

**Ministry of Agriculture  
Republic of Mozambique**

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

**Final Report**

**March 2010**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**ORIENTAL CONSULTANTS CO., LTD.**

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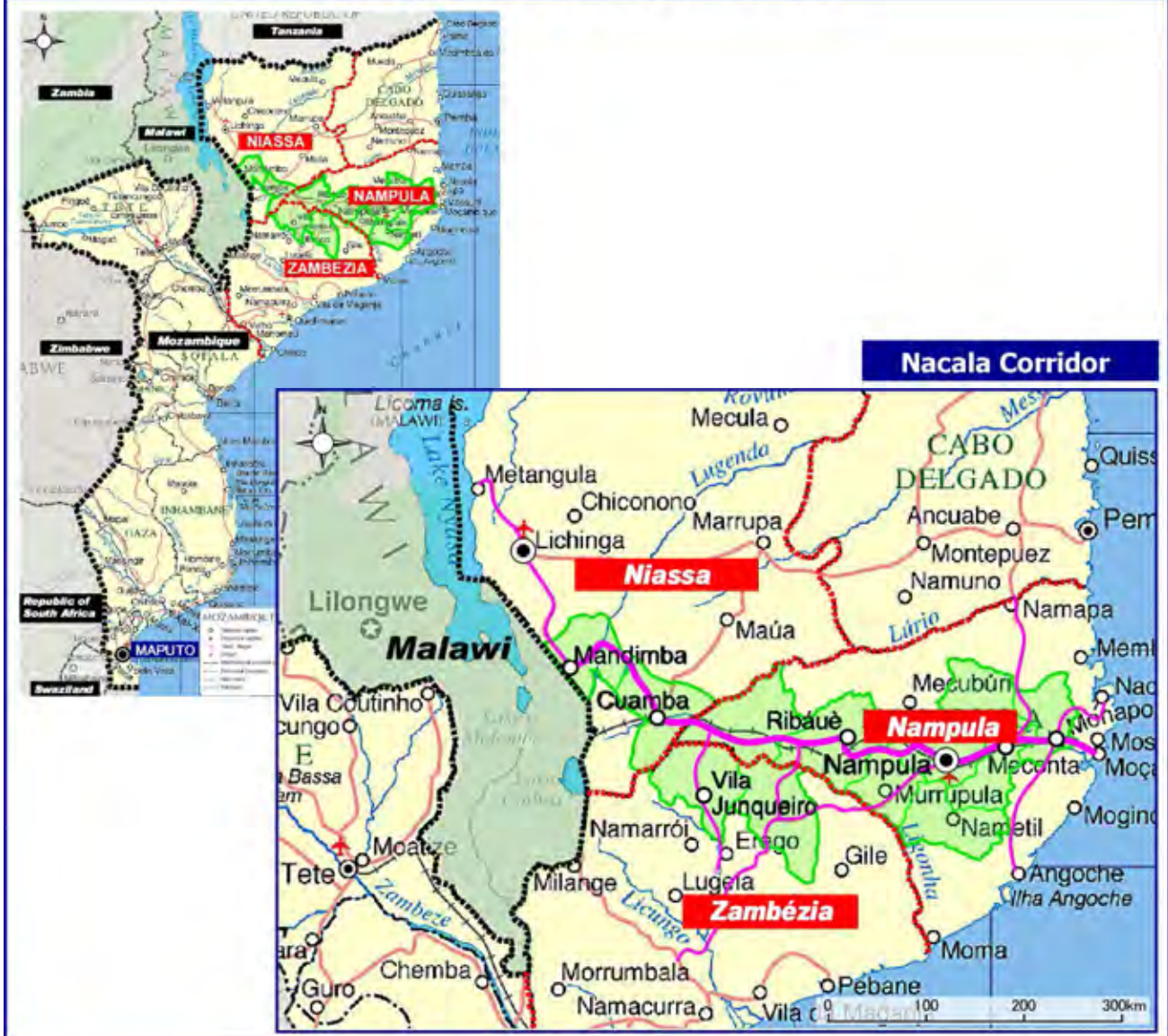
The exchange rate applied in the Study is

US\$1.00 = MZN30.2

US\$1.00 = BRL1.727

(January, 2010)

## Study Area in Mozambique



## Study Area in Brazil



Location Map of Study Area

# SUMMARY

## 1. Background of the Study

In tropical savannah areas located at the north part of Mozambique, there are vast agricultural lands with constant rainfall, and it has potential to expand the agricultural production. However, in these areas, most of agricultural technique is traditional and farmers' unions are weak. Therefore, it is expected to enhance the agricultural productivity by introducing the modern technique and investment and organizing the farmers' union.

Japan has experience in agricultural development for Cerrado over the past 20 years in Brazil. The Cerrado is now world's leading grain belt. The Government of Japan and Brazil planned the agricultural development support in Africa, and considered the technology transfer of agriculture for Cerrado development to tropical savannah areas in Africa. As the first study area, Mozambique is selected for triangular cooperation of agricultural development.

Based on this background, Japanese mission, team leader of Kenzo Oshima, vice president of JICA and Brazilian mission, team leader of Marco Farani, chief director visited Mozambique for 19 days from September 16, 2009. Japanese and Brazilian missions discussed the basic framework of program on the triangular cooperation for tropical Savannah agricultural development in Mozambique with Soares B. Nhaca, minister of agriculture, Aiuba Cuereneia, minister of Development & Planning and related organization, and signed the agreement at Maputo in September 17, 2009.

JICA allocated the study team for program formulation study on the triangular cooperation for tropical Savannah agricultural development in Mozambique from September 20, 2009 and started basic study. This report is summarized the results of the study.

## 2. Objectives of the Study

The study objectives are as follow.

- (1) to consider how to apply the agricultural development in Brazil's Cerrado to Mozambique
- (2) to recommend the direction (cooperation outline, scale and effectiveness) for future technical cooperation projects between Japan and Brazil.

The following three projects are considered as future technical cooperation projects between Japan and Brazil:

- (1) capacity development in terms of soil improvement and selection of appropriate crops (technical assistance project),
- (2) experimental study through setting up the development model area at the village level (technical assistance project),
- (3) formulation of regional agricultural development plan (master plan).

### 3. Study Area

The Study covers the whole Mozambique, especially the Nacala corridor area at the north part, the City of Brasilia and the Cerrado area. Based on the request of Mozambique side, the following 12 districts were selected as the study area.

Province of Nampula: Malema, Ribáuè, Murrupula, Nampula, Meconta, Mogovolas, Muecate and Monapo

Province of Niassa: Mandimba and Cuamba

Province of Zambézia: Gurue and Alto Molocue

### 4. Period and Scope of the Study

The Study was implemented from the middle of September 2009 to the end of March 2010 for six months. The scope of the study is as follow.

**Table 1 Scope of the study**

Study Step	Main Objectives	Reports
Step 1: Preparatory work in Japan	Preparation of study, formulation of study plan and preparation of inception report	Inception report
Step 2: First work in Mozambique	Explanation and discussion of inception report, confirmation of the plan and agricultural policy, exchange of opinions among each donors, understanding of current conditions of Nacala corridor areas, and selection of issues	
Step 3: First work in Brazil	Study on Cerrado development, consolidation of similar and different points between Cerrado development and agricultural development in Mozambique	
Step 4: Analysis work in Japan (1)	Preparation of interim report	Interim report
Step 5: Second work in Mozambique	Explanation and discussion of interim report, additional study of the first work and consideration of technical cooperation projects between Japan and Brazil	
Step 6: Second work in Brazil	Additional study of the first work in Brazil	
Step 7: Analysis work in Japan (2)	Preparation of final report, submission of study outputs for international symposium	Draft final report
Step 8: Third work in Mozambique	Explanation and discussion of draft final report, Provision of study results of international symposium	Final Report

### 5. Similarities and Differences between Nacala Corridor Area and Cerrado Area

Many agricultural similarities are recognized between Mozambican tropical savannah region and Brazil Cerrado region. Trough 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.

## **6 . Application of Agricultural Technology from Cerrado Development**

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 Gurué, 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. 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.

## **7. 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).

## **(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”.

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.

## **8. 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.

## **9. 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 2.

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 2 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		0.6(shell)			(oil)
	(processed)		↓			(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.

**10. 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).

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.

## **11. Zoning of the Target Region**

The suggestion, as per this work, is that the Nacala Corridor be considered as having four distinct areas. 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 an ecological economic zoning (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 Ribaué. 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 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 Ribaué, 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 Arid. 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 then 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).

## **12. 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. 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.

### **13. 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.

### **14. Improvement of Agricultural Productivity**

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.

## 15. Promotion of Agricultural Processing Industry

### (1) Agricultural Cluster

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 Nacara 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 3.

**Table 3 Proposed Criteria Selection of Crops and Processing**

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



		<p>(Especially, do it consolidate the labor benefited to the peasant?)?</p> <ul style="list-style-type: none"> <li>• Synergy effect to the industry and the supporting industry in the surrounding high?</li> <li>• Influence of the price fluctuation be reduced</li> <li>• Possibility of advancement promotion of the enterprise pressed</li> </ul>
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### (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 4.

**Table 4 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	Forestry, kenaf, 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

## 16. Development of Farmers' Organization

### (1) Encourage Farmers Understanding and Participation in Organized Group Efforts.

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-organize 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) Purpose of the Organized Groups and Promotion among the Members**

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) Capacity Building Activities**

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

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.

## **(4) Who Leads the Activities to Organize Farmers?**

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.

# **17. Development of Infrastructure for Production**

## **(1) Water Resources Development**

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.

## **(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.

## **18. Proposal Support Programs and Projects**

The measures in order to achieve the development objectives, the proposal support programs and projects will be as follow, table 5.

Table 5 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	Short term	Medium term	Long term				
Food security/poverty reduction	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.		○		○	○	○						
	Improvement of logistics system	Organization of test data	Organization of meteorological data, soil data, etc.		○		○	○	○						
		Reduction of logistics costs	Preparing logistics infrastructure		○	○	○	○			○				
Improve income/poverty reduction	Strengthening of agriculture support services	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, Training of promoters, preparation of extension material, support for the formation of farmers' organization, cooperatives, etc.		○		○	○	○						
	Promote agriculture diversification Promote processing of agriculture products	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.			○	○	○	○						
		Support strategic clusters	Agriculture diversification, organic agriculture, introduction of small animal farms, etc.			○	○	○			○	○			
Reactivation regional economy	Development strategies by sector	Installation of simple agriculture products processing, irrigation facilities, etc.			○	○	○			○	○				
		Land use plan	Land use map, classification map, Zoning map etc.		○	○	○	○							
	-Preparing of development guidelines	Agriculture	Preparation of development guidelines			○	○	○							
		Industry	Preparation of development guidelines			○	○	○							
		Transportation	Preparation of development guidelines			○	○	○							
Strengthening exports competitiveness Improvement of living	Commerce	Preparation of development guidelines				○	○	○							
	Manpower training	Technical training		○			○			○	○				
	Organization of the system	Organization of the system							○	○	○				
Environmental conservation and restoration	Environmental conservation and restoration	Basic infrastructure	Basic infrastructure, infrastructure for education, Definition of areas for protection and conservation		○	○	○								
		Recovery of devastated land	Reforestation projects, agroforestry		○		○				○	○			
Conservative type agriculture	Conservative type agriculture	Cultivation without plowing, intensive husbandry, agroforestry, soil erosion prevention, etc.			○	○	○				○				

## 19. 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.

## 20. 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 community’s 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 Implementation Period Plan**

ProSavana-JBM	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<u>First Stage</u>										
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					←					
<u>Second Stage</u>										
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.

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.

## **21. 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, PRODECER 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 “PRODECER” 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.

