the funds corresponding to extension were not transferred to the provinces, so the selection tests for promoters are also conducted with resources of the province.

³¹ SEDAE: District Services of Economic Activities

³² Ministry of Agriculture: Results of Agriculture Survey (TIA). 2007. (Presentation Material)

Table 3.7.3 Number of Promoters by Districts at the Project Area

Province	District (* Production of food Districts of the Project (PAPA))	Number of promoters in 2009						Total
		Public workers	NGO		Agro-industry			
			(Promoters)	Assistance to farmers	Promoters	Assistance to farmers	Farmers	
				Advisors		(Promoters)		
Zambézia	Alto Molocué*	5	12	0	—	—	—	17
	Gurué*	6	13	0	—	—	—	19
Total		11	25	0	—	—	—	36
Nampula	Murrupula*	5	7	0	1	0	—	13
	Malema*	3	10	0	4	0	—	17
	Ribaue*	3	5	0	3	0	—	11
	Meconta*	9	3	0	3	0	—	15
	Mogovolas*	6	7	0	0	0	—	13
	Muecate	8	1	0	6	0	—	15
	Nampula	8	3	0	0	0	—	11
Monapo	8	9	0	6	0	—	23	
Total		50	45	0	23	0	—	118
Niassa	Cuamba*	6	4	0	5	0	61	76
	Mandimba*	6	6	0	5	0	36	53
Total		12	10	0	10	0	97	129
Grand Total		73	80	0	33	0	97	283

Source: JICA Study Team Report for the “Preparatory Survey for the Program of Economic Recovery and Regional Development in Mozambique (Promotion for rice cultivation”, JICA, 2007

2) Training of Promotion

Most of promoters have elementary education (5 years), middle education (5 years) to study at the technical agricultural schools (3 year). In recent years, a course for agriculture promoters was created at the National University Eduardo Mondlane (4 years) in the agronomy career and there are some graduates working as promoters. Training of promoters is conducted at national, provincial and district level. Training at national level is basically through training new promoters in each province³³. At district level, training should be conducted through monthly activities with the support the Province Direction of Agriculture but they are limited to the presence in the meetings held at the Province Direction of Agriculture for the reading of the monthly report of activities of said direction and most of the content refers to the policies of the central government. Didactic material is not available yet, curricula is not ready and the stage for extension methods or the know how to improve technical capacity of individual farmers has not been achieved yet. Recently, it was requested to the National University Eduardo Mondlane to prepare a manual of extension techniques for main crops and JICA’s project for rice production is been used as reference. Furthermore, according to the issue, the support from Ministries of other sectors to prepare the manuals was requested³⁴. It is necessary to acknowledge this effort of the central

³³ As the training capacity in provinces is low, the State send officers with this purpose by in the future, provinces should be in charge.

³⁴ For example, “Methods for cattle raising in dry season” and “Corn Marketing”, together with the Ministry of Trade

government but it is clear that agricultural techniques are not been developed according to the needs of each region, within the large country territory.

(2) NGO

At the Project area there are as many or more NGO's promoters than those of the provinces and they carry out their tasks according to their goals, however there is no exchange of information among NGO promoters and province and district promoters. Besides, differently from the activities of NGOs in other provinces, there are no advisors among farmers and there is a concern that extension techniques are not being sufficiently interiorized. (Table 3.5.2). Extension activities by NGO promoters are not continuous and one of the problems is the lack of extension activities in connection with the market.

(3) Private companies

At Nampula an Niassa provinces there are promoters of private companies related to agriculture. In the case of Niassa province, there are many agriculture advisors related to the agroindustries of cotton and tobacco; they provide fertilizers and agrochemicals as well as technical orientation for crops. However, excepting Niassa province, there are no advisors to train other assistants or guides among the same farmers, as in the case of NGOs, causing a limitation in technical extension (Table 3.7.3).

3.7.3. Farmers' Organization

Farmers' organization in the target areas can be mainly divided into "farmers' group" and "farmers' association". The farmers' group means what farmers are just assembled, but the farmers' association has its rule (constitution) and management body for its purpose. The size of one organization is usually 10-40 farmers, for instance; the extension service of MINAG assembles 20-25 farmers into one farmers' group/association, but in the case of CLUSA³⁵, one group/association consists of 10-40 farmers.

The farmers' associations include registered organizations and not-registered organizations. Regarding the regulation about an incorporated organization, the presidential decree – low No. 2/2006 on the 3rd of May³⁶ prescribed. The registered organizations have advantages for their fund-raising. However as a Box below shows, the application needs various documents and red-tape formalities. It becomes a large obstacle when farmers apply for it. As the result of it, many farmers' organizations have not been registered. In Nampula

³⁵ CLUSA (the Cooperative League of the USA) was established in 1916 in the US, and the eldest organization for cooperation development in the US. CLUSA has already implemented its programs and projects like organizing agricultural cooperation, natural resource conservation based on communities, strengthening civil society, and promoting public health in 81 countries. CLUSA has current programs and project 11 countries in Africa, 2 countries in Central and South America, and 2 countries in South Asia.

³⁶ Decreto-Lei No 2/2006 de 3 de Maio, Diploma Ministerial No 155/2006 de 20 de Setembro do MINAG, Despacho de 29 de Setembro de 2006 do Ministerio da Administracao Estatal (MAE)

province, there are 688 registered organizations and 514 unregistered organizations as of September 2009³⁷.

Box. Summary of the presidential decree, law No.2/2006 (Decreto-Lei No 2/2006 de 3 de Maio)

【Required conditions】

Members of the organization should be over 15 years old, and the founders should be over 18 years old. An application should include (1) a name of the organization, names and signs (or finger prints) of more than 10 founders, (2) its constitution, (3) its action plan by documents or verbal explanation. Also the application form should be submitted with identification of each founder.

【Procedure of Approval】

Applicant submits needed documents to the head of district and/or post administrative. The head of district and/or post administrative examines the documents, and makes a decision of approval. The organization approved is notified a public announcement.

【Supervisory authorities and their responsibilities】

Supervisory authority is the head of district and/or the head of post administrative. The authority has a responsibility to supervise the business of the organization and to advise it appropriately if needed.

【Establishment of the Union】

Registered organization can establish a Union with one more other registered organizations. If the Union works beyond more than one district, the head of province has a responsibility for the supervision. If the Union works beyond more than one province, the head of concerned department of MINAG has a responsibility for the supervision. Following upon the establishment of a Union, the member organizations can modify their constitution.

Source: JICA survey team

Farmers' organizations in Mozambique have 1) to act as a recipient of agricultural extension services from MINAG and others, 2) to strengthen the mutual assistance in the community, 3) to consolidate produce in one place, and to collectively negotiate with traders and/or middle-men, 4) access financial resources, and 5) to operate and maintain the communal property (five) in order to take one or some responsibilities.

(1) Agricultural extension services

As the previous section explained, the agricultural extension workers of MINAG are quite small number of people and have a limited budget for transportation. Houses and agricultural fields of the recipient farmers of MINAG are scattered throughout the extensive catchment area. It is quite difficult that MINAG extension workers visit and give some advice for every recipient farmer. Therefore, the agricultural extension services from MINAG is provided to a group consisted of 20-25 farmers. The extension worker prepares a CDR³⁸ in one member's farm, and provides the technical transfer and/or training for that member. The CDR methodology is quite effective because one extension worker can train 20-25 farmers once, and also farmers can learn new knowledge and technology practically.

³⁷ Source: Nampula Agriculture department

³⁸ Campo de Demonstracao de Resultados

The producer group is also expected to be an agent of information between farmers and outsiders. A few groups received supports from NGOs have already worked the agent; to collect information about market and customers' demand, to analyse the tendency of variety of produces and the market prices, and to make their planting plan based on the information. However, almost all producers' group supported by MINAG and others have not been aware of what is important information

(2) To strengthen the mutual assistance in the community

To group farmers is very popular methodology among NGOs and/or donor projects to strengthen the mutual assistance in the community. For instance, in the target area CLUSA implements a program called PROSOYA. It mainly aims to increase the income of beneficiaries through producing and selling soya beans. The program at the beginning encouraged the people living in the target area to form a group.

Then the program provides agricultural technology and knowledge to increase the productivity of the members. At the same time, the program implements some activities for the literacy of the members. It is said that to increase people's ability of reading and writing directly relates to increasing the self-esteem and absorptive capacity of people for new knowledge and/or technology.

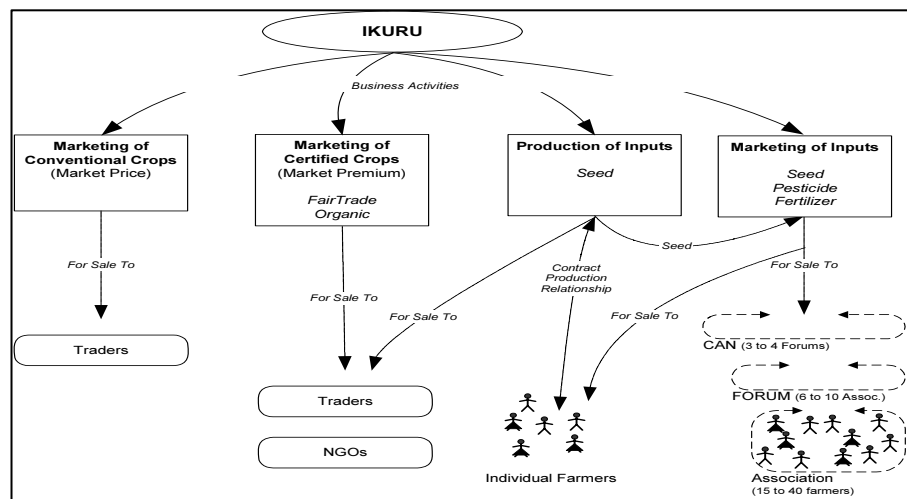
Also many programs/projects which aim to enhance mutual assistance among communities consider to encourage the participation of vulnerable groups to the activities.

(3) To operate and maintain the communal property

'Communal Property' can be included irrigation system, storage, post-harvest processing facilities, wells, and so on. For instance, some farmers' associations of IKURU in Monapo district established a FORA. The FORA has a facility for processing and storing sesami. The member associations of the FORA operate and maintain the facility together. A FORA in Muecate district also built a storage, and maintains it with member associations. These associations have their original rule and the system of management.

The government distributed 'Rural Initiative Fund' to each district. The fund is used for job development and/or food security. Ribaue and Malema disticits, which the team visited, purchased animals for cultivation and tractors used by this fund, and lent to necessary farmers for a charge.

The 'Rural Initiative Fund' can be applied by who has a bank account. The district government examines a proposal from applicant, and offers the fund to the most appropriate proposal. As an example using the fund, Gurue district government implements 'Equipment Park' project. The local government purchased equipment, and entrusted some farmers' groups with the operation and maintenance.



Source: CLUSA presentation

Figure 3.7.3 Organization System of IKURU

IKURU was established in 2003 as a "Sociedade Anonima de Responsabilidade Limitada (Limited Liability Stock Company)". The owner(s) of IKURU is FORA and the members. The management of IKURU is done by Central Management Unit (CMU), and the office is allocated in the office of CLUSA in Nampula. The CMU is in charge of 3 matters below;

- Financial management of IKURU
- Analysis of international markets
- Certification for organic, Fair Trade and other premium markets on contract to IKURU

The CMU collects cultivation plans of the year, which each FORA submits to, and expects the quality and quantity of the harvests of the year. Considering international market prices, the CMU decides purchasing prices. Also the CMU has important roles to look for the domestic markets and to connects the members to buyers.

3.7.4. Rural Financing

The government and donors are making efforts to expand rural financing services⁴⁰. At Nampula province, in the Study area, CLUSA offers short term microcredits for small farmers (less than one year) and according to interviews held with this entity, it intends to increase the number. At Murrupula province, from the 7 000 000 MT assigned from the central government budget, they provide loans for small farmers and associations. However around 80% is not paid back and it was found that it happens because the system of association is weak and in many occasions the capital was not used for agricultural purposes. (According to interviews with the provincial government of Murrupula).

⁴⁰ For example, the Program Rural Finance Support (2005-2013) in cooperation with the International Fund for Agricultural Development IFAD) of the African Development Bank AfDB, Market led Smallholder Development in the Zambezi Valley Project (2007~2013) of World Bank.

3.8. Situation of Aid Agency Activities of Donors in the Study Area

In Nacala corridor area, many donor projects such as agriculture development, microfinance, technical assistance for NGO and fund assistance have been implemented. Implementation projects are as follows.

Table 3.8.1 Trends on Assistances of Main Donors in Nacala Corridor Area

International Aid Agency/Donor	Program/Project	Implementation Area
African Development Bank (AfDB)	<ul style="list-style-type: none"> Artisanal Fisheries Development Program Financing of the Upstream Program, a micro-finance capacity building program with AusAID, UNDP, ILO 	<ul style="list-style-type: none"> Nampula, Cabo Delgado, Northern Region Country-wide
World Bank (WB)	<ul style="list-style-type: none"> Decentralized Planning and Finance Project (DPFP) Preparing major agric project, similar to ASP 	<ul style="list-style-type: none"> Tete, Sofala, Manica, Zambezia (>>43 Districts) Zambezi Valley provinces, districts to be defined
European Union (EU)	<ul style="list-style-type: none"> Support of Institutional Development for Gabinete Apoio a Pequena Indústria (GAPI*) and Mozambican Association for Rural Development (AMODER) Support of AMODER commercialization credit fund Support of NGOs: including World Vision, CARE, ISCOS, ADRA 	<ul style="list-style-type: none"> Nampula, Niassa, , Zambézia Northern Provinces Northern Provinces
United Nations Capital Development Fund (UNCDF)/ United Nations Development Programme (UNDP)	<ul style="list-style-type: none"> Pioneering support of decentralization projects PPF New, similar projects recent/commencing 	<ul style="list-style-type: none"> Nampula Cabo Delgado, Gaza, Inhambane, Manica, Maputo, Niassa, Sofala,
Agency for International Development (USAID)	<ul style="list-style-type: none"> Financial assistance to CLUSA, Technoserve and ACDI/VOCA (farmer organization/extension/social development) Centre for Promotion of Rural Finance Technical Assistance to IIAM, agricultural research, incl socio-economic department 	<ul style="list-style-type: none"> Nampula Country-wide Country-wide, (research zones)
Swedish Development Agency (SIDA)	<ul style="list-style-type: none"> Contractual Joint-Venture Partnership with AMODER Malonda private sector initiatives project 	<ul style="list-style-type: none"> Nampula Niassa Province
Swiss Development Cooperation Agency (SDC)	<ul style="list-style-type: none"> Rural Development Program (c Helvetas/IFAD grant) Support to NGOs for community development 	<ul style="list-style-type: none"> Cabo Delgado Nampula, Manica, Sofala
Finnish International Development Agency (FINNIDA)	<ul style="list-style-type: none"> New program for ProAgri II under preparation, may include budget support 	<ul style="list-style-type: none"> Zambezia, possibly Inhambane

Source: Small business promotion office

Among the international cooperation entities, USAID launched in October 2009, the Agricultural Research and Innovation (ARI) Program, with the objective of improving agricultural production in Mozambique through the development of agricultural policies, technologies and implementation methods, for a period of five years. The budget for the first year is SU\$35 000 000 and for the second year on, it will be of US\$8,000,000. The ARI Program aims to support Mozambican agriculture sector in a comprehensive way,

considering agricultural research, technological transfer (includes agricultural machinery and equipment), human resources development and strengthening of organizational capacity (includes capacity building of IIAM).

Through the strengthening of the value chain for nine main products (banana, pineapple, mango, cashew nuts, maize, peanuts, sesame seed, soya and reforestation), AgriFUTURO project is on going since 2009 in order to improve competitiveness of the private sector. The budget for this five-year project is US\$ 20 million. AgriFUTURO has as intervention area the Nacala corridor and the Beira corridor, and the following results are expected.

- 1) Build up a proper environment for agro business activities (Organization of policies and regulations, etc.)
- 2) Expansion and strengthening of services necessary for agro business development (research, technological innovation, infrastructure, mechanization, agricultural implements, marketing, dissemination, transportation, etc.).
- 3) Build up a relationship between entrepreneurs and financial services
- 4) Strengthening public-private partnership

There are not only projects by donors but also there are many NGOs operating in many activities, such as improvement of agricultural production, technological support to farmers, and actions of social development such as education, awareness raising on HIV/AIDS, community development.

NGOs also have implemented many activities such as agriculture production increase, technical assistance for farmers, education, promotion of awareness on HIV/AIDS, community development. Implementation projects are as follows.

Table 3.8.2 Trends on Assistance of NGOs in Nacala Corridor Area

NGO	Target Sector/Programme/Project
KULIMA Established in 1984	<p>【Projects】</p> <ul style="list-style-type: none"> • Product ion and Commercialization of Cashews (Incaju, EU)* • Seaweed production (Cesvitem, EU) • Rural development (CARE) • Micro Credit Programme (USAID/ world Bank) • Outsourcing program (EU) • HIV/AIDS Awareness and Water Program (AIFO) <p>* Donor name</p>
OLIPA Established in 1999	<p>Local NGO which is CLUSA established</p> <p>【Target sector】</p> <ol style="list-style-type: none"> ① Rural socio-economic development ② Gender equity in the socio-economic development of the communities ③ The promotion of environmental education and awareness to the farmers associations
Helvetes	<p>【Projects】</p> <ul style="list-style-type: none"> • Segurance Alimentar and Commercialization: Cabo Delgado, Nampula • PROGOAS Programme (water and sanitation)
ORAM Established in 1993	<p>Associacao Rural de Ajunda Mutua Nampula office was established in 1998</p> <p>【Activities】</p> <ol style="list-style-type: none"> ① Awareness raising of community leaders on relevant environmental legislation and sectoral based policies on land rights and decentralization ② To assist the communities to register the delimitation of the lands ③ To assist the communities to create land use planning and to strengthen farmers movements
Save the Children (SC)	<p>Save the Children has implemented the following activities with three sectors.</p> <p>【Sectors and related projects】</p> <ol style="list-style-type: none"> ① To strengthen food security and to fight child malnutrition <ul style="list-style-type: none"> • SC alliance: Children affected by flooding • SC/US: Intensified crop management practices • SC/US: Agricultural extension and field-based research activities with farmers ② To improve children's access to high-quality early childhood development and basic education <ul style="list-style-type: none"> • SC alliance: children back into schools program ③ To expand HIV/AIDS program <ul style="list-style-type: none"> • SC alliance: Home base care program and awareness raising program of HIV/AIDS
CLUSA in Niassa, Tete, Manica, Zambesia and Nampula Provinces	<p>【Sectors】</p> <ol style="list-style-type: none"> ① Association Development ② The Cooperative Legal Environment ③ Emerging Farmers Training ④ Producer-owned Trading Company Development ⑤ Value Chain Development ⑥ Certified Produce ⑦ Quality Control and Testing <p>【Projects】</p> <ul style="list-style-type: none"> • Expanding soybean production and marketing in northern Mozambique • Empowering private enterprise in the development of agriculture (EMPRENDA) • Cotton value chain improvement in Central Mozambique • Establishing a production services operation and building trade programs in Mozambique
ESSOR RISE(NGO of Brazil) started activities as body organization in 1997	<p>【Projects】</p> <ul style="list-style-type: none"> • Food Safety and Agricultural Training for Women in Nacala-a-velha

NGO	Target Sector/Programme/Project
OIKOS Established in 1988 (NGO of Portugal)	【Projects】 <ul style="list-style-type: none"> • Implementation warning system and community response to natural disasters on the Island of Mozambique and the District of Mossuril • Improving communication for community-based disaster preparedness and risk reduction • ECHO 2007 floods in Mozambique • Support for the resettlement of populations affected by floods, Mozambique • Distribution of food aid in Zambesia (WFP) • Distribution of essential non-food goods (IOM) • Production and marketing of cash crops among small farmers in Niassa • Food Security Project outsourcing of Mandimba • Stimulation of Artisanal Fisheries in the Region of Mozambique island • Support for people affected by Cyclone Jokwe on the island of Mozambique and Mossuril

3.9. Issues on Agricultural Sector and Agricultural Development

Issues and impeding factors for agricultural development (increase of production) are summarized in table 3.9.1.

Table 3.9.1 Issues and Impeding Factors for Agricultural Development (increase of production)

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
<p>1. Policies of agricultural development</p>	<p>1) Main objectives of the third Government Five Year Plan (2005~2009) are “fight against poverty”, “correction of regional inequalities” and “maintenance of peace”. Development issues are “education”, “health”, “agriculture”, “rural development” and “infrastructure” as major sectors. In this context, the Program for Absolute Poverty Reduction (PARPA II : 2006~2009) was prepared considering 3 basic pillars “governability”, “human capital” and “economic development” and 8 horizontal issues that are “gender”, “HIV/AIDS”, “environment”, “food and nutrition security”, “technology”, “rural development”, “natural disasters” and “demining”.</p> <p>2) To increase agriculture productivity, the National Program of Agriculture Development (PROAGRI II: 2006~2010) intends to change the type of agriculture, from a self consumption agriculture to an agriculture directed to the market and the five pillars are: a) market; b) financial services; c) technology; d) access to natural resources; and) build a business friendly environment.</p>	<p>2) The vision of the “Strategic Plan of the Agriculture Sector PEDSA 2010 – 2019”, presently in preparation, is to build “ a competitive and sustainable agriculture sector ” and the main issues are: a) food security and improvement of nutrition conditions; b) improve competitiveness of national products and increase income of farmers; c) sustainable use of natural resources and environmental conservation. As concrete goals there are: a) increase of food production, b) increase of production directed to the market; c) strengthen farmers’ competitiveness; d) methods of sustainable use of soils, water and forest; e) development of institutional capacities of agriculture sector.</p>	<p>2) • Development strategies are not coherent with the market conditions and the desires of farmers.</p> <ul style="list-style-type: none"> • PAPA considers to increase production of some crops such as corn, rice, wheat, sunflower, soya, poultry, potato and cassava in three years. In this plan, all issues of the value chain for food production, that are plowing, harvest, storage, processing and market (including exports) are considered. • Government support to achieve said strategies of development are insufficient.
<p>2. Natural Conditions</p>	<p>1) Semi arid climate of the savanna (Köppen classification)</p> <p>2) Rainfall volume during summer (November to April) is 800-1000 mm (Mandimba, Cuamba, Muecaté, Nampula, Mulumba, Meconte and Mogovolas) , 1000-1200 mm (Ribaue, Alto Molocué, Malema)</p>	<p>1) Use of soil for dry season crops (permanent crops, reforestation)</p> <p>2) When there is little rain or the rainy season is delayed, there is drought</p>	<p>In general, a) farmers do not have capital; b) there is not a market to compensate agriculture investments; c) Impeding factors are not acknowledged as problems; d) one impeding factor is the lack of technology necessary to solve the problems. Other points related to each item</p>

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors are the following:
	<p>and more than 1200 mm (Gurué), so rain is distributed generously in large areas within the country.</p> <p>3) Annual average temperature ranges from 18.5° C to 26.5° C, higher the altitude, lower the temperature.</p> <p>4) The 12 districts are distributed in altitudes ranging from 0-200 m (Monapo), 200-600 m (Murrupula, Nampula, Mucaeté, Meconta), and 600-1000 m (Mandimba, Cuamba, Gurué, Alto Molocué, Malema, Ribaué), considered high altitudes in Mozambique.</p> <p>5) At the Study area there are several types of soils Lixisols (alkaline soil), Luvisols (solo woody fertile soils), Acrisols (acid soil of tropical forests), Lixi-luvisols , gresols (humid soil). Soils similar to the cerrado, Ferrasols, are found only in zones around the district of Gurué, province of Zambezia.</p> <p>6) Soil occupation rate for agriculture is 0~5% (Gurué, Mogavolas), 5~30% (Mandimba, Cuamba, Meconta, Malema, Ribaué), 30~50% m (Nampula, Muocate, Alto Molocue, Murrupala) corresponding to zones considered of high occupation in the country.</p>	<p>3) Pests in vegetables during cool season at the high zones</p> <p>4) Soil erosion in high zones</p> <p>5)-1 Salinisation of soil in low lands and with little rain</p> <p>5)-2 Drought in sandy soil zones</p> <p>5)-3 Acidity of soil in areas of ferrasols</p> <p>6) Forestry resources degradation due to fire</p>	<p>1)-1 Cashew nut is planted in large areas but there is not an entity to advise in issues of variety improvement and in the introduction, processing and storage of new products, adapted to the tropical climate.</p> <p>1)-2 With the coming of foreign companies, an increase of deforestation is noticed, and in some areas devastation can be seen, but reforestation with useful species (eucalyptus, etc.) is not promoted.</p> <p>2)-1 Introduction of varieties resistant to drought is lacking</p> <p>2)-2 Lack of knowledge of soil protection techniques (plants, plastic sheet covers, no-till agriculture, etc.).</p> <p>2)-3 Lack of water resources</p> <p>2)-4 No irrigation</p> <p>3)-1 Varieties more resistant to diseases are not introduced</p> <p>3)-2 Lack of knowledge of rain protection, film protection, etc.</p> <p>4)-1 As they consider they have abundant land, there are no specific measures, so old fields are continuously left behind for new ones</p> <p>4)-2 Lack of technical knowledge to prevent soil erosion (farming in levels, no-till agriculture, etc.)</p> <p>5)-1 Don't know about soil salinisation so prevention measures are not applied.</p> <p>5)-2 2)- Idem to 2</p>

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
3. Social Conditions	<p>1) Population in Nampula province is 3 960 000 inhabitants and 1 080 000 inhabitants in Niassa</p> <p>2) Life expectancy in Nampula province is 41,3 years, 69% of population is in situation of extreme poverty</p> <p>3) In Nampula province there were 200 health centers (2007), with 2 988 beds</p> <p>4) HIV/AIDS infection rate in the north region is 7.2%</p> <p>5) Adult literacy rate in the whole province of Nampula is 55.9% for men and 24.1% for women, much lower than the country average. At Nampula, 40% of heads of family has no formal education and only 32% finished elementary school</p>	<p>1) Population concentrated in big urban centers and at the coastal area</p> <p>2) Deaths are caused by diseases that can be prevented and with possibilities of cure (measles, meningitis, food poisoning, malaria, respiratory diseases, diarrhea, tuberculosis and hanseniasis, HIV/AIDS)</p> <p>3) 3 delays (lack of knowledge concerning medical services by the population, delay in decisions to look for mobilization and difficulties in transportation and locomotion, delay in the quality of medical services)</p> <p>4) Low transmission of information about HIV/AIDS prevention (distribution of preservatives, awareness raising activities, etc.) and measures of attention, especially at rural zones</p> <p>5) Training of personnel for adult literacy education and provide services at the rural zone</p>	<p>5)-3 Coal remaining from fires is used to correct soil acidity but proper techniques are unknown</p> <p>6) Potassium is used after firing land as nutritional complement but studies on years of rest necessary to vegetation recovery are not made</p>
4. Agriculture Production/ Agriculture Management	<p>1) Average cultivation area per family (1ha) is lower than the national average (1.3ha)</p> <p>2) In search of land with better production conditions, (resistance, market), agriculture land is dispersed (1</p>	<p>1) • Reduction of worker population in rural areas</p> <ul style="list-style-type: none"> • At rural areas, housing and cultivation land are dispersed. So it is difficult to provide agricultural technical extension services efficiently. • Population density and agriculture volume production do not allow the generation of economies of scale and practically there are no opportunities of access to markets or traders <p>2)3) The Ministry of Health is making efforts to expand mother-child care services by building health care centers and training of personnel but still it is not enough</p> <p>4) At rural areas the implementation of measures to disseminate information about HIV/AIDS prevention methods is urgent</p> <p>5) • Ministry of Education is preparing a curricula and material for adult literacy. Educators carrying out literacy teaching together with NGOs and churches are trained to assure quality of public education for adults.</p>	<p>1)-1 As works depend on human labor, maximum limit per family is 2,5ha</p> <p>1)-2 Up to 2 ha it is not necessary to request agricultural land extension permit to the</p>

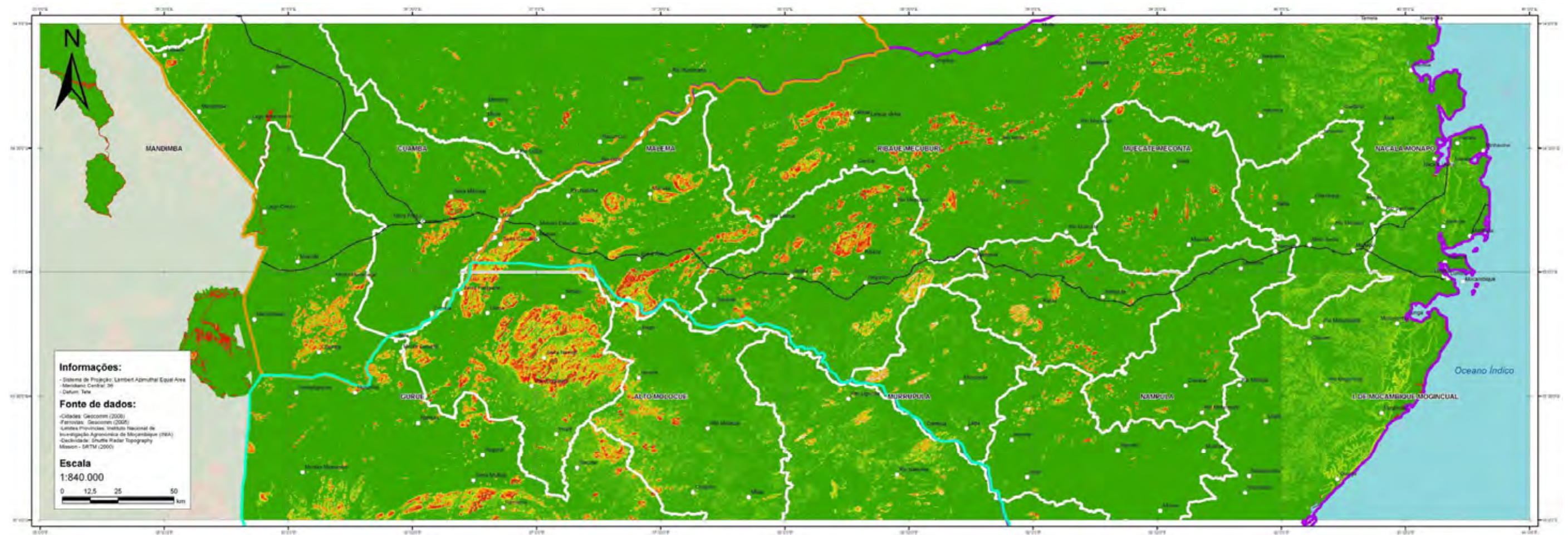
Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
(Small farmers)	<p>family has in average 3 cultivation plots in distinct places)</p> <p>3) Low productivity, consequence of rain fed agriculture (corn, 0,9 ton/ha, cassava 5,5 ton/ha)</p> <p>4) 90% of the total of farmers with approximately 1 ha of land has income around 6 000MT (US\$ 220), above the poverty line and subsists with self consumption</p> <p>5) Agriculture income sources depend on the production of cotton and cashew nuts, which can be monetized. Unstable agricultural management because prices vary according to the price paid by the industry</p>	<p>dispatch system</p> <p>3)-1 Increase supply of fertilizers and certified seeds and improve the agriculture system based on human force</p> <p>3)-2 Development and extension of plowing system based in the agro ecology</p> <p>4)-1 Increase productivity of staple food and diversification of trading crops.</p> <p>4)-2 Assure a system of collective purchase for fertilizers and certified seeds</p> <p>4)-3 Techniques to improve productivity with crops according to the agro ecology and low application of inputs</p> <p>4)-4 Preparing policies to improve agriculture management and increase income</p> <p>5)-1 Production diversification for agroindustry supply</p> <p>5)-2 Strengthen the power of negotiation with agro industries</p>	<p>government</p> <p>1)-3 Policy of agriculture promotion both of the Ministry of Agriculture and the province government of Nampula</p> <p>2) Agriculture methods by changing cultivation fields with fire</p> <p>3) -1 No policies to support acquisition of implements such as fertilizers and certified seeds</p> <p>3)-2 No proper technical method for each agro ecologic zone</p> <p>4)-1 Absolute shortage of promoters (104 in the province government of Nampula)</p> <p>4)-2 High grade of dependency on NGOs and private companies promoters (228)</p> <p>4)-3 Precarious extension means (transportation means, extension manuals)</p> <p>4)-4 No policy to improve agriculture management directed for income increase</p> <p>5)-1 Government establishes minimum prices for cotton in order to incentive increase of production by farmers</p> <p>5)-2 No warehouse to help price variation and no conditions to dispatch products according to market prices variation.</p>
5. Trade/Value chain	<p>1) Production surplus due to market size: 720 000 farmer families supplying a consumer market of 200 000 (urban area)</p> <p>2) Fertilizer cost in Nampula market is 2 500MT/50 kg but imported product costs half</p> <p>3) Products with added value to the market such as cashew nuts, tobacco and cotton, in this order are increasing in the last years , so opportunities of choice for producers are increasing.</p> <p>4) Processed corn prices are 7 times higher than price</p>	<p>1) Support in the production between seasons (September -April)</p> <p>2) Structuring a system of collective dispatch to assure access to cheaper imported inputs, reducing goods transportation costs</p> <p>3) Assure a stable market by expanding production for the industry</p> <p>4) Promote the simple processing of main food (corn, cassava) within the rural communities</p>	<p>1) No policies of assistance by the government, there is a case of success in a zone, through the associativism promoted by a NGO (CLUUSA) that allowed the construction of small irrigation infrastructure, collective dispatch and sales</p> <p>2) Idem</p> <p>3) Idem</p> <p>4)-1 Idem</p> <p>4)-2 There is a plan of the government to promote</p>