## 22. Project to Increase the Research 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			
<ol style="list-style-type: none"> <li>1) Identification of appropriate area for agriculture in the Nacala corridor zone</li> <li>2) Identification of soil improvement technologies in the Nacala corridor zone</li> <li>3) Identification of proper technology for cultivation for products at the zone of Nacala corridor</li> <li>4) Identification of proper technology for animal farming at the zone of Nacala corridor</li> <li>5) Identification of strategic cluster</li> </ol>			
(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			
<ol style="list-style-type: none"> <li>1) Evaluation of soil conditions at the Nacala corridor</li> <li>2) Meteorological data collection in the Nacala corridor</li> <li>3) Formulation of GIS map in the Nacala corridor</li> <li>4) Consideration of agricultural environmental zoning</li> <li>5) Set up the criteria for the selection of the pilot area</li> <li>6) Selection of pilot area</li> <li>7) Evaluation of technology for soil improvement</li> <li>8) Experiences in the cultivation of crops in the zone of Nacala corridor</li> <li>9) Identification of products to be promoted</li> <li>10) Experiences in animal farming at the zone of Nacala corridor</li> <li>11) Identification of animal farming to be promoted, among others</li> <li>12) Consideration of strategic cluster</li> </ol>			
5. Contents of main contribution			
(1) Japanese side	(2) Brazilian side	(3) Mozambique side	
<ul style="list-style-type: none"> <li>• Assignment of experts</li> <li>• Supply of equipment</li> <li>• Costs of the project</li> </ul>	<ul style="list-style-type: none"> <li>• Assignment of experts</li> <li>• Supply of equipment</li> <li>• Training of counterpart in Brazil</li> </ul>	<ul style="list-style-type: none"> <li>• Assignment of counterpart</li> <li>• Supply of land and installations</li> <li>• Local costs of the project</li> </ul>	
6. Implementation period Start: June 2010 Finish: May 2013 (Duration of the project: 3 years)			
7. Observations —			



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

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 —			

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

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

## 25. 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.

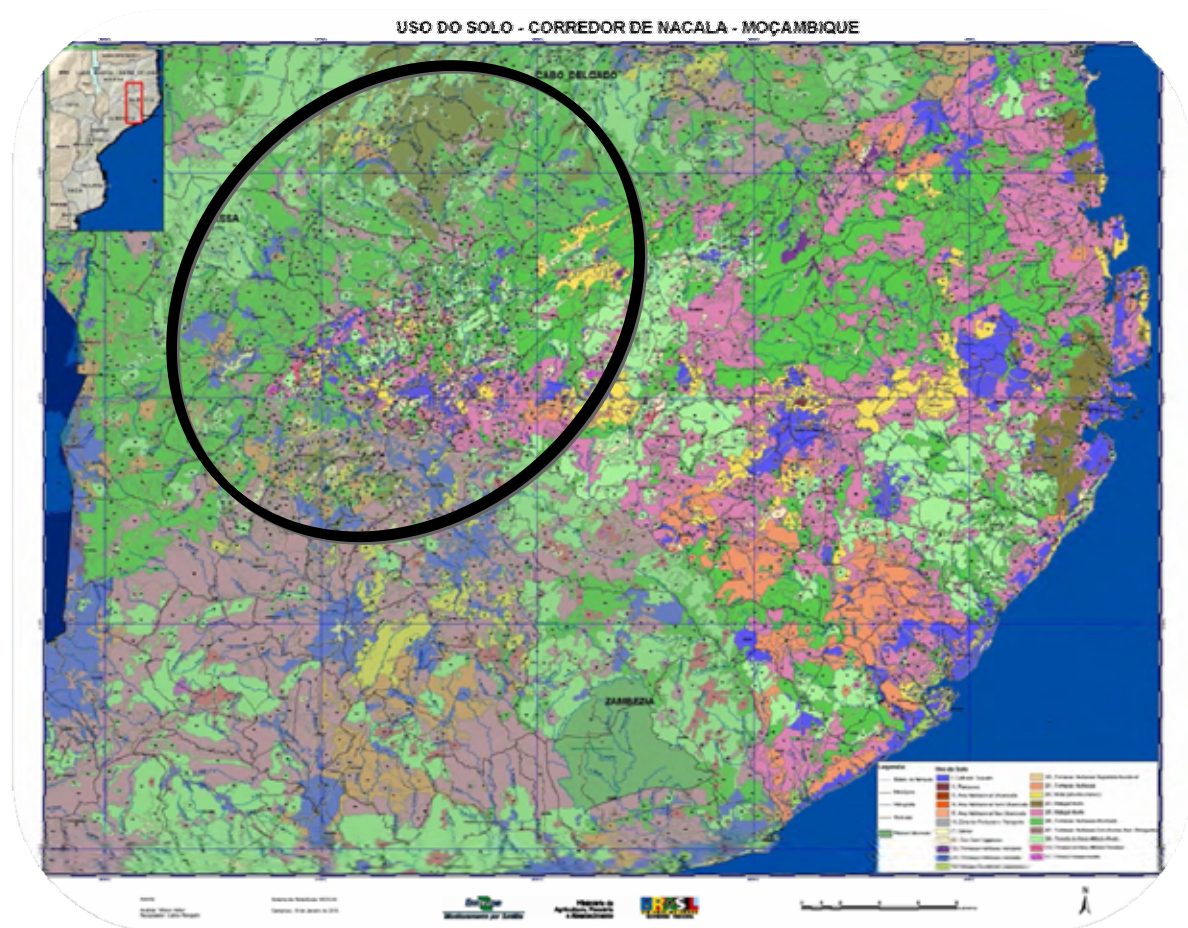
3. At the final stage of the Study the Brazilian side (EMBRAPA) provided the following recommendations concerning agricultural development at the Nacala corridor region, considering also results of the study they independently conducted.

- 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.

## **26. 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 PRODECER 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 ProSavana program.

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 program. 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 ProSavana shall be implemented and its further delimitation.



- **Activities**

1. Identification of criteria for the selection of the area where ProSavana 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 program 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 program 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 one of IIAM's experimental stations 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 program area. Partner: EMBRAPA, EMATER, MINAG.
4. Pilot area selection. Partners: MINAGRI, JICA, ABC.
5. Identification of 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 ProSavana 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.

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## Abbreviation

ABC	Agencia Brasileira de Cooperação	Brazilian Agency for Cooperation
AfDB	Banco Africano de Desenvolvimento	African Development Bank
AMODER	Associação Moçambicana para o Desenvolvimento Rural	Mozambique Association for Rural Development
AusAID	Agencia Australiana para o Desenvolvimento Internacional	Australian Agency for International Development
CAMPO	Companhia de Promoção Agrícola (CPA)	Agriculture Promotion Company
CDN	Corredor de Desenvolvimento de Norte	North Development Corridor
CFM	Portos e Caminhos de Ferro de Moçambique	Ports and Railways of Mozambique
CIDA	Agencia Canadense para o Desenvolvimento Internacional	Canadian International Development Agency
CLUSA	Liga das Cooperativas dos Estados Unidos da América	Cooperative League of USA
CPI	Centro de Promoção de Investimentos	Investment Promotion Centre
D/D	Desenho Detalhado	Detail Design
DANIDA	Agencia Dinamarquesa para o Desenvolvimento Internacional	Danish International Development Agency
DARN	Direção de Agronomia e Recursos Naturais	Agronomy and natural resources direction
DCA	Direção de Ciências Animais	Direction of Animal Sciences
DFDTT	Direção de Formação, Documentação e Transferência de Tecnologias	Direction of Training, Documentation and Technology Transfer
DfID	Departamento de Desenvolvimento Internacional	Department for International Development
DPAF	Direção de Planificação, Administração e Finanças	Direction of Planning, Administration and Finance
EDEL	Estratégia de Desenvolvimento Económico Local	Local Economy Development Strategy
EDR	Estratégia de Desenvolvimento Rural	Rural Development Strategy
EMATER-DF	Empresa de Assistência Técnica e Extensão Rural do Distrito Federal	Technical Assistance and Rural Extension Enterprise of the Federal District
EMBRAPA	Empresa Brasileira de Pesquisas Agropecuárias	Brazilian Agricultural Research Corporation
EU	União Européia	European Union
FFPI	Fundo de Promoção da Pequena Indústria	Small Industry Promotion Fund
FMI	Fundo Monetário Internacional	International Monetary Fund
GTZ	Agencia de Cooperação Técnica Alemã	Deutsche Gesellschaft fur Technische Zusammenarbeit
IDIL	Instituto para o Desenvolvimento da Indústria Local	Institute for Local Industry Development
IIAM	Instituto de Investigações Agrárias de Moçambique	Mozambique National Institute of Agronomic Research
INE	Instituto Nacional de Estatística	National Statistics Institute

IPEX	Instituto de Promoção das Exportações de Moçambique	Mozambique Institute of Export Promotion
JBIC	Banco Japonês para a Cooperação Internacional	Japan Bank for International Cooperation
JICA	Agencia de Cooperação Internacional do Japão	Japan International Cooperation Agency
JPC-SED	Centro Japonês de Produtividade para o Desenvolvimento Socioeconômico	Japan Productivity Center for Socio-Economic Development
MADER	Ministério de Agricultura e Desenvolvimento Rural	Ministry of Agriculture and Rural Development
MIC	Ministério de Indústria e Comércio	Ministry of Industry and Commerce
MINAGRI	Ministério da Agricultura	Ministry of Agriculture
MPD	Ministério da Planificação e Desenvolvimento	Ministry of Planning and Development
MSME	Instituto para a Micro, Pequena e Média empresa	Institute Micro, Small and Medium Enterprise Institute
NEPAD	Nova Parceria para o Desenvolvimento da África	The New Partnership for Africa's Development
NORAD	Agencia Noruega para o Desenvolvimento	Norwegian Agency for Development
PAPA	Plano de Ação para a Produção de Alimentos	Action Plan for Food Production
PARPA	Plano de Ação para a Redução da Pobreza Absoluta	Action Plan for the Reduction of Absolute Poverty
PE	Plano Estratégico	Strategic Plan
PEDD	Plano Estratégico de Desenvolvimento Distrital	Strategic Plan for District Development
PEDSA	Plano Estratégico para o Desenvolvimento do Sector Agrário	Strategic Plan for Agriculture Sector Development
PES	Plano Económico Social	Economic and Social Plan
PESOP	Plano Económico e Social Orçamento	Economic and Social Plan Budget
PIB	Produto Nacional Bruto	Gross Domestic Product
PNUD	Programa das Nações Unidas para o Desenvolvimento	UNDP United Nations Development Program
PROAGRI	Programa Nacional de Desenvolvimento Agrário	National Program for Agriculture Development
RNB	Renda Nacional Bruta	Gross Domestic Income
SENAR	Serviço Nacional de Aprendizagem Rural	National Service of Rural Learning
SIDA	Agencia Sueca de Desenvolvimento Internacional	Swedish International Development Agency
UCODIN	Unidade de Coordenação de Desenvolvimento Integral da Província de Nampula	Nampula Province Integrated Development and Coordination Unit
UGC	União Geral de Cooperação	General Union of Cooperation
USAID	Agencia Norte-Americana para o Desenvolvimento Internacional	United States Agency for International Development

# CHAPTER 1 INTRODUCTION

## 1.1. Background and Objectives of the Study

### 1.1.1. Background of the Study

In tropical savannah areas located at the north part of Mozambique, there are vast agricultural lands with constant rainfall, and it has potential to expand the agricultural production. However, in these areas, most of agricultural technique is traditional and farmers' unions are weak. Therefore, it is expected to enhance the agricultural productivity by introducing the modern technique and investment and organizing the farmers' union.

Japan has experience in agricultural development for Cerrado over the past 20 years in Brazil. The Cerrado is now world's leading grain belt. The Government of Japan and Brazil planned the agricultural development support in Africa, and considered the technology transfer of agriculture for Cerrado development to tropical savannah areas in Africa. As the first study area, Mozambique is selected for triangular cooperation of agricultural development.

Based on this background, Japanese mission, team leader of Kenzo Oshima, vice president of JICA and Brazilian mission, team leader of Marco Farani, chief director visited Mozambique for 19 days from September 16, 2009. Japanese and Brazilian missions discussed the basic framework of program on the triangular cooperation for tropical Savannah agricultural development in Mozambique with Soares B. Nhaca, minister of agriculture, Aiuba Cuereneia, minister of Development & Planning and related organization, and signed the agreement at Maputo in September 17, 2009.

JICA allocated the study team for program formulation study on the triangular cooperation for tropical Savannah agricultural development in Mozambique from September 20, 2009 and started basic study. This report is summarized the results of the study.

### 1.1.2. Objectives of the Study

The study objectives are as follow.

- (1) to consider how to apply the agricultural development in Brazil's Cerrado to Mozambique
- (2) to recommend the direction (cooperation outline, scale and effectiveness) for future technical cooperation projects between Japan and Brazil.

The following three projects are considered as future technical cooperation projects between Japan and Brazil:

- (1) capacity development in terms of soil improvement and selection of appropriate crops (technical assistance project),

- (2) experimental study through setting up the development model area at the village level (technical assistance project),
- (3) formulation of regional agricultural development plan (master plan).

## 1.2. Study Area

The Study covers the whole Mozambique, especially the Nacala corridor area at the north part, the City of Brasília and the Cerrado area. Based on the request of Mozambique side, the following 12 districts were selected as the study area.

Province of Nampula: Malema, Ribáuè, Murrupula, Nampula, Meconta, Mogovolas, Muecate and Monapo

Province of Niassa: Mandimba and Cuamba

Province of Zambézia: Gurue and Alto Molocue

## 1.3. Period and Scope of the Study

The Study was implemented from the middle of September 2009 to the end of March 2010 for six months. The scope of the study are as follow.