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
6. Product processing (Agro-industry)	<p>in the plot. Even consumption foods have possibilities of increasing added value.</p> <ol style="list-style-type: none"> 1) Occupation rate in agro industries is in average 40 % and with the increase of plant maintenance costs, there is loss of competitiveness to export 2) Problems to assure raw material, depend on self owned generators to count on with a stable power supply, high labor costs and depend on imports from raw material to packaging 3) Companies mostly are small sized and are in stage 1, 5 to 2 of processing 	<ol style="list-style-type: none"> 1) Assure a stable supply of raw material 2)-1 Increase production of farmers that supply the industries 2)-2 Strengthen competitiveness to export 2)-3 Strengthen competitiveness to replace imported products 3)-1 Promote industries with high added value products to put in motion the regional economy 3)-2 Prepare policies of development using the natural resources of the region 	<p>cassava processing (flour) in order to substitute imported wheat and to improve nutritional conditions of the population</p> <ol style="list-style-type: none"> 1) In the case of cotton, there is a concession system impeding industries to buy from suppliers of other zones, making it difficult to assure raw material quality 2)-1 Many times industries provide fertilizers to farmers in order to improve productivity, however application rate is around 40 %, remaining fertilizer is used in other crops, almost never industries achieve the expected volume of production 2)-2 Besides the production costs at the dispatch stage from plant (fuel, packaging, raw material), transportation costs and labor have to be added, so, trade cost is very high in port (exports stage). 3)-1 Delay in forming other related supporting activities 3)-2 Lack of infrastructure to increase production capacity (paved roads, electricity)
7. Associativism (Agriculture cooperatives)	<ol style="list-style-type: none"> 1) Agriculture direction of the province has identified 1 202 farmers' associations (688 registered, 514 without register as legal person) in Nampula, and of those, 292 are provided for with services from agriculture promoters 2) There are 591 farmers' groups, different from the associations that should be attended by the direction of agriculture of the province. 3) 75% of the farmers' associations in Nampula province was conformed with the support of NGOs and private companies 4) The law of farmers' associations legalization was created on 2006 5) Farmers associativism has one or more of the 	<ol style="list-style-type: none"> 1) Associativism issues 1)-1 Service is inefficient due to the dispersion of farmers and cultivation plots in large areas and the limited number of promoters 1)-2 Little knowledge of farmers related to market economic mechanisms 1)-3 Little knowledge about the advantages and mechanisms of associativism 2) Issues of agricultural cooperative promotion 2)-1 Access to financing (credit) 2)-2 Complexity of the register for legalization system 2)-3 Capacity of association management 2)-4 Means to collect data about internal and external 	<ol style="list-style-type: none"> 1) Existing measures for the associativism issue 1)-1 • Loan of motorcycles for promoters and field personnel, NGO and others. Installation of fields for demonstration of results allow collective training in agriculture techniques 1)-2,3 External technical support from other projects and NGOs 2) Existing measures for promotion of cooperatives 2)-1 • Provides the Local Development Fund (district level) • Microcredit by private banks

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors																
<p>8. Agricultural Assistance</p> <p>8.1 Research</p>	<p>following objectives 1) services of agriculture extension, 2) mutual solidarity (community development, empowerment of women, etc.), 3) collective collection and dispatch and 4) rural financing (microcredit)</p> <p>1) The National Institute of Agricultural Research (IIAM) is responsible for the agricultural research in the country. The Northeast zone center (Nampula, in Nampula province) and the Northwest zone center (Lichinga, at Niassa province) are responsible at the Study area.</p> <table border="1" data-bbox="874 1339 1018 1787"> <thead> <tr> <th>Zone centers</th> <th>Total</th> <th>Drs. Masters Grad.</th> <th>(No.)</th> </tr> </thead> <tbody> <tr> <td>North east</td> <td>31</td> <td>2</td> <td>7</td> </tr> <tr> <td>North West</td> <td>12</td> <td>0</td> <td>2</td> </tr> <tr> <td></td> <td></td> <td></td> <td>10</td> </tr> </tbody> </table> <p>2) At the Study area there are 3 experimental research stations in the northeast (Nametil, Ribaua, Namapa) and one analysis laboratory (Nampula city) and the Northwest zone center has one experimental research station (Mutuali)</p> <p>3) However, as shown in the chart below, the number of researchers is very small and 70% are agriculture experts or related to the issue.</p> <p>4) Installations and equipment, including transportation means are inadequate</p> <p>5) Not much communication with other entities,</p>	Zone centers	Total	Drs. Masters Grad.	(No.)	North east	31	2	7	North West	12	0	2				10	<p>market, prices, demand, etc.</p> <p>2)-5 Analysis of collected information and capacity to formulate, implement and monitor plans</p>	<ul style="list-style-type: none"> • NGOs bonds 2)-2 • Preparing of a “Guide for register legalization” (Ministry of Agriculture) 2)-3 • Extension of adult literacy teaching by the Ministry of Education and Culture. <ul style="list-style-type: none"> • Coordination with NGOs • Management training with other projects and NGOs 2)-4 • Ministry of Agriculture and Ministry of Industry and Trade provide information by radio and internet 2)-5 • Management training with other projects and NGOs
Zone centers	Total	Drs. Masters Grad.	(No.)																
North east	31	2	7																
North West	12	0	2																
			10																
	<p>1) It is necessary to increase the number of researchers for the necessary sectors</p> <p>2) It is necessary to improve research installations and equipment</p> <p>3) It is necessary to build a system where institutions concerned with agriculture issues share results of investigations to be applied in the field</p> <p>4) It is necessary to prepare manuals of extension of practical results of researches, among other items</p>	<p>1) No long term national plan to increase number and train researchers, unfavorable labor conditions discourage researchers</p> <p>2) The country has no long term plan to improve installations and operation of research centers, giving priority to high technology investments</p> <p>3)-1 Coordination meetings among interested parts are only formality and have no concrete meaning. It may be due to the lack of useful research in field,</p> <p>3)-2 As show of effort, IIAM displays the contents of its activities in a web site. The</p>																	

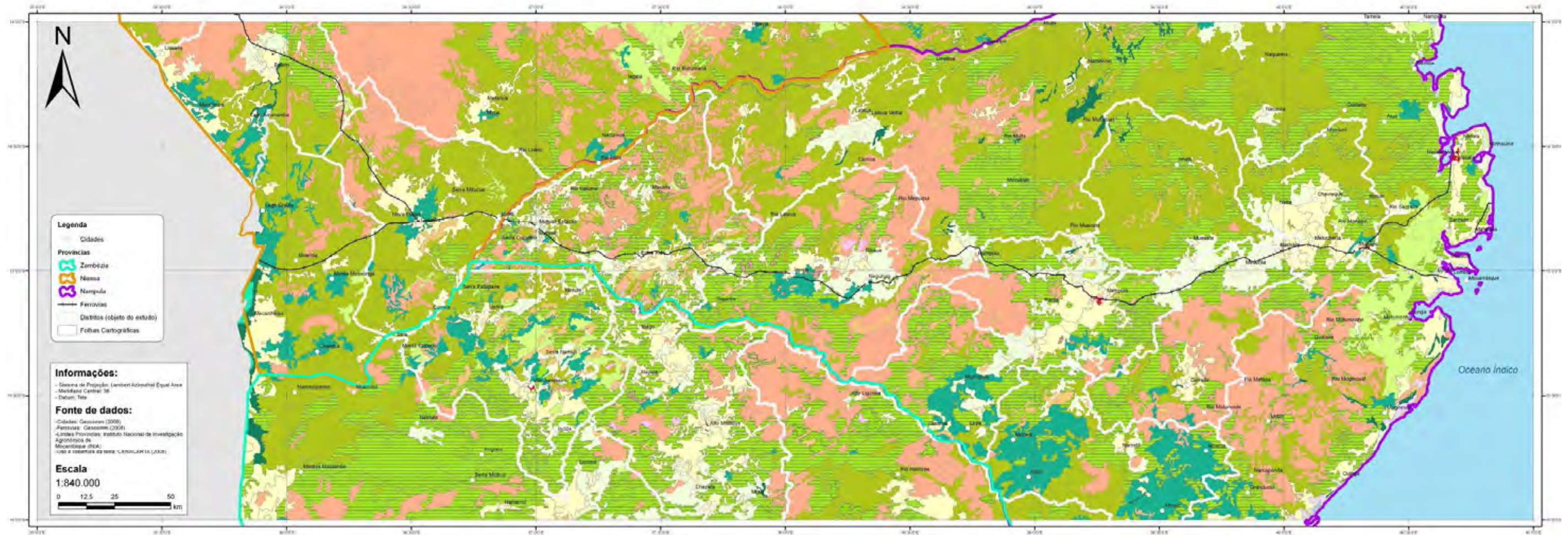
Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
8.2 Agricultural Extension	<p>including extension entities in the country</p> <p>6) In Mozambique, the agronomy course is provided at National University Eduardo Mondlane (Maputo) and the Catholic University (Cuamba). Both have laboratory of soils analysis.</p> <p>1) The Ministry of Agriculture Direction of Agriculture Extension is responsible for extension activities in the country, and has power of decision concerning personnel and budget distribution. It also supports in training promoters.</p> <p>2) However, promoters were distributed in the provinces due to the decentralization process.</p> <p>3) The province assigned them centers of economic activities promotion, in the department of agricultural extension, but there are only 671 promoters at national level, very low number considering the whole territory (2009, like below_)</p> <p>4) Many NGOs conduct extension activities (total of promoters: 551; total of rural coordinators: 21)</p> <p>5) Agro industries also have promoters to provide assistance in farming techniques for their products (total of technical promoters: 225, Total of rural coordinators: 3)</p> <p>6) The direction of extension has registered 471 advisors among the same farmers</p> <p>7) There is not much coordination between the extension entity with others related entities (research institutes, NGOs, private companies, etc.), so it is hard to make use of the results obtained by each one of them in the field</p>	<p>1) Strengthening of extension capacities of province entities (training of promoters, development of extension elements)</p> <p>2) Increase the number of promoters</p> <p>3) Assure transportation means for promoters</p> <p>4) Strengthen communication with other related agriculture entities</p>	<p>person in charge finished a training with IRRRI, now is planning to open a web site with rice crop information</p> <p>4) As agriculture research entity, there is little contact with the situation in the field and although the University is supporting in the preparation of an extension manual, actions of the research institute are slow</p> <p>According to the “PROAGRI” policies, Mozambique government is trying to promote extension activities but the required level has not been achieved yet. The situation is explained as follows:</p> <p>1) Decentralization policies are in the starting point and province governments have not enough capacity yet. Even now, training is made by the central government. Participation in the province government meetings is considered training. Formal promoters are absent. Extension materials are not ready (finalized).</p> <p>2) There is a plan to increase promoters to 8 in each district until year 2010 (1 052 in the whole country /128 districts) but it seems difficult to achieve this goal.</p> <p>3) There is a proposal to provide one motorbike for each promoter and distribution started at the southern provinces that are closer to the capital (139 in 2008, 194 in 2009).</p> <p>4) The Ministry of Agriculture Direction of Extension requested to the National University Eduardo Mondlane to prepare extension materials but no coordination was made with NGOs and institutions related to with the agriculture sector</p>

Sector	Existing Situation	Main Issues	Existing measures and Main impeding factors
8.3 Financing	<p>1) Private banks provide financial services</p> <p>2) National and foreign NGOs provide microfinance services</p> <p>3) Districts provide microcredit to small and medium rural farmers using the budget assigned from the central government</p>	<p>1) • Branch offices are located at urban centers and practically are inexistent at districts and rural villages</p> <ul style="list-style-type: none"> • Financial services are directed to big farmers, traders, agro industries and the foreign trade sector; small farmers do not count on with this kind of services <p>2) Without the support of NGOs, financing would not be possible</p> <p>3) Among those persons who received credit, approximately 80% does not paid their obligations</p>	<p>1) The risk of providing loans to small farmers is much higher for their crops are rain fed and for self consumption</p> <p>2) Promote NGOs microcredit</p> <p>3) As the associative system of cooperatives is too weak, capital is used for other purposes than agriculture, increasing insolvency rates</p>
9. Production Infrastructure	<p>1) As the Nacala port is a deep waters port, goods are unloaded once. Approximately 70% of the volume corresponds to national cargo and 30% to Malawi cargo.</p> <p>2) Nacala port — Cuamba railway operates everyday</p> <p>3) In relation to roadways, 197 km between Nacala and Nampula are paved but the stretch Nampula – Lichinga is not paved.</p> <p>4) Irrigation facilities are practically inexistent and irrigated surface is not more than 4%</p>	<p>1) The reconstruction works of the port after the passage of the cyclone are delayed</p> <p>2) There is little frequency of trips and wagons and rails are worn out, so cargo transportation is delayed</p> <p>3) During the rainy season stretches without pavement are impassable</p> <p>4) Limits the use of agriculture land during the dry season</p>	<p>1) Nacala port rehabilitation is programmed (JICA)</p> <p>2) Railway rehabilitation project by Brazil is programmed</p> <p>3) Nacala corridor road improvement project is programmed (JICA)</p> <p>4) In some parts dam construction started by the company Matanuska Mozambique Ltda. (banana) in February 2008</p>



Source: Formulated from Shuttle Radar Topography Mission (SRTM)

Figure 3.1.5 Distribution of Ground Surface Slope in the Nacala Corridor Area



Source: National Chart of Soils, INIA, 1995.

Figure 3.1.9 Use and Coverage of Land at the Nacala Corridor

CHAPTER 4 THE CERRADO DEVELOPMENT AND DEVELOPMENT OUTPUTS

4.1. Overview of Cerrado Development

4.1.1 What is Cerrado

The work “cerrado” in Portuguese, originally means “enclosed”, and it is the name of a kind of vegetation. Usually it consists in plains with bushes, but depending on the zone the vegetation is diversified; bushes height varies as well as the density. Total area of Brazilian cerrado, located at the center-west of the country, has 240 million hectares (5.5 times the size of Japan). Cerrado extends mainly in the states of Mato Grosso, Minas Gerais and Goiás, that concentrate 60% of the cerrado area.

Cerrado soil has high acidity and very alkaline, poor in calcium and phosphorus, with concentration of aluminum, so for a long time it was considered improper to be used as agriculture land. However, by the application of corrective measures in the soil it was possible to change this area into an agriculture zone and it is estimated that areas proper for agriculture could reach approximately 120 million hectares.

4.1.2 History of the Cerrados Agricultural Development

The Cerrados agricultural development was promoted by the implementation of development programs such as the Plan of Guided Settlement of Alto Paranaíba (PADAP) and the Cerrados Development Program (POLOCENTRO). These programs were precursors of the Cerrados agricultural development. After them, the PRODECER was launched in 1979.

(1) From PADAP to POLOCENTRO

When the Minas Gerais state government understood the economic relevance to agricultural development in the Cerrado region widely distributed inland, the PADAP was carried out for the Cerrado area in the upstream catchment area of Paranaíba river in 1973. This was a pioneer program of guided settlement, with the main objective of producing grains without irrigation, aiming at the intense development of Cerrados. Following the PADAP, the Brazilian government designed the POLOCENTRO that was created through Legal Decree No. 75,320, started in 1975 and concluded in 1982. POLOCENTRO benefited a total area of 3.7 million ha, distributed among the States of Mato Grosso, Mato Grosso do Sul, Goiás and Minas Gerais. The land was used as follows: 1.8 million ha for crops (soybean, maize, wheat, rice, cotton), 1.2 million ha for pastures, and 700,000 ha for reforestation.

The program budget was fixed at US\$1.5 billion, out of which US\$1 billion was used to provide credit with favorable interest rates. The necessary resources for the implementation of infrastructure, such as roads, electrification, storehouses, analytical laboratories, among others, were provided by the government as part of the program. The financing for the

implementation of processing industries by the private sector (rural producers cooperatives, companies, agricultural producers) was also part of the program, as well as services for the supply of agricultural inputs. POLOCENTRO mainly benefited establishments with more than 1,000 ha (which absorbed 60% of program total resources), and thus promoted the ascent of large-scale producers and processors, which encouraged the development to be conducted under the leadership of large-scale farmers.

(2) From POLOCENTRO to PRODECER

The Japanese-Brazilian Cooperation Program for the Cerrados Development (PRODECER), which started in 1979 as a bilateral program was conceived under the influence of these earlier programs. However, its development concept differs from that of POLOCENTRO in nature in at least the following two ways:

- 1) Although allowing the participation of large-scale agricultural companies in Phase 1, PRODECER has adopted a settlement system for medium-scale family producers (300~100 ha).
- 2) Since the beginning, the program demonstrated a great concern with the issue of environment.

4.1.3 Profile of PRODECER Project

The PRODECER was first implemented in 1979 with the purpose of developing agriculture at the Brazilian cerrado. Firstly, the pilot project PRODECER I was executed in an area of 70 thousand hectares in Minas Gerais. The pilot project PRODECER II was implemented in an area of 67 thousand hectares in the states of Bahia and Minas Gerais and the project properly, was executed at the states of Minas Gerais, Goiás and Mato Grosso do Sul in an area of 139 thousand hectares. PRODECER III was launched on 1994 with the pilot project in the states of Maranhão and Tocantins in an area of 80 thousand hectares. The result was the construction of 21 development areas in the cerrado, covering a total area of 334 thousand hectares.

By launching the project PRODECER there was an increase of population in the cerrado allowing the development of other business related to the agriculture sector. The Project PRODECER expanded Brazilian agriculture production and has largely contributed for the development of the cerrado region. It is especially remarkable in the case of soya, which national production in 1978 was 9,500,000 tons and in 1998 reached 30,500,000 tons. Soya production at the Brazilian cerrado represents almost half of the total national production and is responsible for about 10% of world production. However, investments of the first pioneers coincided with a period of high interest rate policies of the financial system, so farmers had trouble paying off the loans only with the income they got from agriculture, and agriculture investments did not grew due to the obligations of accumulated debts.

4.1.4 Characteristics of PRODECER Project

(1) Model of development centers in zones of frontier based on the colonization by medium farmers

PRODECER project intended to develop a new agriculture frontier at the cerrado region. Basic guidelines for the implementation were to establish farmers without land to conform medium farmers under a system of family administration. The following requisites were necessary for that:

- The farmer should buy land, machinery, housing, installation and production input.
- The initial investment required large amounts of capital.
- Most part of investments was made through bank loans made by farmers. So, good conditions for financing were necessary.
- The fulfillment of environment requirements at the frontier zone was required.
- State and municipality governments needed to build socioeconomic infrastructure

(2) Model of colonization based on agriculture cooperatives

At the development centers at the frontier, one necessary condition, especially for colonization projects was the activities to be carried through cooperatives. In most case, PRODECER project selected agriculture cooperatives with an established base in the south of the country to settle branches, but in some cases new cooperatives were established by initiative of the same farmers. The selection of farmers was made by the cooperatives. For that, the role of cooperatives was essential for they already had organization based information nets. Cooperatives also supported in farming management, guiding farmers in land acquisition, farming management and acquisition of production implements and played an important role for the farmers from a practical point of view.

(3) Coordination between financial and technical cooperation projects

For the agriculture production in the cerrado region, to assure capital for the development was essential as well as to assure techniques for soil improvement, selection of products and proper varieties, together with the development of technology and agriculture extension. Thus, both Brazil and Japan implemented financial cooperation together with technical cooperation. Therefore, PRODECER project, jointly executed by the Brazilian and Japanese government had the program approach of combining technical and financial cooperation.

(4) Results and Issues

It is usually said that the reason by which the cerrado, that is a tropical savanna, succeeded in transforming itself into a food production zone was due to soil improvement techniques. Cerrado soil presented problems by having a strong level of acidity, lacked nutrients by alluvial erosion and with a high concentration of aluminum that impedes the normal development of crops. The application of lime in this type of soil corrects acidity and with

that, it was possible to improve the quality of soil. Another factor for the success was the development of proper varieties of soya, corn, wheat and others, adapted to tropical climate. In a practical way “Project of development centers in the frontier through a model of cooperativist colonization” was introduced. The colonization of land by descendents of Japanese and European immigrants from the south of the country, the administration and coordination in charge of a public private company (CAMPO), a trade infrastructure relatively built and the fact that Brazil had the capacity to internally manufacture agriculture implements are all factors that can be pointed out as determinant for the success of the program.

4.1.5 Technical Cooperation and Joint Research

One of the PRODECER characteristics was concomitant execution of technical cooperation projects together with the main financial cooperation project. The first technical cooperation for the Cerrados region started in 1977 between JICA and EMBRAPA-Cerrados (CPAC). CPAC is still working as the main research organization in the Cerrado. And JIRCAS (Japan International Center for Agricultural Sciences) and EMBRAPA, have been carried out joint research since 1972. These technical cooperation and joint research, developed agricultural technique for agricultural development in the Cerrado, contributed to increase of crop production.

(1) Technical Cooperation

The way that the Cerrados region, which was considered unproductive for a long time, could start to produce, was fundamentally through the execution of research and experiments aiming at the development and consolidation of rural management, cultivation, selection of crops and varieties, soil correction, among other techniques. Therefore, with the objective to promote the development of the Cerrados region in an efficient and rational way, the governments of both countries, Brazil and Japan, decided to carry out technical cooperation projects: Technical-scientific support project for agricultural development of Cerrado, Technical-scientific support project for sustainable agricultural development of Cerrado, and Environmental Monitoring of Cerrado.

(2) Joint Research

JIRCAS has been carried out joint research with EMBRAPA for the agricultural technology development and testing of the Cerrado. The objective was not only the research of agriculture and livestock in the Cerrado region, but also in the entire Brazilian agriculture. This research could be classified according to objectives, as follows:

- 1) Research of upland field crops production in Brazil (1972~1996)
- 2) Survey and analysis of agriculture characteristics and the course of technological improvement in South/Central America. (1993~)

3) Far-reaching research (1996~2002) and Research into large areas (1997~2006)

The joint research project for soya started in 1972 and in 1996 it changed into an integral project and several researches were carried out concerning “sustainable and safe techniques for soya production, in accordance to the environment”, by introducing the existing system, the system of land farming in rotation with animal farming, among others, contributing significantly with the improvement of agricultural techniques of soya production in Brazil.

Main technical and financial cooperation of our country to the cerrado region are shown as follows.

Table 4.1.1 Main Technical and Financial Cooperation of our Country to the Cerrado Region

Entity	International Cooperation Agency		JBIC (Ex-OECF)	JIRCAS	
Type of cooperation	Project of technical cooperation including former methods of technical cooperation projects	Development Study	Loan projects	Reimbursable Cooperation	Joint research (1972~EMBRAPA)
Name of the Project	<ul style="list-style-type: none"> • Project of research cooperation for agricultural development in the Cerrado I (77~85, CPAC) • Project of research cooperation for agricultural development in the Cerrado II (85~92, CPAC) • Project of Vegetable Research (87~94, CNPH) • Study of Environmental Monitoring in the Cerrado (92~00, CAMPO, EMBRAPA) • Project of Research for the agro-environmental conservation in the Cerrado (94~99, CPAC) • Project of the Cerrado ecologic corridor conservation (03~06) • Project of agricultural extension system reinforcement to small rural producers in the State of Tocantins (03~06) • Project of vegetable production (06~11, CNPH) 	<ul style="list-style-type: none"> • Study for the Comprehensive Plan of Agricultural Development in the State of Tocantins (96~99, State Government of Tocantins) • Study for Plan of Agricultural Development in the North of Tocantins State (99~01, State Government of Tocantins) 	<ul style="list-style-type: none"> • Project of Cooperation for the Agricultural Development in the Cerrado I Pilot Project (79~82, Ministry of Agriculture) • Cooperation for the Agricultural Development in the Cerrado II Pilot Project (85~90, Ministry of Agriculture) • Cooperation for the Agricultural Development in the Cerrado III Pilot Project (95~01, Ministry of Agriculture) 	<ul style="list-style-type: none"> • Project of Cooperation for the Agricultural Development in the Cerrado PRODECER (II Project Extension (85~93) • Project of rural electrification in the State of Goiás (approved in 89) • Project of Irrigation in the Cerrado (Approved in 91) 	<ul style="list-style-type: none"> • Research about cultivation products in Brazil (72~96) • Analytical Study of agricultural characteristics in Latin America and direction for technological improvement (93~) • General Research (96~02) • Extensive Research (97~06)

Source: Prepared from the Overseas Development Aid of the Ministry of Foreign Relations and JICA's yearbook

4.2. Situation of Agricultural Management and Production of Small Farmers

More than 90% of the total of farmers (3,600,000) in Mozambique are small farmers that in average farm in 1.5 ha land. To apply the results obtained in the Brazilian cerrado, it is necessary to understand the situation of small farmers in Brazil (family agriculture). So, this chapter considers the support system and agriculture system of small farmers in Brazil, especially in the cerrado.

4.2.1 Present Situation of Small-Scale Farmers (family agriculture) in Brazil

The total number of farm households in Brazil is 5.2 million, 84% of which is small-scale farmers. The population of small-scale farmers of the population engaging in agriculture (16 million) reaches 74% or 12 million, threefold of non-small-scale (middle-scale, large-scale) farm households. Small-scale farm households produce 87%, 70% and 46% of main food crops, cassava, frijol and maize, respectively, and produce 40% of the agricultural GDP; thus they are playing an important role socioeconomically.

Small-scale farm households increased 420 thousand during these 10 years to 4.55 million in 2006 from 4.13 million in 1996. However, the agricultural land of small-scale farm households decreased one million ha during the same period, indicating statistically a contraction of the individual-household-based operation scale of small-scale farm households. More than 50% of small-scale farm households are ranged in the northeastern region, and the ratio of small-scale farm households in the mid-western region, central part of the Cerrado, accounts for merely 5% to the total. The farmers in the Cerrado are mostly comprised of middle-scale farmers with average land area of 300 to 500 ha.

The Agricultural Development Ministry is directly in charge of problems of small-scale agriculture (land problems and settlement of disputes on butts and bounds). Further, as test and research institutions in Brazil including the Cerrado, there are EMATER as an organization to support and extend agricultural technology and SENAR as an entity to organize and train farmers, in addition to the Brazilian Agricultural Research Corporation or EMBRAPA. A small-scale farm household in Brazil is defined by agricultural famer law (September 24, 2006, law No. 11326) as follows:

- Area of rural establishment or enterprise not exceeding four fiscal modules;
- Manpower employed in the economic activities is predominantly of the same family;
- Family income is mainly generated by activities connected to the same establishment;
- The establishment or enterprise is managed by the family

4.2.2. Cost of Production of Vegetables

During the last years in the cerrado¹, vegetable production has been promoted among small farmers. Table 4.2.1 shows the estimated cost of production, as well as the expected productivity by EMATER, by small farmers' production unit, for cassava, tomato and onions. Field farming of tomato and onions do not show much difference concerning production costs compared to greenhouse production, but this last allows sales out the season, increasing turnovers. However, initial investment by cost of construction for one unit (included installation of dripping irrigation system) is R\$ 6,500 (US\$ 3,500); besides, it is necessary to replace the installation every 5 years approximately. Tomato for industry is also very popular and tomatoes produced in fields are almost always directed to the industry.

Table 4.2.1 Main Crops Cost of Production

Unit: R\$

	Cassava	Tomato		Onion in field
		Field	Greenhouse	
1) Variable Costs	1,300	30,640	30,394	5,626
Fertilizers	990	9,281	7,760	3,079
Pesticides	277	8,553	4,326	588
Irrigation/Other input	-	6,871	10,471	312
Seedling/Seeds	33	5,935	7,837	1,647
2) Fixed Costs	1,800	10,010	11,910	3,840
Equipment	200	740	390	490
Labor	1,250	7,920	9,870	3,350
Others	350	1,350	1,650	-
3) 1)+2)	3,100	40,654	42,300	9,469
Expected productivity	12 t/ha	90 t/ha	120 t/ha	12 t/ha

Source: Cost of Production, EMATER, DF, May, 2009

The market demand for organic products is very high also and there is a trend of incrementing the number of farmers dedicated to it, but it is necessary to obtain the official certificate of DIPOVA (Local Entity of Inspection) and ECOCERT (Internationally Acknowledged Certifier of Organic Products). The cost to obtain ECOCERT certificate is expensive, so it is not easy for small farmers to get the certificate individually, and its obtaining is limited to enterprises of organic farming. Malunga Farm, dedicated to organic vegetable production (40 ha), animal food production (50 ha), cattle breeding (100 heads) has 170 workers. So, small farmers wanting to work with organic crops should send their production to the market, labeled as products without use of agrochemicals or with small application of fertilizers

4.2.3. Market Situation and Farm Management

As mentioned before, small farmers apply fertilizers, use irrigation, agriculture implements, and greenhouses and count on with agricultural extension, so they establish productivity considering these inputs. Production cost (initial capital) of said agricultural facilities looks

¹ In this chapter, references to cerrado imply only the states of Minas Gerais and Goiás, where field investigation was conducted.

too high considering the size of properties (average size of properties 5 ha). However, both in the states of Minas Gerais and Goiás, where field investigation was conducted, small farmers in the cerrado are near the country's capital, Brasília, that has an approximated population of 2,200,000 inhabitants. Calculating that there are approximately 220,000 farmer families, (relation between the number of small farmers families/percentage of small farmers distribution in center west), they would be attending an effective demand 100 times larger.

In this way, it is considered that this big market, besides having a diversity of destinations and consumption strata (big supermarket chains, public entities such as hospital, army, schools and organic products' consumers), allows the quick recovery of the initial investment. On the other hand, in order to compete with products coming from other states, in search of the capital market, technical factor is essential to improve quality and productivity through agricultural facilities.

Table 4.2.2 shows an example of small farmers management conditions at the field investigation area. A farmer with 2 ha who basically produces vegetables for the market of Brasília gets a gross annual income of US\$ 26 thousand in agriculture, considered a high income for a small farmer. As producers of organic fruits and vegetables have facilities to buy organic input such as chicken manure and processed compost, they are in conditions of specializing in organic production of fruits and vegetables.

Table 4.2.2 Situation of Small Farmers Management

Property size	2 ha	3 ha	9 ha
1.Cultivation Area (ha)	Rotation crops of vegetables (lettuce, carrot, cabbage, eggplants) and beans, corn and fruits	Cassava: 0.5 Vegetable: 0.5 Fruits: 1.0 Poultry: 1.0	Milky cow: 33 heads Cattle food: 5.0 Corn: 1.5 Conservation area: 3.0
2.Main product	Vegetables (no agrochemicals)	Poultry	Milk
3.Agricultura income (year)	R\$42,000 (US\$ 26,000)	R\$12 000 (US\$ 7 000)	R\$22,200 (US\$ 13,000)
4.Labor	Family labor force (women)	Family labor force	Family labor force
5.Observations	<ul style="list-style-type: none"> Administration is stable since 5 years, with the support of technical extension of EMATER and SENAR It aims to differentiate the products by obtaining the organic product certificate 	<ul style="list-style-type: none"> Start business 4 years ago, under orientation of SENAR Poultry is the main source of income that is dispatched 70 days after birth (4 to 5 time a year, one chicken: R\$ 15 a 20) 0, 5 ha of conservation area 	<ul style="list-style-type: none"> Production of fresh milk with organic fertilizer (chicken and cow manure). Volume of chicken manure 10t/ha Price of chicken manure: R\$ 90/t Start organic agriculture to improve the quality of river waters around the property

Source: JICA Study Team, 2009

In the cerrado zone, where the field investigation was conducted, there are many medium sized farmers that carry out a diversified agriculture, producing soya, corn, coffee, tomato for industry, etc. (Table 4.2.3). This agricultural system is possible because they have irrigation facilities and water resources. That was made possible due to programs of planned colonization like PRODECER and the existence of financial support policies in order to allow farmers to have initial capital centered in agricultural infrastructure.

Table 4.2.3 Situation of Medium Farmers Management

Property size	130 ha	300 ha (zone of PRODECER project)
1.Cultivation Area (ha)	Cattle breeding (rotation crops): 11 Pasture (extensive): 63 Corn: 25 Fish farming: 1.2	Rotation crops of soya, corn, coffee, tomato for industry, vegetables (onion, garlic, okra) and pasture
2.Main product	Selling of fish and milk	Soya, corn, coffee
3.Agricultura income (year)	R\$ 112,000 (US\$ 70,000)	R\$ 161,000 (gross income)
4.Labor	Temporary workers 4	Temporary workers 3
5.Observations	<ul style="list-style-type: none"> • Milky cow 95 heads. Plans to increase to 130 heads • Freezer with capacity to 3,000 L • 29.8 ha as conservation area 	<ul style="list-style-type: none"> • Income varies according international prices oscillation of corn and soya • Due to a reduction in coffee prices, cultivation area was cut to half. Soya shows a trend of going up • Conservation area 20% of the property

Source: JICA Study Team , 2009

4.3. Agricultural Support Program for Family Farmers

4.3.1. PRONAF

The National Program to Strengthen Family Agriculture (PRONAF) is a program of public financing for small producers, started in 1996, funds projects and individual or collective. This generates income for family farmers and agrarian reform implemented by the National Institute of Colonization and Agrarian Reform (INCRA). The program has 16 lines of credit as the characteristics of the candidate to finance, and interest rates are the lowest among the rural finance programs.

Access to the PRONAF starts in the family discussion about the need for credit, be it for the cost of the agro-industrial activity, whether for investment in machinery, equipment and infrastructure. After the decision to fund, the family should contact the rural syndicates or EMATER to obtain the Declaration of Qualification to PRONAF (DAP), which will be issued according to the annual income and activities operated by directing the farmer to specific lines of credit. For the beneficiaries of agrarian reform and land credit, the farmer must seek the INCRA or the State Technical Unit (UTE).

The farmer must be settled with the registered tax (CPF) and debt-free. The conditions of access to credit PRONAF, payment and interest rate corresponding to each line are set annually for each cropping plan for each family agriculture, published between the months of June and July.

Program addresses are as follows:

1) Agroecology PRONAF

Line for the financing of production systems of ecological agriculture or organic agriculture, including the costs of deployment and maintenance of the project.

- 2) Eco PRONAF
Line for the financing of techniques that minimize the impact of rural activity to the environment such as the biomass produced by farmers.
- 3) Forest PRONAF
Financing of investment projects for agroforestry; ecologically sustainable exploitation, forest management plan, restoration and maintenance preservation areas and legal reserves, and degraded land restoration.
- 4) Semi-arid PRONAF
Line for the financing of projects in the semi-arid region, focused on the sustainability of ecosystems, prioritizing water infrastructure construction, expansion, rehabilitation or upgrading of other infrastructures.
- 5) Women PRONAF
Line for the financing of credit proposals of female farmers.
- 6) Youth PRONAF
Line for the financing of investment credit proposals for young farmers.
- 7) Family Agriculture Costs of Agroindustry Marketing PRONAF
Designed for farmers and their cooperatives or associations to finance the needs of cost of processing and industrialization of the house and / or third parties.
- 8) Cota Party PRONAF
Line for the financing of investment for the payment of shares-shares the farmers belong to cooperatives or production for use in working capital, cost or investment.
- 9) Rural Microcredit
Destined to farmers in lower income, to the financing of farming and non farming. Credits intended solely for the beneficiary families the National Programa of Land Credit (PNCF) and the National Programa of Agrarian Reform (PNRA).
- 10) More Food PRONAF
Funding proposals or investment projects for the production associated with apiculture, aquaculture, poultry, beef, milk, goats, fruits, horticulture, sheep, swine, fish and saffron, rice, barley, beans, cassava, maize, sorghum and wheat.

4.3.2. PAA

The Familiar Agriculture Acquisition Program (PAA), in order to procure food directly from family farming to eradicate hunger, was enacted in 2003. The PAA has bought in 2007 part of the production of 117 thousand familiar agricultures and supplied food to more than 14 million people in around 2.5 thousand cities.

The institutions connected with the PAA are: Ministry for the Social Development and Famine Fight (MDS); Ministry for the Agrarian Development (MDA/INCRA); Ministry of

Education (MEC/FNDE); Ministry of Agriculture, Livestock and Supply / Supply National Company (MAPA/CONAB); Finance Ministry (MF); Ministry of Planning, Budget and Management (MPOG); Technical Assistance Institutions; States, Municipalities, Social Institutions, Social Councils and Familiar Agriculture Organizations. The beneficiary of the Program are consumers (schools, communities association, public daycare, community restaurants, senior's centers and etc.) who receive food, and the small scale rural producers who supply raw products (grains, vegetables, meat and etc.).

The Program has five systems which have specific ways of operating, resources funds, executing agencies and participation channels.

Table 4.3.1 Familiar Agriculture Food Acquisition Program

Type of Acquisition	Objective	Resource Funds and limit per producer/year	Implementing Institution	Who can apply
I- Acquisition of food for schools	For school lunch (Law 11,947 of June/16/09)	R\$ 9.000.00 MEC/PNAE	FNDE, States and Municipalities	Familiar Agriculture Organizations
II- Direct Acquisition	For the Government stock or distribution.	R\$ 8,000.00 MDS and MDA	CONAB	Individuals
III- Stockpiling by the Familiar Agriculture	To support organizations to keep a stock, so that the products can be sold for a better prices later	R\$ 8,000.00 MDS and MDA	CONAB	Cooperatives and Associations
IV- Acquisition for donation	Immediate donation to social institutions	R\$ 4,500.00 MDS	CONAB States and Municipalities	Individuals, Cooperatives and Associations
V- Milk Program	To promote the production and consumption of milk	R\$ 4,000.00 / semester MDS	States from the Northeast and North of MG State	Familiar Agriculture Organizations

Source: Decreto/PR nº 6,959, de 15 de setembro de 2009

4.4. The Situation of the Environment Preservation Measures of the Brazilian Cerrado

4.4.1 Current Situation and the Development of the Brazilian Cerrado

Considered as a one of the world hotspots for biodiversity, the Cerrado has an extreme abundance of endemic species. From the biological diversity point of view, the Brazilian Cerrado is recognized as the richest savannah in the world, with more than 6,500 species of catalogued plants, from which 44% are endemic. There is a great diversity of habitats that determines the presence of many species. Besides the environmental aspects, the Cerrado has a great social relevance. Many people make their living out of its natural resources, including Indians groups and local people that have the traditional knowledge of the biodiversity.

However, many species of plants and animals are at risk of extinction. Around 20% of the native and endemic species can not be found in the protect areas and at least 137 animal species that live in the Cerrado are endangered. After the Mata Atlântica, the Cerrado is the Brazilian biome that has suffered the most with the human occupation. With the exploitation of new areas, in order to increase the production of meat and grain for export, there has been a progressive exhaustion of the region natural resources. In the last three decades, the Cerrado has some parts which were degraded by the expansion of the Brazilian agriculture frontier.

One the Cerrado occupation's problems were the way the water resources were used. The springs were left without the protection of its bordering vegetation. The region has the world's biggest aquifer and its huge drinkable water resources must be controlled not only from the environment preservation point of view but also regarding its economic value. In a geopolitical context that foresees the shortage of water in the near future, the human pressure on the biome is due to increase with the intensification of the production.

The economic development of the Center-West region is highly based on the production of commodities and on its industrial chains (soybeans, corn, rice, cotton and cattle, chicken and pork)

4.4.2 Measures to Preserve the Environment

Little less than 1% of the 200 million hectares of the Cerrado, which occupies $\frac{1}{4}$ of the national territory, has conservation units (parks, ecological stations and ect). Almost 80% of the original area was changed by non organized urbanization, mining exploitation and agriculture and livestock production.

Among the PRODECER I, the concept that there is no sustainable agriculture development without harmony with the environment is implicit. Apart from this, in PRODECER III, besides conservation of preserves in a collective manner, as a joint preserves, which represents a minimum of 50% of the total area, measures that contribute to the environment conservation such as construction of contour lines, introduction of crops rotation of crops, seeding cultivation, etc., are actively and continuously adopted.

In order to preserve and maintain the Cerrado conditions, various programs and studies have been launched by Ibama, in association with other institutions that have a direct interest on this biome, such as. Currently, IBAMA is newly corganized, and ICMBio is responsible for it,

- Study of the Ecological Importance of the Cerrado Biome
- Araguaia-Bananal Ecological Corridor
- Cerrado Ecological Corridor
- Jalapão – Mangabeiras Ecological Corridor
- Cerrado – Pantanal Ecological Corridor

The Ecological Corridors projects reflects the concept created by studies in the conservation biology field, which defines a linear area, connecting two protected areas that has the objective to promote the reproduction exchange between populations of isolated biological organisms. So the corridors try to follow the natural corridors on which the conservation efforts are stressed.

In the last years there was a revision in the areas considered priority to be preserved in terms of conservation, sustainable use and share of the Brazilian biodiversity benefits of the Cerrado and Pantanal and 431 areas were considered a priority in the Cerrado from that 181 are already protected areas (conservation units and Indian land). And, 237 areas (489,312 km²) were considered of extremely high biological importance. Please notice the figure bellow:

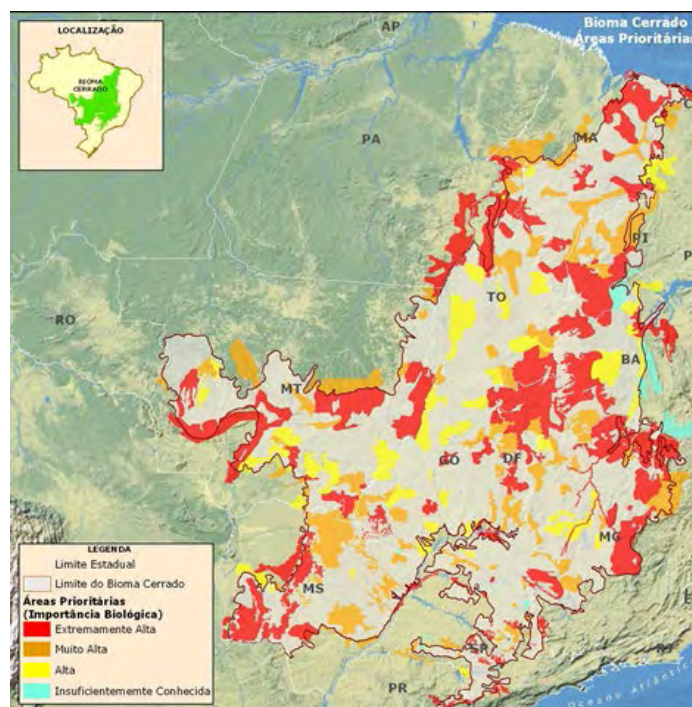


Figure 4.3.1 Priority Area for Cerrado Biotic Formation

4.5. Activities of Involved Entities

4.5.1 EMBRAPA

Created on April 26th, 1973, Embrapa's mission is to come up with viable solutions for research, development and innovation for agricultural sustainability, to the benefit of Brazilian society. The corporation acts through its Research and Service Units and its Administrative Units, being present in almost all of the States of the Federation, in diverse Brazilian biomes.

In order to assist Brazil's leadership in the field of tropical agriculture, the Corporation has mainly invested on the training of human resources. As of today, Embrapa accounts 8,692

employees, 2,014 of them are researchers - 21% hold a masters degree, 71% have a doctorate and 7% hold post-doctorate degrees. For the year of 2009, the Corporation's budget reached over R\$ 1 billion.

Embrapa is in charge of coordinating the National System of Agricultural Research - SNPA, composed by Federal and State public institutions, universities, private companies and foundations that jointly execute researches in different geographical areas and scientific knowledge fields.

SNPA generated technology has changed Brazilian agriculture. An assortment of technologies for the incorporation of cerrado regions in the productive system has made the area responsible for 67.8 million tons, meaning 48.5% of Brazil's production (2008). The cultivation of soy beans has been adapted to Brazilian conditions turning the country into world's second largest producer. Beef and pork offers are five times higher, whereas chicken has increased 21 times its previous amount (period 1975/2008). Milk production has increased from 7.9 billion in 1975 to 27 billion liters in 2008 and Brazilian vegetable production has increased from 9 million tons, for an area of 771.36 thousand hectares, to 17.5 million tons, in 806.8 thousand hectares, in 2006. In addition to that, specific research programs managed to organize technologies and production systems in order to increase family-based agriculture efficiency and incorporate small-scale producers into agribusiness, assuring improvement of their income and well-being.

(1) International Cooperation

In the field of international cooperation, the Corporation keeps 68 technical cooperation agreements with over 46 countries and 89 foreign institutions, mainly from the agricultural research field. Embrapa also maintains multilateral agreements with 20 international organizations, mostly encompassing research association and technology transfer.

In order to support such efforts, Embrapa has established partnerships with laboratories in the United States and Europe (France, Netherlands and England) for the development of high technology research. These "Laboratories Abroad" (LABEX's) count on the facilities of the United States Agricultural Research Service (ARS), in Washington, of Agropolis, in Montpellier, France, of the University of Wageningen, in the Netherlands, and of the Rothamsted Research Institute, in England. More recently, activities were implemented in LABEX-Korea, in Seoul, South Korea. These initiatives have allowed the access of Embrapa researchers, as well as of researchers from the above mentioned countries, to high cutting-edge technology in fields such as natural resources, biotechnology, informatics, precision agriculture, etc.

Within the scope of technology transfer to developing countries (South-South Cooperation) we can highlight the commencement of Embrapa's technology transfer projects in the African continent (Embrapa Africa, in Ghana), in the South American continent (Embrapa

Venezuela), and in Central America and the Caribbean (Embrapa Americas, in Panama), allowing for a greater dissemination of technologies and tropical agriculture innovations developed by Embrapa, as well as better response to the requests and demands of the countries of these continents for cooperation with Embrapa aimed at their agricultural development.

(2) Background

Brazil helps Africa, through technical assistance, centralizing it at the African tropical Savannah that has similar natural conditions.³ This assistance towards Africa has been strengthened from the beginning of the decade of 2000. Currently, more than half of the budget for International Aid projects (US\$ 22,000,000⁴) is directed to Africa; out of 318 projects developed overseas, 125 are executed at 19 African countries (2009), so Africa has surpassed Latin America and is the major area for the development of aid projects.

The Corporation of Agricultural Research of Brazil (Empresa Brasileira de Pesquisa Agropecuária), EMBRAPA has provided assistance to African countries since the past 20 years past and in 2006 it established an office in the capital of Ghana, Accra. Since April 2008, there is 3 permanent staff there in charge of project planning, liaison and coordination to reinforce aid to Africa. Together with this background, there is a risk that maybe Brazil could not be able to produce internally all agriculture products it needs in the future, if the effects of global warming get stronger, by reduction of its cultivation area (Table 4.5.1) . Thus, African aid is directed to the strengthening of research cooperation to obtain genetic resources and the development of agriculture at dry zones with high temperature as a country strategy to prevent future risks also.

Table 4.5.1 Changes Expected in the Current Cultivation Area in Brazil due to Global Warming

Product	Appropriate land for farming (km ²)				Production volume (x 10 ⁶ t)		Rate of decrease compared to year 2000 cultivation area (crop volume)
	Average temperature increase				2000	2100	
	2000	2020	2050	2100			
	Present level	1°C	3°C	5.8°C			
Rice	4,755,204	4,560,347	3,875,734	2,792,430	13	7.7	41
Beans	5,141,047	4,992,366	4,575,250	3,972,723	2.8	2.2	23
Soy bean	3,419,072	3,093,664	2,085,815	1,238,557	60	22	64
Maize	5,169,034	5,079,497	4,080,833	4,421,934	39	33	15
Population (x 10 ⁶)	165	190	300	400	—		

Source: Alexandre J.Cattelan, EMBRAPA: Potential for Cooperation with Developing Countries, Japan-Brazil Symposium of the Universities and Agricultural Research Institutes, Tokyo, December 13, 2008

³ resident Lula presidential speech on television (November 16, 2009), World Bank Institute, 「Brazil as an Emerging Donor: Huge potential and growing pains」, Development Outreach, Feb. 2009, <http://www1.worldbank.org/devoutreach/articleid526.html>, etc.

⁴ Contents of expenditure are technical development training at areas where Brazil is competitive (22%), Health (18%), Agriculture (15%), Education and others (10%), Social development (7%) and legal assistance (6%).

Under such circumstances, in 2006, Brazilian Congress approved a law to allow Agriculture Research Corporation, EMBRAPA, to profit by selling intellectual property, associating with private companies, etc. Moreover, in 2008 as a component of the Economic Reactivation Plan, it was allowed agricultural technological transfer to startup and joint venture companies. In order to cope with these new functions, EMBRAPA is restructuring itself by employing more researchers and a strategic plan for 2010 is under preparation.

As shown above, Brazilian government has put EMBRAPA in charge of a) Agricultural development support to Africa; b) Reactivation of agriculture-related Brazilian business in Africa and c) Promote research for national food security; however the budget to develop such activities is not sufficient. So, as a means to complement it the following has been considered a) To coordinately use the operation and management mechanisms and installations and equipment of other international institutions (such as FAO); b) obtain capital from third countries wishing to make use of technical cooperation activities (triangular cooperation); and c) coordination with private companies executing activities in the other country. The contents of the present survey “Program of Trilateral Cooperation Japan-Brazil-Mozambique for Rural Development at the Tropical Savannah” (Support Agricultural Development in Africa) and the methodology of actions (participative cooperation) meet the policies of EMBRAPA in relation to Africa, so EMBRAPA is actively participating in it.

(3) Contents of Research Cooperation

In order to build a technology base to support the investments in productive projects, EMBRAPA’s contribution will be focused on the reinforcement of a national and regional investigation platform, following two major lines of action, within the short-term: i) survey and fast deliverance of available technologies for local institutions and, complementarily, the introduction of available Brazilian technology, which is quickly adaptable to the local social-economic and edapho-climatic conditions; ii) agility in basic and genetic seeds production from surveyed material to support commercial seeds’ production; iii) participation on the elaboration of a project to implement an Integrated Center composed of Investigation, Technical Assistance and Training sections, as well as of an Integrated Center with Agro Industry and Soil Science modules, with a view to increasing regional investigation capacity.

Within the medium-term EMBRAPA’s cooperation will be done as follows: i) survey of natural resources available for agricultural use; ii) execution of studies to elaborate technical projects for equipping of chosen laboratories and research units; iii) conclusion and technical support for the implementation of an Agricultural Research Strategic Plan; and iv) design and technical support for the implementation of an institutional model for research and human resources management.

(4) Activities in Mozambique

The EMBRAPA's Research Institute for vegetables and for cassava and tropical fruits is a place for JICA's practical training for third countries since 1995 and it used to regularly receive trainees from Portuguese speaking countries and Latin American countries. In 2001, an agreement was made between the Brazilian Agency of Cooperation (ABC⁵) and JICA, and more entities of EMBRAPA took charge of developing capacities of agricultural technicians of several countries. In 2007 this agreement was renewed and it is to continue until year 2011. As part of the present project, EMBRAPA is regularly training technicians of Mozambique at the Vegetable and the Cassava and Tropical fruits institute as well as in the production and processing of cashew nuts, that is the representative exports product of Mozambique, and cotton production (Table 4.5.2). Efforts have been made to transmit knowledge in relation to the balance between food production and the ecosystem for bio fuel production, that has caught the attention during the last years, and in which Brazil has large experience.

In 2008, in the frame of the trilateral cooperation with the beneficiary country, Mozambique and EMBRAPA, an agreement was made with the French government for the project "Training of experts in sustainable agricultural techniques directed to small farmers". Here, promoters and leader farmers of Mozambique receive training at the Cerrado Research Center on cultivation techniques without plowing using animals directed to small farmers and the monitoring report of the results is under preparation (2009). EMBRAPA researchers are assigned to other institutions within the country and abroad⁶ and attending to requests of the Mozambique government, provide short term technical assistant. However, the government of Mozambique lacks funds to invite good researchers and in some cases the results obtained from researchers were not satisfactory⁷.

⁵ Agência Brasileira de Cooperação

⁶ In 2005, there was a cooperation action between the government of Norway and FAO, and one researcher of EMBRAPA Clima Temperado stayed for 10 days to teach rice pad cultivation techniques. In 2008, 2 researchers of the Cerrado Research Institute went to Mozambique to give a seminar on techniques to improve soil acidity (one of them got the "World Food Prize" in USA.

⁷ EMBRAPA researchers have a role as consultants and are extremely busy so in order to assure good personnel, a huge budget is required. (According to interview to the Ministry of Agriculture).

**Table 4.5.2 Training Seminars of EMBRAPA with Mozambique Participants
(Only after 2004)**

Entity	Year	Start (Month)	Period (Days)	Participants (No)	Contents		Sponsors
					Subject	Details	
Vegetable Institute	2004	8	34	1	10th international vegetable cultivation training	Methods of sustainable cultivation, rational use of water, organic cultivation	
		9	33		Idem 11th	Cultivation method of each type of vegetable, conservation and transportation	
		10	40		Idem 12th	Characteristics of each vegetable, greenhouse cultivation, soil management, irrigation, plague prevention, easy post harvest handling, organic cultivation, hydroponics	
	2006	11	27		First sustainable vegetable cultivation methods	Organic cultivation	
	2007	10	63		Idem 2nd	Organic cultivation, seeds production	
Cassava and tropical fruit cultivation institute	2004	9	26	3	Methods for cassava processing (for farmer families and for industries)	Socioeconomic influences of cassava industry, tendencies of the world market, cultivation, genetic resources, soil conservation, soil fertility, nutrients, harmony with forest resources, importance of women in cassava production, etc.	JICA ABC
	2007	11	—	3	Cassava cultivation and processing (for farmer families and for industries)	Socioeconomic influences of cassava and statistics, harvesting method, post harvest handling, processing, method of participative type research, technological transfer to small farmer families	
	2008	9	26	3	Methods for tropical fruit cultivation (for farmer families and for industries)	Socioeconomic influences of tropical fruits and statistics, theory of tropical fruit cultivation, cultivation and harvest system, post-harvest techniques, etc.	
	2009	10	25	3	Cassava cultivation and processing (for farmer families and for industries)	Methods of cassava cultivation, processing, soil conservation, participative research methods, etc.	
Tropical agriculture and agro business institute	2004	11	25	—	Cassava cultivation and processing	Seminar of cashew nuts processing directed to the Institute for the Promotion of Small and Medium Enterprise of Mozambique (IPEME: Instituto para a Promoção de Pequenas e Médias Empresas de Moçambique)	—
	2009	11	17	1	Techniques of cashew nut (seed and fruit) industrialization		
Cerrado research center	2009	5	22	15	Techniques of sustainable agriculture for small farmers at tropical areas	Sustainable agriculture methods, tropical soil fertility management, agriculture methods utilizing bio-diversity, techniques for integral plague control management, etc.	Trilateral cooperation (France)
Cotton Institute	2008	9	—	4	Techniques for fertilization and agro-chemicals application in cotton	Lecture on techniques of cotton cultivation to the Mozambique Institute of Cotton (IAM: Instituto do Algodão de Moçambique) and personnel involved with cotton industry in Niasa province	—
Agrarian Information Institute	2009	10	14	—	Approach to bio-fuel production	Agriculture land zoning from the agriculture ecosystem point of view	JICA ABC
Central	2009	4	10	—	Rural education	Introduction to projects of small libraries	—

Source: Prepared from EMBRAPA's homepage <http://www.embrapa.br/>, November 21, 2009

As part of the cooperation to strengthen agriculture development in Africa, a minute of understanding with the Mozambique government was signed for cooperation in the strengthening of agricultural research (MOU⁸) in November 2004⁹. Based on that, EMBRAPA has promoted the restructuring of Mozambique agriculture research institutes, integrating the formerly existing five institutions in only one, the Institute of Agricultural Investigation of Mozambique (IIAM) (See 3.8.1). Moreover, a private mining company of Brazil, Vale do Rio Doce¹⁰, awarded with the concession to exploit the coal mine upstream the Zambeze river (Province of Tete, Moatize) as part of the company's social responsibility (to turn it into a steadfast issue after a fierce competition to be awarded with the rights of exploitation) will support the sustainable agricultural development of the surrounding areas (contract made in 2005). Concretely, the Cabinet of the Zambeze Region Development Plan (GPZ¹¹) was appointed as the executing entity and through it, EMBRAPA is to provide technical assistance during the first 2 years (budget of US\$ 650,000) , preparing the development plan and for the following ten years (US\$ 2,700,000) it considers irrigation agriculture, assurance of a system for local production of seeds, training in sustainable agriculture techniques, among others.

In recent years, a trilateral project with the cooperation of the American government (implementing entity is USAID¹²), is on going also. USAID had interest in the corridors of the Northern area (Nampula province, Nampula) and central area (Sofala province, Beira) with an active agriculture production, and in 2009 launched a five-year project to put into the market products such as mango, banana, pineapple, peanuts and cashew nuts (seed and fruit) and forest products. (AgriFUTURO: Budget of US\$ 20,000,000)¹³. Together with this project, USAID plans to start another project of trilateral cooperation with EMBRAPA in 2010 (budget of US\$ 10,700,000) including the establishment of the seed production system, rational use of natural resources (soil, water, etc.), dissemination of agricultural techniques and development of agriculture land regulation; aiming to improve the functions of the agrarian research institutions in Mozambique. In November 11, a study mission, mainly conformed by EMBRAPA researchers was sent to visit the provinces of Maputo, Nampula and Manica to prepare the concrete plan.

In order to implement the projects smoothly, EMBRAPA opened an office in the capital of Mozambique, Maputo in February 2010, assigning 2 permanent personnel for the project planning and coordination. Although an agreement for research cooperation was signed in

⁸ Memoria de Entendimento

⁹ Similar agreements were made simultaneously with Namibia, Angola and San Tomé e Príncipe.

¹⁰ Companhia Vale do Rio Doce S.A. Representative private company of Brazil for integral resources development, has a share of 35% in world production and sales of steel, top in the world market..

¹¹ Gabinete do Plano de Desenvolvimento da Região do Zambeze. Created during the end of the colonial government, it resumed its activities after the end of the Civil War, managed mainly by former militaries.

¹² United States Agency of International Development

¹³ Main activities are private companies, other donors, NGO and Ministry of Agriculture of Mozambique (According to the Embassy of United States of America 「Estamos Juntos」 , October, 2009)

2004, EMBRAPA has not carried out outstanding action, and it is expected that this could be an opportunity to show more active actions.

4.5.2 EMATER-DF (the Technical Assistance and Rural Extension Company of Distrito Federal)

(1) Background

The Brazilian development model adopted from the mid-1960's on has had, as one of its elements, an action combining credit, research and rural extension. Research institutions and universities were responsible for planning technology packages designed for the agriculture and livestock sector, and rural extension was in charge of employing this technology to the country's rural production. The purpose of those technology packages was the intensive use of raw materials, equipments and machinery to increase productivity. In addition, the subsidized rural credit has allowed rural producers to buy those raw materials, thus indirectly financing the country's industrialization.

In spite of existing experiments in Technical Assistance and Rural Extension – ATER since the 1940's that aimed at improving the rural population's living conditions, this service began being provided nationally only in 1956 when the Brazilian Association of Credit and Rural Assistance – ABCAR was established, and therefore formed a National System integrated with the State Associations of Credit and Rural Assistance. In 1975, the federal government has incorporated the service, implementing the Brazilian System of Technical Assistance and Rural Extension – SIBRATER– that comprised in its structure all the EMATERs, state companies of ATER and the central coordination of EMBRATER. This system played a key role in the implementation of the Brazilian agriculture modernization process, changing the traditional agriculture into a modern and dynamic sector of the economy, especially in the southern and southeastern regions of the country.