**Table 1.1.1 Scope of the Study**

Study Step	Main Objectives	Reports
<b>Step 1:</b> Preparatory work in Japan	Preparation of study, formulation of study plan and preparation of inception report	Inception report
<b>Step 2:</b> First work in Mozambique	Explanation and discussion of inception report, confirmation of the plan and agricultural policy, exchange of opinions among each donors, understanding of current conditions of Nacala corridor areas, and selection of issues	
<b>Step 3:</b> First work in Brazil	Study on Cerrado development, consolidation of similar and different points between Cerrado development and agricultural development in Mozambique	
<b>Step 4:</b> Analysis work in Japan (1)	Preparation of interim report	Interim report
<b>Step 5:</b> Second work in Mozambique	Explanation and discussion of interim report, additional study of the first work and consideration of technical cooperation projects between Japan and Brazil	
<b>Step 6:</b> Second work in Brazil	Additional study of the first work in Brazil	
<b>Step 7:</b> Analysis work in Japan (2)	Preparation of final report, submission of study outputs for international symposium	Draft final report
<b>Step 8:</b> Third work in Mozambique	Explanation and discussion of draft final report, Provision of study results of international symposium	Final Report

## 1.4. Counterpart Agency

The Study is a cooperation study between Japan and Brazil, targeting Mozambique. Counterpart agencies of each country are as follow.

Brazil: Brazilian Cooperation Agency (ABC), Brazilian Agricultural Research Corporation (EMBRAPA), Technical Assistance and Rural Extension Enterprise of the Federal District (EMATER-DF), The National Rural Training Service (SENAR), etc.

Mozambique: Ministry of Agriculture (MINAGRI), National Institute for Agricultural Research of Mozambique (IIAM), Ministry of Development & Planning, etc.

## 1.5. Members of Study Team

JICA study team is composed of the following eight members.

Team Leader/Cooperation Planning	Keiji Matsumoto
Deputy Team Leader/Agricultural Policies	Yutaka Nozaki
Agricultural Economics	Tetsuo Mizobe
Agricultural Trades	Kumi Okayama
Natural Environment	Toshimori Nakane
Social Development	Nobuko Miyake
Agricultural Research	Kiyoko Hitsuda
Project Coordinator	Marilda Nakane

## CHAPTER 2 EXISTING CONDITIONS AND ISSUES OF AGRICULTURE IN MOZAMBIQUE

### 2.1. Agricultural Sector in National Economy

Mozambique started its full-fledged democratization process in 1995 following the first presidential election held in 1994 after the termination of the civil war. Starting from 1995, its real gross domestic product (GDP) growth rate continued to post a rate as high as above 8% level until the mid-2000s, and during the recent five years (2003 through 2007), it still maintained a high growth rate of 7.7% per annum (Table 2.1.1). In accordance with such a high economic growth rate, per capita GDP as an economic indicator increased to \$400 in 2007 from \$144 in 1995. The recent favourable economic growth reduced the country's poverty rate against the total population to 54% in 2003 from 69% in 1996, and it is expected to decline to 45% in 2009 (PAPRA II, 2006).

**Table 2.1.1 Main Macro Economic Index**

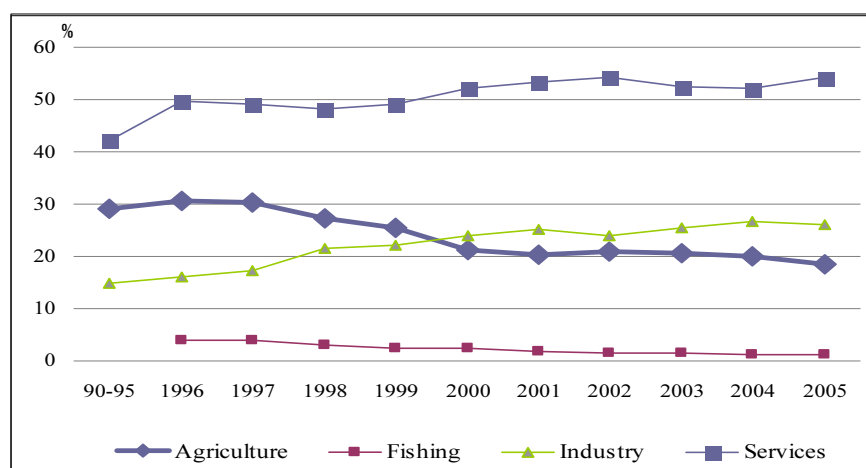
	1995	2000	2001	2002	2003	2004	2005	2006	2007
GDP (US\$ billions)	2.3	4.2	4.1	4.2	4.7	5.7	6.6	7.2	8.1
GDP annual % change	2.3	1.5	12.3	9.2	6.5	7.9	8.4	8.7	7.0
GDP per capita (US\$)	144	237	226	228	248	297	337	362	400
PPP per capita GDP (US\$)*	311	474	533	580	619	664	711	782	843
Average consumer prices (%)	54	13	9	17	13	13	6	13	8
Population (million)	15.0	17.4	17.9	19.1	19.6	20.1	20.5	21.0	21.4

Source: After World Economic Outlook, IMF, April, 2009, <http://www.imf.org/>

Note: \* PPP = Purchasing-power-parity

The growth rate of an agricultural sector from 1995 to 2007 is 5.3%, and it falls below the industrial sector at a simultaneous period and the growth rate of the service sector (Anuario Estadístico, INE, 2007). As a result, the share in GDP of an agricultural section decreases momentary from 30% level in 1997, and it changes by about 20% after 2000. However, an agricultural section still employing about 80% of the economically active population (9.6 million people and 2007), and accounting for 10% of total exports. In addition, it is the main raw material supply source to the industrial sector that canters on the agricultural processing industry. The significance of agricultural sector in the national economy has remained constant traditionally.





Source: Elaborated by Anuario Estadístico (INE), 2001, 2007

**Figure 2.1.1 Change of GDP Share by Sub-Sector**

## 2.2. Trends of Agricultural Production

### 2.2.1. Agricultural Production

The total number of farm households in Mozambique is estimated to be 3.06 million, with area possessed by a household standing at around 1.3 ha in average, and 95% of the farm households belong to small-scale farmers (2000 Agricultural Census). Meanwhile, according to the Strategic Plan for the Development of the Agricultural Sector “PLANO ESTRATÉGICO PARA O DESENVOLVIMENTO DO SECTOR AGRÁRIO: PEDSA, 2010 - 2019” formulated in 2009, it estimates that the number of farming household totals 3.6 million (2008), indicating an increase of 540 thousand during eight years.

As for the arable land, it is reported to be approximately 36 million ha, but the area actually cultivated is 5.7 million ha or equivalent to 16% of the total arable land. The irrigation area as against the acreage under cultivation accounts for 0.3%, and most of the farmers depending on the rain-fed agriculture (rainy season starts in November and ends in April).

The crop that occupies the largest production area is staple maize with 1.35 million ha, followed by cassava, sorghum and rice (Table 2.2.1). Each of these crops, excluding rice, tends to be a product for self-sufficiency, and surplus of production is generally offered for sale. However, in some years, farmers in the provinces of Nampula, Niassa and Tete which are adjacent to Malawi and Zambia have used the self-sufficiency portion of their staple maize for export for the purpose of conversion in cash. As a result, it is reported that the supply of staple food is shortened frequently in these provinces (Special Report, FAO/WFP Crop and Food Supply Assessment Mission to Mozambique, 2005).

**Table 2.2.1 Production of main crops**

		Production area 1,000 ha, Production 1,000 ton							
		2000	2001	2002	2003	2004	2005	2006	2007
Maize	Area	1,350	1,193	1,270	1,356	1,311	1,230	1,664	1,350
	Production	1,180	1,114	1,178	1,247	1,437	1,403	1,417	1,152
Millet	Area	54	100	105	105	111	78	57	60
	Production	31	61	49	48	53	36	22	25
Rice (paddy)	Area	184	155	172	178	178	180	160	165
	Production	180	93	117	200	177	174	99	104
Sorghum	Area	333	420	501	515	528	488	406	300
	Production	193	313	314	314	337	307	204	169
Cassava	Area	925	925	834	1,019	1,045	1,068	1,105	857
	Production	5,361	5,361	5,974	5,924	6,149	6,412	6,500	6,764

Source: Elaborated by information of Ministry of Agriculture, 2009

In addition to the major crops described above, cotton, tobacco, cashew nuts as agricultural products for processing for export purposes and ground nuts (for domestic market) are produced. These are valuable cash crops for small-scale farmers and these crops are directly purchased by agro-processing enterprises or firms. The purchase price of these crops is under strong influence of fluctuating prices in international markets. However, the minimum procurement price is set for cotton by the government, which is playing the role of one of few incentives for farmers to produce the crop. In recent years, the production of sesame, soybean and sunflower tends to increase as non-traditional crops, although statistics are not available.

**Table 2.2.2 Trend of Agro-industrial Crops**

	Unit: ton		
	1995-1999	2000-2004	2005-2007
Cotton (raw)	63,894	64,748	111,000
Tabacco	3,756	26,102	68,000
Cashew nuts	50,539	50,665	63,000
Ground nuts	22,987	33,102	-

Source: Estrategia da Comercializacon Agrcola, MIC, 2006

Meantime, the domestic agricultural production area is divided into three regions of the northern, the central and the southern. Different agricultural forms are found in each region. In the northern and central regions, maize, cassava, rice, sorghum, beans and the above-mentioned agricultural materials for processing (cotton, tobacco, cashew nut, etc.) are mainly produced, representing relatively similar agricultural forms. On the other hand, the production in the southern region is mainly maize and cassava because the region receives less rain compared to the other regions (Table 2.2.3).

**Table 2.2.3 Production of Main Crops by Province (2007)**

Province Crops	Production 1,000 ton										Total
	Northern area			Central area				Southern area			
	Niassa	Cabo Delgado	Nam- pula	Zam- bézia	Tete	Manica	Sofala	Inham- bane	Gaza	Maputo	
Maize	104	86	94	229	212	212	97	29	61	11	1,133
Millet	1	0	2	3	11	2	4	0	2	-	25
Rice (paddy)	3	12	10	62	0	2	11	2	2	0	103
Sorghum	8	18	21	14	22	44	36	3	1	-	169
Frijol beans	16	0	4	15	12	3	1	0	3	0	55
Cassava	88	45	1,144	2,322	24	171	123	442	156	42	4,959

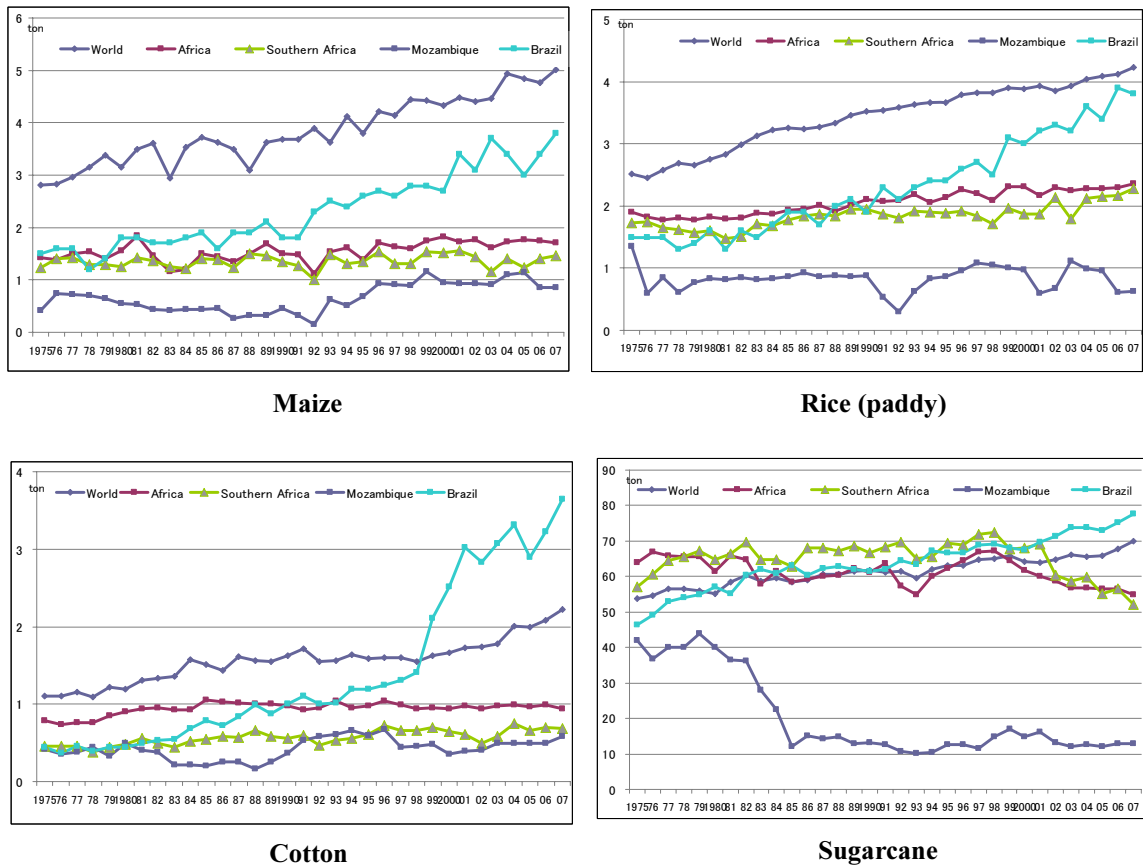
Source: Elaborated by Trabalho Inquérito Agrícola (TIA), Miznistry of Agriculture, 2007

## 2.2.2. Yield of Main Crops

Figure 2.2.1 compares the average yields of maize, rice, cotton and sugarcane in Mozambique with those of Brazil, the globe, Africa and southern Africa. The yields of maize and rice in Mozambique are one fourth of Brazil. As for cotton and sugarcane, the yields are so low; one seventh and one tenth, respectively, compared with the same country. This Figure tells us that the yields of the main crops in Mozambique have been staying at a low level for a long time.

About the low yield factors are pointed out by the Ministry of Mozambique and international cooperation agencies such as FAO, World Bank and IFAD, as follows.

- 1) Small holding size, plus uncertain climate, and manual systems
- 2) Excessive dependence to manpower work
- 3) Excessive reliance on over-burdened women for farm work
- 4) Difficulty in accessing markets and lack of available finance
- 5) Lack of market oriented skills of the small farmers and farmers groups
- 6) Minimal use of improved inputs in agricultural production
- 7) Appropriate better technology not available/accepted
- 8) Outreach of extension service extremely limited



Source: Elaborated by FAOSTAT, 2009

**Figure 2.2.1 Yield Comparison**

### 2.2.3. Food Consumption

The crop consumed in the largest quantity per head among major foods in Mozambique is cassava with annual consumption of 250 kg (Table 2.2.4). The consumption of cassava has been on the increase at an annual rate of around 4% since 1995. While per capita consumption of maize is approximately 60 kg, rice with low production volume and wheat that is dependent on import are consumed more or less 15 kg respectively. These are characterized by a large annual variation. Comparing the consumption of crops with other African nations, people in Mozambique takes 20% less except for maize and cassava. Particularly, the consumption of protein source, meats excluding chicken meat, is extremely low among African countries.

**Table 2.2.4 Food Consumption per Capita per Year**

kg/per capita/year

Maize				Cassava			
year	Mozambique	South of Sahara	Africa	year	Mozambique	South of Sahara	Africa
1995	48	41	42	1995	208	105	80
2000	50	38	42	2000	217	102	79
2001	63	37	41	2001	217	102	78
2002	66	37	41	2002	240	100	77
2003	58	38	41	2003	247	101	78
Rice(paddy)				Wheat			
year	Mozambique	South of Sahara	Africa	year	Mozambique	South of Sahara	Africa
1995	7	16	17	1995	15	14	45
2000	11	18	18	2000	26	18	46
2001	7	19	19	2001	13	19	47
2002	9	19	19	2002	13	20	47
2003	15	20	20	2003	19	22	48
Beef				Mutton and Goat			
year	Mozambique	South of Sahara	Africa	year	Mozambique	South of Sahara	Africa
1995	2	4	6	1995	0.2	2	2
2000	2	5	6	2000	0.1	2	2
2001	2	5	5	2001	0.2	2	2
2002	2	5	5	2002	0.2	2	2
2003	2	5	5	2003	0.1	2	2
Poultry				Milk			
year	Mozambique	South of Sahara	Africa	year	Mozambique	South of Sahara	Africa
1995	2	2	4	1995	7	29	36
2000	2	2	4	2000	6	28	36
2001	2	2	4	2001	5	29	37
2002	3	2	4	2002	5	30	38
2003	2	2	5	2003	4	30	38

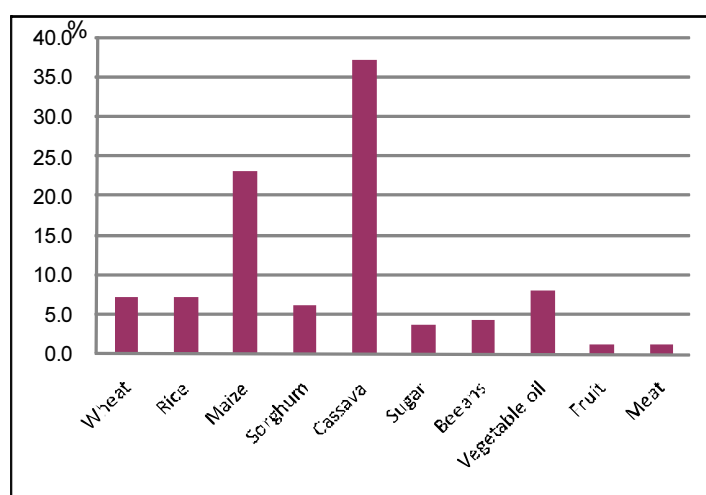
Source: FAOSTAT, 2009

Reflecting such food intake, per capita caloric intake in Mozambique is less than 2,100 kcal/day, 10% - 20% lower than sub-Sahara countries (Table 2.2.5). Also, 75% of caloric intake is sourced from crops such as cassava, maize, rice and wheat. In particular, the ratio of the dependent to cassava reaching to nearly 40% is a distinctive feature of the country.

**Table 2.2.5 Calories Intakes**

	kcal/person/per day		
	Mozambique	South of Sahara	Africa
1995	1,786	2,141	2,369
2000	1,983	2,191	2,409
2001	2,037	2,202	2,420
2002	2,091	2,204	2,423
2003	2,081	2,217	2,436
Growth rate/year %	3.9	0.9	0.7

Source: Food balance sheet, FAOSTAT, 2009



Source: Food balance sheet, FAOSTAT, 2009

**Figure 2.2.2 Calories Intakes Share by Main Crops (%)**

#### 2.2.4. Estimation of Production Value by Products

The gross output inclusive of agricultural products and stock farm products in Mozambique is calculated to be \$1,152 million, 86% of which is accounted for by crop production and its processed products (Table 2.2.6). The two crops of staple cassava and maize account for 41% of the total output, and are positioned as key crops in the agricultural sector. However, the unit prices per ton of such major crops in the markets are \$72 and \$95, respectively, and priced significantly low compared to \$1,200 - \$2,000 for agricultural and livestock processed products (manufactured cotton, tobacco, beef, chicken).

**Table 2.2.6 Production Value by Products (2007)**

Products	Production (ton)	Unit price (\$/ton)	Value (\$1,000)	%
1. Cassava	5,038,623	72	363,083	32
2. Cotton lint	94,231	1,484	139,884	12
3. Maize	1,152,050	95	109,814	9
4. Tobacco (unmanufactured)	34,132	1,823	62,230	5
5. Pulses	205,000	243	49,819	4
6. Cashew nuts (with shell)	74,395	657	48,879	4
7. Sugar cane	2,060,667	21	42,800	4
8. Groundnuts (with shell)	102,932	372	38,336	3
9. Coconuts	265,000	90	23,966	2
10. Castor oil seed	54,515	392	21,409	2
11. Vegetables (fresh)	105,000	188	19,703	2
12. Rice (paddy)	104,655	186	19,480	2
13. Sorghum	169,543	114	19,426	2
14. Fruit (fresh)	115,000	159	18,343	2
15. Cottonseed	113,000	157	17,744	1
sub-total			994,916	86
Livestock products				
1. Cattle meat	29,264	2,068	60,528	6
2. Chicken meat	35,482	1,166	41,387	4
3. Goat meat	25,200	1,523	38,368	3
4. Cow milk (whole, fresh)	66,300	266	17,631	1
sub-total			157,914	14
Total			1,152,830	100

Source: Elaborated by Information of Ministry of Agriculture, 2007 and FAOSTAT, 2007

## 2.2.5. Export and Import of Agricultural Products

### (1) Trade balance

Export-import balance of five years changes in the deficit (2004: 530 million dollars, 2005: 660 million dollars, 2006: 490 million dollars, 2007: 640 million dollars), and the amount of the trade deficit in 2008 reaches 1.15 billion dollars (Institute para Promocao de Exportacion: IPEX, 2009).

The maximum exports are the aluminum wares, and it accounts for 55% of total exports (2.65 billion dollars), and energy (electric power and natural gas) continues by 14%. Exports of the processing agricultural products (wood is excluded) reach 270 million dollars around the cigarette, sugar (sugar refining), and raw cotton and the cashew nut, and account for 10% of total exports (Table 2.2.7).

**Table 2.2.7 Export and Import Products (2008)**

Million US\$					
Export	Value	%	Import	Value	%
Aluminium	1,451	55.0	Machiens	532	13.9
Electricity	221	8.3	Gasoleo	467	12.3
Natural Gas	151	5.6	Vehicles	268	7.0
Tobacco	132	4.9	Cereals	200	5.3
Camarao	45	1.7	Electricity	122	3.2
Suagr	71	2.6	Gasolina	90	2.4
Cotton	48	1.8	Medicamentos	49	1.3
Lumber	25	0.9	Beer	1	0.0
Oil	32	1.2	Acucar	3	0.1
Bunkers	27	1.0	Others	2,071	54.5
Cashewnuts (processed)	12	0.6			
Cashewnuts (raw)	10	0.5			
Others	422	15.9			
<b>Total</b>	<b>2,653</b>	<b>100.0</b>	<b>Total</b>	<b>3,804</b>	<b>100.0</b>

Source: Elaborated by Institute para Promocao de Exportacion: IPEX, 2009

## (2) Import of food crops

The amount of the cereals import, for example, maize, rice, and wheat is 200 million dollars that correspond to 5.3% of the amount of a total import. Table 2.2.8 shows the amount of the import of these cereals (2007) in three domestic large cities according to the month. The amount of the import of these cereals in 2007 reaches 640,000 tons. This corresponds to 50% or more of the maize and rice production (1.25 million tons).

Rice is 63% to the amount of the import in 2008 because cereal prices soared worldwide compared with 2007, wheat decreases by each 23%, and the amount of a total import has decreased to 360,000 tons greatly. However, the amount of the import of maize in 2008 was the previous year and the same amount. Because the amount of a domestic supply was stringent, Malawi, Zambia, and the border are pointed out to this (interviewed in MIC) as it is because the export of state touched was diverted to the domestic market.



**Table 2.2.8 Import Volume of Cereals by Main City**

	1,000 ton												
City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>1.Maputo (Maputo port)</b>													
Maize	3.2	-	-	-	5.3	-	-	-	-	-	-	-	8.5
Rice	-	18.8	44.7	12.1	11.5	14.5	36.3	19.9	21.5	7.0	33.7	27.9	247.9
Wheat	12.0	16.5	11.0	5.5	14.8	10.1	22.9	18.6	1.9	10.0	12.9	-	136.1
<b>2.Beira (Beira port)</b>													
Maize	-	-	-	-	-	-	-	-	-	-	-	-	-
Rice	11.5	5.7	-	-	-	7.0	-	-	-	16.2	-	5.9	40.4
Wheat	12.9	-	9.0	-	7.0	16.0	-	24.0	-	9.2	-	-	78.1
<b>3.Nampula (Nacala port)</b>													
Maize	-	-	-	-	-	-	-	-	-	-	-	-	-
Rice	7.0	2.0	-	2.5	9.5	9.8	-	3.5	3.1	13.8	-	-	51.2
Wheat	7.0	7.4	-	17.0	-	18.9	-	-	-	-	30.0	-	80.2

Source: Elaborated by Importacao de milho, trigo e arroz correspondente ao Janero a Dezembro, 2007/08, MIC, 2009