In 1990, the federal government, motivated by the neoliberal tendencies to reduce the government's role, ended EMBRATER, therefore finishing the SIBRATER and stopping the flow of federal resources to the state rural extension institutions. In this way, the continuity of the service was left to the state governments' resolve which led to the termination, merging and dismantling of a significant number of the country's rural extension institutions. Despite the fact of being part of the Federal Constitution of 1998 and the Agricultural Law of 1991, the federal government decided not to support the services of public and free ATER. It was only from 2002 that the social movement complaints started to find their way to the federal government, and the family agriculture demands were progressively included in the country's development strategies. This commitment was revived, in what respects the legislation, through the Law 12.188 of 11 January 2010 which established the National Policy of Technical Assistance and Rural Extension for the Family Agriculture and the

Agrarian Reform (PNATER) and the National Program of Technical Assistance and Rural Extension for the Family Agriculture and the Agrarian Reform (PRONATER).

Relying on the facts mentioned above about the Brazilian rural extension, we can now focus on the role of EMATER-DF in developing the *cerrados* (the Brazilian savannas). In the 1970's, the country was still immersed in the economic growth model based on the agriculture modernization sustained by the tripod: research, technical assistance and rural credit. In this scenario, the land occupancy in the agricultural frontier was intensified, making possible the development of new technologies and products in the *cerrados*, and reducing the high cost of incorporating the central plateau areas into the production process. This way, the lands in the Mid-West of Brazil, more notably Brasilia's outskirts, which were priced according to real state speculation, now had also a value in terms of production, due to the closeness to the consumption center and to its population's high purchase power.

In this perspective, it was necessary to develop the region in such a way to include the traditional rural producers, who lived out of subsistence agriculture, in the intensive production that supplied the capital, and, in the same time, to change the central plateau areas near Brasilia into a showcase to display the productivity potentials of the *cerrado*.

This context justifies the federal government's approving and establishing EMATER-DF in 1978, aiming at developing the rural area in Distrito Federal. For the local government, the main purpose was to create a green belt to provide a self-sufficient supply to the capital of the country. In its beginning, EMATER-DF would direct its efforts to the areas of rural nucleuses where the intensive production of vegetables, poultry and milk was gradually being consolidated with the significant participation of migrants and Japanese descendants, and was responsible for an important share in the market of produces.

In the course of time, the ATER work in Distrito Federal was concentrated in the productive occupancy of the *cerrados*, which were the country's greatest agricultural frontier. It is worthy mentioning that, at the time, researches made available a supply of technological innovations to rural extension whose use in the production process would bring about significant productive gains in comparison to the traditional production systems. In this respect, the role played by the Japanese government stands out, due to the decisive support of JICA to the Brazilian research institutes concerned about developing technologies adapted to the *cerrados*. Consolidating the Assisted Settlement Program of Distrito Federal (PAD – DF) according to PRODECER standards and the green supply belt were top priorities, and to achieve these goals the company has adopted its own methodology framework of rural extension, reproducing the success obtained in other regions of the country to the use of areas in the *cerrado*. This production model has quickly spread, changing the characteristics of land occupancy in the Mid-west, which was a region drastically devoid of people and with low economic dynamism, that has become more intensely occupied, displaying a dynamic and highly competitive development of agriculture and animal husbandry.

With the national rural extension crisis, the institution become even more dependent on local administrations that have incurred the costs and conducted the work according to the guidelines of the government ruling at the time. Those governments would tend to favor family agriculture one time and another would widen the range of service options for the agribusiness. Nevertheless, the focus has always been on technical assistance associated with rural extension activities intended to organizing farmers and increasing profits. The federal government's participation in restructuring the ATER institutions and financing part of the activities in the past years has been stimulating the idea of a public and free ATER primarily directed to assist family agriculture, which would become real this year with the passing of the law establishing the National Program of Technical Assistance and Rural Extension.

In Distrito Federal, where land belongs to the federal government, most of the produce supply comes from small farmers. EMATER has carried out in a consistent way these farmers' technical assistance and organization, proving that it is possible to obtain high profits and protect the environment at the same time. Today, the average productivity of many produces from Brasilia is greater than the national one. The Ministry of External Relations of Brazil, becoming aware of the fact, has requested EMATER-DF to introduce foreign visitors, especially those coming from developing countries with similar natural conditions, to this excellent work, in compliance with the policy of strengthening South-South cooperation. In 2007, when the first attempt was encouraged, there were only 2 countries¹⁴ taking part; though in 2008, this number had increased to 11¹⁵. By October 2009, the institution had already received visitors from 10 countries. In 2010, there is a meeting in Brazil scheduled to receive ministers of agriculture of 53 African countries, with the objective of amplifying the projects supporting the development.

(2) Activities

The results of the EMATER-DF activities are directly related to human, social and technological development which consequently leads to the rural space development. Starting from this broad definition of rural space development, it is possible to affirm that the Company's actions take place in various dimensions: society, economy, technology, environment, politics, institution and legislation. To promote development, the company provides Technical Assistance as a consultative and updating tool for the managerial and technological process of rural enterprises, besides acting in the Rural Extension field, aiming at organizing and qualifying, bringing citizenship and new motivations to, and sharing experiences with the beneficiary public, in a way to value their competencies and skills. This way, the work performed by EMATER-DF encompasses two fields of action: one refers to on-demand services, which includes customized services at the decentralized Local Units and during the visits to rural properties; the other one is offer-oriented, especially in what

¹⁴ China and USA.

¹⁵ The following developing countries: Sudan, Senegal, Nigeria, Venezuela, Haiti, Benin, Fiji Islands, Angola, China and Costa Rica.

concerns qualification and training courses in new skills through the rural extension methods.

These methods have different formats depending on the objectives to be achieved and the characteristics of the target public. Produce fairs, exhibitions and festivals are large scale festive events that include activities with technological approach, negotiation rounds, or qualification and training courses, characterized by the participation of a large number of people, normally students and city dwellers, who have the opportunity to learn more about agriculture and animal husbandry. Other extensions methods such as field visits and social activities are aimed at providing services and having the participation of rural producers and families. They mostly comprise medium-sized events, directed towards providing technical assistance and rural extension. And finally, there are the methods designed for small events, exclusively technical ones, for specific urban and rural segments, in which the goals set by the Company are to be met.

The activities carried out by the Company are divided in various fields of action. The Provision of Technical Assistance and Rural Extension Services include all the services requested to the Company, such as technological development to rural entrepreneurs dedicated to producing, conventional or agro-environmental ones, or in social areas to a specific public, in terms of sex and age, with emphasis on family agriculture. It is worthy mentioning the activities directed to the elders and women living in rural areas, as well as rural workers who are the priority target public in the Federal Government's inclusion policy. These services are directed to the rural family, most of times not included in the agriculture and livestock production, as an attempt to promote the rural population's social inclusion. EMATER's role is very relevant for it is one of the few institutions serving as means to implement public policies for the rural sector.

In the Agro-environmental Development field, actions to develop organic agriculture and animal husbandry in Distrito Federal are carried out with methodologies and actions to qualify, in agro-ecology and agro-ecology transition, farmers who develop conventional agriculture, promoting the implementation, transition or maintenance of agro-ecologic systems that avoid using agrochemicals, have low dependence on external raw materials and need more workforce when compared to conventional systems, directly influencing the availability of more job offers.

The activities of Agribusiness Support are fundamentally based on organizing the production sector, majorly Family Agriculture, aiming at commercializing produces and other products. Through formal and informal groups of farmers, with the purpose of commercializing collectively, the decision making process is improved, thus reducing economic threats common to the activity and allowing them to continue carrying out rural activities. The support for the commercialization, in the vegetable production chain, particularly stands out,

because it reduces the threats and ensures the supply of high quality and safer produces to the final customer.

The Technological Modernization segment encompasses the availability of methods of qualification and development of skills to rural entrepreneurs, based on the demands field technicians judge necessary and broad-ranging, as well as those in compliance with governmental policies.

Vegetable production has economical relevance and an important socio-environmental role in Distrito Federal. The planted area accounts for 6,545 ha. vegetables/year, with a total production of 171 thousand tons of vegetables/year, including 70 different species and making use of high-tech production systems, such as sheltered planting (mulching, greenhouse and screen covering), hybrid cultivars resistant to pests and diseases, technologies of plant nutrition, spraying or dripping irrigation systems, fertirrigation, among others. In the vegetable agribusiness of Distrito Federal R\$ 185 millions/year circulate. In addition, there are 4,500 rural producers, of whom 80% develop family agriculture; this situation generates 30 thousand direct jobs and 10 thousand indirect ones. Each hectare planted with vegetables generates an average of 3 to 5 direct jobs, depending on the production system used. EMATER's action has been intended to structure each link in the vegetable production chain, as a very relevant mechanism to defend the interests of the sector and to achieve common goals, as well as stimulating the establishment, implementation and management of groups of rural producers, such as collective alternatives to commercialize agriculture produces, providing more competitiveness for the Brazilian agriculture.

As for animal husbandry, the efforts are concentrated on Dairy Cattle, which is a priority according to current public policies. The milk produced in Distrito Federal and its outskirts partially supplies the Better Life Social Program (*Programa Social Vida Melhor*). The program purchases milk from small and medium-sized rural producers through eight local dairies that carry out the processing.

The sector has been included in policies of development, priority technical assistance and specific rural credit lines (PRO LEITE). With the purpose of allowing the access of small rural producers to the activity in accordance with cattle sanitary regulations and product quality control, groups of small producers were created in order to manage community cooling tanks for milk extraction and storage.

In what concerns the Social Development of the Rural Area, activities are carried out so as to build the capacities of rural family members, mainly family rural producers, in different areas of human and social development. Its most important topic, Family Agriculture Strengthening, is based on the following development concept: a vast need with governmental action and community participation, focusing on three pillars of social cohesion: opportunities to have basic needs fulfilled, thus guaranteeing better living

conditions, such as education, employment, safety and income generation; abilities such as knowledge about the human being, competence and the conditions leading to accomplishment; and protection, such as social action to guarantee or maintain the necessary conditions for the people's wellbeing. Since development is a systemic long-term action, relevant to the people's wellbeing, the Company has prioritized the work in some areas: Food, Health and Infrastructure Safety, which encompasses food quality projects aimed at Good Practices in Agriculture and Good Practices in Manufacturing for income generation, providing health food. As for food quality, especially cole crops, the service and training efforts were focused on sanitation, pest control, water and food. Citizenship and Social Benefits: orientations to provide the rural family producer with access to governmental social benefits. Non Agricultural Rural Activities: qualification and organization of the agroindustrial, food processing and handicrafts sectors associated with rural tourism. Social Organization and Management: support for the organizations, in the areas covered by EMATER – DF as a facilitator and motivator of local development, ensuring that the rural families, through the social organizations, become the real protagonists of the changes in their territories, so as to achieve an effective improvement in the living conditions of the entire rural community.

4.5.3 SENAR

(1) Context

The National Service of Rural Learning (Serviço Nacional de Aprendizagem Rural: SENAR) was created by the Brazilian government as an entity to improve quality life of rural population through education and professional training. However, as public entity, the efficiency and number of actions were not enough to attend the development of Brazilian agribusiness. Thus, with the establishment of Law 8,315/91, SENAR turned into a legal entity of private law, without profit ends for the execution of actions for Rural Professional Formation (FPR) and activities of Social Promotion (PS) for workers, rural producers and their families; that is, training. Its collection is regulated by Decree 790/93, as follows:

"Art. 11. – SENAR income are:

I Compulsory monthly contribution of 2.5% to be collected through Social Security on the amount of the wage paid to all workers, by legal persons or equivalent, that conduct activities of:

- a) agro business;*
- b) agriculture;*
- c) silviculture;*
- d) rural cooperatives;*
- e) rural syndicate employer;*

- II *compulsory contribution to be collected to the Social Security, of one tenth per cent of the gross income coming from the commercialization of the physical person, owner or not, who exploits agricultural or fishing activities, permanently or temporarily, directly or through representatives or with the help of employees, using it in any way, even though not continuously;*
- III *donations and legacies;*
- IV *subventions from the Union, States and Municipalities;*
- V *finances collected by the infraction of the dispositions and, regulations generated by Law n° 8,315, of December 2 , 1991, with modifications of Law n° 8,540, of December 22 , 1992;*
- VI *income generated by the rendering of services and the alienation or rent of its goods;*
- VII *operative income;*
- VIII *contribution foreseen in article. 1° of Decree-Law n° 1,989, of December 28, 1982, together with art. 5° of Decree-Law n° 1,146, of December, 31 1970;*
- IX *eventual income.*

The law establishes that 80% of the corporation's income has to be applied in activities of support to producers¹⁶.

SENAR has a Central Administration in Brasilia/DF and Regional Administrations distributed in all capitals of the country. Part of its function is to assign technical team staffs to each target rural areas of the state, to locally identify the conditions and needs of farmers to the central region, so this office plans and implement courses and training needed by producers, in cooperation with other regional branches or the central office. As example, only in 2007, in the state of Goiás, more than 5,000 activities were carried out, with the participation of more than 50,000 persons.

The Ministry of Foreign Relations took notice of said performance and requested SENAR to participate with the international cooperation to "End Hunger" in the framework of the Millennium development Objectives of the United Nations. SENAR responded to this call and carries out training on support actions to concerned entities of six countries¹⁷ belonging to the Central America Agriculture Council (CAC¹⁸) as well as to Angola and Mozambique in Africa.

¹⁶ Remaining 20% is to cover administrative and personnel expenses, all offices are rented to rationalize administration.

¹⁷ Dominican Republic, Belize, Haiti, Costa Rica, Honduras and Nicaragua

¹⁸ Conselho Agropecuário Centro-Americano. Conformed by 9 Central America countries. In March 2009, Brazilian government conducted the first conference on policies to support rural development with said countries in Rio de Janeiro.

(2) Actions

SENAR's program for training in each sector ranges from alphabetization and children education in rural areas, to farmers organization formalization, agricultural entrepreneurship, laws and regulations related to agriculture, as well as health, covering all sectors considered necessary at rural areas (Table 4.5.3).

Table 4.5.3 SENAR Training Program

Programa	Contents	Participants	Objective
Agrinho	Education for children in rural areas	Elementary school from 1 to 9 th year and teachers	Civil education. In 2009 it was focused on environmental education (trash, agrochemicals, soil and agriculture, water)
CAMPO-SAÚDE	Health	Rural workers, farmers and families	Through implementation of basic health care actions, aims to improve quality of life
PROGRAMA EMPREENDEDOR RURAL	Agricultural business	Rural producers over 18 years and employees at rural areas who completed basic education (more than 2 years at elementary school).	Through socioeconomic and political activities, promote changes in agriculture and rural society, strengthening rural organization and building modern business. In concrete, reactivation of group activities and project conformation.
EMPREENDEDOR SINDICAL	Rural organization	30 organizations (in 2009)	Reactivation of rural organizations
PROGRAMA GINÁSTICA LABORAL	Physical education for rural population	For employees over 18 years old, mainly agribusiness factory workers	Improve health and life of workers
campo futuro	Agricultural management education	Soya, maize and beef producers and their workers	Calculation of production costs, development of future markets and other related knowledge and techniques
CAMPO EM ORDEM	Agriculture related legal education	Agricultural producers, rural workers and related area workers	Knowledge and techniques related to accounting and regulations
GESTÃO LEITEIRA	Alphabetization	Rural producers and workers	Improve reading capacity of rural producers and workers using teaching material which contents are useful for the daily life.

Moreover, although the contents of training are all practical and concrete techniques necessary for small farmers, there are some that are linked to small manufacturing business (Table 4.5.4). Each subject has items with practical technical details, necessary in practice, and producers can choose among them. Annual training plan is prepared as part of a program or accordingly to the needs of producers, that is published through the regional office. As it is a practical training, there are only 7 to 8 participations per section, but the same is repeated till all participants receive practical training. If a producer wants to start business with products developed from techniques acquired during the course, support is provided by Brazilian Service to Support Micro and Small Business (Serviço Brasileiro de Apoio às Micro e Pequenas Empresas) - SEBRAE¹⁹ who collaborates with SENAR.

¹⁹ Serviço Brasileiro de Apoio às Micro e Pequenas Empresas

Table 4.5.4 SENAR Subjects of Training and Examples

A. Rural Professional Promotion (FPR ; Promoção Profissional Rural)			
Subject	Detail	Subject	Detail
Agriculture	<ul style="list-style-type: none"> • Manual sugar cane harvest • Organic production of medical herbs • Organization and management of kitchen gardens • Fruit production (pineapple, banana, papaya, passion fruit) • Basic ornamental plants production • Fruit (watermelon) • Organic vegetable • Manual sugar cane planting • Burning of sugar cane low leaves during harvest 	Support to agriculture, animal farming and silviculture	<ul style="list-style-type: none"> • Lot management <ul style="list-style-type: none"> - Accounting - Rural business <ul style="list-style-type: none"> • Plague prevention - Sprayers /Automatic sprayers - Shoulder carrying sprayers - Use of nozzle in agrochemical sprayers • GPS operation <ul style="list-style-type: none"> - GPS use in agricultural machinery - GPS survey (theory and application) • Operation and practice of planting machine without plowing • Following practices and operation and maintenance of related equipment <ul style="list-style-type: none"> - Irrigation with central pivot - Irrigation equipment with shooting - Sugar cane harvester - Cotton harvester - Soil compacting roller - Electrical chain saw - Milking machine - Bulldozer - Mechanical digger - Partial irrigation - Agricultural tractor - Sugar cane mechanical transporter - Type of harvesters • Sugarcane planting machine • Analysis and interpretation of NR-31 law (labor law)
Animal farming	<ul style="list-style-type: none"> • Honey • Basic Poultry (eggs) • Basic Poultry (meat) • Beef cattle farming • Dairy farming • Milk quality control • Preventive vaccination in cattle • Hoof trimmer • Preventive hoof trimmer in cattle • Training cattle for exposition in fairs • Horse taming • Methods to tame horses • Artificial insemination • Fodder cultivation • Worm raising • Sheep farming (mutton) • Egg production for production of baby chickens • Suckling pig production • Pig raising • Pig raising and pork meet production 	Support related to Social infrastructure organization	<ul style="list-style-type: none"> • Electricity and water installation and repairing and masonry works • Fence installation • Electric fence installation • Basic electrical works at rural areas • Manufacturing a horseshoe • Operation and maintenance of motors • Horse saddling training • Electrical cutter and electrical welding • Methods of leather production
Silviculture	<ul style="list-style-type: none"> • Planting of trees for lumber production and wood management • Preventive planting at river banks and recovery of devastated vegetation land 		
Aquiculture	<ul style="list-style-type: none"> • Fish farming 		
Agro business	<ul style="list-style-type: none"> • Leather production • Cachaça production (distilled sugar cane spirit) 		
B. Social Promotion (PS:Promoção Social)			
Food and nutrition	<ul style="list-style-type: none"> • Rural cooking • Manufacture of <ul style="list-style-type: none"> - sugar cane. - jam, - Sugar cube • Use of food and menu plan / Diversification of products • Domestic production <ul style="list-style-type: none"> - Milk, - Cassava, - Vegetable (marmalade) 	Handicraft	Handicraft production of <ul style="list-style-type: none"> - Bags - Basket - use of banana fiber (paper) - Use of banana fiber (like sheep wool) - Artificial flower, dry flower, etc. - Paper craft - String craft
Rural social organization	<ul style="list-style-type: none"> • Theory of associations • Theory of cooperatives I, II, III and IV 	Health	<ul style="list-style-type: none"> • Type of medical herbs and methods for domestic production • First aid

4.5.4 Principal Related Organizations

Principal organizations concerned with agricultural development in the Cerrado region are:

- Ministry of Agriculture, Livestock and Food Supply (MAPA)
- National Supply Company (CONAB)
- Brazilian Agricultural Research Corporation (EMBRAPA)

Embrapa Tropical Agroindustry	Embrapa Vegetables
Embrapa Cotton	Embrapa Cassava & Tropical Fruits
Embrapa Rice & Beans	Embrapa Maize & Sorghum
Embrapa Coffee	Embrapa Satellite Monitoring
Embrapa Goats and Sheep	Embrapa Semi-Arid
Embrapa Cerrados	Embrapa Soybean
Embrapa Beef Cattle	Embrapa Soils
Embrapa Dairy Cattle	Embrapa Wheat

- Ministry of Agrarian Development (MDA)
- National Institute of Colonization and Agrarian Reform (INCRA)
- Technical Assistance and Rural Extension Corporation (EMATER)
- Ministry for Environment (MMA)
- Brazilian Institute of Environment and Renewable Natural Resources (IBAMA)
- Chico Mendes Institute for Biodiversity Conservation (ICMBio)
- National Institute of Meteorology (INMET)
- National Institute for Space Research (INPE)
- Brazilian Institute of Geography and Statistics (IBGE)
- National Service for Rural Training (SENAR)
- Brazilian Micro and Small Business Support service (SEBRAE)
- National Service for Industrial Training (SENAI)
- National Society of Agriculture (SNA)
- National Confederation of Agriculture (CNA)
- Agricultural Promotion Company (CAMPO)
- Federal University of Viçosa (UFV)
- "Luiz de Queiroz" Graduate College of Agriculture (ESALQ)

CHAPTER 5 POSSIBILITIES TO APPLY THE RESULTS OF CERRADO DEVELOPMENT AT NACALA CORRIDOR DEVELOPMENT

5.1. Similarities and Differences between Nacala Corridor Area and Cerrado Area

Many agricultural similarities are recognized between Mozambican tropical savannah region and Brazil Cerrado region. Through the development of Cerrado over 30 years, Brazil has accumulated much agricultural knowledge which can be applied to Mozambican tropical savannah region. Many could be expected to improve productivity dramatically in a relatively simple technique. However, Mozambique and Brazil have very different socio-economic environment and it is hard to transfer straightforwardly Cerrado developing model. Moreover, Crops cultivation in Mozambique involves issues such as, irrigation problems, land use issues (no land acquisition require license) and there are many other issues to be solved. The main challenge of Cerrado development was to change a barren uninhabited in arable land by technology and financial strength. Agribusiness foundation like Infrastructure, modern farm management, marketing are provided in case of Cerrado development. On the contrary, there are many issues to be solved not only technology and financial aspect but also technical level and marketing aspects of the farm in Mozambique. The existing situation is that lacking of equipment ranging from development to marketing, storage facility, domestic market and moreover very few farmers' organization.

Individual technologies of Cerrado type savannah development can be transferred, however, it is issue encountered how to implement a regional development. Meanwhile, the ripple effect can be expected. Improving of administrative capacity such as introduction of union activities, testing and research, dissemination activities and financing, and establishment of "New Development Model" suitable to the natural social and economic environment in region are required.

Main similarities and differences between Development of Mozambican Tropical Savannah and Cerrado Development are as follows:

Table 5.1.1 Comparison between Development of Mozambican Savannah and Cerrado Development

Item	Cerrado Development	Mozambican Tropical Savannah Development
objective	Economic development • Food production increase	poverty alleviation • Achieve food self-sufficiency • Market oriented
Farmers	Medium-scale farmers	small farmers
Crops	Export crop	Subsistence crop
Production activities	larger-scale mechanized farming	Use of indigenous technology
Farming	Reduce production costs	Secure employment opportunities
Initial Investment	Large	Difficult input
Farmers' Organization	Organized cooperatives	No organization
Marketing	developed	Under developing
Agro-processing	developed	Extremely small scale
Technical Assistance	Each organization	Vulnerability • NGO
Micro finance	Organized	Non

5.2. Possibilities to Apply the Results of Cerrado Development at Nacala Corridor Development

In Table 5.2.1 a summary of institution related to cerrado development according to the sector, such as research entities, agricultural extension entities, farmers organizations, agricultural production, environmental conservation, agroindustry, agricultural financing, etc. is shown. In this same table, issues to be considered in case of applying the results of each sector in the Study area, the Nacala corridor, is also shown; evaluating the way these results could be applied at the Study area.

5.2.1 Application of Agricultural Technology from Cerrado Development

From all these aspects, it should be especially considered the application and extension of agricultural technology developed by EMBRAPA in the cerrado area.

- (1) Generally all along the Nacala corridor, abundant basic soil can be found (fertile soil for agriculture), but in one portion (mainly in the surroundings of Gurué district), soil is not basic, so improvement techniques developed by EMBRAPA for alkaline soils could be applied. However, this zone in Mozambique presents high altitudes with a rather hilly topography, so there is a high possibility that said conditions could make soil improvement works harder; at the same time, due to the factor of soil erosion, correction effects could decrease. Thus, in case works of soil improvement are conducted, it should be necessary to consider cost and labor of lime application and distribution, carefully selecting the application zones, where economic conditions are favorable and where producers strongly consider the possibilities of this technology.
- (2) Five out of the 12 districts considered in the Study area, particularly Gurue, Malema, Ribaué, Alto Molocué and Cuamba, present a hilly topography. Besides, existence of sandy soil has been reported in the whole area. So, in many zones during the rain season, together with

erosion, there is the problem of loss of crops due to drought, when the period between rains extends too much. In order to solve these problems, the introduction of cultivation techniques in levels and planting varieties that fix themselves to the soil can be applied, even by farmers of the zone. For small farmers in conditions to buy herbicides, no till-farming will also be recommended.

- (3) EMBRAPA allowed a considerable increase of agriculture production in the cerrado. However, conditions not only of soil and water were different between the cerrado and the Study area; it is expected that pest types, that are a problem, would be different. Besides, it is not possible simply to introduce new varieties at the Study area, once they have high productivity by the application of advanced technologies of irrigation, soil fertilization and herbicides. However, the techniques considered necessary will be evaluated to certify the possibilities to promote the application of agriculture technology of the cerrado provided by EMBRAPA such as, a) introduction of genetic resources; b) participation in technical training courses; c) utilization and use of technical information in Portuguese.
- (4) In relation to EMATER, it has a system of technical extension directed to small farmers but they work with a basic principle that is farmers' participation. Farmers' needs are identified and once evaluated, the extension system is built. In the case of Mozambique, Ministry of Agriculture technical promoters of the technical extension department were reassigned to the provinces, under the decentralization policies. Provinces created a section of technical extension in the Center of support to economic activities at the agriculture departments of each district, but they are few. In this context, for extension to be executed efficiently, it is necessary to identify farmers' needs; it is also important for IIAM and the technical extension department to evaluate the developed technology, being essential to apply and show farmers the results in demonstration fields, so that the same farmers build an extension system.
- (5) In order to promote technical extension with efficiency, it is necessary to create an entity to promote extension, such as SENAR. In the centers of economic activities promotion, rural development departments are established, but there is no department specialized in institutional advisement to attend the different activities of small farmers. This function is performed by NGOs, so local governments can create a system to plan and support the extension of successful experiences to other zones; here there is a possibility to apply an implementation system of this type of entity, with SENAR as reference. Besides, farmers should be trained to support local activities, performing as coordinators.
- (6) To develop the cerrado, in PRODECER project, "Campo" company, performed many functions, it even served as coordinator between the executing entity, that was the government, and the research institutes and the farmers. In Nacala corridor, the company for the regional development of Nacala corridor has been established as "Corredor de Desenvolvimento do Norte" (CDN), or North Development Corridor. However, the main

interest of this company is the development of trade infrastructure and it is not dedicated to agricultural development in particular. It is necessary to create a development company from the central government and province governments in order to evaluate the methodology of development and to perform as coordinator among the several institutions.

5.2.2 Development Effects Learned from Cerrado Development

(1) Economic Induced Effects

In the Cerrado area, soybean oil for agricultural processing purpose and its by-products or assorted feed are produced starting at soybeans, furthermore, starting at the place, agriculture-related-industries (fertilizer, agrichemical, transportation, distribution) are involved with the transaction process, which has prompted the development of the supporting industries, bringing a large synergy effect to have generated a huge agro-industry (agribusiness). As a result, the export value of soybean products amounted to \$4.1 billion in 2000, coming to account for 25% of the total export value of the agriculture sector. This is the same amount as the export value worth \$4.0 billion of iron and steel products (aluminum, iron and steel). There is a report that the GDP in a case where soybeans are exported after processed inclusive the inducement effect of agricultural processing industry and related industries is 1.7 times as large as a case where soybeans are exported as beans (Evaluation Report of Cerrado Agricultural Development, JICA, 2000).

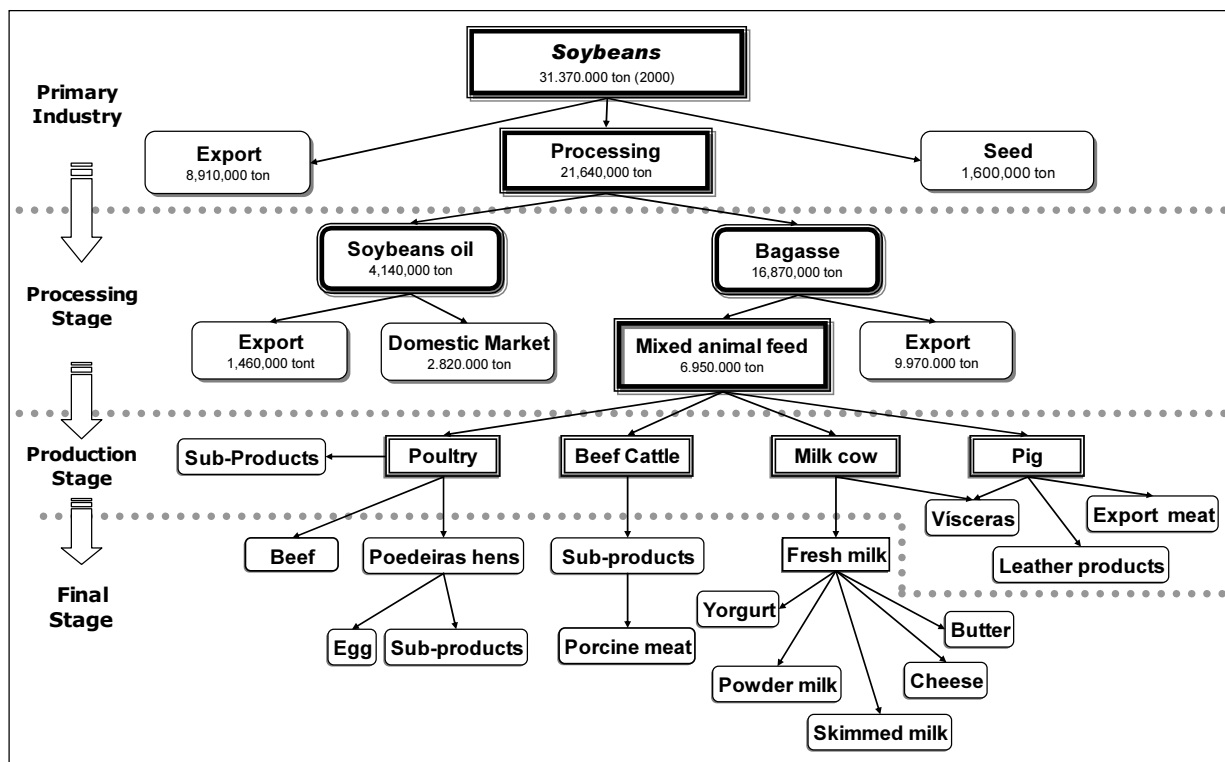


Figure 5.2.1 Economic Impacts Flow of Soybeans Products

(2) Supports to Farm Households Given by Agricultural Cooperatives

It is necessary to note that agricultural cooperatives in addition to enterprises have played an important role for the development of agro-industry centering on soybean products as mentioned above. In the Prodecer which gave a big push to Cerrado, the cooperative had people mainly of the children of members of existing agricultural cooperatives settle there and provided various support measures including purchasing materials at a higher price than the price at which companies purchased such materials also at the time when international prices declined by establishing processing plants as well as supplying fund for farming. Stated differently, agricultural cooperatives played an important role in promoting production by keeping agriculture, processing and also the livestock industry in a mutually complementary and consistent state.

In the surveyed area, a written agreement is concluded between an agricultural processing company and a farmhouse. Besides, a traditional production form is maintained. Processing companies of cotton, tobacco and cashew nut provide a stable market through purchase of materials, in addition, they compensate lack of farming fund by providing technology and materials and equipment (seeds, fertilizer, agrichemical, agricultural machinery). Meanwhile, however, the survey revealed that there are actions adversely affecting farmers such as a cheap purchase price (a minimum price system is available for cotton) and nonpayment of expenses. Also, it revealed cases where processing companies replaced commercial farms with others when they found farmers which provided favorable terms to the companies.

In order farm households to have a bargaining power equal to that of an agricultural processing company, a voluntary organization or a cooperative by farmers is necessary. Unless there is a system in which they can respond to distribution or price formation themselves, farmers are always forced to lose the initiative in the “regional agricultural development beginning at agro-industry”. That example we find in the cost formation of cashew nut. Figure 5.2.2 shows a result of comparison of the production cost structure of cashew nut between Fortaleza district, Ceara Province, Brazil and the surveyed area in Mozambique.

While the ratio of materials in the cost structure of cashew nut in Brazil is 12%, it is about half the figure of Brazil, accounting for merely 5% in the surveyed area. This means that the income of farmers who assume the role of producing material is relatively low. In order not to have the set development objectives turn out to be a pie in the sky, what is more, in order to deal with various supporting programs (services), organizations of farmers or development and reinforcement of cooperatives are important.

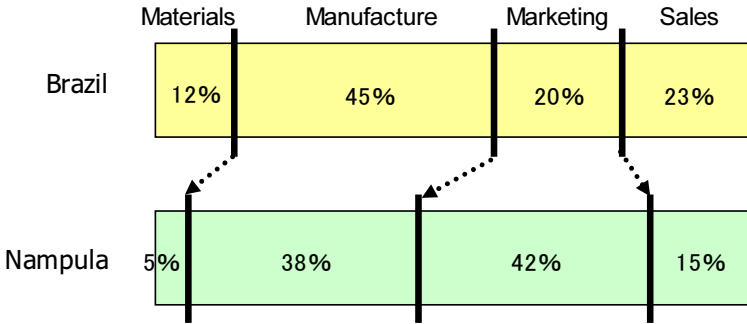


Figure 5.2.2 Cost Components of Cashew nuts

Table 5.2.1 Applicability of Experience through Cerrado Development in Brazil to the Study Area

Sector	Achievement of Cerrado Development		Applicability to the Study Area	
	Organization in charge	Achievement	Organization in charge	Application
Research Institute	Government of Brazil (GOB)	<ul style="list-style-type: none"> • Cerrado research centre (CPAC) was established as a centre of Brazilian national agricultural research public corporation (EMBRAPA) in 1975. GOB employed researchers under the good conditions and encouraged them to acquire academic degree in Europe. • CPAC contributed to the sustainable agricultural development under due consideration to environment conservation. And it became one of the best institutes of the world. It contributed to develop the Cerrado as the second largest food basket in Brazil. • Now, 96 researchers (55 PhD and 41 masters) working in CPAC 	Government of Mozambique (GOM)	<ul style="list-style-type: none"> • Brazilian policies for promotion of research institutes can be referred to the enhancement of Mozambican research system, including improvement of circumstances of researchers and capacity development, for the development of Nacala Corridor at the initial stage. • There are many chances to joint the capacity development program of researches by donor countries. GOM shall set up system to provide this information and support the candidates to joint the program. • It is expected that the GOM make more efforts to obtain the cooperation/supports from donor countries for the agricultural development through the clear explanation on agricultural issues and macro-economic circumstances under the national policies.
Enhancement of Institute	GOB	<ul style="list-style-type: none"> • GOB established the EMATER for agricultural technology support, the SENAR for technical training, and SEBRAI for support for agro-industry and commercialization of the small to medium scale farmers. These institutes are separately or jointly support farmers. • Now, SENAR and SEBRAI were privatized, but they are still providing and developing the services. • SENAR deploys moderators in the target villages and set up the system to provide the appropriate supports on time. 	GOB and local government	<ul style="list-style-type: none"> • Ministry of agriculture shifted the extension workers from department of extension to provincial governments under the decentralization policies. Extension workers are deployed in extension offices of sub-district, the supporting centre of economic activities, under the bureau of agriculture. Their numbers are extremely small. • There is no section which can give advises to the small scale farmers how to access the market of their products in the supporting centre of economic activities. • NGOs are supporting small scale farmers to access market of their products. Local government can setup the system to support their activities and promote success stories to other area. It can promote farmers to coordinators for regional activities.
Agricultural extension				

Activities	EMATER/ SENAR	<ul style="list-style-type: none"> EMATER is mainly providing technical extension services based on requests of small scale farmers through the farmers participation in Cerrado. Through the service, extension manuals, know-how for formulation of farmer's organizations are developed and cumulated by EMATER. SENAR cumulated experiences and know-how of supporting and training technical skill from small to large scale farmers in Cerrado. 	GOM and local government	<ul style="list-style-type: none"> Logistic knowhow for extension services of EMATER and SENAR can be apply in Mozambique. In order to conduct the extension service to meet the farmers needs, the training curriculum, materials and manual for extension workers shall be improved by referring to the extension manuals of EMATER and training manuals of SENAR, The access system connecting the farmers' needs/problems in the field to appropriate research institutes, government organizations, NGOs and private companies shall be formulated. Also the capacity development of extension workers to apply the access system. For the formulation and operation system, the experiences in Brazil can be referred.
	EMBRAPA	Cassava and tropical fruits research centre is conducting the research in the area of local agricultural cooperative for the direct connection of research and field. As the results, the centre achieved the significant outputs such as new high yield varieties (average yield increased 2.5 times within 2 years), improvement of cultivation technology, and rationalization of cassava milling project in the area.	IIAM	It is very difficult to conduct experimental examinations under the insufficient researchers/staff and material/equipment. It is possible to conduct research/examination in the selected pilot area with farmer's assistant, and transfer the results to the farmers/producers.
Formulation of farmers organization	EMATER	Rice and beans research centre developed the sampling kit of integrated pest management for kidney bean.	DNAE	Modify the kit for applying to the Study area. It can be appropriate tool to understand the actual field conditions/problems by extension workers.
	SENAR	EMATER is applying the participatory approach for formulation of farmers organization to achieve the efficient extension service Several training for enhancement of existing farmer's organizations and improvement of technologies of farmers by SENAR. Training fees are collected as supporting fees and fees based on amount of agricultural products of member farmers, including small to large scale farm, as	Local government DNAE	<ul style="list-style-type: none"> Present farmers group for extension services shall be shifted to group for improvement of incomes. Approaches of EMATER for capacity development, participative organizing of farmers can be applicable for the sifting the group. After training extension workers on the operation and management of farmers' organization (financial arrangement, accounting and management) applied in Brazil, the extension workers can advise to the group members.

Agricultural and livestock production	Agricultural infrastructure	Soil improvement	EMBRAPA	The soil acidity correction technology for high acid soil in Cerrado by use lime to the soil was formulated. Also soil improvement technique by the use of the gypsum.	IIAM	The soil acidity correction technology can be applicable to the soils similar to Cerrado soil in Gurue district. The site shall be selected after confirmation of economic advantage by estimation of costs of lime importation and spreading in the field together with labour costs. It is necessary to consider expense and labour to hang for lime import and the soil dispersion, and it is necessary to choose the area where it may be said that it is an advantage economically.
		Soil erosion protection	EMBRAPA	<ul style="list-style-type: none"> • Soil erosion was significantly reduced by introducing the alley cropping and the surface mulching methods together with zero tillage cultivation. • Also intercropping of forage crops in maize field is effective to increase land use and reduction of soil erosion damage. 	IIAM DNAE	<ul style="list-style-type: none"> • Among 12 districts of the Study Area, 5 districts (Gurue, Malema, Ribáué, Alto Molocue, and Cuamba) are located in mountainous sloped area. They are considered to be possible to suffer the damages of soil erosion. They might be protected by ally cropping and soil surface mulching which are possible to introduce even the present technology in the Study Area. • If herbicide is available, it is possible to introduce zero-tillage cultivate using the local tool (“Matoraka”) by small scale farmers. Intercrop cultivation of maize and forage crop can be applicable for livestock farmers.
		Cassava	EMBRAPA	Cassava and tropical fruits research centre developed the new disease tolerant varieties, their yield increased 25 t/ha from 10 t/ha in average.	IIAM DNAE	Type of disease and pests, natural conditions such as soil and water in the study area are different with Brazilian. Crops cultivated under the good conditions of irrigation, fertilizer allocation, pest/disease control in Brazil is almost impossible grow up in the Study Area. But the following agricultural technology of Cerrado can be applicable in the Study Area.
		Maize	EMBRAPA	Developed the variety of yield at 9 t/ha in average in Cerrado area		1) introduce gen sources
		Kidney bean	EMBRAPA	Developed the variety of yield at 2.4 t/ha in average in Cerrado area		2) participate technical training/seminar
		Rice	EMBRAPA	Developed the high yield up-land rice variety with 6 t/ha. Also varieties of various period of growth, from 80-days growing period, are available.		3) obtain and apply the technical material in Portuguese
		Poultry	EMATER SENAR	Promoting the technology enabling shipment more than four times a year from breeding for a short term in (70 days) produce to small scale farmers.	Local government	Most farmers have experience of poultry farming. It is efficient to distribute chick fed under the intensive management in the private poultry farm.
		Dairy farming.	SENAR	Through extension of intensive cow raising technology to small scale farmers and proved the compound farm management.	Local government	The intensive milk cow breeding by small scale (1 to 2 ha) farm, can improve the nutrition conditions and produce manure for agriculture. But it needs fertilizer and rainfall to maintain soil moisture for fodder crop production
		Inland fishery	EMATER	Technical support on inland fishery to small scale compound farmers	Local government	It is necessary arrange the following activities to start the inland fisheries: 1) identifying the area where the water resource available through the year, 2) prepare the initial investment capitals for develop aquaculture and 3) confirm the supply system and nursery of fry.

				<ul style="list-style-type: none"> • EMATER provides the technical assistance for organic agriculture of vegetable and the commercialized organic fertilizers are available for producers. Also demand of organic vegetable is expected to be six times of production in big cities. • Brazilian government authorizes the approval organization for quality management of organic vegetable and support the added value for productions. 	DNAE	<ul style="list-style-type: none"> • Agriculture in Mozambique are almost organic in terms of not using chemical fertilizer and pesticide. • When compost resources are available, the technique is possible to utilize, but little potential. • When only compost resources are available, it is necessary to introduce the “blurring technique” as plant residual preferentially. • It is necessary for organic certification from overseas to develop the approval organization as national policies because of many budget.
	Organic agriculture	EMATER	<ul style="list-style-type: none"> • EMATER provides the technical assistance for organic agriculture of vegetable and the commercialized organic fertilizers are available for producers. Also demand of organic vegetable is expected to be six times of production in big cities. • Brazilian government authorizes the approval organization for quality management of organic vegetable and support the added value for productions. 	DNAE	<ul style="list-style-type: none"> • Agriculture in Mozambique are almost organic in terms of not using chemical fertilizer and pesticide. • When compost resources are available, the technique is possible to utilize, but little potential. • When only compost resources are available, it is necessary to introduce the “blurring technique” as plant residual preferentially. • It is necessary for organic certification from overseas to develop the approval organization as national policies because of many budget. 	
	Small scale agricultural machinery	EMBRAPA	“The institute for rice and beans” developed machines for cultivation, thrashing and so on for small scale rice farmers.	IIAM DNAE	As EMBRAPA accepts, these techniques are utilized to Mozambique by being imported or produced in Mozambique.	
	Others	SENAR SEBRAI	SENAR extends the technique for bee keeping to small scale farmers, and SEBRAI supports the commercialization technique.	DNAE	<ul style="list-style-type: none"> • Extension for bee keeping technique is useful for the improvement of nutrition for small scale farmers, but it is not enough for commercialization. • In the present situation, the containers are imported. So the price of containers is more expensive than honey itself and it is not the level for commercialization because of insufficient technique of sealing. • It is necessary to analyze if there is available utilization on logistic technique of SEBRAI. 	
	Regulation	GOB	By 2001, producers were in charge of keeping the 20%~30% of agriculture area as nature conservation area. In PRODECER, settlement from phase 1 to phase 3 were obliged to keep the rancheirie.	GOM local government	In the areas where are not suitable for agriculture, it can be improved the promotion plan for sustainable agricultural development by obligating the nature conservation. So that it is necessary to formulate the land use plan for this purpose. It is necessary to consider the legal system for conservation as priority.	
Environmental preservation	Farming technology	EMBRAPA	Previously increase of production was by expanding the agricultural area, but presently by effective utilization of agriculture area, sustainable production technique considering environmental protection is developed. The technique of mix cultivation with maize and feed crop is introduced.	IIAM	In order to increase of utilization effectiveness for agricultural area, it is usually increase the input of materials. But improvement of mix crop method, establishment of crop rotation system and agriculture area utilization method at farmer’s level can be refer to the technique in Brazil Cerrado.	

	Extension	EMATER	Technique which EMBRAPA develops for agricultural area effective utilization is extended to small and medium farmers and contributed to improvement of income with agricultural area utilization method and crop rotation technique for small area for. In addition, environmental awareness is extended. SENAR promotes the environmental education under the brother and sisters of farmers at elementally school.	DNAE	It can be utilized to increase the farmer's understanding on the environmental protection and sustainable agriculture as well as sustainable technical assistance of extension organization linked to increase of their income and communication with farmers,
	Education	SENAR		GOM Local government DEAE	It can be formulated the system of activities for understanding In terms of relation with environmental protection and sustainable development among the inhabitants (children, young people and adults)
Processing agricultural products	Cassava powder	EMBRAPA	In the place of production on cassava, technique of increase income and processing are successfully linked. So producers increase their income and added value for cassava by processing is actualized by establishment of cooperation system with local agriculture cooperative (COOPATAN)	GOM Local government IIAM	<ul style="list-style-type: none"> • Agricultural processing should be considered the increase of agricultural income through the promotion of processing by increasing production of processing material to enterprises and also through the promotion of simple processing in the local areas. • GOM and local government are aiming at utilizing the cassava to bread. In terms of this support, it is valuable to combine the technique of increasing the production for processing cassava material and organization of milling processing technique for small scale farmers from EMBRAPA.
Agricultural credit	Micro credit	GOB	It is potential to utilize the credit system of PRONAF by Brazilian Bank for small scale farmers.	GOM Local government	<ul style="list-style-type: none"> • GOM and local government should refer to credit system of PRONAF for small scale farmers. • The credit system should introduced with Mozambique central bank and private commercial bank.

CHAPTER 6 DIRECTIONS OF AGRICULTURAL DEVELOPMENT IN THE NACALA CORRIDOR AREA WITHIN TRIANGULAR COOPERATION PROGRAM

6.1. Significance of Agricultural Development in the Nacala Corridor Area (Tropical Savannah)

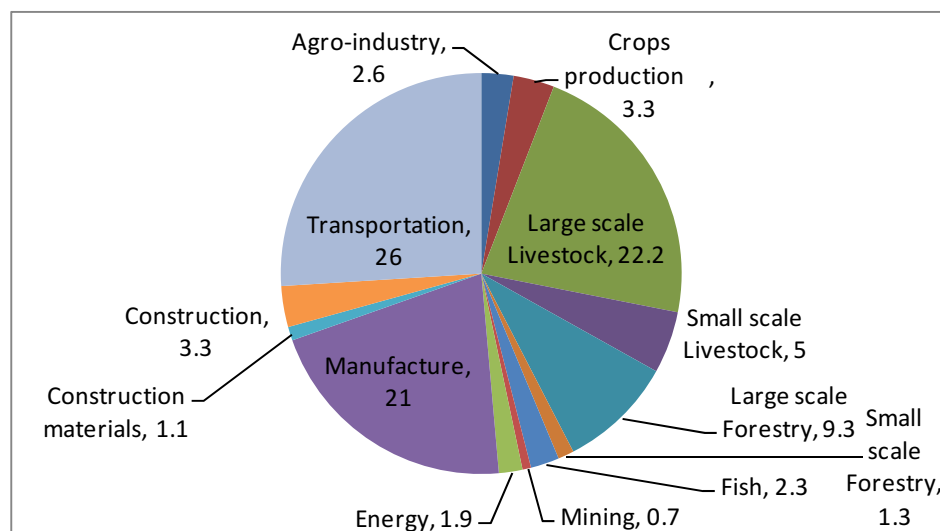
6.1.1 Features of the Regional Agriculture and Needs for Development

The number of farm households dotted over the study area amounts to 720,000, equivalent to 24% of the total number of the country, making it the province that has the largest farm households in Mozambique. However, the average area possessed by one household is 1.0 ha, below the national average of 1.3 ha, and the province's poverty rate is higher than the national average. Consumers with effective demand amount to 250,000 only centering on Nampula city, indicating a situation where a price drop due to excessive production easily happens. Small market reflected, most of the farms depend basically on more or less the self-sufficient production style mainly of corn and cassava. Also, the most of their agricultural income rests on production of materials (cotton, tobacco, cashew nut, etc.) for agricultural products processing industry.

It is estimated that the average annual rate of increase of population in Nampula Province is 2.5% for 10 years to come and the aggregate population there as of 2020 totals to 6 million. In terms of the population composition, the younger generation aged 15 or less accounts for 45% of the total, and the population of this category is estimated to increase in future as well. At present, the unemployment rate of the province stands at approximately 20%. Unless job opportunities are provided to increasing number of workable age group, it is feared that the unemployment rate will increase and the poverty will be expanded. The economic growth at least larger than the increase rate of population is required as a measure for it. In order to do this, the improvement of productivity in the agricultural sector which absorbs more than 90% of the population of the economic activity is an indispensable issue for the sustainable development of the regional economy.

As is indicated in the Figure 6.1.1, the largest proportion in the GDP of the relevant province is occupied by the livestock raising (beef cattle farming) and large-scale forestry production by large-scale farm households which account for less than 1% to the total farm households, with the proportion of the two sectors to the entire GDP at 32%. Logged trees are exported as they are to China or the Middle East countries without any processing like the case of beef cattle. The Figure may indicate that without the development of the production sector of

farm products in which 95% of the total farms are engaged and the agricultural processing sector which is a major source of agricultural income, a virtual reduction in poverty in the province would not be materialized.



Source: Data provided by Direcção Provincial de Agricultura de Nampula

Figure 6.1.1 Share of GDP by Industries in Nampula Province

6.1.2 Possibility of the Expansion of Agricultural Production

(1) Value-chain

The agricultural sector in the surveyed area is characterized by small market as well as tiny farm size. While they have such problems, farm products produced by a lot of small-scale farm households are generating a lot of value added in the distribution stage and final products as Table 6.1.1 (the same table exhibited already as Table 3.3.2 in the Chapter 3).

Even corn which almost all the farmers produce for self-support purpose generates, if processed, the value added worth about 9 times from sales price at \$0.1/kg at material stage (loco price) to \$0.9/kg at the milling stage (retail price) where corn becomes final products. Meanwhile, they have sesame or other products which are exported without processed and so their value added remains small although such products are likely to be processed to cooking oil and so on.

Table 6.1.1 Value-chain by Crops

Units: US\$/kg

	Maize	Cotton	Cashew nuts	Sesame	Tobacco	Soy beans
Farm gate price	0.1	0.4	0.5	1.02	1.20	0.5
Middlemen	0.2	↓	↓	↓	↓	↓
Retail price	0.9 (processed)	↓	0.6(shell) ↓	↓	↓	(oil) (meal)
FOB	—	1.2 (lint) 0.7 (oil)	4.50 (processed)	1.07 (raw)	3.15 (dry leaf)	—
Destination	Domestic	Export	Export	Export	Export	Compound feed

Source: JICA Study Team

(2) Viewpoint of EMBRAPA

Adding value as a tool for the increase of small and medium-scale producers' income, it is important that the agro-economical spaces of the provinces of Niassa and west of Zambezia are included in the project, as a way of incorporating agricultural land indicated by Embrapa and, thus, making feasible investments in agricultural production on a commercial scale.

6.1.3 Economic Impacts of Agro-processing Sector

An average annual growth rate of GDP in Mozambique during the past decade from 1998 to 2007 was 8.0%. As a result, per capita GDP increased from \$114 in 1995 to \$400 in 2007. Such high growth rates of GDP have been sustained by the resource-development-type projects (aluminum refining, natural gas, rare metal) called the Five Mega Projects (companies of Mozal, Sasol, Moma, Moatize and Chibuto), and the projects have come to account for 80% of the aggregate exports in 2008.

The investments by a Mega Projects enterprise are \$1 to \$2.5 billion, and capital-intensive projects have been developed as large-scale investment projects by foreign direct investment (FDI) in capital city of Maputo or surrounding provinces. On the other hand, more than 20 kinds of small but diversified agricultural processing companies which are engaged in production of cashew nut, cotton, tobacco, sesame, banana, beans and poultry farming are expanding their businesses in the surveyed area. The investment per firm is \$50,000 up to \$80 million and its type of business organization is labor-intensive.

Table 6.1.2 compares the ability to create jobs of the Mega Projects and agricultural processing companies in the surveyed area. A poultry farming firm, in which \$1.3 million was invested, employs 1,070 persons together with plant workers and contract farmers,

surpassing 1,000 persons of Mozal, the largest enterprise of the Mega Project (of which 650 are Mozambican). Particularly, Moza Banana, working with Chiquita in production, processing and distribution, a banana production company that started operation in 2009 and will begin full-fledged shipment in 2011, has achieved employment of 18,000 people, showing a large impact by agricultural processing industry to employment.

Table 6.1.2 Comparison of Economic Impact

1.Company	Mega projects			Company of Agro-industry in Sturdy Area			
	Mozal	Sasol	Moma	New Horizontal	Sonil Fabrica	Condor Nuts	Moza Banana
2.Type of industry	Aluminum	Natural gas	Metals	Poultry	Tobacco	Cashew nuts	Banana
3.Investment 1 million\$	2,400	1,200	500	1.3	-	-	80
4.Employment	1,000 (650)*1	- (250)	425 (124)	Factory 186 Agri.farm 890	100 2,500	750 n.d	18,000 -
5.Market	Export	Export	Export	Domestic	Export	Export	Export

Note: *1 () means number of Mozambican persons

Source: Institute para a promocao de exportacoes, Institute de estudos socialis e economicos
JICA Study Team

6.2. Direction and Objectives of the Development Plan

6.2.1 Objectives of the Development

(1) Superior Objective of the Development

The objective of the development plan at the Nacala corridor zone is to carry out the development issues considered by the Mozambique government, at a local level. Among these issues, food security, expansion of the internal consumption market, increasing producers' income, improvement of living conditions of the population and sustainable use and conservation of natural resources can be pointed out; all those are market directed for the reactivation of local economy. According to these, it is possible to achieve the Millennium Development Objectives such as the reduction of poverty and hunger. Considering this background, several plans for agricultural development at central and local government level have been prepared namely the "Strategies for green revolution in Mozambique" (Estratégia da Revolução Verde em Moçambique), Action Plan for Food Production (Plano de Ação para a Produção de Alimentos: PAPA), Research Strategies, Agrarian Extension Strategies, and Strategic Plan for the Agriculture Sector Development (Plano Estratégico para o Desenvolvimento do Sector Agrário PEDSA 2010 – 2019).

In the Five-Year Plan of the Government up today, poverty reduction is considered as one of the global objectives, and "agriculture" and "rural development" are considered as major

sectors as development issues. The Third Plan presently in force, the improvement of productivity of sectors related to agriculture is considered as an individual sector. Also, in the Action Plan of the Five-year Plan of the Government, the Action Plan for Absolute Poverty Reduction (Plano de Ação para Redução da Pobreza Absoluta: PARPA II) (2006~2009), economic growth has special consideration, and it aims a reform centered in rural development.

On the other hand, concerning agriculture policies, the Action Plan for Agriculture Production (PAPA), approved in 2008 is part of the execution plan for the “Strategies for green revolution in Mozambique” prepared in 2007 and in order to reduce the dependency in the imports of food it considers the improvement of productivity and production of the main crops, stressing the importance of the value chain for food production. Also, “the Strategic Plan for the Development of the Agrarian Sector” (PEDSA 2010 – 2019) , presently under preparation, has as vision the “Achievement of a sustainable and competitive agrarian sector”, centered in the following development strategies.

- 1) Food security and improvement of nutritional conditions
- 2) Reinforcement of internal production competitiveness and improvement of farmers’ income
- 3) Conservation and sustainable use of natural resources

Moreover, the Strategic Plan of Development for Nampula Province 2010 – 2020 (Plano Estratégico de Desenvolvimento da Província de Nampula 2010 – 2020 : PEP), considers the following development strategies.

- 1) Promote economic growth
- 2) Organization of a participative type administration based on human resources development
- 3) Infrastructure implementation and environmental improvement
- 4) Development of social human capital

Also, according both to the Law of Local Entities of the State (Lei dos Órgãos Locais do Estado: LOLE), and to the Strategic Plan of District Development (Plano Estratégico de Desenvolvimento Distrital: PEDD), that is the basic administrative unit of the development, the reduction of poverty and economic development are the major objectives.

From the above, it is clear that the agriculture development of the Nacala corridor zone is coherent with the superior objective of the country, the agriculture sector, province and district governments’ development strategies so the plan has to contribute to achievement of this objective. For such, envisaging the “materialization of sustainable agricultural

development with environmental considerations”, the development plan needs to contribute to the following.

- 1) Development to assure food security and improvement of nutrition
- 2) Development in order to strengthen internal production competitiveness and improve income of farmers, considering the market
- 3) Development considering the conservation and sustainable use of natural resources

(2) Basic Guidelines

The agricultural development at the Nacala corridor zone according to the trilateral cooperation aims to achieve objectives based on a long term and sustainable commitment among the government of Japan, Brazil and Mozambique. As it is a long term plan, timely adjustments according to the presented conditions can be considered.

In order to achieve food security in the country, as well as the sustainable production growth of agricultural products, and to promote the increase of production for crops directed to the market, it is necessary to intervene in several sectors such as production, transportation, storage, processing and national and international trade. However, the efficiency and effectiveness of the intervention will depend on how the government will act concerning investments, coordination, and supervision, promotion of public projects and as promoter of each implementing entity.

In order for the government of Mozambique to perform such roles, it is necessary to support the government in the organization of a sustainable and competitive integral model centered in the Nacala corridor zone, considering the improvement of agriculture products directed to the national and international market, the improvement of producers’ competitiveness, sustainable use of water, forest and soil, strengthening and development of agriculture sector organizations.

For that, the activities listed below have to be accounted for and prioritized to be executed according to the established order.

- 1) Improvement of productivity : Technical development for income improvement, soil improvement, data bank, preparation of maps and agricultural environment zoning
- 2) Logistics: improvement of the system to reduce costs and losses, provision of agricultural tools and machinery
- 3) Agricultural support: Research development, agricultural extension, agricultural production, financing system (financial cooperatives, bank system), market organization and development and training of human resources, sustainability reinforcement

- 4) Promotion of agriculture diversification and products processing projects: Support to strategic clusters (grains, tubers, meat, fruit, cotton, timber, bio-fuel, vegetables)
- 5) Strengthening of competitiveness: Training and formation of human resources, products exports and organization of internal consumption system
- 6) Improve living conditions of producers: Execution of basic infrastructure such as housing, schools, energy, health care, roads, etc.
- 7) Sustainable agriculture extension and formation of agriculture sector experts: Capacity of answer to technological changes in the P& D system, technical verification, support producers' decision making, promote the formation of associations and cooperatives
- 8) Production financing: Establishment of a financial line for expenses and investment directed to agricultural families (individuals) and agricultural enterprises (companies)
- 9) Sustainability: Prepare policies to assure a minimum market by storing agricultural products to adjust the market, policies for exports promotion, mechanisms to assure the purchase from supporters
- 10) Environmental conservation: Promote the conservation of soil and biodiversity, prevention of soil erosion, recovery of vegetation close to water springs and conformation of ecosystems, reduction of burnings, preparing of policies to value environment related projects, preparation of a water resources inventory, and diversification of water resources use.

Said projects must be executed under clear and transparent laws, with the active and direct participation of the citizens or their representatives.

6.2.2 Zoning of the Target Region

Nowadays the sustainability represents a challenge for the development processes, and to overcome that, it is necessary to use all available tools and technical subsidies. The ecological economic zoning (ZEE) represents one of the main subsidies that contributes to the: orientation of public policies; actions focused on the environment; definition of priority areas; and investments of the Government and the civil society according to the characteristics of each region. The ZEE is also an essential information tool to support the planning and territorial management.

They were identified in Mozambique four studies that bring some information about the zoning of the Nacala Corridor, as follows:

- 1) General Agri-Climate Suitability for the Production of Cultures-project FAO/UNDP/MOZ/75/011, 1982; scale 1:1.000.000;

- 2) Nampula Forestry Reserves: Current Situation and Perspectives - GCP/MOZ/056/NET, 1998;
- 3) Economic-Ecological Zoning of the Forestry Resources of Nampula Province-project FAO/GCP/MOZ/056/NET, 1999; scale 1:1.000.000;
- 4) General Situation of the Water Resources of the Region – ARA Center North – Regional Administration of the Waters, technical report, 2006

Based on the above mentioned documents and on the field observations made during the two visits in the area of the Study, the suggestion, as per this work, is that the Nacala Corridor be considered as having four distinct areas (Figure 6.2.1). However it is important to notice that the existing information does not allow a clear identification of the situation of the soil, climate and water resources of the Nacala Corridor, special the soil. Therefore it is important to make a ZEE on a compatible scale and with all necessary variables to the good performance of the project of the Nampula Corridor agrarian development.

Area I (Priority area for conservation)

This area is located in Area II. It is an area very sensitive to environmental impact, for it covers springs of rivers that make up the water basins of Lurio and Liogonha rivers. The area is characterized by the presence of mountains with altitudes that varied from 500 to 1,700 meters. The annual water precipitation varies between 1,160mm to 1,800 mm. The vegetation is like mountain forest that is always green and is very crucial in the formation of the water system. It is included on this fragile zone the valley of the rivers Malema, Niualo, Nioce and Muanda, which are already suffering from an intense environmental impact by the human activity. The agrarian activity in this region must be reduced.