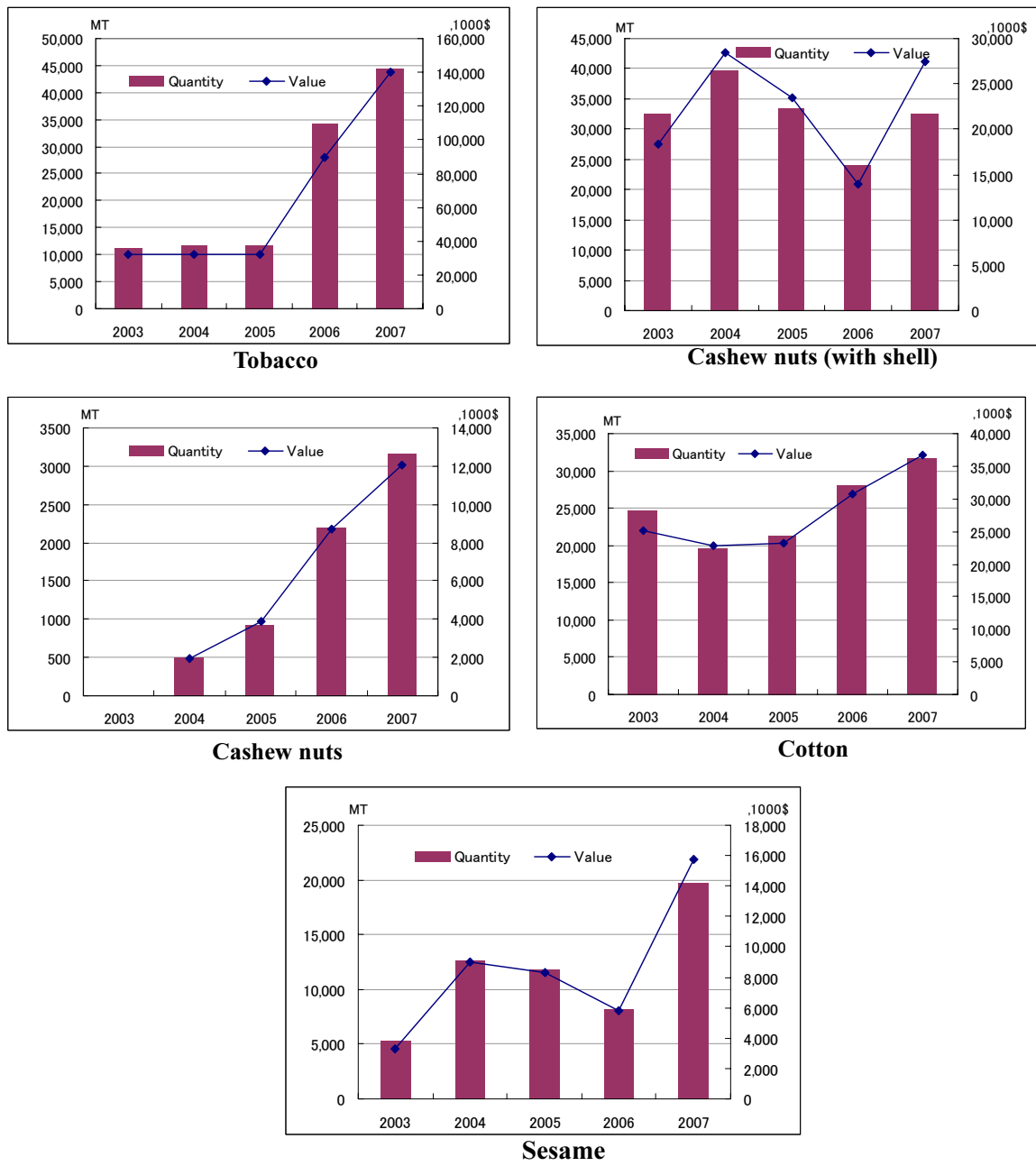
### (3) Export of agricultural products

Figure 2.2.3 shows the trends of export volume and values the main agricultural export crops for the last 5 years.

Growing of the tobacco and the cashew nut (the husk none of the processing) of both amounts of export and exports is remarkable. In case of the cashew nut, the export tax is not set for the processed one. However, the export tax came to be given for unprocessed in 2004. Therefore, it is a factor that the export of the processed cashew nut increases as shown in figure.

Production recovers by the government's setting the lowest purchase guaranteed price, and raw cotton is connected with the expansion of the amount of export though domestic production decreased until the first half of 2000 due to the decrease of the international value. It is exported unprocessed though sesame seeds are the export crops with a remarkable growth recently. Moreover, the soybean increases in recent years domestic production, and is expected with sesame seeds as crops for new export though doesn't record in export statistics.

Production and the export of sugarcane are paid to attention by a recent biofuel boom. It increases to 2.24 million tons and each 2.41 million tons in 2005 and 2006 though the amount of export of sugarcane was 1.87 million tons in 2003. However, the production of sugarcane is greatly different from the subject the foreign, capital plantation method of South Africa and Mauritania, and the dependence of many of export farm products mentioned above on the small-scale farmers.



Source: Elaborated by FAOSTAT, FAO, 2003-2007

**Figure 2.2.3 Export Volume and Value of Main Agricultural Export Crops**

## **2.3. Guidelines for Agricultural Development Strategies**

### **2.3.1. Summary of Development Policies in Mozambique**

The framework of development strategy of the agricultural sector is based on the National Development Plan, the Action Plan for Reduction of Absolute Poverty, the agrarian policies and the Action Plan for Food Production. Development policies of Mozambique, the National Development Plan (Programa de Governo or Government Five-Year Plan) is located in the top rank, and the Action Program for Reduction of Absolute Poverty (Programa de Ação para Redução de Pobreza Absoluta: PARPA) and sectorial development plans continue under that. Moreover, the coordination from the central government to local governments must be assured.

#### **(1) National Five-Year Plan**

The National Five-Year Plan was prepared for the first plan (1995 ~ 1999) after established a peace treaty in 1995, followed by the second plan (2000 ~ 2004) in 2000 and the third plan for the period 2005 ~ 2009 prepared in 2005 which remains in force. The main policies of each plans are described below.

##### **1) First National Five-Year Plan (1995 ~ 1999)**

- Peacekeeping
- Poverty eradication
- Promotion of rural development, education, health and medical care

##### **2) Second National Five-Year Plan (2000 ~ 2004)**

- Reduction of the levels of absolute poverty
- Economic development swift and sustainable
- Reduction of inequalities regional
- Peace, national unity, administration of justice, democracy and patriotism strengthening

##### **3) Third National Five-Year Plan (2005 ~ 2009)**

- Reduction of absolute poverty in the development of education, health and rural development through the promotion of rapid and sustainable global economic growth.
- Promotion of sustainable socioeconomic development based on reduction of regional disparities with emphasis on rural areas.
- Balanced development with national unity, peace, administration of justice, democracy and patriotism.
- Training and promotion of values and culture of work, effort, honesty and enthusiasm.
- Eliminate corruption, red tape and crime.
- Promote international cooperation and national self-sufficiency.

Of all the five-year plans, all hold the key objectives "eradication of poverty", "reducing regional inequalities" and "peacekeeping" and how development issues are considered important areas of "education", "health", "agriculture", "rural development" and "infrastructure". From the second five-year plan also considered governance and capacity building of public sector and decentralization, and the third five-year plan also highlighted economic, financial and trade. When considering the agricultural sector, highlighting the increase in productivity is clear the important position given to the agricultural sector in the national policies of Mozambique.

## **(2) Action Program for Reduction of Absolute Poverty (PARPA)**

As part of the vision of the national development within the five-year plan, as noted in the text of government policies, the Action program for Reduction of Absolute Poverty (Plano de Ação para Redução da Pobreza Absoluta: PARPA), the plan is being implemented to achieve the policy objectives expressed in the five-year plan. Together with the second plan that began in 2000, has prepared a strategic plan for poverty reduction from 2001 became known as PARPA I (2001 ~ 2005). This plan can be considered a Mozambique version of the Poverty Reduction Strategy Paper (PRSP). The PARPA I emphasizes 6 basis points "education", "health", "agriculture and regional development", "basic infrastructure", "good government" and "macroeconomic and financial policies".

In 2006 the PARPA II (2006 ~ 2009) was prepared as a continuation of the PARPA I. The PARPA II was based on PARPA I, but was designed to be consistent with the third five-year plan (2005 ~ 2009) and has as its vision "to seek stability in economic growth and improve living conditions, raising the welfare of the population" putting more weight on economic growth, the content of proposed reforms centered on rural development. The PARPA II considers regional development and economic promotion as one of the 3 main pillars with capital development and governance, and believes that sustainable economic growth requires for poverty reduction. The following 8 are important items that should be emphasized:

- 1) The increase in income per capita by economic activity, with particular emphasis on rural areas;
- 2) The increase in productivity through greater integration in inter-sectoral and regional (between rural and urban areas, and north and south) linkages;
- 3) The creation and improvement in quality of employment and self-employment;
- 4) The increase in national level productivity through development of the infrastructures related to the scientific capabilities and technologies;
- 5) The expansion of strong private sector dynamic, competitive and innovative;
- 6) The development of monetary and financial system to fulfill its role to boost the savings and channel them to productive investment level;

- 7) The further tax reform to increase the accountability of state institutions and residents contributing to the expansion of the formal economy; and.
- 8) The expansion of markets through the inter-regional distribution of foreign and domestic levers.

For regional development, is interested in the items 2) regional integration and 8) expansion of the market. The PARPA II quotes that promote these items will be emphasized to improve the infrastructure of transport, logistics system and trading system of the internal market, to promote the expansion of circulation, dissemination and exchange of goods, people and information.

In relation to promoting economic, items 5) private sector development and 6) the monetary system are closely related with the improvement of economic environment, and the World Bank Group supports “the improvement of investment environment” considering it one of the 3 main pillars. In relation to item 8) regional and international markets, and pursue a balanced development between regions, and intend to develop the regions of the corridors and make the exploitation of the resources of the interior and market expansion through the development of regional and international markets and international corridors linking the countries of the interior. In particular, it seeks to promote foreign investment and improving infrastructure especially the Beira corridor in the center of the country, and the Nacala corridor in the north.

### **(3) Framework of Development Plan and Establishment of State Budget**

The framework of the national development policy and budget is based on the government five-year plan and the PARPA among others, and is preparing the Strategic Plan (Plano Estratégico: PE) for the medium term from 3 to 5 years at the sectorial, provincial and district levels. These plans are considered medium-term plans for the following year with the preparation of the Socioeconomic Plan (Plano Econômico Social: PES) and the State Budget (Orçamento do Estado: OE).

#### **2.3.2. Agricultural Policy**

In Mozambique, about 80% of the employed population works in agriculture sector, and about 70% live in rural areas. Nevertheless, the share of value added of agriculture in GDP is 28% (2007, World Bank). The country has good territory with vast rich area for agriculture, and the agricultural potential is considered high. But under current conditions, only 10% of all arable land is used for agricultural production.

The main export products of the agricultural sector are: tobacco, sugar, cashew nuts, cooking oil, cotton, etc. But the main foods are corn, rice and wheat import dependent, and the country is not self-sufficient in food. Therefore, the goal of agricultural policy is to promote agricultural production, and aims to shift from subsistence to industrial agricultural

productions. The PARPA II, the sectors of agriculture and agricultural development are part of the item "Economic Development".

Within the framework of the policies mentioned above, the Ministry of Agriculture is preparing programs and action plans for agricultural development. As development plans for the agriculture sector can be mentioned the National Program of Agricultural Development (Programa Nacional de Desenvolvimento Agrário: PROAGRI) and execution is done by the annual budget. And, the PROAGRI is being mentioned "Agriculture Sector Public Expenditure Program", and is supported by the donors as the means of sector-wide approach.

### **(1) PROAGRI**

The PROAGRI I was implemented as the sectorial program of the PARPA for the period 1999 ~ 2004 with the objective of reducing poverty and food security in the rural area. During the 5-year implementation period budget shares were held for 8 items (regulation and standards, livestock, forestry and wildlife, extension, research development, land, irrigation and food production), through the financial support of more than 16 donors amounting to 218 million dollars in public investment. The PROAGRI I focused mainly on organization strengthening and through training and promotion of human resources within the agricultural institutions of central and regional governments and administrative capacity is strengthened. With regard to infrastructure improvement, facilities were built for irrigation and water supply and drainage, promoting the production of cash crops such as tobacco, cotton, sugarcane and cashew nuts.

In 2004 the PROAGRI II was prepared for the period from 2006 to 2010. In the PROAGRI II, to raise agricultural predictably was seeking a change of production consumption to production for the market. Whereas about 80% of the labor force engaged in agriculture and the dependence of the rural area in agriculture is very high, highlights the need to increase agricultural productivity, improve living conditions, build infrastructure and train human resources in the rural area to strengthen and reactivate the economy and thereby achieve economic growth in the medium term. The 5 pillars were: 1) market, 2) financial services, 3) technology, 4) access to natural resources and 5) creation of a business condition. According to the explanation of the Ministry of Agriculture, PROAGRI II was completed in 2009.

### **(2) Action Plan for Food Production (Plano de Ação para Produção de Alimentos: PAPA)**

In response to rising global food and oil prices, in October 2007 the Strategy of Green Revolution in Mozambique (Estratégia da Revolução Verde em Moçambique) was drawn up and in June 2008 the PAPA has been approved as a action plan. The total budget for the PAPA in the implementation period from September 2008 to November 2010 is 15 billion 900 million MT, or 572 million dollars. The aim of the PAPA was to reduce dependence on food imports and sought to increase production and productivity of major agricultural

products over a period of 3 years. Products considered within the PAPA were maize, paddy, wheat, sunflower, soybean, chicken, potatoes, cassava, among others, and was believed to triple production over a period of 3 years. All aspects of the value chain of food production, cultivation, harvesting, storage, processing and marketing (including export) were considered within this plan.