Area II (Simihumid area)

From the parallel 35°30'E to parallel 38°E. It covers the Districts of Mandimba, Cuamba, Malema, Gurue, Alto Molocue and part of the west part of Ribaue. It is an area that presents similarities with the Brazilian Cerrado in terms of vegetation (field observation) and with an annual precipitation that varies from de 1,150 mm to 1,650 mm, while in Brazil (cerrado) it varies from 1.200 mm a 1.500 mm. According information from ARA Center North, the area water balance is positive, indicating that there is a good agrarian potential. However, there is the necessity to make further studies on soils in order to understand its real potential. In Cuamba and Mandimba regions there are the production of commercial agriculture such as grains, vegetables, tobacco and reforestation.

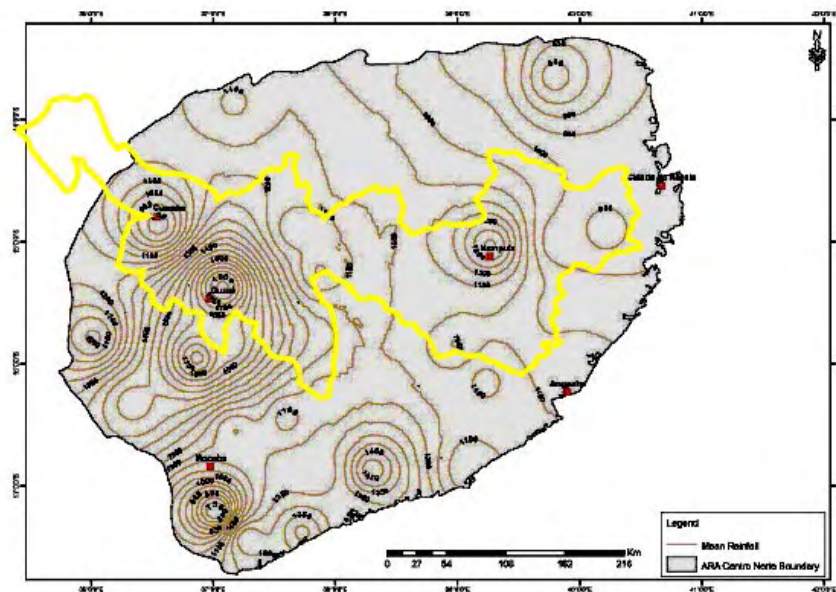
Area III (Transitional)

From parallel 38°E to the parallel 39°E. It comprises the Districts of Ribaue, Murrupula and the West part of Nampula. The vegetation is lower and the soils are more sandy (field observation) and it is similar to the transition area between the Brazilian Cerrado and Semi

Aride. As per the rainfall data, the precipitation varies from 1,150 mm to 1,200 mm. Following the Soil Potential Map of the Nampula province ZEE made by FAO/1999, most part of the soils were classified – in term of agrarian aspects – as been of level III (medium potential) and IV (low potential) with some areas of level II (high Potential). This classification was simplified due to the complexity of soils identifies by FAO ZEE, more than seventy types of soils were found.

Area IV (Semiarid area)

From parallel 39°E to parallel 40°15'E. It comprises the Districts of Nampula, Mogovolas, Meconta, Muecate and Monapo. The data shows that the precipitation decreases from West to East, which mean, from the country side to the ocean. Varying from 1,150 mm to 950 mm it concentrates only from December to April. The natural vegetation (field observation) has similarities with the Brazilian Northeast. The agriculture production follows months with better precipitation and types of soils such as cotton. And the most planted perennial culture is the cashew tree that resists better on the dry season. It is important to emphasize that, as per FAO ZEE from 1999, the agrarian production potential ranges from level I (high potential) to V (very low potential), going through the levels II (high), III (medium) and IV (low).



Source: ARA Center North, 2006

Figure 6.2.2 Map of Equal Rainfall Line

6.2.3 Objectives of Agricultural Development (Orientation of the Development)

Following the features of the agricultural sector in the aforementioned study area, we propose “the promotion of regional agricultural development beginning at agro-industry” for the agricultural development of the study area aiming at the advancement of the regional agriculture through supporting small-scale farm households which make up the majority of farmers and developing high value-added agriculture.

This proposal looks to establish the integrated system of agricultural production and agricultural processing industry which may lead to agro-industry. It is based on the synergy effect that is expected as stable agricultural production may be realized and the agricultural competitiveness may also be enhanced by elevating the competitiveness of agricultural processing industry. Namely, it is not a temporal refugee measure for excessive production of farm products via promotion of processing industry. It is nothing but a regional agricultural development aiming for stabilizing agricultural production through securing new markets and inducing various economic effects such as creation of jobs.

The agro-industry which we have set as a development target is called an agriculture-related industry. As an upstream industry, there is an agricultural production industry centering on agriculture that has the largest employment scale in the surveyed area. Meanwhile, as a downstream industry there are industries which provide seeds, fertilizers, agrichemicals, agricultural machinery and equipment in addition to distribution industry. In order to proceed with the regional development beginning at the agro-industry, we should put emphasis on the implementation of agricultural processing which enables the collaboration with agricultural production in which more than 90% of farm households of the total population are engaged and has the largest capability to form value added.

An increase in value added against the investment amount in agro-industry is generally larger compared to other industries. Stated differently, the productivity of capital is better, which we can understand from the capability to form value added stated in the previous Table 6.2.1. Increasing investments in this field has an extremely significant meaning to boost capital productivity in the whole surveyed area. In order to overcome the bottleneck of the small market and pursue the underlying development which the region potentially has in the surveyed area, the development of agro-industry must be the one focused on export-oriented agricultural processing industry.

6.3. Consideration of Counter Measures to Improvement Development Objectives

In a bid to promote regional development, we have proposed a regional agricultural development beginning at the broad agro-industry inclusive of production, distribution (including storage), processing and sales. We will examine the following four measures (improvement of agricultural productivity, promotion of agricultural processing industry, organizing farmers and maintenance of production fundamentals) as supporting measures to materialize the development objectives as mentioned above. These measures are in mutually complementary relationships and focused on how to realize the regional agricultural development beginning at agro-industry in future.

6.3.1 Improvement of Agricultural Productivity

As stated in Chapter 2, the yield of major crops (productivity of land) in Mozambique has been stagnating during more than 30 years in the past and remains in low productivity compared to other African nations (refer to Figure 2.2.1 in Chapter 2). The study area has the similar tendency as the other areas in Mozambique. The Ministry of Agriculture of Mozambique, the Agriculture Department of Nampula Provincial Government, and related countries and organizations (FAO or Food and Agriculture Organization, the World Bank, IFAD or International Fund for Agricultural Development and USAID or United States Agency for International Development) which support the agricultural development have pointed out the followings as factors for Mozambique's low productivity:

- (1) Possession of small land area and production form dependent on meteoric water
- (2) Manual agricultural production
- (3) Difficulty of market access (roads to deliver the products are not well maintained)
- (4) Production technology for market not well developed
- (5) Low-level input of materials for production such as fertilizers and improved seeds
- (6) Popular technology not suitable to the ability of farmers
- (7) System to diffuse technology is not established (absolute lack of persons to diffuse such technology and equipment for diffusing) and others

We can easily imagine these points, but this alone is not adequate for explaining the reason why the surveyed area and Mozambique have been suffering low-productivity for such a long time. Agricultural production in the study area is sustained by small scale farmers with their average land area of 1 ha. It is difficult to expect of small-scale farm households to make an investment for increasing income and production under circumstances where any price guarantee or risk guarantee is not secured. It is indispensable to recognize the management scale of farm households and the level of farming technology at the particular

spot, establish a proper technology system enabling to secure a certain profitability with low input in accordance with the agricultural ecosystem and implement policies including granting incentives (improvement of systems for sales and distribution of products, credit and so on) necessary for farm households to work on such technology to increase yield and disseminate technologies. Long-time low productivity is considered to be attributable to the imperfection of such comprehensive agricultural and supporting measures.

Measures against such issues should be examined as an individual project responding to the program which is set up for supporting “the promotion of the regional agriculture development starting at agro-industry” established as development objectives. Table 6.3.1 illustrates the factors for low agricultural productivity in the surveyed area and measures for improvement.

Table 6.3.1 Topics to Improve Productivity at the Study Area and Proposal of Countermeasures

Field	Target	Topic to be solved	Present situation	Counter measure
Cropping system	Slash & burn agricultural area (all target areas)	<ul style="list-style-type: none"> Degradation of soil fertility 	<ul style="list-style-type: none"> Shortened fallow period. Shortage of areas to allow shifting cultivation. Cassava and maize are mainly cultivated. 	<ul style="list-style-type: none"> Securing arable land in favorable locations Direct planting Soil coverage (green manure, crop residue, etc.) Crop rotation Improvement of weed control Usage of manure Fertilization Installation of a soil laboratory
	Slope land (R10 & R7 areas)	<ul style="list-style-type: none"> Soil erosion Degradation of soil fertility 	<ul style="list-style-type: none"> Farmers are engaged in tea industry since colonial time. Rain fed rice fields are developed in valleys Maize is a major crop. 	<ul style="list-style-type: none"> The same as above, and Contour cropping
	Sandy land (R7 & R8 areas)	<ul style="list-style-type: none"> Low soil fertility Drought 	<ul style="list-style-type: none"> Primitive agriculture is mainly practiced; growing cashew nut, cassava, or ground nut 	<ul style="list-style-type: none"> Improvement of intercropping system (sesame, groundnut, mung bean, buckwheat, etc.) Soil coverage Simple irrigation Fertilization Breeding of drought tolerant varieties
Cropping	Maize (Staple crop)	<ul style="list-style-type: none"> Serious insect (<i>Ostrinia furnacalis</i>) damage Mozaic disease, rust disease, bird damage Enrichment of nutrition Threat of hunger before harvest Drought 	<ul style="list-style-type: none"> Introduction of Quality Protein Maize (QPM) varieties by CIMMYT. Lack of laboratory for food nutrition Establishment of a seed production program of a variety with a short crop duration (Matuba; 90 days) by the government that could ease off starvation before harvest time. 	<ul style="list-style-type: none"> Improvement of cultivation technique (utilization of trap or barrier crops, etc.) High quality seed production and extension. Breeding of resistant varieties against the targeted diseases/damages Establishment of extension system of improved varieties. Provision of technical support for crop management of improved varieties Installation of a food nutrition laboratory

Field	Target	Topic to be solved	Present situation	Counter measure
	Cassava (Staple crop)	<ul style="list-style-type: none"> Occurrence of root rot disease caused by cassava brown streak (virus) disease (CBSD) Occurrence of cassava mosaic disease (CMD) Occurrence of cassava bacterial blight (CBB), etc. Breeding of drought tolerant varieties Breeding of highly nutritious varieties 	<ul style="list-style-type: none"> Development of a tolerant variety against CBSD (Nachinyaya) by IITA. IIAM has started the seedling multiplication of the tolerant variety by tissue culture technique since 2007, and IIAM-Nampula is growing the seeds (stems) that are to be distributed to producers. The high nutrition varieties have been developed by EMBRAPA, Brazil. 	<ul style="list-style-type: none"> NGOs worked on the dissemination of the tolerant variety, but the producers who can receive the service have been limited. Breeding varieties which are multi-tolerant against problematic diseases, such as CBSD and CMD Empowerment of the system for extension of improved varieties Provision of technical support for crop management of improved varieties Installation of a food nutrition laboratory
	Cashew nut	<ul style="list-style-type: none"> Occurrence Fungus disease: <ol style="list-style-type: none"> <i>Oidium anacardii</i> <i>Colletotrichum gloeosporioides</i> Occurrence of Insect disease: <i>Helopeltis</i> sp. 	<ul style="list-style-type: none"> A variety (5.12-PA) which is relatively tolerant to <i>Oidium anacardii</i> has been developed. Although IIAM-Nampula has obtained 'tolerant' variety seeds from EMBRAPA-Cassava & Tropical Fruits, Brazil, the growing tests have not achieved satisfactory results; the required characteristics of the variety have not been certainly fixed (the Brazilian law inhibits taking the seedlings out from the country). A variety which is satisfactory tolerant against <i>Colletotrichum gloeosporioides</i> has not been developed. Fumigation of agricultural chemicals cannot cover huge cultivation areas of the plant, and, moreover, small scale producers cannot afford the cost. The change to a more tolerant variety has not yet progressed. The Government has prioritized and started high quality seeds production. Varieties which are suitable for the respective agricultural conditions have not been fully developed. CLUSAhas started soybean cultivation financed by NORAD since 2003. The Action Plan for Food Production (PAPA) has designated soybean as one of the strategy crops in the country. The market has not been established. 	<ul style="list-style-type: none"> Identification of a tolerant gene against the diseases by means of biotechnology technique Breeding of tolerant varieties against the diseases Improvement of the cultivation technique to slow down the diseases
	Rice	<ul style="list-style-type: none"> Degradation of seed quality Low productivity (around 1 t/ha) 	<ul style="list-style-type: none"> The Government has prioritized and started high quality seeds production. Varieties which are suitable for the respective agricultural conditions have not been fully developed. 	<ul style="list-style-type: none"> Empowerment of the quality seed distribution system Breeding appropriate varieties in each region.
	Soybean	<ul style="list-style-type: none"> Improvement of crop rotation system Breeding of drought tolerant varieties 	<ul style="list-style-type: none"> CLUSAhas started soybean cultivation financed by NORAD since 2003. The Action Plan for Food Production (PAPA) has designated soybean as one of the strategy crops in the country. The market has not been established. 	<ul style="list-style-type: none"> A study on soybean (breeding, crop rotation, etc.) is practiced by IIAM. Promotion of domestic industries (soy milk, etc.) Promotion of small scale industries (feedstuff, oil, etc)

Field	Target	Topic to be solved	Present situation	Counter measure
	Irish potato	<ul style="list-style-type: none"> Production of national seed potato (it is imported from Rep. of South Africa, now) High production cost (irrigation, fertilizers, transportation, etc.) Reservation of lands for crop rotation Control of the entry of cheaper imported product from Rep. of South Africa 	<ul style="list-style-type: none"> The crop is mainly cultivated by producers which can afford the inputs, such as enterprises, and medium to large scale farmers. 	<ul style="list-style-type: none"> Improvement of seed potato conservation technique Improvement of fertilizers and agro-chemicals application technique.
	Vegetables	<ul style="list-style-type: none"> High production cost (seeds, irrigation, fertilizers, chemicals, transportation, etc.) 	<ul style="list-style-type: none"> Only producers who can afford the production cost and have an easy access to markets are able to cultivate them. 	<ul style="list-style-type: none"> Improvement of fertilizers and agro-chemicals application technique. Adoption of water-saving cultivation methods.
	Sweet potato	<ul style="list-style-type: none"> Enrichment of nutrition 	<ul style="list-style-type: none"> High carotene varieties have been developed. 	<ul style="list-style-type: none"> Empowerment of the extension system for improved varieties together with the provision of technical support for crop management Installation of a food nutrition laboratory
	Coconut (R7 area)	<ul style="list-style-type: none"> Occurrence of lethal yellowing disease 	<ul style="list-style-type: none"> Coconut industry has closed down because of the declined production due to the occurrence of lethal yellowing disease. The cause of the endemic has not been illuminated. 	<ul style="list-style-type: none"> Clearing up the cause of the lethal yellowing disease. Breeding resistant varieties against the endemic.
Forestry	Mainly R7 area	—	<ul style="list-style-type: none"> Forests are recklessly lumbered. Re-forestation has not progressed. 	<ul style="list-style-type: none"> Survey on deforested areas Collection and conservation of genetic resources of indigenous species Improvement and extension of deforestation technique Giving enlightenment to the residents about natural reservation Preparation of a public law for disciplined forestry promotion
Post harvest	All crops	<ul style="list-style-type: none"> Large harvest loss Poor storage technique 	<ul style="list-style-type: none"> A large portion of products, 10-40%, is lost during post-harvest processes. Degradation of seeds for the next cropping is the main concern of producers. Conservation of maize grains after harvest is not considered, which may contaminate with aflatoxin. 	<ul style="list-style-type: none"> Improvement of technical packages on farm management and its dissemination Survey on actual post harvest condition of maize Improvement of post harvest technique of maize which can be adopted by ordinary producers.

Field	Target	Topic to be solved	Present situation	Counter measure
Simple irrigation	Mainly R7 area	—	<ul style="list-style-type: none"> Streams and rivers are distributed in the sloped areas located 200 – 600 m above sea level, where potential sites for small scale irrigation exist. A middle scale farmer has prepared facilities for a small scale irrigation (Mutuali, Malema District) Simple irrigation facilities have been made and managed by villagers (Mutipa village, Mutuali, Malema District) 	<ul style="list-style-type: none"> Conduct of a survey on potential sites for small scale irrigation Conduct of a case study on existing small irrigation systems, and application of lessons learned Installation of small scale irrigation system through a participatory method
	Beef cattle (R7 & R8 areas)	<ul style="list-style-type: none"> Occurrence of sleeping sickness (endemic disease) infected by tsetse fly Value-added livestock technology (fattening, meat processing, etc.) 	<ul style="list-style-type: none"> Free vaccination is provided by the Government once a year. 	<ul style="list-style-type: none"> Promotion of vaccination against ordinary diseases Provision of veterinary service Preparation of high quality feedstuff
Processing	Poultry	—	<ul style="list-style-type: none"> Epidemics like Newcastle disease is popular. 	<ul style="list-style-type: none"> Promotion of vaccination against ordinary diseases Provision of small scale industry for processing cassava flour Utilization of cassava flour (bread, etc.) Provision of small scale industry for processing cassava starch Processing feedstuff using cassava leaves and stems Utilization of the cashew apple (jam, juice, etc.) Utilization of the cashew nutshell (the cashew nutshell liquid, etc.)
	Cassava	<ul style="list-style-type: none"> Improvement of value-added processing 	<ul style="list-style-type: none"> Fresh roots and the dry powder processed by domestic industry are taken as staple food. 	
	Cashew nut	<ul style="list-style-type: none"> Improvement of value-added production 	<ul style="list-style-type: none"> Cashew seeds are the only part to be processed. 	

6.3.2 Promotion of Agricultural Processing Industry

(1) Agricultural Cluster

The study area has a comparative advantage in the land-intensive agriculture because it has a vast arable land compared to its population. Processed cotton, tobacco and cashew nut have traditionally been exported from the area. In addition, the production of soybeans and sesame has been on the increase in recent years, and the agricultural processing field in the area is considered to be blessed with a large frontier. However, after visiting an agricultural processing company where we asked them some questions, we have known that lack of materials for processing lowered the operation rate of their factory and that the inadequacy of transportation infrastructure in addition to equipment and materials related to processing (vinyl, containers and labels) are main factors for flagging competitiveness. In the agricultural processing sector, potential resources are not utilized because the vertical and horizontal collaborations among the processing industry and production farms, further, distribution and related material industries are weak, and this is said to be an issue to be solved.

In propelling the agricultural processing industry, we will present strategy Agricultural Cluster as a development method in order to facilitate the inducement effect (synergy effect) of industrial development based on farm products that become materials for agricultural processing, primary, secondary and tertiary processing (final) products and related industrial sectors. A cluster is originally a geographical industrial accumulation, but here it means a group of industries related to the process from farm products as materials until its processing. The related industries starting from agro-industry are wide-ranging. Consequently, it means understanding a group of plural items closely related to input and output as a cluster. We consider that to understand a cluster narrowly will make it easier to propose effective measures because we can zero in on an economic development of the surveyed area.

(2) Selection of crops and processed products by Agricultural Cluster

In selecting crops and processed products to proceed with agricultural processing industry, we should review it while imagining the shape of the export-oriented final products with large value added taking into account the smallness of the market in the surveyed area. Viewpoints that the final products have a production potential in the surveyed Nacala Corridor, are easy to enhance export competitiveness, and have value added or an ability to create jobs are also important. Moreover, we will put an emphasis on the farmers' technological capability to respond and effects to production environment without changing the current agricultural form or type of agricultural management very much, in addition, consider production performance, export performance and export potential, and make a review.

From the viewpoints mentioned above, we propose the standards to set up preferential crops and processed goods as Table 6.3.2.

Table 6.3.2 Proposed Criteria Selection of Crops and Processing

Indicator	Crops	Processing
Production Potential	<ul style="list-style-type: none"> • There are a lot of cultivation farmers • The cultivation experience is enough • Yield can be secured by low inputs production material • Introduction of cultivation techniques are comparatively easy. • There is vastly a cultivation proper land. • Policy priority is high. 	<ul style="list-style-type: none"> • The raw material is abundant (Can various processing be done besides the raw material can be procured at a low price, and stably?). • Possibility of processing technology • Capacity of production infrastructure • experience
Export Potential	<ul style="list-style-type: none"> • Possibility for differentiation of the raw material • Possibility of stable supply of the raw material 	<ul style="list-style-type: none"> • Possibility of price competitiveness (Is there a possibility of improving the price competitiveness?) • Possibility of differentiation of the commodity • Scale of market
Possibility of Valued-added	<ul style="list-style-type: none"> • Possibility of benefit for farm households 	<ul style="list-style-type: none"> • Additional value (Is the additional value rate raised?) • Scale of employment absorption power (Especially, do it consolidate the labor benefited to the peasant?)? • Synergy effect to the industry and the supporting industry in the surrounding high? • Influence of the price fluctuation be reduced • Possibility of advancement promotion of the enterprise pressed

(3) Preferential Agricultural Cluster

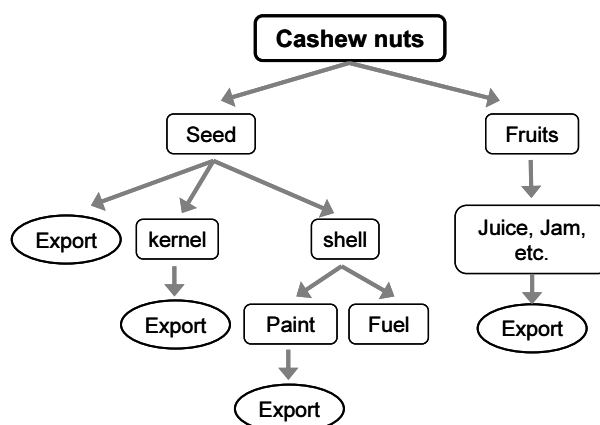
In most of the Agricultural Clusters, various products are produced from one kind of material crops and diversified products can be developed by using the by-products. Considering the economy of scope, intensifying the competitiveness of the aforementioned Agricultural Cluster is thought to be more practical as an approach to regional development and more applicable as a development model than choosing a specific agricultural processing product or crop and improving its productivity or export competitiveness. We will make a study of facilitating the development of agricultural processing industry with such a method. The preferential crops that are proposed toward the promotion of an Agricultural Cluster and its final products are as indicated in Table 6.3.3.

Table 6.3.3 Proposed Agricultural Cluster (Selection of crops and products)

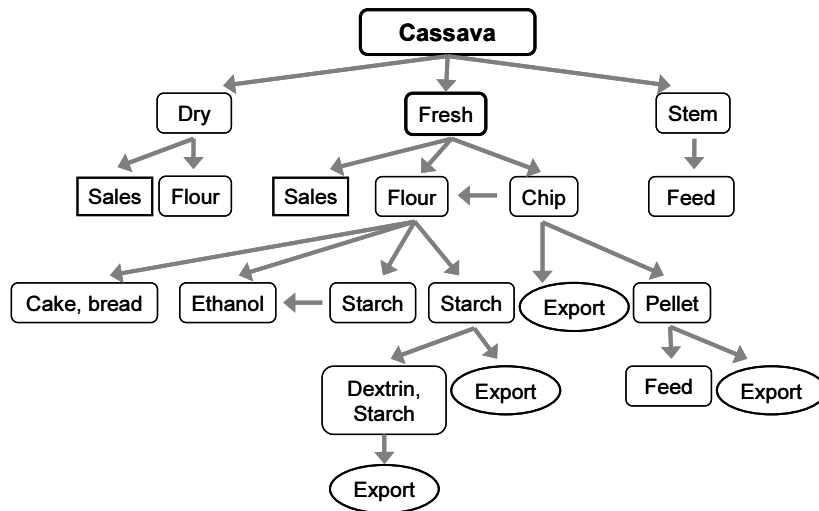
Cluster	Industries			Crops	Intermediate products	Final Products
	Primary	Secondary	Tertiary			
Mixed animal feed	Grain production, Livestock production	Mixed feed Milk products Meat products	-Production materials -Transportation, Marketing, stocks	Maize, cassava, Soybeans, and so on	Mixed feed	Poultry Beef Milk
Vegetables	Vegetables production	Frozen Food Industry, bottling & Canned, freeze drying	-Production materials -Transportation, Marketing, stocks	Tomato and so on		Tomato products(puree and so on), Fresh tomato
Fruits	Fruits production, industrial crops production		-Production materials -Transportation, Marketing, stocks	Cashew nuts, Banana, Orange, and so on	Bagasse, Wood fuel	Juice, Nuts, Fresh Fruit
Woods	Forestry, Kenaf production	Sawmilling, Plywood manufacturing Building Industry, Paper industry	-Production materials -Transportation, Marketing, stocks	Forstry, kena, Bagasse, and so on	Bagasse	Furniture Building Plywood Cardboard
Cotton	Cotton production	Textile industry Woven cloth Dyeing industry Garment	-Production materials -Transportation, Marketing, stocks	Cotton	Cotton string, Cotton cloth, Cotton seeds oil.	Cotton string, Cotton cloth,, Clothes, Margarine
Biofuels	Sugarcane production, Eucalyptus production, Palm production, Jatropha production	Charcoal production, Oil press disposal	-Production materials -Transportation, Marketing, stocks	Sugarcane, Eucalyptus, Palm, Jatropha and so on	Charcoal, Bagasse	Biofuel

Of Agricultural Clusters, we will show here as its development examples the examples of each concept of the clusters of traditional cashew nut and cassava crops and the cluster of assorted feeds commencing in soybeans that are expected as a new crop in the surveyed area.

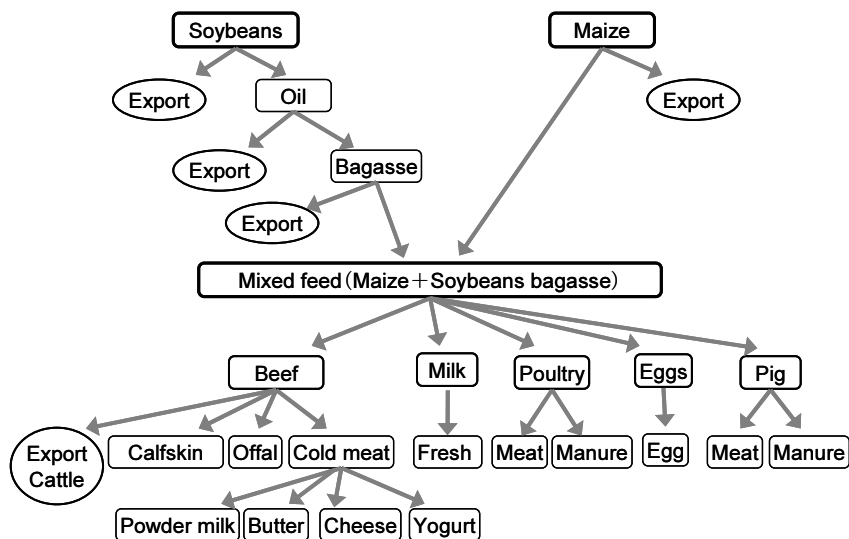
Example 1: The concept for the cluster of cashew production



Example 2: The concept for the cluster of cassava production



Example 3: The concept of the cluster of mixed feed



6.3.3 Development of Farmers' Organization

- (1) Encourage farmers understanding and participation in organized group efforts.

Many farmers in the Nacala Corridor area were displaced from the corridor as a result of the civil war, and returned to their home only recently. They find themselves in communities with little or no economic, social or political support. For instance they have very limited access to agricultural supplies, such as seeds, fertilizer, or pesticides. They have virtually no access to market information and limited logistics options for transporting their produce to market.

In the short-term these people will find it extremely difficult to overcome these obstacles. However if they work collectively, they can seek assistance from the government, traders, NGOs and others. The team observed that if there was a means for the extension officers of MINAG to cooperate and provide assistance to the farmers, the officers are very keen to do so. The traders are also in a similar position of wanting to cooperate with the farmers but are at a loss as to how to do so.

Therefore, many donor projects and NGOs consider that to organize farmers at the beginning of the project is very important.

The projects and NGOs should consider and encourage the beneficiaries themselves to identify their problems (obstacles against their well-being), and they recognize the merits of taking collective actions for tackling to their obstacles. It leads to strengthening their ownership to their activities and the sustainability.

Also it is important to notice the situation in Mozambique. In the 1980's there was an enforced collectivization of agriculture and a subsequent demoralization of the farmers, and many still show a strong reaction against the idea of 'Co-operatives'. The other is that the communities were devastated by war. It means that the communities are quite new and there are no traditional leaders. Therefore any future project will need to encourage self-organise the people in the Nacala Corridor, the project will also need to take into consideration promotion of understanding amongst the beneficiaries and leaders of the community, region and appropriate government ministries.

(2) Concretization of the purpose for form of organization

After specifying the development issues on the farmers and communities, it is important that the group defines its purpose/goal and planned activities. All members should share these goals and understand the meaning of each activity.

The function of the groups in the Nacala Corridor could be summarized as follow five functions (see the details in section 3.7.3);

- 1) to act as a recipient of agricultural extension services from MINAG and others
- 2) to strengthen the mutual assistance in the community
- 3) to consolidate produce in one place, and to collectively negotiate with traders and/or middle-men
- 4) access financial resources
- 5) to operate and maintain the communal property

These five functions do not always exist singly, and many organizations have more than one purpose. Some organizations established as a recipient of extension services may expand their activities to act as a collective negotiator with traders. Any group that obtained corporate status could open a bank account. This is quite meaningful because only groups

with a bank account can gain access to bank loans and rural development funds which local governments manage.

Also when groups operate, they need an action-plan, division of roles, rules/regulations t. They should be simply so everyone can understand them and can be amended easily if necessary in the future.

(3) Settlement of operational system of farmers' organization

The size and operational system of a group is dependent on its function and activities. Cases of existing groups in the Nacala Corridor area are shown below.

1) to work as a recipient of agricultural extension services from MINAG and others

The agricultural extension services from MINAG is provided to a group consisted of 20-25 farmers. The extension worker prepares a CDR in one member's farm, and provides the technical transfer and/or training for that member. Therefore it is most likely that the member lives near the CDR. As the group aims to receive the services, many of them do not have any institutional organization.

The NGOs formulate a group consisting of 10-40 farmers. As the members have to attend a weekly meeting, the members will need to live within a 5-kilometer radius. In the NGO activities, the group is considered a 'basic unit', and most groups have institutional organizations/systems, such as committees and a board. Some groups combine to establish an aggregated body.

2) to strengthen the mutual assistance in the community

The same as the 1).

3) to consolidate produce in one place, and to collectively negotiate with traders and/or middle-men

The advantage of consolidation and collective sales derives from economy of scale. IKURU is a case in point (see 3.7.3) where several larger groups (FORA) came together and established one Corporation (private farm) for the consolidation of produce and collective sales.

In operating consolidation of produce and collective sales there is a need for close coordination among member groups. Most of the basic units started from the recipient of agricultural extension activities. Through these activities, they became familiar with the operation of their organization and developed their abilities. Then eventually they could manage more complicated activities.

4) access to financial resources

The accessibility to financial resources in the Nacala Corridor area is quite limited. In order to receive any loan, an organization should be registered and hold an open bank account, but the procedure for registration is quite bureaucratic and inconvenient for rural residents. Even if they succeed in registration, few organizations can access a loan. CLUSA gives its guarantee for selected good performers (emerging farmers) when they apply for a bank loan.

Some districts provide some support through the Rural Initiative Fund (low interest loan) for the people and organizations having a bank account. Many recipients of the fund purchased agricultural equipment (tractor, cow and so on), and they not only utilize them for their own farm, but also earn the rental fee from hiring out the equipment.

5) to operate and maintain the communal property

The size of the organization for operating and maintaining the communal property varies considerably. However, whatever size, the organization is always needs to formulate an action-plan, regulations for operation and maintenance of the communal property.

(4) Capacity Building Activities

1) Leadership Training

It is said that the capacity of leaders always influences how sustainable an organization is. Especially, it is important to find people for leadership capability and to build own that capacity as a leader. These people are not always the same as traditional leaders and/or elder people.

The talented person is likely;

- To have an awareness of the problems which the community has
- To be expected to work pro-actively as a Community Change Agent
- To have high communication skills

These points also need to be developed in leaders, so the persons to be leaders should obtain them through on-the-job training.

2) Training of members

In the Nacala Corridor area, many in the over 30 age group have not had enough public education for various socio-economic reasons. Therefore, their capacity for acquiring new information (knowledge and technology) is quite low, so that the training for these members should be done step by step. The required training will depend on the purpose of the job, but common attributes are listed below;

- Information sharing
- Settlement and management of rules/regulations

- Operation of meetings
- Plan making
- Accounting and management of property
- Operation and maintenance of common property
- Monitoring and evaluation
- Enhancement of participation of vulnerable people

(5) Who leads the activities to organise farmers?

The activities to organise farmers in the Nacala Corridor area have been done by the MINAG extension workers, international and local NGOs, and private companies. The extension workers of MINAG and private companies have focused on issues related to agricultural technologies. NGOs have provided the beneficiaries with cross sector support related to these problems, like agricultural productivity, income generation, infrastructure, health, education, safe water and sanitation. Also some NGOs support that people/organizations in implementing marketing activities.

MINAG's priority is to increase the number of farmers who receive extension services. As a consequence MINAG has not been able to provide comprehensive support like the NGOs to the farmers/organizations. NGOs also have some limitation because they have to work within the framework of donor projects. Both the MINAG and NGOs have small number of extension workers, and work within limited budgets. Thus they divide their respective working areas in order to maximise the extension area covered without any duplication.

In order to enhance the rural development through farmer organizations, the current demarcation between MINAG extension services and NGO activities might not be so effective. There is a room to consider more effective cooperation systems, which can strengthen the advantages of both MINAG and NGOs.

6.3.4 Development of Infrastructure for Production

(1) Water Resources Development

As stated previous 3.1.2, the water resources development potential in the Study Area might be limited because of the Area located on the foot of the hydraulic border mountains. Water demands for irrigation, domestic water and for animal raising, for agro-industry for the regional agricultural development will increase rapidly. Therefore it is necessary to confirm the water resources development potential for the regional agricultural development in the Study Area.

In order to analyze the water development potential, the existing data on precipitation and volume of runoff shall be collected and analyzed. And the present meteo-hydrological observation net work shall be reviewed. In the case of the present data are not sufficient to determine the development potential, the improvement of observation net work shall be

implemented in the first stage of the Program as a part of Capacity Development of Agricultural Research and Extension Project. The study of water resources development potential will be conducted under the collaboration together with Northern Central Regional Water Resources Administration office.

(2) Irrigation Development

In order to improve the agricultural productivity in the Study Area, the irrigation development is inevitable for the cultivation in dry season and supplementary in rainy season in the area where the water resources available. The process of the irrigation development can be expected as follows:

- 1) Provide the dissemination campaign to the farmers in the potential irrigation area through the study tour to the existing model irrigation system and learn the effects of irrigation in the crop productions and required responsibility of beneficiaries directory from beneficiary farmers of existing irrigation system. Before the campaign, the effort of extension works to prepare the model irrigation system under the appropriate operation, maintenance and repair of irrigation system and method of water saving irrigation and cultivation by farmers / water users association..
- 2) After the confirmation of potential irrigation development area, the irrigation development plan shall be formulated by the participation of expected farmers/beneficiaries for the sustainable operation and maintenance of irrigation system. Under the participatory plan formulation, the expected farmers can aware the necessity of irrigation, belongingness to the community, and responsibilities of beneficiaries and necessity of collaboration works for the irrigation. On the process of participatory planning, the demarcation of roles of farmers/farmers group, the government/NGO and other stakeholder for the construction and operation and maintenance stages shall be identified and confirmed.
- 3) In case medium to large scale irrigation potential confirmed, environmental and social consideration shall be more important for the irrigation development.

(3) Access and Community Roads

The primary and secondary roads in the Study Area are maintained and developed by the ANE of MPWH based on their plans. In order to achieve the agro-industry oriented regional agricultural development, the access road development from the production field to the main / secondary roads is required.

Because of the access and community roads are small scale and limited beneficiaries, the development of access/community roads are expected to be developed by the beneficiaries' participatory approach. The requirement of access/community roads development, how to develop and maintain the roads and what the beneficiaries can do and need the supports are

discussed in their community meetings. They are compiled as a proposal by the participants to the district government through extension workers. The district government will conduct the appraisal of proposals from community as competitive base. And the priority of proposal for access/community roads will set for the implementation schedule in period between 2 and 5 years in the district. Through these process, beneficiaries will aware the belongingness of community and ownership of roads and as actors of regional development. It is expected the government support shall be limited to provide materials and equipment required for the construction and maintenance, other input shall be arranged by beneficiaries

Based on the measures in order to achieve the development objectives, the proposal support programs and projects will be as follow, Table 6.3.4.

.

Table 6.3.4 Proposal of Support Programs / Projects

Strategic objectives of agriculture development: Regional Agriculture Development based on processing of products		Proposal of support programs/projects					Zoning				Priority		
Issues	Objective	Project	Activities	I	II	III	IV	Urgent term	Short term	Medium term	Long term		
Increase of productivity	Increase of productivity	Development of technologies to increase productivity	Productivity improvement by agricultural environment, improvement of low input type technology, distribution of selected seeds, etc.		○		○	○					
		Soil improvement	Soil improvement, balanced fertilizer, etc.		○		○	○					
		Organization of test data	Organization of meteorological data, soil data, etc.		○		○	○					
		Reduction of logistics costs	Preparing logistics infrastructure		○		○	○					
Improvement of logistics system	Improvement of logistics system	Improvement of logistics losses	Development of post-harvest treatment technology, storage organization, etc.		○		○			○	○		
		Market structuring	Organization of market information, product distribution structure, etc.		○		○			○	○		
		Research strengthening and organization of tests	Soil analysis, tests, preparation of soil typology map, selection of proper products, crop disease prevention,		○		○	○					
		Strengthening of agriculture dissemination system	Training of promoters, preparation of extension material, support for the formation of farmers' organization, cooperatives, etc.		○		○	○					
Strengthening of agriculture support services	Strengthening of agriculture support services	Micro-financing support	Financing for farmer families, etc.		○		○			○			
		Support for the improvement of agricultural management	Establishment of a system for annual crops, irrigation system installation, etc.		○		○	○					
			Agriculture diversification, organic agriculture, introduction of small animal farms, etc.		○		○	○			○	○	
		Support strategic clusters	Agriculture mechanization, animal pulling, etc.		○		○	○			○	○	
Promote agriculture diversification Promote processing of agriculture products	Promote agriculture diversification Promote processing of agriculture products		Installation of simple agriculture products processing, irrigation facilities, etc.		○		○			○			
		Land use plan	Land use map, classification map, Zoning map etc.		○		○	○					
		Agriculture	Preparation of development guidelines		○		○	○					
		Industry	Preparation of development guidelines		○		○	○					
Development strategies by sector -Preparing of development guidelines	Development strategies by sector -Preparing of development guidelines	Transportation	Preparation of development guidelines		○		○	○					
		Commerce	Preparation of development guidelines		○		○	○					
		Manpower training	Technical training		○		○	○			○	○	
		Organization of the system	Organization of the system		○		○	○			○	○	
Improvement of living	Improvement of living	Basic infrastructure	Basic infrastructure, infrastructure for education,		○		○	○			○	○	
		Definition of protected areas	Definition of areas for protection and conservation		○		○	○			○	○	
		Recovery of devastated land	Reforestation projects, agroforestry		○		○	○			○	○	
		Conservative type agriculture	Cultivation without plowing, intensive husbandry, agroforestry, soil erosion prevention, etc.		○		○	○			○	○	
Environmental conservation and restoration	Environmental conservation and restoration				○		○						
					○		○						
					○		○						
					○		○						

6.4. Role of Related Organizations between Japan and Brazil

The JICA project for the agricultural development at the Cerrado (PROCERRADO Project) that transformed the huge Brazilian tropical savannah (cerrado region) into a major grain producer, is one of the largest JICA projects in the context of the Japanese government official development aid (ODA). In order to make use of this valuable experience at the tropical savannah in Mozambique, the cooperation between Japan and Brazil is effective, for the former can contribute supplying the capacity of preparation and execution of development projects while Brazil can supply technology and experts that were formed due to the execution of the Cerrado project.

The technology accumulated with the execution of the Cerrado project in Brazil by the Brazilian Agricultural Research Corporation (EMBRAPA), Technical Assistance and Agricultural Extension Company (EMATER), National Service for Rural Training (SENAR), Agricultural Development Company (CAMPO), and others will be put into use through the assignment of Brazilian experts. Such institutions have experience not only in projects related to the Cerrado but also in development projects at the semi-arid region of Brazilian Northeast, so there are great possibilities to make good use of such experience.

EMBRAPA particularly has a regional office at Accra, in Ghana, and it already has experience of cooperation with African countries. EMBRAPA has considered the African savannah as the “new cerrado” with a future potential to transform itself into a major world level food producer, thus it has started investigations to verify the possibilities to apply the results of the cerrado development in the African savannah in cooperation with FAO and the World Bank.

For the execution of the present program, the government of Mozambique plays the role of coordinator between the related Ministries and the local governments, centered in the Ministry of Agriculture. Also, the government of Mozambique has placed the present Program in high priority due to its own development policies and will supply the financial resources and personnel considered necessary. According to the JBPP, there is a commitment from the government to provide all necessary facilities by occasion of the acceptance of all members of the Japanese and Brazilian Study team members as well as experts. Moreover, it is necessary for the government of Mozambique to carry on with the policies related to modifications in the regulations concerning the assurance of budget.

6.5. Implementation Methods

The ProSavana-JBM is expected to be implemented in two phases. The first phase (program preparation stage) will execute 4 projects under technical cooperation between Brazil and Japan in order to establish an agricultural development model for the tropical savannah in Mozambique. 1) Basic study: expected to be finished by March 2010, 2) Project for the improvement of research capacity: Start in 2010, 3) Plan for the Integral Agricultural

Development at the Nacala Corridor Zone (Master Plan): Due to start in 2011, 4) Structure of a development model at communities level (pilot project); due to start in 2011. Those 3 projects of technical cooperation should be implemented simultaneously, and multiplier effect is expected with cooperation. The second phase considers the expansion of the program with financial cooperation according to the results of the first phase. It would start in accordance with the starting year of the Fifth Five-year Plan of the Government, approximately in 2015.

Following, the proposal for the execution period of each project is presented.

Table 6.5.1 Implementation Period Plan

ProSavana-JBM	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
First Stage										
1) Preliminary Study	→									
2) Project of Improve Capacity in Mozambique	←	←	←	←	←					
3) Integrated Master Plan for Agricultural Development of the Nacala Corridor Area		←	←	←	←					
4) Project of Establishment of New Models of Development in Rural Communities		←	←	←	←					
Second Stage										
Implementation of the Programme						←	←	←	←	←

Both Study Teams of Brazil and Japan conducted an analysis of the existing data, discussions, exchange of opinions, interviews and field investigation, together with the Mozambican counterpart. As a result, it was defined that the research capacity improvement project and pilot projects should take into consideration the following.

- Promotion of a sustainable and social inclusive type development based on existing information and products
- Promote an integral system considering production, processing and logistics.
- Type of development with capacity of answer to needs at local and global level
- Development of an agricultural block based on the railroad net along the corridor, in order to establish strategic clusters in the region, under the direction of the central government
- During the first phase, the basis for the development will be established at commercial areas and along the railroad. At the second phase, areas far away from the railroad will be considered.

Along the Nacala corridor there are two areas with characteristics similar to the Brazilian cerrado and semi-arid. We propose to implement the pilot project at these two areas (Area II and Area IV in the zoning simultaneously). This project has as objective to make the population in the area put into practice the obtained results aiming that a larger number of producers put into consideration this type of production process.

Concerning the definition of the research center, it will be revised at the preparatory study for the project of research capacity improvement with the participation of Embrapa. It is expected that Embrapa participates in the conduction of the following:

- Study of soil (classification, fertilizers)
- Collection of meteorological data
- Map with GIS information in the area of the corridor
- Elaboration of a plan of seeds and agroecological zoning
- Consideration of strategic cluster
- Technical applicability of crops (varieties, fertilizers)
- Awareness raising for soil and water conservation

For the execution of the PRODECER project in the cerrado, CAMPO, a private company with the participation of Brazil and Japan was created to be responsible for the planning, coordination and supervision of the project, performing as coordinating entity. For this reason, we propose the creation of a trilateral coordinating institution also, to promote the execution of the present program in order to reduce the influence of changes in the government and variation of the economic conditions in each country. At Mozambique, where the program is to be implemented, there are many institutions involved such as the Ministries of the Central Government, regional and local governments, besides the private sector and NGOs. So, it is very important for the Ministry of Agriculture in Mozambique to effectively coordinate the relationship between these institutions. According to the situation, the creation of a new institution with more power (such as the Nacala corridor region development corporation), should be considered.

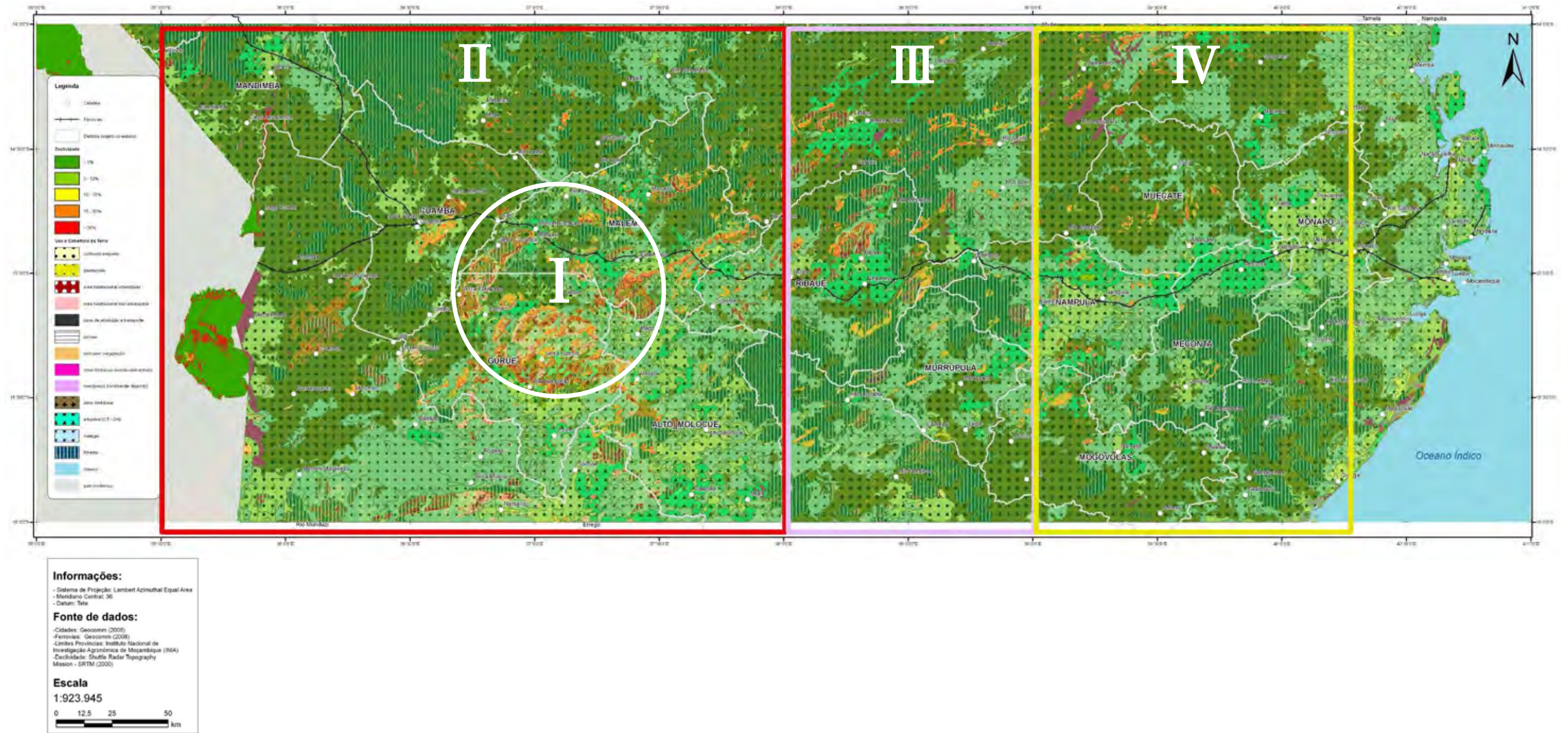


Figure 6.2.1 Zoning Map of Nacala corridor

CHAPTER 7 EVALUATION OF THE FIRST PHASE OF THE PROJECT

7.1. Needs of the Project during the First Phase

It is clear that many aspects of the knowledge accumulated during the development projects at the Brazilian cerrado and semi-arid can be used to contribute in the increase of agricultural production at the Mozambique savannah. However, there are significant differences between the Brazilian cerrado region and the Mozambique savannah concerning socioeconomic conditions. Thus, in order to make it real the agricultural development at the Nacala corridor zone at the Mozambique savannah, it would be more effective to establish first a “model of agriculture development” proper to the conditions of the zone, in order to be expanded. On the other hand, the pioneer project in the development of the Brazilian cerrado, PROCERRADO certifies that technical cooperation applied together with economic cooperation works favorably.

So, during the preparatory stage of activities for the program that will be part of the “model of agriculture development”, both Japan and Brazil will implement the technical cooperation. This is a preparatory activity to allow the efficient and effective implementation of the program’s projects necessary for the urgent and short term strategic plans also. From the experience of the “Prodeder” project the “results of research and investigation” and the execution of “pilot projects”, provided very positive results at the moment of the project implementation. So, the following projects that are short term strategic plans will be implemented during the preparatory stage of the program, corresponding to the first phase.

- (1) Project to increase the capacity of research
- (2) Study for the Plan of Integral Development in the Nacala corridor zone
- (3) Project to organize the system of a development model at communities’ level

7.2. Project to Increase the Research Capacity

In order to identify the needs of support for agriculture development considering technology for soil improvement and introduction of new crops and agricultural products at the Nacala corridor zone, together with the Institute of Agrarian Investigation in Mozambique (Regional Research Center of Nampula and Mutuali regional), research at investigation centers level to improve technology for agriculture production will be conducted.

Certified technologies will be applied to the pilot projects at level of 3) Project to organize the system of a development model at communities’ level; at the same time, technical extension will be put into practice with the project implementation. Moreover, the implementation of the project will strengthen IIAM’s capacity.

1. Project Name	Project to improve the capacity of research		
2. Implementation scheme	Project of technical cooperation	3. Implementing entity	Ministry of Agriculture / IIAM
4. Summary of the project			
(1) Superior Objective Improve agriculture production at the Nacala corridor zone.			
(2) Objective of the project Improve the research capacity of IIAM for the ProSavana-JBM project			
(3) Expected major results			
1) Identification of appropriate area for agriculture in the Nacala corridor zone			
2) Identification of soil improvement technologies in the Nacala corridor zone			
3) Identification of proper technology for cultivation for products at the zone of Nacala corridor			
4) Identification of proper technology for animal farming at the zone of Nacala corridor			
5) Identification of strategic cluster			
(4) Estimated implementation area Two sites: Zone close to the IIAM Zonal Station in Nampula and the experimental agrarian station of Mutuali			
(5) Contents of main activities			
1) Evaluation of soil conditions at the Nacala corridor			
2) Meteorological data collection in the Nacala corridor			
3) Formulation of GIS map in the Nacala corridor			
4) Consideration of agricultural environmental zoning			
5) Set up the criteria for the selection of the pilot area			
6) Selection of pilot area			
7) Evaluation of technology for soil improvement			
8) Experiences in the cultivation of crops in the zone of Nacala corridor			
9) Identification of products to be promoted			
10) Experiences in animal farming at the zone of Nacala corridor			
11) Identification of animal farming to be promoted, among others			
12) Consideration of strategic cluster			
5. Contents of main contribution			
(1) Japanese side	(2) Brazilian side	(3) Mozambique side	
• Assignment of experts	• Assignment of experts	• Assignment of counterpart	
• Supply of equipment	• Supply of equipment	• Supply of land and installations	
• Costs of the project	• Training of counterpart in Brazil	• Local costs of the project	
6. Implementation period Start: June 2010 Finish: May 2013 (Duration of the project: 3 years)			
7. Observations —			

7.3. Study for the Plan of Integral Development in the Nacala Corridor Zone

In order to reactivate local agriculture at the Nacala corridor zone, a Development Study having as starting point the development guidelines for agriculture and agroindustry will be conducted. Said guidelines will allow the organization of a Plan of Integral Agricultural Development (Master Plan), who, in its turn has as objective strengthening competitiveness of agricultural products of Nacala corridor, with an integral and multi-sectorial approach. Also a financial cooperation plan will be prepared for the implementation of ProSavana-JBM.

1. Project Name	Study for the Plan of Integral Development in the Nacala corridor zone		
2. Implementation scheme	Development Study	3. Implementing Entity	Ministry of Agriculture / Ministry of Planning / Province Government (Nampula, Niassa, Zambezia) / District Government
4. Summary of the project			
(1) Superior Objective Development of regional economy at the Nacala corridor zone			
(2) Project Objective Preparing a Plan of integral agricultural development in the Nacala corridor zone (Master Plan) to promote regional development, being the agroindustry the starting point			
(3) Major expected results			
1) Preparing a sustainable development plan related to agriculture, animal farming, industry, and trade and logistics infrastructure.			
2) Preparing measures to strengthen market competitiveness by increasing productivity of agricultural products			
3) Preparing measures to increase added value to products			
4) Preparing measures to increase the income of local residents			
5) Preparing measures for environmental conservation			
(4) Estimated implementation area All zones around the Nacala corridor			
(5) Contents of main activities			
1) Execution of basic investigation (development conditions and analysis of issues in the Study area)			
• Situation of soil resources distribution			
• Agricultural environment zoning			
• Impeding factors to the development: infrastructure (roads, railroads, ports, irrigation, logistics, market, etc.), structure of production, human resources, institutionalization, financing, etc.			
2) Evaluation of development policies and identification of impeding factors (poverty reduction, economic reactivation, regional economic integration, etc.)			
3) Elaboration of basic infrastructure for development strategies			
• Population, internal demand, possibilities for exports, volume of transportation supply, volume of goods supply, etc.			
4) Preparing proposals for development strategies			
• Evaluation of regional projects for the organization of producer zones			
5) Elaboration of development plans (programs / projects)			
• Evaluation of development priorities			
• Evaluation of the implementation system			
• Cost estimation of the project			
• Elaboration of implementation plan			
• Elaboration of financial cooperation plan			
6) Evaluation of the project, among others			
5. Contents of main contributions			
1) Japanese side	(2) Brazilian side	(3) Mozambican side	
• Assignment of experts	• Assignment of experts	• Assignment of counterpart	
• Preparing of material and equipment needed for the Study	• Preparing of material and equipment needed for the Study	• Supply of offices for the execution of the Study	
6. Implementation period Start: June 2011 End: May 2013 (Duration of the project: 2 years)			
7. Observation —			

7.4. Project to Organize the System of a Development Model at Communities' Level

Activities to be implemented in order to achieve agricultural development at level of communities will be evaluated through the conduction of pilot projects and thus, organize a "model of agricultural development". Candidate communities to be selected for the execution of projects should be located at the priority zones established in the Nacala corridor zone, preferably close to the experimental stations, to optimize research capacity. The implementation of pilot projects includes technical extension activities and training of personnel.

Besides, in relation to items which results can be verified in the short term in 1), the pertaining activities will start as pilot project.

1. Name of the project	Project to organize the system of a development model at communities' level		
2. Implementation scheme	Project of technical cooperation (Pilot Project)	3. Implementing entity	Ministry of Agriculture/Province government of Nampula/District governments
4. Summary of the project			
(1) Superior Objective Implementation of ProSavana-JBM projects			
(2) Objective of the project Organization of several models for community development adequate for the influence area			
(3) Expected major results			
<ol style="list-style-type: none"> 1) Identification of necessary conditions through results of research to adequate them locally 2) Identification of implementation methods of technical extension and human resources training 3) Identification of roles for the Ministry of Agriculture, province and district governments and NGOs among others, considering projects of communities' development 4) Preparing a model of development for communities 5) Preparing of a manual for the execution of each development model for communities 			
(4) Estimated implementation area Province of Nampula (Zones near Nampula and Mutuali)			
(5) Contents of main activities			
<ol style="list-style-type: none"> 1) Evaluation of demonstrative methods for the master plan development methodology and results of investigations 2) Conduction of technical training for agriculture extentioner and farmers representatives 3) Conduction of seminars related with projects for the development of communities, directed to personnel related to agricultural development 4) Collection of data and information by the execution of pilot projects in order to allow the selection of farmers and the respective groups 5) Organization of a system of organizations and farmers groups management, according to the activities objectives 6) Conduction of technical training directed to farmers, respective groups, and cooperative 7) Consideration of some development model for village 8) Evaluate the methodology of projects execution for each model of communities' development 9) Organize activities of promotion and impeding factors for each model of communities' development 10) Formulation of implementation manuals for each village model 			
5. Contents of main contribution			
(1) Japanese side	(2) Brazilian side	(3) Mozambique side	
<ul style="list-style-type: none"> • Assignment of experts • Supply of equipment • Costs of the project 	<ul style="list-style-type: none"> • Assignment of experts • Supply of equipment • Training of counterpart in Brazil 	<ul style="list-style-type: none"> • Assignment of counterpart • Supply of land and installations • Local costs of the project 	
6. Implementation period Start: June 2011 Finish: May 2013 (Duration of the project: 3 years)			
7. Observations —			

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

1. The present report contains the results of the Study carried out in the scope of the “First Mozambique Survey” started on September 2009 at the 12 districts pointed out by the Ministry of Agriculture of Mozambique, as the ones comprising the “Nacala Corridor”. The Study area comprises 600 km in the East-West direction, parallel to the National Roadway 13 and the railway and the watershed that crosses the districts in the North-South direction. This area has a diversified natural and social environment. Roughly dividing, the North shows little rainfall volume and is a semi-arid zone, similar to the Brazilian caatinga. On the other hand, rainfall is more abundant in the West and EMBRAPA points out that out of the 12 districts of the Study Area, there are large potential agricultural areas similar to the Cerrado that admits mechanization

2. The agricultural development at the Nacala corridor zone in the tropical savannah in Mozambique can be achieved through the good use of the knowledge and experiences accumulated with the example of the Brazilian cerrado development project; conducted previously to the project of the savannah agriculture. With the introduction of a similar agricultural development, economic development of Nacala corridor is expected and thus assures food security, alleviate poverty and increase income of farmers’ families at the project study area. Also it will be possible to contribute to the achievement of the “United Nations Millennium Objectives” (MDG), which aims to eradicate extreme poverty and hunger worldwide. Based on the results of said program, it will be possible to contribute to the local development of farmer communities and agriculture at the African tropical savannah in the future, and so contribute to the economic development of Africa and consequently food security worldwide. Said facts validate and show the extreme importance of ProSavana-JBM and its importance to be implemented as soon as possible.

However, there is not enough detailed information about natural and socio-economic conditions of the Nacala corridor zone, as well as about the existing economic activities. As consequence of experiences accumulated both by Japan and Brazil through the conduction of the development project in the cerrado, we consider it necessary to conduct the pertaining research to allow the program to materialize into projects, through the execution of pilot projects and simultaneously to prepare a proper development plan.

3. At the final stage of the Study the Brazilian side (EMBRAPA) provided the following recommendations concerning agricultural development at the Nacala corridor region, considering also results of the study they independently conducted.

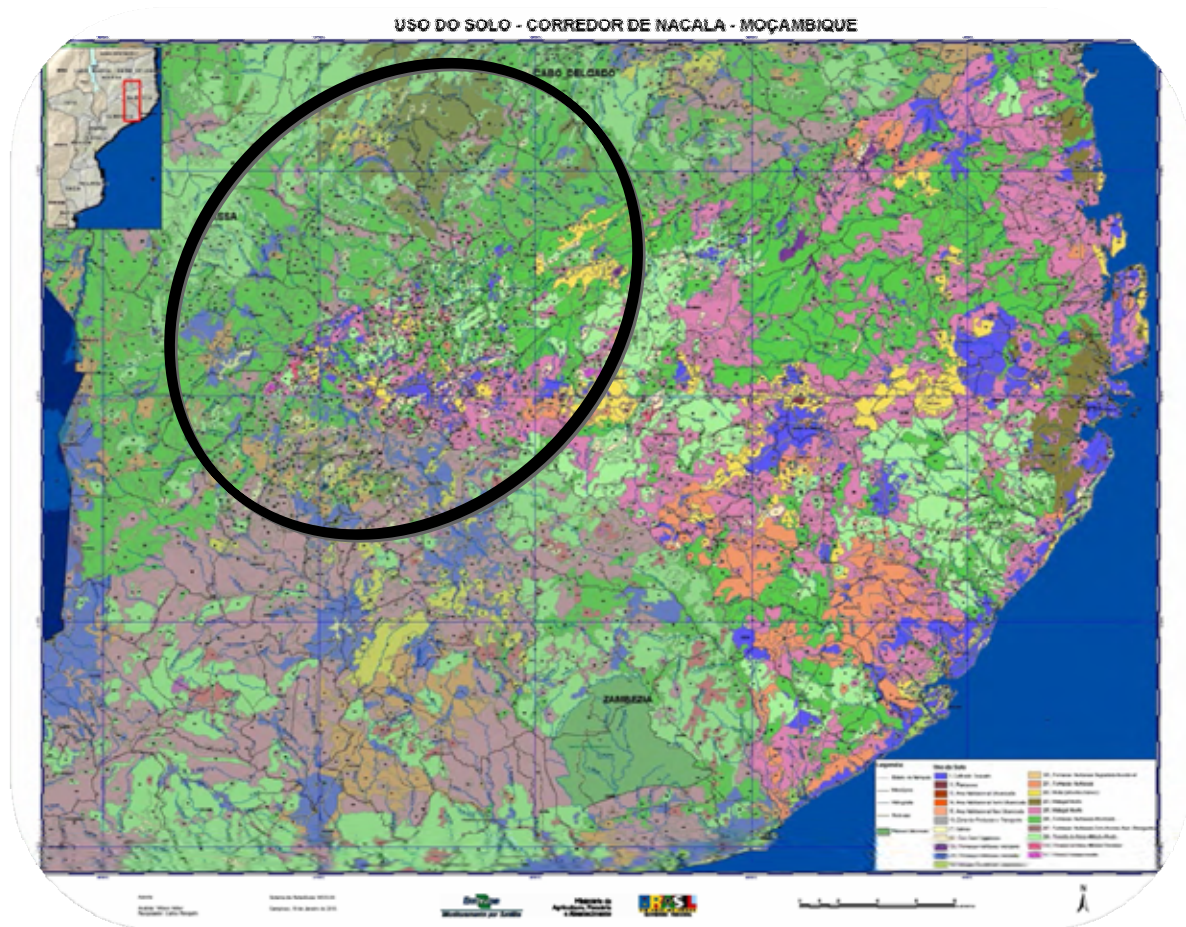
1) The present “Preparatory Study” considers the provinces of Nampula and Niassa and part of Zambezia province along the National Roadway 13 as the Study Area. However, in this

region ① There is no land proper to develop large scale agriculture ② In this region there is no soil similar to the cerrado (except the small farmers producing tradable products at the south-east of National Roadway 13).