**Table 2.3.1 Projection of Production and Market Volume within the Strategy of Green Revolution**

Unit: Tons

Year	2008/09		2009/10		2010/11		
	Goods	Volume	for Market	Volume	for Market	Volume	for Market
Maize		1,854,062	556,219	1,994,142	598,243	2,245,907	673,772
Paddy		265,098	79,529	576,730	173,019	931,844	279,553
Wheat		21,300	21,300	46,313	46,313	96,750	96,750
Sunflower		10,000	10,000	14,400	14,400	19,200	19,200
Soybean		9,500	9,500	26,500	26,500	38,800	38,800
Chicken		47,364	42,628	51,616	46,454	61,290	55,161
Potato		81,364	107,122	138,356	162,277	229,268	251,377
Cassava		9,576,292	653,363	9,960,551	665,971	10,732,344	736,394
Total		2,140,460	1,631,950	2,617,185	1,906,152	3,274,501	2,369,135

Source: Plano de Ação para a Produção de Alimentos 2008-2011, República de Moçambique, Jun 2008, p. 81~82.

### (3) Strategic Plan for the Development of Agricultural Sector

The Strategic Plan for the Agricultural Sector Development (Plano Estratégico para o Desenvolvimento do Sector Agrário PEDSA 2010 - 2019) is now preparing for the future medium and long term planning. A draft version of the document was completed in 2009, and to prepare the final version, is being held meetings with donors. The PEDS is a continuation of the PROAGRI II, and its vision is "achieve a sustainable agricultural sector with competitiveness". The 3 main pillars of the strategy are:

- 1) Food security and improving nutritional status;
- 2) Strengthening the competitiveness of domestic production and increase farmers' income; and
- 3) Sustainable use of natural resources and environmental conservation.

The concrete goals are 5, as shown below.

The overall goal of the PEDSA rapidly developing countries and contribute to sustainable food security and competitive, increase revenue and profit for farmers and increasing agricultural production toward the market. The 5 strategic goals for its implementation are:

- Expansion of food production,
- Increased production for the market,

- Strengthening the competitiveness of farmers,
- Methods for sustainable use of soil, water and forest, and
- Development of institutional capacity of the agricultural sector.

The PEDSA will be implemented based on the Government five-year plan. In the 2010-2014 five-year plan seeks to achieve the objective of eradicating absolute poverty and hunger, which is part of the Millennium Development Goals, emphasizing environmental protection, sustainable use of natural resources and ensuring food and nutrients. In addition, the Action Plan for Food Production (PAPA) covering the period between 2008 and 2011 will be considered the initial phase of PEDSA. In the 2015-2019 five-year plan seeks to integrate the security of food and nutrients through works that emphasize environmental protection, sustainable use of natural resources and increased farmers' incomes and the competitiveness of domestic production.

The PEDS indicates that the agricultural sector to grow 7% per year on average, and therefore, the productivity of cereals (tons/ha) should increase at least 100%, and the area under cultivation increased by 25% by 2019. Below are the main indicators:

IMPACT	Key Performance Indicators	Meta	
		Baseline 2009	2019
<i>Sector Growth</i>	1. Rate of average annual growth	7%	7%
<i>Investment in Agriculture</i>	2. Public expenditure for agriculture sector as a percentage of GDP	8%	10%
<i>Vulnerability</i>	3. Population vulnerable to food insecurity	400,000	100,000

#### (4) Other plans

Below is a list of other plans and strategies related to agriculture and rural development

- Master Plan for Agricultural Extension, 2007-2016, MINAG, 2006.
- Strategic Plan 2009-2018, IIAM, 2008.
- Rural Development Strategy, MPD, 2007.
- National Strategy for Water Resources Management, 2007.
- Water Policy, Ministry of Public Works and Housing, 2006.
- Strategy and Action Plan for Biological Diversity in Mozambique, Sustainable Development through Biodiversity Conservation 2003-2010, 2003.

### 2.3.3. Governmental and related Entities

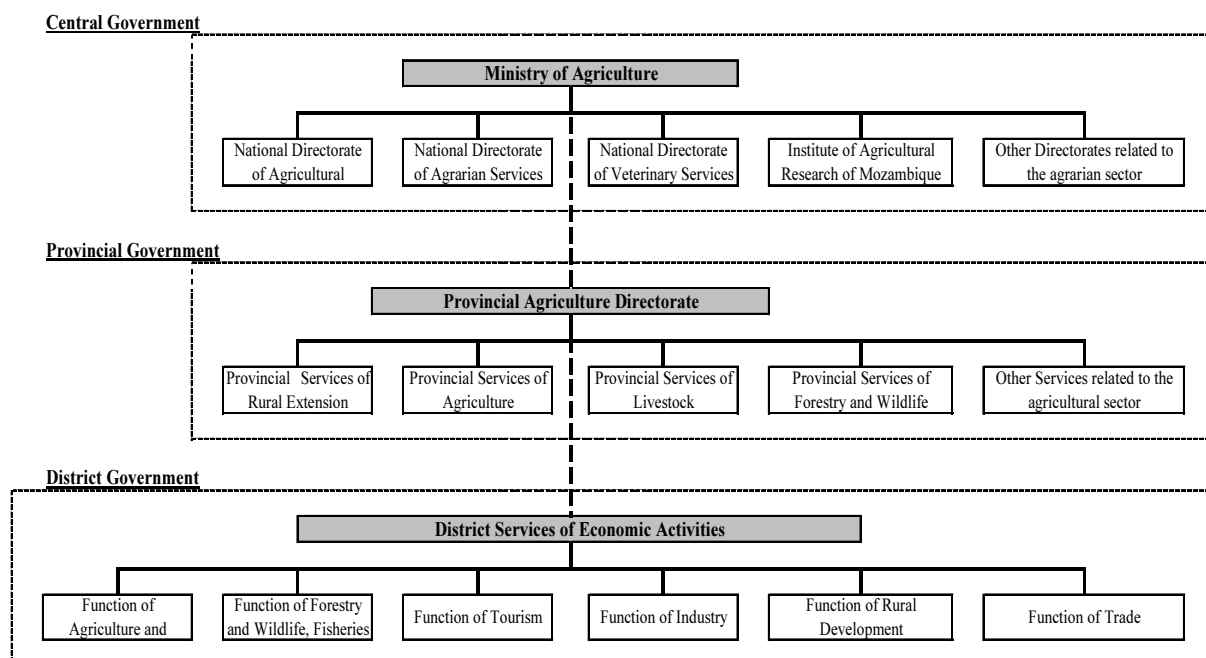
#### (1) Ministry of Agriculture (Ministério da Agricultura: MINAG)

The role of the Ministry of Agriculture is agricultural promotion, identification of agricultural production, land management, technical extension, and improvement of related facilities such as irrigation. Earlier this Ministry was also responsible for rural development, as indicated by its previous name, Ministry of Agriculture and Rural Development



(Ministério de Agricultura e Desenvolvimento Rural: MADER). But currently, the MADER is responsible for rural development.

The administrative structure of the Ministry of Agriculture is as follows.



Source: MINAG, 2010

**Figure 2.3.1 Administrative Structure of the Ministry of Agriculture**

The institutions responsible for the different agricultural activities are the Ministry of Agriculture, the Mozambique Cotton Institute (IAM), the National Cashew Institute (INCAJU), the National Agricultural Research Institute (IIAM) and the Center for the Promotion of Agriculture (CEPAGRI). The IAM manages policy on cotton adopted in 1998, and manages INCAJU advocacy strategy cashew processing is also in force since 1998. The IIAM is responsible for research in agriculture and production of basic seeds is provided to commercial seed companies and farmers contracted to produce certified seed. The CEPAGRI promotes investments in agricultural export oriented.

## **(2) Ministry of Planning and Development (Ministério da Planificação e Desenvolvimento: MPD)**

The Ministry of Planning and Development is the ministry responsible for overall coordination in preparing the Government Five-Year Plan and the PARPA. When a ministry prepares its policies and strategies, the MPD verifies that it agrees with the contents of the Government Five-Year Plan. It also verifies that the provincial development plans are in line with national policies and plans must be approved by the MPD and it must also check the progress of implementation of policies by ministries and provincial governments for each

sector. Regarding rural development, in September 2007 the Rural Development Strategy (Estratégia de Desenvolvimento Rural: EDR) was prepared.

#### 2.3.4. Land Tenure Policy

After the country's independence in 1975, the lands were nationalized. In the 80s, after the socialist administration in the country, residential property has been returned to the private request, but so far not recognized land tenure and can only be leased for 50 years. With the movement of privatization, rents of commercial properties also have to be recognized for 50 years, and foreigners are also entitled to lease land. To transfer the right to rent land, it must recognize the government, and therefore the land can not be offered as collateral for financing. According to the explanation of the CPI, the right to rent land for up to 1,000 ha requires the approval of the provincial governor, for up to 10,000 ha the minister of agriculture, and for the upper areas the council of ministers. There is no restriction on foreigners or foreign companies registered as legal entity. But the right of use of land will be confiscated if it is not used for a certain period (2 years in the case of a foreigner and 5 years for nationals).

Farmers and enterprises pay a land usage fee to the provincial government to obtain the right to use land, and produce crops or engage in agricultural processing. The maximum period of lease granted to farmers from the provincial government is 50 years, and the renewal of another 50 years is authorized subject to additional procedures for extension. Basic land usage taxes per purpose are as follows. Taking into account the basic usage taxes above mentioned and the location conditions of the farm plot, the final land usage fee is determined.

- a) Agrocultural land: 15 MT/ha
- b) Perennial crops: 2 MT/ha
- c) Livestock land: 2 MT/ha
- d) Others: 30 MT/ha
- e) Sightseeing area: 200 MT/ha

Source: <http://www.portaldogoverno.gov.mz/Informacao/dirTerra/terra3>

#### 2.3.5. Land Occupation

The safety and land possession in Mozambique have shown signs of change in the last years. The Land Policy adopted in 1995 and the Law of Land approved in 1997, followed by the Regulation of the law in 1998, established the principles and terms of the constitution, the exercise, modification and transmission and extinction of land right and land use, to assure the access and safety of land possession, both for farmers and national and foreign investors. Finally, the technical annex of the regulation approved in 1999, details the methodology for land registration. With the law, the foundation for the development of the land administration

system was set forth to make rural development easier and to assure the rights and interests of the private sector, as well as the local communities. The policy and the legal tools cover several key aspects of land use and occupation. Many situations were regulated, including a methodology to allow the acquisition of land use rights and benefits for the local communities by good faith occupation and through the official channels. Furthermore, the policy was designed to promote the development of partnerships between the private sector and local communities, allowing so the communities to benefit directly from the land use. However, the implementation of the Law of Land has been slow and requires an efficient system of land administration to improve safety in land possession as well as to improve the access and to assure the most efficient way of use to benefit economic growth.

### **2.3.6. Environmental Impact**

Mozambique, following the global environment actions, has approved in 1995 its Environment National Policy, which has as principle: “to promote the sustainable development and the rational use of natural resources, through the inclusion of environmental principles and practices as a national effort to rebuild and bring development to the country, through policies and appropriate legislation for this purpose.” (MICOA, 1995). Later, in October 1997 it was approved an Environment Law that addresses issues such as environment pollution, special measures to protect the environment, to avoid damages, rights and duties of the citizens, responsibilities and sanctions and environmental supervision. And in 2004 it was approved the Decree 45/2004 of September 29th that regulates the Processes to Evaluate the Environmental Impact.

The legislation states the necessity to preserve the country’s natural resources and has as a doctrine the obligation to make the EIA – Environmental Impact Study, so that all public and private activities that directly or indirectly contribute to the environmental components receive the duly authorization, which means, a certificate that proves the project’s viability: the environmental license issued by MICOA.

The process to obtain the environment license comprises steps such as the Evaluation of the Environment Impact (AIA), the environment Pre-viability Study and the Definition of its Scope (EPDA), the Environment Impact Study (EIA) and the Simplified Environment Study (EAS). In this process it is included the elaboration and the presentation of the Term of Reference (ToR) of the studies.

The legislation includes all aspects that impact the natural resources; however it does not require any environment obligation from the agrarian activities in areas smaller than 50 hectares. This benefit includes all small farmers of the region, who are the main responsible for the environment impact found in the study area.

The reduction of the environmental impacts in this area is directly related to the condition of extensioning a basic level of information and environmental education.