These observations leave two issues concerning the development of a market directed agriculture in this limited area. Thus, ① Limitations would arise in the contribution that could be made by the Brazilian side concerning the introduction of genetical resources (seeds) and technology for a commercial agricultural that could be applied at the present area. ② Therefore, (for the moment), it is necessary to consider to increase income of small and medium farmers dispersed in the area by increasing the productivity of the existing crops.

2) On the other hand, EMBRAPA Survey Team has identified the existence of soil similar to the Brazilian cerrado distributed in an extension of 6,400,000 ha at the northwest of the Nacala corridor in the provinces of Niasa and Nampula. This soil, similar to the cerrado covers approximately only 12% of the present study area as specified in 1) above (the remaining 88% is distributed out of the 12 districts along the National Road 13) .

The location of the 6,400,000 ha is shown in the following map.



Source: Data from the EMBRAPA presentation at the "International Symposium" (3/17)

3) Therefore, Brazilian side (EMBRAPA), considers that it is important to include the 6,400,000 ha of 2) in the Study Area, besides the area along the National Road 13, object of the present Program “Support the income increase of small and medium farmers”, to allow investments in agricultural production at commercial scale.

This new proposal was later supported by the Ministry of Agriculture of Mozambique. According to it, on March 18, 2010, the proposal was approved and said area is to be included in the following Study, according to the Minutes of Meeting (annex) signed by the three parts (JICA’s Vice president, ABC General Secretary and the Minister of Agriculture of Mozambique). The proposal exposed in 8.2. 5) “Recommendation on the implementation measures at Phase 1” has been prepared according to such antecedents.

8.2. Recommendations

(1) General Recommendations related to ProSavana-JBM

1) Importance to prepare a Plan for projects considering environmental conservation and execution of the same

In relation to agricultural development, it is common talk that excessive intervention causes desertification of agricultural land. On the other hand, for projects to be presently accepted, they need to contribute to global environment conservation. So, environmental considerations should be a priority and biodiversity conservation a previous condition to development. Considering the experience of PRODECER project, when at the beginning due attention to this aspect was not given, for the preparing of the present development project it is important to actually put into practice measures for environment conservation. To prevent the indiscriminate use of soil (development), it is important to urgently evaluate the zoning to clearly establish land delimitation for protected areas and development areas, as well as to establish the objectives of development.

2) Importance of human resources development

The struggle for the country’s independency and posterior internal conflicts had as consequence a deficit in proper human resources in several sectors, mainly referred to experts in agriculture development and promoters responsible for technical extension. So, for development projects to be properly managed and executed, capacity building of all personnel concerned in the process is required. That is why human resources capacity building has to be considered as an extremely important component since the preparation stage of the program. However, to wait for the results of capacity building first to start the execution of the projects later is not the most efficient way of implementation, so it is desirable to prioritize at an early stage those activities that do not depend so much on qualified personnel and conduct training simultaneously.

3) Importance of coordination among related entities

The effective execution of the program considers several entities of the public sector of central government through the ministries and province and district governments, as well as the private sector through companies and NGOs, etc. In order to allow the Ministry of Agriculture of Mozambique to implement the programs efficiently it is necessary to assure an effective coordination among all concerned entities. According to the needs, the creation of a coordinating entity should be considered. As the direct beneficiaries with the project implementation will be the local population, the active participation of local representatives in the programs of province and local government is required. Moreover, said institutions should make efforts to improve the capacity and train personnel to manage the projects, being also necessary to provide technical assistance and supply of materials and equipment.

4) Importance of a comprehensive support

Strategies of development and support of this program should be prepared with the consensus of the three concerned countries and the support in infrastructure works, institutionalization and human resources training should be promoted according to this consensus. Support from Brazil and Japan will be in the way of technical cooperation and non-reimbursable financial cooperation and the activities of volunteers and of ODA should be coordinated in order to make the best use of the aid multiplying effect, so the development of a comprehensive support is important. On the other hand, the government of Mozambique should evaluate other financing sources such as the bilateral cooperation of third countries and other international institutions, once the resources of public treasure for the execution of programs are very limited.

5) Proposal for the creation of a coordinating entity for the Program

It is important to implement this program of trilateral cooperation under a relation of equity between the three countries. Work groups, presently working individually in each country were created and they perform as communication windows among the three countries. During the effective execution of the program, in order to get a closer mutual understanding and for the cooperation to effectively and efficiently work, we propose the creation of a coordinating entity to execute the ProSavana-JBP in Mozambique. For that, the actions for the creation of CAMPO Company, in the project PROCERRADO for the development of the cerrado, could be taken into account.

6) Promotion of the active participation of the population

As it can be verified not only by the cerrado development, public resources for regional development are limited, so it is important to promote the participation of private capital, both internal and external. For that, it is important to consider that the private sector is the main actor for economic development, being necessary to go beyond the existing

government to government relationship in ODA and to promote the private sector active participation to allow it to contribute to the African development.

(2) Recommendations for the First Phase (Preparatory Stage of the Program)

1) Importance to assign an expert in coordination at an early phase

For the first phase of the Program, the execution of technical cooperation project is programmed from 2010. In order to allow the smooth execution of said technical cooperation projects it is important to assign soon an expert in coordination to the department in charge of the program in the Ministry of Agriculture, to carry out the necessary coordination for the launching of the projects.

2) Importance of basic information organization

In order to allow a smooth implementation of the Program the collection of all information related to natural conditions (meteorological, water and soil resources, topographic map, etc.), social conditions (specially land possession register, updated land use, etc.), and useful tools for the preparation of the development plan (GIS, etc.) during the preparatory stage is necessary. There is a need to evaluate if said activities are to be executed in the context of the technical cooperation projects (especially the Development Study), or if they will be individually executed.

3) Importance of zoning based regional development

Nacala corridor zone at the Study area has approximately an extension of 600 km from East to West and it is characterized by diversity concerning natural and socioeconomic conditions, social infrastructure and also there is a cultural diversification among the several tribes. For that, in order to prepare the development plan it is important to consider said intraregional diversification. So, the application of the zoning methodology considering the agricultural environment is more effective.

4) Importance of the coordination with the project of technical cooperation EMBRAPA-USAID

The detailed contents of the joint project between EMBRAPA and USAID to be executed at the IIAM “Project of Basic Technical Assistance for Agricultural Development in Mozambique” should be clarified in time. It is important to make adjustments among the three countries in order to avoid duplication of activities with the present program. For that, the terms of reference should be discussed among the three countries to clarify the functions of each part. In the terms of reference it should be specified the desire of both Japan and Brazil to cooperate, providing due importance to the executing entity of the project to actually conduct the coordination.

The action plans for the technical support project between Embrapa and USAID are as follow.

Activities	Start	End
1. Preparation of technical feasibility study for the strengthening of infrastructure at the stations of Napula, Sussudenga and the Agronomic Post of Mutuali	03/2010	07/2010
2. Elaboration of feasibility study for the implementation and equipment of the Soil Laboratory in Maputo and a Center of Soil Sciences in Nampula	05/2010	12/2010
3. Generation of maps of agronomic properties of soil in the zones surrounding the Nacala corridor, between parallels 13° S and 17° S	02/2010	03/2010
4. Conduction of studies of agronomic properties of limestone and phosphate stone in the zones surrounding the Nacala corridor	04/2010	12/2010
5. Elaboration of feasibility study to deepen data collection on climate in the Nacala corridor surroundings	03/2010	07/2010
6. Planning of complementary actions to the AGRA project in soil fertilization and plant nutrition in the regions of Nampula and Zambezia	05/2010	12/2010
7. Planning and preparation of the technical project of equipping the Production Unit of Basic Seeds of IIAM		
8. Planning and preparation of the technical project to implement and equip laboratories of seeds analysis in Nampula and Chimoio	05/2010	12/2010
9. Plan, elaborate and support the execution of pilot projects of communication and technological transfer in the zonal centers of Nampula and Chimoio	03/2010	05/2010

According to EMBRAPA, at the present stage, they are considering a delimitation of areas of cooperation, and coordinations are being made between EMBRAPA and USAID, so that EMBRAPA would cooperate with Japan at the Northern part in Nacala corridor and the other areas they would work in cooperation with USAID.

5) Recommendation on the implementation measures at Phase 1

In the last stage of the present Study, the Brazilian side presented a new proposal for the implementation method, considering the results of the trilateral study. Its contents reflects takes into consideration chapter 7 “Evaluation of the first phase of the project” and it was a constructive proposal, however due to time limitation the discussion could not be finished. For this motive, in the Minutes of Meeting (Annex) signed on March 18, 2010, the three parts (JICA’s Vice president, ABC General Secretary and the Minister of Agriculture of Mozambique) agreed to evaluate said proposal at the following working groups.

<Summary of the Brazilian side proposal>

First Step	Second Step		Third Step
Selection of ProSAVANA project area (Base of reference for the project area selection at the second step)	「Project 1」 Installation of a Center for agricultural and animal farming technological development	「Project 2」 Installation of Pilot Project’s modules	「Project 3」 Integral Development Program To be implemented 3 years after the start of step 2
	Both projects are to be simultaneously implemented. The agreement system of stakeholders has to be considered. It will serve as basic data for the concrete proposals for the third step.		

Step 1 is composed of the selection, identification, delimitation and legal protection for the implementation target area of PROSAVANNAH programme.

At step 2, following two technical cooperation projects are implemented simultaneously.

Project 1: Support for the development of agricultural innovation centers,

Project 2: Implementation of pilot project aimed at regional development for selected area for programme. These projects are implemented simultaneously. The results are utilized for the next consideration.

Step 3 is aimed at the implementation of an agricultural development plan for the area delimited during Step 1.

STEP 1: Macro Definitions

- **Objective**

The objective of this step is the diagnosis for the selection of the area where PROSAVANNAH shall be implemented and its further delimitation.

- **Activities**

1. Identification of criteria for the selection of the area where PROSAVANNAH shall be implemented. This will be done by means of geopolitical, edapho-climatic, socioeconomic and environmental criteria.
2. Identification and delimitation of ProSAVANA areas.
3. For the next step of the programme implementation, legal procedure on conservation and access of the area for ProSAVANA

- **Results**

1. Project Area identified, delimited accordingly to the selection criteria established.
2. Implementation area for ProSAVANA programme Legal protection protected
3. As the results of the activities in the step, the next step will be considered. Partners: MINAG, ABC, JICA

STEP 2: Technical Cooperation Projects

- Technical Cooperation Project 1

- Research and Technology Development Center Module

- **Objective**

Within the area of the Pilot Project, transform two of IIAM's experimental stations in Nampula and Mutuali into a Regional Technology Center constituted of a segment dedicated to the research, one dedicated to rural extension assistance and another dedicated to training and resource capacity-building.

- **Activities**

1. Reinforce research and development capacities. Partners: EMBRAPA and IIAM

2. Strengthen extension and rural assistance capacity within the area of the Pilot Project. Partners: EMATER and IIAM
3. Build capacity and train agricultural technicians and farmers from the Pilot project region. Partners: SENAR and IIAM

- **Results**

1. Establishment of a technology center
2. Support research, extension and capacity building activities for the execution of the Pilot Project.

- Technical Cooperation 2

- Module of Pilot Project

- **Objective**

Development of an Agricultural Project in a pilot area from the region, previously established during Step 1. The Pilot Project aims at the development of the region through the enhancement of agricultural production, implementation and transfer of agro-industrial processing technology and development of the commercialization of agricultural products.

- **Activities**

1. Occupation model for the area (module definitions: large, average, and family-based). Partners: MINAGRI.
2. Discussion and validation of the model within the selected area. Partners: ABC, JICA, MINAG.
3. Formulation of criteria for selection of pilot area in the ProSAVANA programme area. Partner: EMBRAPA, EMATER., MINAG
4. Pilot area selection. Partners: MINAGRI, JICA, ABC.
5. Identification o the communities within the Pilot Project area. Partners: MINAGRI, JICA, ABC.
6. The environmental zoning of the pilot area. Partners: MINAGRI, JICA, ABC, EMBRAPA.
7. An agricultural or stockbreeding model for the modules. Partners: MINAGRI, JICA, ABC, EMBRAPA, EMATER.
8. Socioeconomic infrastructure for the Pilot region. Partners: JICA, MINAGRI.
9. Grant access to credit and input. Partners: MINAGRI, ABC and JICA.
10. Support and incentives to promote participation of private and cooperative sectors. Partners: MINAGRI, ABC and JICA.
11. Transfer and adaptation of technological packages appropriate for the region. Partners: MINAGRI, JICA, ABC, EMBRAPA.
12. Support to technical assistance and rural extension at the Pilot Project region. Partners: MINAGRI, JICA, ABC, EMATER.

13. Support capacity building and training in the Pilot Project area. Partners: MINAGRI, JICA, ABC, SENAR.

STEP 3: Extension for the Elaboration of a Regional Agricultural Development Plan

- **Objectives**

To extend the regional development area established during the Pilot Module (Pilot Project, Step 2) to the PROSAVANNAH area previously delimited during Step 1.

- **Activities**

1. Elaboration of a development plan for the selected zone.
2. This step shall be initiated within 36 to 60 months after the beginning of Pilot Project's execution.

- **Results**

1. Development of an integrated agricultural plan in the area delimited during Step 1
2. Technology transfer and adoption of new agricultural techniques.
3. Development of internal agricultural market, as well as exports.

APPENDIX 1: Minutes of Meeting (September 17th, 2009)

Minutes of Meeting on Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique

Based on the Record of Discussions of the Japan-Brazil Partnership Programme (hereinafter referred to as 'JBPP') signed on March 28, 2000 in Tokyo, the President of Japan International Cooperation Agency (hereinafter referred to as 'JICA'), Sadako Ogata, and the Minister of Foreign Affairs of the Federative Republic of Brazil, Ambassador Celso Luis Nunes Amorim, announced in April 2007 the strengthening of the Assistance for Africa through cooperation under the framework of JBPP. In addition, in July 2009, at L'Aquila Summit, the Japanese Prime Minister, Taro Aso (then), and the President of the Federative Republic of Brazil, Luiz Inácio Lula da Silva, agreed on promoting the agricultural development of Mozambique through cooperation under JBPP, applying the knowledge acquired during implementation of the Cooperation Programme for the Development of the Cerrado.

Considering the agreements reached, the Japanese Mission, headed by the Senior Vice-President of JICA, Kenzo Oshima, and the Brazilian Mission, headed by the Director of the Brazilian Cooperation Agency (hereinafter referred to as 'ABC'), Minister Marco Farani, jointly visited the Republic of Mozambique from 16th to 19th September 2009 and discussed the basic structure of the Triangular Cooperation Programme for Agricultural Development of the Tropical Savannah in Mozambique with the Minister of Agriculture, Soares B. Nhaca, the Minister of Planning and Development, Aiuba Cuereneia, and other Mozambican authorities.

The three organisations represented by the signatories of this Minutes of Meeting agreed to keep the record of the results of the discussions on the current Japan-Brazil-Mozambique Joint Study, according to the annex attached hereto, as well as to promote joint actions for the early execution of the Triangular Cooperation Programme.

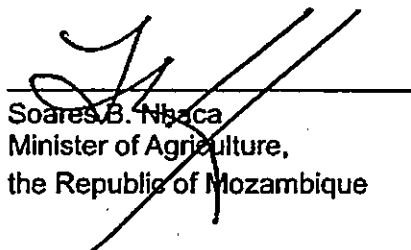
Maputo, Mozambique, 17th September, 2009.



Kenzo Oshima
Senior Vice-President,
Japan International Cooperation Agency



Marco Farani
Director,
Brazilian Cooperation Agency



Soares B. Nhaca
Minister of Agriculture,
the Republic of Mozambique

1. Background and Events related to the Cooperation Programme for Agricultural Development of the Tropical Savannah in Mozambique

- (1) The Japan-Brazil Cooperation Programme for the Development of the Brazilian Cerrado, which started in the '70s, has implemented projects of technical cooperation and financial cooperation for about 20 years and made a great contribution not only to Brazil inland development but also to balancing the supply and demand for food in global standards by increasing food production. Through agricultural development of the Cerrado, Brazil now has large knowledge related to sustainable agricultural development in tropical savannah zones. Based on these facts, on April 3, 2009, the Senior Vice-President of JICA, Mr. Kenzo Oshima, and the Director of the Brazilian Cooperation Agency (ABC), Minister Marco Farani, signed the 'Minutes of Meeting' to confirm common interest in the 'Japan-Brazil Partnership Programme on Cooperation for the Development of African Tropical Savannah, based on the results of the Programme of Brazil-Japan Cooperation for the Brazilian Cerrado development.
- (2) Considering that about 70 percent of Mozambican territory (approximately 540 thousand km²) is characterised as an area of tropical savannah and that there is an extensive area of non-used arable land, the mission that the Ministry of Agriculture of Mozambique dispatched to the Cerrado region in Brazil in May 2009 confirmed that there are several points of similarity between the Brazilian Cerrado and the Mozambican tropical savannah, as well as that many examples of agricultural techniques used for development of the Cerrado can be transferred to Mozambique.
- (3) Based on the 'Minutes of Meeting' mentioned in 1(1) above, the Japan-Brazil Joint Preliminary Mission, which was dispatched to Mozambique in June 2009, conducted a series of discussions with the Mozambican Ministry of Agriculture regarding the basic structure of the Triangular Cooperation Programme. Besides, Working Groups for promoting activities of the Triangular Cooperation were established in Japan, Brazil, and Mozambique (see Annex 1).
- (4) Discussions between the Joint Mission under the JBPP framework and the Ministry of Agriculture and the Ministry of Planning and Development of Mozambique were conducted based on the abovementioned facts.

2. Significance and Challenges of Triangular Cooperation

The parties share the following basic understandings on the significance and challenges

of triangular cooperation.

- (1) The area of the African Guinea savannah is about 700 million hectares, of which approximately 400 millions hectares are arable. This is the largest non-used agricultural area in the world (see annex). Sustainable agricultural development of the African tropical savannah, including Mozambique, will contribute not only to guaranteeing food security of the local population and to promoting socioeconomic development of the region but also to enhancing food security globally.
- (2) In Mozambique, 70 percent of the total population inhabit rural areas, where 95 percent of employed people engage in agricultural activity. A total of 96 percent of all farmers' activities are centered on small-scale family farms (cultivation area of 1 to 2 hectares) and most of them run subsistence agriculture with small investment with small productivity. Besides, the exploitation rate of arable areas is approximately 4 percent. However, taking into account that the tropical savannah around the northern region of Mozambique is blessed with a large arable area and a substantial amount of rainfall, its potential to expand agricultural production is extremely high. If there is an introduction of modern techniques and increased capital investment, and also if farmers' organisations are promoted through the present Triangular Cooperation Programme, significant impacts on agricultural productivity are expected.
- (3) It is also expected that the knowledge acquired through the Development of the Brazilian Cerrado will contribute to the improvement of agricultural productivity of the African tropical savannah, e.g., soil correction techniques and the use of proper varieties of different crops. However, considering that the socioeconomic situation of the Brazilian Cerrado region differs greatly from that of the African tropical savannah, new models of sustainable agricultural development specific to each region in Africa will be necessary.
- (4) When creating new models of sustainable agricultural development for the tropical savannah of Mozambique, human security, food security, and poverty reduction for the local population, as well as protection of wildlife and preservation of the environment, must be considered. Meanwhile, it is necessary to target market-oriented agricultural/rural/regional development with a competitive edge in the respective markets.

3. Basic Structure of the Triangular Cooperation Programme

As result of the discussions, each party agreed to work on the Cooperation Programme according to the basic structure below for the early materialisation of the Programme. However, it was decided that should the need for changes arise as a result of several

types of survey and discussion in the future, the basic structure will be revised in common agreement among the three parties.

(1) Objective of the Programme

To create new models of sustainable agricultural development in the tropical savannah region of Mozambique through triangular cooperation among Japan, Brazil, and Mozambique, while taking into account preservation of the environment and seeking market-oriented agricultural/rural/regional development with a competitive edge

(2) Name of the Programme

Triangular Cooperation Programme for Agricultural Development of the African Tropical Savannah among Japan, Brazil, and Mozambique (ProSAVANA-JBM)

(3) Preferred Candidate Region as Target Area of the Programme

Taking into account the similarities of its natural environment with the Brazilian Cerrado region, the current situation of infrastructure as well as policies, laws, and regulations of Mozambique, the Nacala Corridor area, located in the northern part of the country, was selected as the preferred target area, wherein future surveys will be carried out and the Programme will be developed.

(4) Main Target Crops and Production Sectors

Preferred crops will be selected from the crops (or group of crops) below, emphasising coherence with the agrarian policy of Mozambique. However, the selection will be made upon mutual discussion and agreement among the three parties.

- ① Subsistence Crops: Cassava, rice, soy, wheat, corn, poultry, dairy cattle, fishery
- ② Crops for Commercialisation: Tobacco, cotton, cashew nut, sugarcane (sugar)
- ③ New Crops to be Introduced: Fruits, vegetables, crops for bio fuel production, etc.
- ④ Structure of Agricultural Management: Farming that combines agriculture and stockbreeding

(5) Stakeholders

- ① Producers: local farmers, local population, agricultural associations, private enterprises (agricultural enterprises, agricultural product-processing enterprises), and other enterprises from the productive chain
- ② Public Organisations: Agrarian Research Institute of Mozambique (IIAM), National Directorate of Agrarian Services (DNSA), National Directorate of Agrarian Extension (DNEA), National Directorate of Veterinary Services

(DNSV), Mozambique Institute for Cotton (IAM), Cashew Promotion Institute (INCAJU), and others, identified along the implementation of the Programme programme

- (6) Contents of the Cooperation Offered under the Triangular Cooperation Framework
- The present Programme combines, as the need arises, technical cooperation, grant aid cooperation, concessional loans, and voluntary programmes from Japan and Brazil. It should be planned in a way that the synergistic effect of each one of these modalities of assistance is manifested to its maximum extent for complete implementation of the Programme .

① First Stage

The first stage ('programme preparation stage') will establish models of agricultural development of the tropical savannah in Mozambique from the implementation of four projects, as detailed below, through the technical cooperation jointly offered by Japan and Brazil.

(i) Preliminary Study

Research will begin in September 2009 and its purpose will be to investigate and understand the socioeconomic situation and natural aspects of agricultural sector of Mozambique, identifying possibilities of applying the experiences acquired in the Programme on Agricultural Development of the Brazilian Cerrado. The results of these studies will be applied in the three projects mentioned below.

(ii) 'Improvement of Research Capacity in Mozambique' (tentative name)

This project aims to improve agricultural production technology by means of, for example, tests on soil improvement and selection of different crops introduced at the agricultural research institutes of Mozambique, as well as dissemination of improved and adapted technologies. This project intends to promote the capacity enhancement of the agricultural research institutes of Mozambique. This project shall begin in Japanese fiscal year 2010.

(iii) 'Integrated Master Plan for Agricultural Development of the Nacala Corridor Area' (tentative name)

A master plan for the agricultural development of the Nacala Corridor area will be developed. Based on the master plan, a financial plan for agricultural development will be developed as well. The master plan shall begin in Japanese fiscal year 2011.

(iv) 'Establishment of New Models of Development in Rural Communities (Demonstrative Project)' (tentative name)

Candidate areas from the Nacala Corridor area will be defined, and new development models at village level will be demonstrated including agricultural extension for development of farmers. This project shall begin in Japanese fiscal year 2011.

② Second Stage

The second stage ('programme implementation stage') is intended to spread the models of agricultural development established in the first stage.

(7) Role of the Mozambican Government

On the implementation of the present Programme, the Government of Mozambique, mainly represented by the Ministry of Agriculture, will coordinate the ministries and national agencies, as well as local governmental organisations. In addition, the Government of Mozambique will put high priority on this Programme in the framework of governmental policies for development, providing the necessary resources and personnel. Moreover, the Government of Mozambique will render necessary services to the missions under the JBPP framework and experts allocated for the Programme.

(8) Implementation Structure ('Working Groups')

① In order to implement the Programme in an effective and efficient way, Working Groups will be created in each country. Each country's Working Group will be in charge of obtaining consensus among the organisations involved and managing the progress of each activity. The Working Groups of the three countries shall maintain close communication among themselves for efficient implementation of the Triangular Cooperation Programme. The Joint Working Group shall gather once or twice a year, with the first meeting being in Tokyo, Japan, in January 2010. During the first meeting of the Joint Working Group, an international symposium will be co-sponsored by Japan, Brazil, and Mozambique. The symposium will be tentatively named 'Cooperation for the Agricultural Development of African Tropical Savannah'.

② In the course of the programme, private enterprises, with large experience in agricultural development of the Cerrado, might participate, and will act as consultant in the task of general coordination, management, monitoring, and promotion of the Programme.

4. Settlement of Disputes

Although the three parties have pledged themselves to pursue early implementation of the programme in close cooperation and according to the structure mentioned in item 3 above, if any doubt or problem arises regarding the content agreed herein, it will be settled through the Working Groups and, according to necessity, with the good faith of the signatories.

This Memorandum is written in two languages, namely, Portuguese and English. In case of any divergence in interpretation, the English version shall prevail.

END

Project for improving research capacity for Nacala Corridor Agriculture Development

1. Implementing Agency:
 - Ministry of Agriculture(MINAG)
 - Institute of Agriculture Research (IIAM :Instituto de Investigacao Agraria de Mocambique)

2. Outline of the Project
 - (1) Overall Goal
Develop agriculture production along the Nacala Corridor
 - (2) Project Purpose
Improve research activities in IIAM Nampula for Nacala Corridor Agriculture Development Programme
 - (3) Outputs
 1. Identify models and formulas for improving soil in Nacala Corridor
 2. Nominate appropriate methods of animal production in Nacala Corridor
 3. Nominate appropriate methods of animal production in Nacala Corridor
 - (4) Area to be covered by the Project
Nacala Corridor Area (centred at IIAM-Nampula, Nampula Province)
 - (5) Project Activities
 1. Assessing overall soil condition (acidity, nutrition, etc) in the Nacala Corridor area
 2. Identifying areas for pilot examination
 5. Examining methods to improve soil
 3. Surveying lime reserves around the Corridor area
 4. Demonstrating lime processing units
 7. Examining various pilot crops for promoting cultivation in the Corridor area
 10. Identifying varieties/crops recommended
 11. Undertaking surveys to identify Tse-tse fly infection
 12. Assessing the level of prevalence of Tse-tse transmitted trypanosomes
 13. Conducting field trials for forage varieties
 14. Examining Brazilian cotton varieties
 15. Monitoring the research every 6 months from Maputo

3. Main inputs from Japan and Brazil
 1. Chief Advisor/Coordinator
 2. Advisor/Consultant for soil improvement
 3. Advisor/Consultant for crops
 4. Advisor/Consultant for social development
 5. Lab rehabilitation, Lab equipments
 6. Farm equipments

4. Project Schedule (subject to change)

Start: 2nd Quarter of 2010

End: 2nd Quarter of 2013 (Project Duration: 3 years)

END

APPENDIX 2: Minutes of Meeting (March 18th, 2010)

Minutes of Meeting on the Triangular Cooperation for Tropical Savannah Agricultural Development in Mozambique

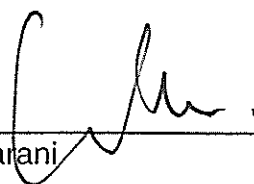
Kenzo Oshima, Senior Vice-President of Japan International Cooperation Agency (JICA), Marco Farani, Director of Brazilian Cooperation Agency (ABC), and Soares B. Nhaca, Minister of Agriculture of the Republic of Mozambique, have discussed the present situation and challenges of the Triangular Cooperation for Tropical Savannah Agricultural Development in Mozambique (hereinafter referred to as the "ProSAVANA") when the International Symposium on the programme was organized in Tokyo, Japan, on 17th March 2010 which was based on the Minutes of Meeting agreed on September 2009. The three parties have agreed on the following points.

1. The three parties take notice with satisfaction of the close cooperation among the parties since September 2009 that led to success of the International Symposium of the ProSAVANA on 17th March 2010 in Tokyo.
2. The three parties have confirmed a significant progress through the preparation survey, the first project of the ProSAVANA, which started in September 2009 until March 2010, by collecting and confirming essential information of the ProSAVANA's targeted area.
3. The survey conducted by the Brazilian researchers has confirmed the existence of the 6.4 million hectares of tropical savannah area, that is suitable to the mechanized agriculture, and which has similar natural conditions to the Brazilian Cerrado, in the north-western part of the Nacala corridor area in Mozambique. This area would be included as ProSAVANA targeted area along with the twelve districts studied by the JICA survey team. The Working Group of the three countries will conduct a necessary survey on studying the feasibility as well as development method of the area as agricultural land.
4. The three parties note that the 'Implementation Schedule' proposed by Brazil on February 2010 includes a constructive vision that would support smooth implementation of the ProSAVANA. Feasibility and the method of implementation of this proposal will be discussed by the Working Group of the three countries.
5. The three parties will continue joint actions for smooth implementation of the ProSAVANA programme.

Tokyo, Japan, March 18th, 2010



Kenzo Oshima
Senior Vice-President
Japan International Cooperation Agency



Marco Farani
Director
Brazilian Cooperation Agency



Soares B. Nhaca
Minister of Agriculture
The Republic of Mozambique