Due to the low level of understanding for farmers, environmental impacts on the natural resources make agricultural productions down with time.

The reduction of the environment impact in the study area is directly connected to the spread of basic information and environment education. At the same time it is difficult for the small farmers to understand that the continuous impact on the natural resources will reduce significantly the agrarian productivity.

Sustainability is a priority on the development of this Program, in this regard, all environmental impacts must be considered, as well as the level of information and the social and cultural aspects of the people. It is also important to suggest action and cooperation that can contribute to the reduction of impacts and that can bring a better life condition and higher income to the agrarian and urban population of the districts included in the project.

### **2.3.7. Agricultural Financing**

According to the report prepared by the World Bank in 2006 “Mozambique Agricultural Development Strategy”, rural financing is almost inexistent for small farmers of the country and it is at a very low stage, even for African countries level<sup>1</sup>.

At rural areas there are no commercial banks and there is almost no financial institution to attend small farmers. One of the factors for this situation is the actual high risk, for these small farmers practice rainfed agriculture of subsistence. On the other hand, financial services are provided for large farmers, traders, agro industries and exporters but evaluation is strict and interest rates are very high (interest rates at National Bank of Mozambique is 12.5%/month).

Microfinance of rural areas is offered primarily to agricultural projects, but there are few agencies that lend directly to farmers. Most of the time, lends itself to traders who buy products from farmers or mediate the purchase, and they lend to farmers (in most cases by providing in kind, for example, seeds, etc.). The loan is not offered directly to farmers due to some reasons.

First, it is possible for farmers to receive the use of lands and the right of utilization if they apply. However there is no right of possession for them, therefore the producers can not offer land as collateral. So, usually offered homes or vehicles, but the micro-producers often have no assets to offer as collateral. Secondly, agriculture is the major influences of climate, and even in developed countries, is considered high-risk sector. Since producers do not have the capacity to reduce the external impacts, are especially vulnerable to climate and time of production and volume produced are not stable. Finally, producers usually need money to buy seed, and as they usually buy from traders, the mechanism to receive the seed as advance payment and then return in the form of harvest is feasible.

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<sup>1</sup> Banco Mundial, *Mozambique Agricultural Development Strategy: Stimulating Smallholder Agricultural Growth*, p. 49.

## **CHAPTER 3 PRESENT CONDITIONS AND ISSUES IN THE NACALA CORRIDOR AREA**

### **3.1. Existing Conditions in the Nacala Corridor Area**

#### **3.1.1. Overview**

Nacala Corridor is located at the North of Mozambique, starts at the Nacala Port in the East coast, crosses the country East-West, passing through the province of Nampula, over the capital Nampula, Cuamba in Niassa, reaches Lichinga and then connects to the interior countries of Malawi and Zambia. In Mozambique, Nacala port is the third in relevance by cargo volume, after the ports of Maputo and Beira. It is a port with natural depth and according to the existing port enhancement project, enlargement of the container yard, construction for petroleum products and mineral yard are considering, projecting the future development of the corridor and the several functions it will lead to.

On the other hand, Nacala corridor has an important place as infrastructure in the NEPAD and many huge investments are been made for the development of mineral resources like coal, copper, titanium and mineral sand at the surroundings of the corridor. Also, besides road construction, support in many areas such as community development are considered and an integral support, not only material, but also social is expected.

From April 2004 to March 2008, the Study for the Improvement of the Nampula-Cuamba Roadway in the Nacala Corridor was conducted by JICA and its execution is planned to be carried out with an AfDB loan. Presently, the Preparatory Survey for the Cuamba-Mandimba and Mandimba-Lichinga Roadway is under execution by JICA.

The Nacala Corridor penetrates in the Study Area with length with more than 600 km from east to west in Mozambique. The Study Area is composed of 12 districts with the area approximately 56,000 km<sup>2</sup> spreading along the Nacala Corridor with length of 570 km east to west and width of 30 to 70 km from north to south.

**Table 3.1.1 Area of the Study Area (km<sup>2</sup>)**

<b>Nampula Province (8 districts, 32,167 km<sup>2</sup>)</b>			
Malema District	6,386	Meconta District	3,786
Ribaué District	6,280	Mogovolas District	4,748
Murupula District	3,095	Muecate District	4,133
Nampula District	3,739	Monapo District	3,581
<b>Niassa Province (2 districts, 10,014 km<sup>2</sup>)</b>			
Mandimba District	4,699	Cuamba District	5,345
<b>Zambézia Province (2 districts, 12,031 km<sup>2</sup>)</b>			
Gurué District	5,688	Alto Molócue District	6,343
<b>Total (12 districts)</b>		<b>57,823</b>	

Source: Perfil do District, Ministerio da Administracao Estatal, 2005.

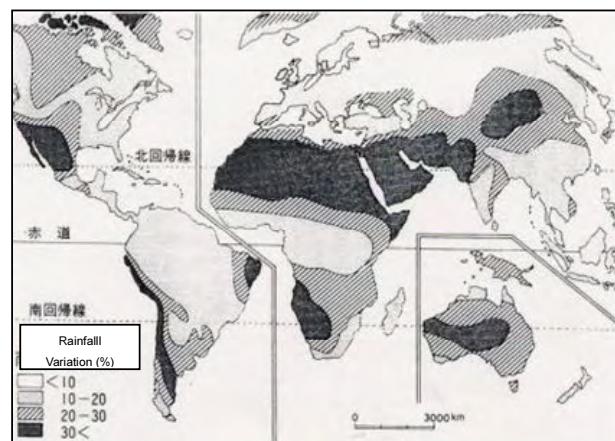
*Note: Statistical data and information of provinces/districts in the Study Area used in the following descriptions are mainly based on the data and information of Nampula District which shares major area and the Nacala Corridor runs center of the Province.*

### 3.1.2. Natural Conditions

#### (1) Climate

##### 1) Rainfall

According to Köppen climate classification, tropical savanna (Aw) has as characteristics a rainy summer where: a) average temperature during the colder months is superior to 18o C (natural palm trees), b) the yearly average rainfall is above the dry limit<sup>1</sup> and c) the rainfall volume during the month with less rain is lower than  $(100-0.04 \times \text{annual rain volume})$ . Brazilian plateau (cerrado region) and Oriental Africa, at the Indic Ocean side (North of Mozambique) are included in this region. However, the annual rain variation rate<sup>2</sup> in the cerrado is quite low, less than 10%, allowing a stable volume of rain during the rainy season; while in the North of Mozambique, it is quite high, between 20 and 30% (Figure 3.1.1), so frequently years of drought alternates with flood years. Observing the climate and the annual rainfall rate of both regions, it could be said that there are some similarities with the Brazilian northeast Caatinga also. (Figure 3.1.1).



Source: A. Goudie, J. Wilkinson, "Desert Environment", translation Masatoshi Hibino, "Environmental science of the desert", 1987

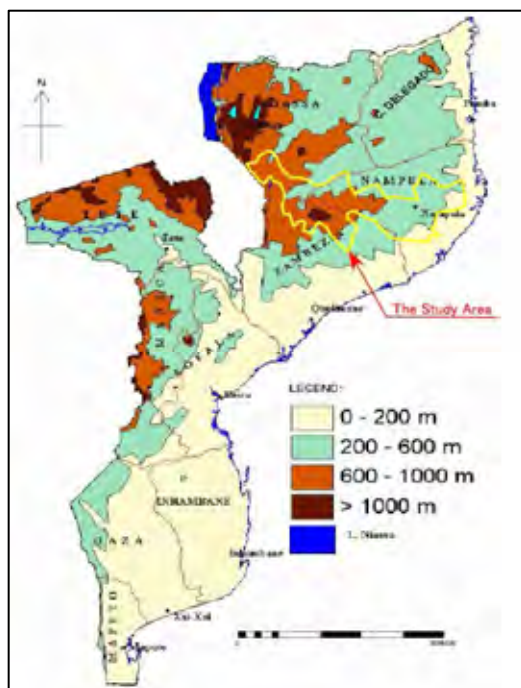
**Figure 3.1.1 Index of Annual World Rainfall Variation**

<sup>1</sup> Dry limit  $r$  (mm) considers the average temperature  $t$  (°C), where  $r=20((t+x))$ . If it is dry winter type  $x=14$ . If it is dry summer type  $x=0$ , if it is average rain type  $x=7$ . (Köppen-geiger-hessd-2007.svg-Wikipedia, October, 31 2009)

<sup>2</sup> Division between standard variation of annual rain volume with the average value

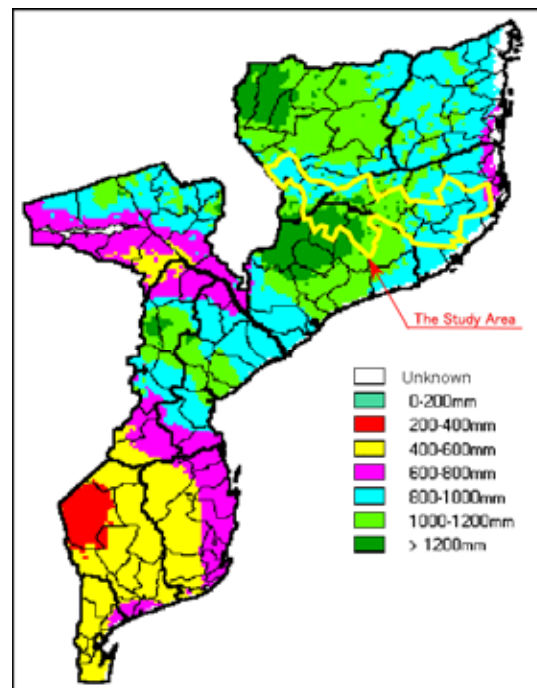
The 12 districts of the present Study are located in areas whose altitude are relatively high in terms of Mozambique, from 0-200 m (Monapo), 200-600 m (Murrupula, Nampula, Mucaeté, Meconta), up to 600-1,000 m (Mandimba, Cuamba, Gurué, Alto Molocué, Malema and Ribaué); where many steep zones can be found (Figure 3.1.2). The characteristics of said zones are semi-arid climate, with severe periods of drought during half the year (May to October) and rainy during summer (November to April), rainfall ranging from 800-1,000 mm (Mandimba, Cuamba, Mucaeté, Monapo, Nampula, Mulumba, Meconta and Mogovolas), 1,000-1,200 mm (Ribaué, Alto Molocué and Malema) to more than 1,200 mm (Gurué) and in the country, they are considered zones with abundant rain (Figure 3.1.3).

Most of rainfall concentrated in short period, the period of months which the monthly rainfall with standard deviation shows above 100 mm in central Cerrado in Brazil is 5 to 6 months, but it is less than 4 months in the Study Area except Gurué (5 months). Also the monthly rainfall with standard deviation in whole area of Cerrado is less than 300 mm, but in the Study Area shows more than 300 mm. The range of standard deviation of rainfall amounts in the Study Area is more than in Cerrado (Figure 3.1.4). Based on these comparisons with Brazilian Cerrado, it is possible to say that the agriculture in the Study Area is shorter period for cultivation and has higher risks of damages of soil erosions during germination period caused by local torrential downpours and droughts during growing period caused by erratic rainfalls



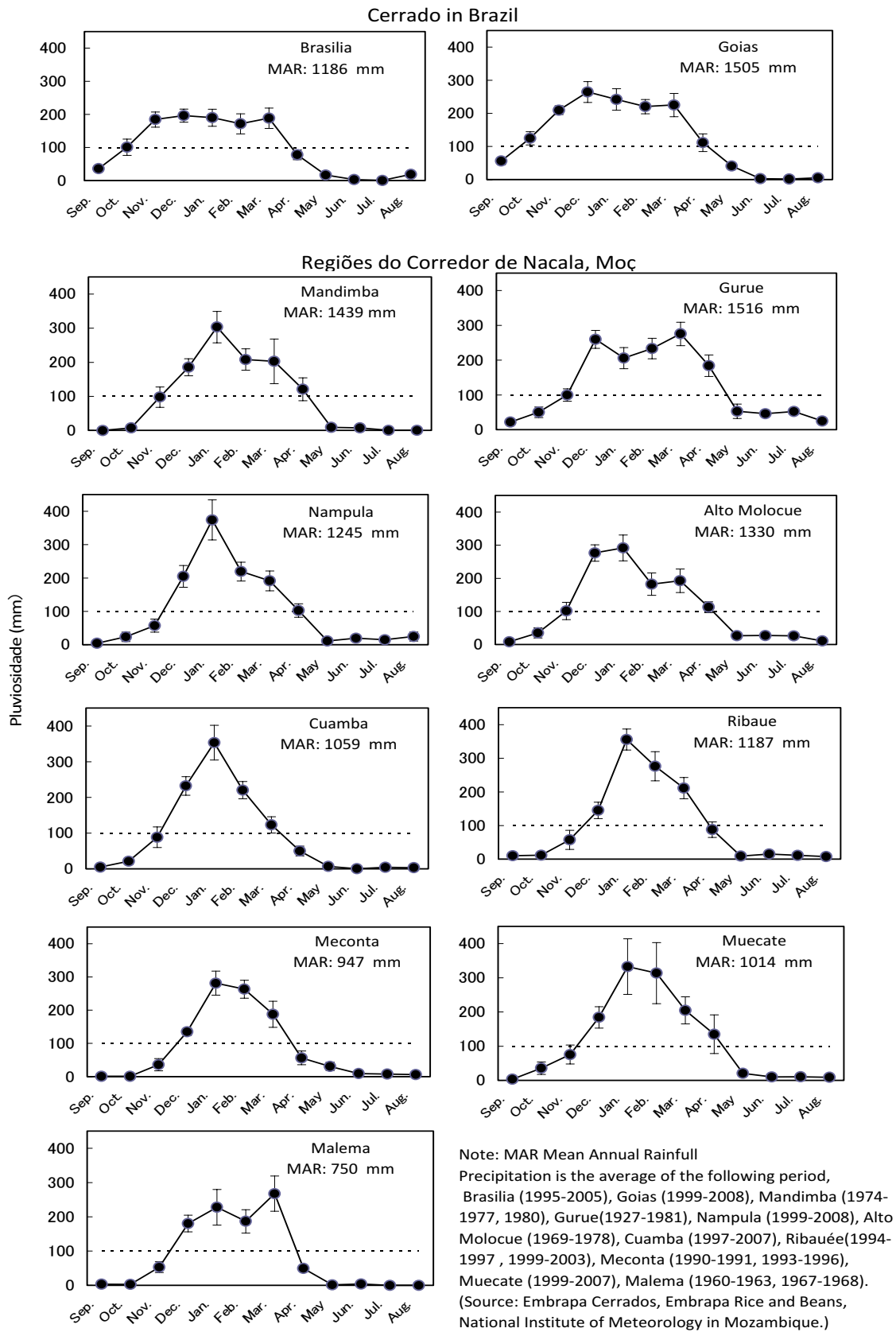
Source: Prepared according to data of the National Institute of Agronomic Investigation (INIA), 1999

**Figure 3.1.2 Distribution of Altitude in Mozambique and Districts of the Study Area**



Source: Prepared from Vulnerability Analysis and Mapping, WA – World Food Program, Mozambique, 1997

**Figure 3.1.3 Rainfall Volume during Rainy Season (November– April), in Mozambique and Districts of the Study Area**



**Figure 3.1.4 Comparison of Mean Monthly Rainfall of the Study Area and Cerrado**



## 2) Temperature

The average temperature at the Study area is 17~28.6°C, rainy season starts in October~December, with high temperatures of 26°C average; during the dry season from June~ July, temperature is cooler with average of 20°C. The temperature difference during the day ranges from 11~17°C in the provinces at the interior like Ribaué, Malema, Kuamba, Gurue y Alto Molocue, there is quite a difference of temperature during the day.

The average maximum temperature in Nampula (altitude 441 m) is 25~32°C, minimum average is 16~22°C. On the other hand, at Kuamba, located in the west (altitude 588 m) , maximum temperature ranges from maximum 28~35°C, to minimum 11~20°C; temperatures get lower in the west direction at high altitudes.

On the other hand, average temperature in the South at Gurue, in Zambezia province (altitude 734 m) and Alto Molocue (altitude 563 m), is 1.0~3.5°C lower compared to the north region; in the city of Gurue monthly maximum temperature is 23~32.5°C and minimum monthly temperature is 12~18°C. It is a different climate from the northern tropical savannah.

## (2) Relief

Relief in Mozambique is characterized by a mountainous zone by the West, decreasing in flattened steps toward the coastal plains at the East. So, in the county it can be found plains, plateaus, mountains and depressions. Around half of the territory (44%) is constituted by plains with altitudes up to 200 meters, especially at the South. In the North and Center (51%), there are two plateau areas between 200 to 500 meters and above.

Concerning geological formation of the target study region, according to works conducted by the “Universidade do Minho” (Minho University), in lithological terms, it could be considered as a “rocky body constituted by fragments of rocks with different size and types, chaotically immersed in fine matrix without sedimentary stratification, originated in tectonic process along the strip of a region of tectonic plates confrontation (tectonic mélange)” (Cumbe, 2007).

At the ten Districts along the Nacala Corridor in the Study area, a very dynamic topography was observed, by the alternation of flat areas and some rocks along the railway. This dynamics can be observed in the inclination map, prepared with information referred to the inclinations at the Study area, selected and extracted from images of the Shuttle Radar Topography Mission (SRTM), with spatial resolution of 90 m (Figure 3.1.5). The handling of these images were made using ArcGIS 9.3 software (slope and hillshade tools), and they were spaced in 05 intervals of inclination (<5%; 5-10%; 10-15%; 15-30% and >30%). In the following table a summary of the SRTM images characteristics employed.

Satellite: Space Shuttle Endeavor	Sensor: C-band and X-band
Resolution of Caption: 3 arc second	Pixel Resolution: 90 meters
Type of Scene: Grades	Size of the Scene: 1 latitude X 1 grade longitude
Projection: Geographic	

According to the slope map, one can observe that the central part of the Nacala Corridor has many areas with steep slopes due to the existence of many rocky mountains. Moreover, and the eastern part from the Nampula city there are few rocky mountains, and especially the 3 districts of the eastern end composed large areas of flat land. Moreover, in the western region, from the western part of Cuamba district to the eastern parte of Mandimba district, there is a vast area of flat land in the north-south. In remote areas of the Corridor in the northern part of Malema district, the southern parte of the Ribaué district and the Murrupula district and southeastern parte of the Molócue district, the terrain is relatively mild.

### **(3) Water resources**

Mozambique has been suffering the effects of water climatic events caused by the low and/or high level of the disposal of surface water. The magnitude of the droughts and floods effects that hit the Country has an extreme impact on the population in the coast and country areas. These represent a challenge to facts such as the capacity to stock water to be used in the scarce period and the construction of a technical-institutional capacity to use water efficiently for agriculture.

The Country has a National Strategy of Water Resources Management, and the main objective is to comply with the basic needs of water supply for human consume; the efficient use of water for economic development; water for the environmental conservation; reduction of the vulnerability of floods and droughts; as well as to guarantee the water resources for development.

In the Nacala Corridor region, there is a great vulnerability in the supply of water in the rural areas and a high dependence on climate conditions. That is the situation of 94% of the agriculture of subsistence and production.

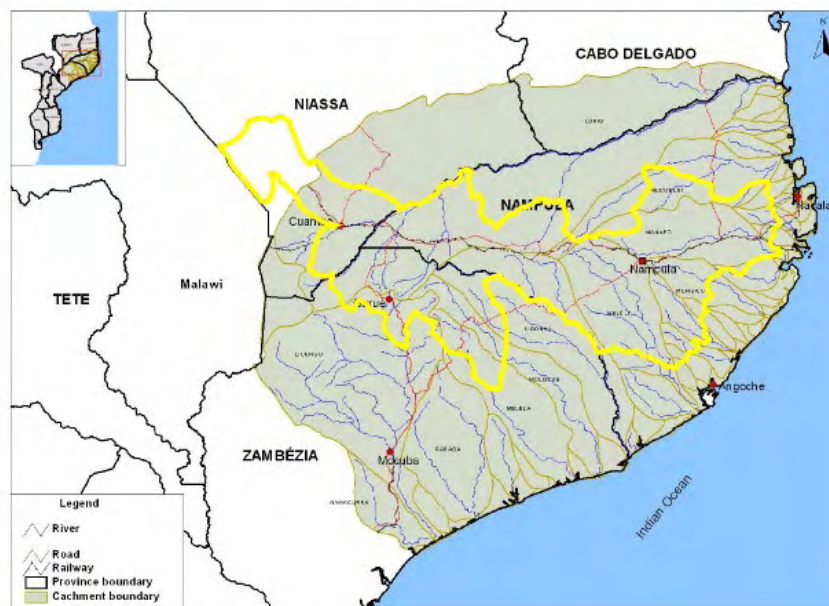
The Water Regional Management of the Center North (ARA Centro Norte) is the institution responsible for the issue and is subordinated to the Ministry of Public Constructions and Housing.

The area covered by the ARA-Center North is delimited by the South borderline of the Licungo river and the North borderline of the Lurio river, in an estimated total area of 188,000 km<sup>2</sup>. This area comprehends 8 main hydrographic water basins, from South to North: Licungo, Malema, Molocue, Ligonha, Meluli, Monapo, Mecuburi and Lurio. The smallest water basin is the Molocue river with approximately 6,500 km<sup>2</sup>, and the largest is the Lurio river with 60,800 km<sup>2</sup>. Besides these hydrographic water basins, a great number of

smaller basins make part of this area, most of them located in the coast zone. The figure shows the ARA Center North coverage (Figure 3.1.6).

Following a technical report of 2006 (Consultec) about the general situation of the water resources, ARA has identified the following aspects:

- The use of water in the ARA-Center North region is very limited;
- There is a fast flowoff of the precipitation water;
- The most important users are the urban water supply systems in big cities like Nampula and others, such as Nacala, Angoche, Ilha de Moçambique, Gurué, Mocuba, Cuamba and other small villages.
- There are almost no industrial projects outside the urban centers, being the most outstanding one the project of Moma heavy sands. The mining developments in the Zambezia Province are insignificant although they represent a potential water user in the future.
- The irrigation in the region is very limited comparing to other areas of the Country;
- The holes of groundwater are not usually measured in the program of water exploitation in Mozambique, they can only be determined from the data of the specific capacity with a maximum lowering of 10 mt. This procedure is applied in many other areas in Mozambique and the data is reliable.
- The average productivity of the aquiferous in the region varies from 0.1 – 12 m<sup>3</sup>/h/m. More than half of the registered holes have a capacity lower than 0.5 m<sup>3</sup>/h/m, which means that they have a limited productivity.
- The rural water supply is very important for the socioeconomic development, but is very small in terms of water consume, although the region is the most populated of Mozambique.



**Figure 3.1.6 Hydrographic Water Basins in the ARA-Center North Region**

So, the main target of the ARA-Center North region is to increase the water supply to the rural population and to supply 50% of such rural demand by 2015. For that they intend to make 145 holes for water per year in the region.

The region also needs water for irrigation that has been scarcely supplied by small investments from the province, districts and by NGO in the construction or reconstruction of barriers.

In fact there is a high increase in the water demand and the density of the agrarian activities in areas of river springs, causing a strong environmental impact, and the direct consequence of this impact is a gradual reduction in the water flow which can cause an water scarcity in the region.

Environmental impact studied and measures to protect and preserve the water springs of surface and underground water must be prioritized before development actions.

In ARA region, at the central northern area, there are 42 dams (reservoirs), 3 lakes and 16 springs as water installations. Almost all of them show low operation and there are plans to rehabilitate them.

#### **(4) Characteristics of soil**

According to the criteria for classification of FAO, at the higher zones in northwest Mozambique there are Ferralsols (acid soil at humid tropical climate) in an advanced stage of erosion; from the northeast to the central coast there are Lixisols (alkaline soil) with abundant basic soil. In the southern plains unexploited Regosols (soils of semi-arid climate) are predominant. In Brazil on the other hand, most part of the Amazon basin and the plateau is covered by Ferralsols and at the northeast in direction to the Atlantic coast there are Lixisols. In the southern area, where the climate is warmer, there are Leptosols (very fine soil on a rocky base) and Vertisols (High level of clay).

Observing the districts of the Study area, the presence of Ferralsols can be noticed at the proximities of Gurué district, at Zambezia province, but in other districts Lixisols, Luvisols (woody soil rich in nutrients), Acrisols (acid soil of humid tropical climate), Lixi/Luvisols and Gleysols (excessively humid soil) prevail, showing the diversity of the existing soils., and different from soils in cerrado with Ferralsols<sup>3</sup> (Figure 3.1.7).

The Ministry of Agriculture and Fishery (presently, Ministry of Agriculture) made a classification of the county according to 10 agroecologic zones (Table 3.1.2 and Figure 3.1.8) according to rain pattern, relief, type of soil, etc.. According to this classification, most of districts in the Study area are in zones with annual rainfall volume between 1000 and 1400 mm, sandy or clayish soil R7 (Cuamba, Mandimba, Malema, Ribaué, Murupula,

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<sup>3</sup> According to the classification utilized by Brazil's EMBRAPA, most part of the cerrado soil is latosols, and there are indications that latosols is widely distributed at the Nacala corridor surroundings

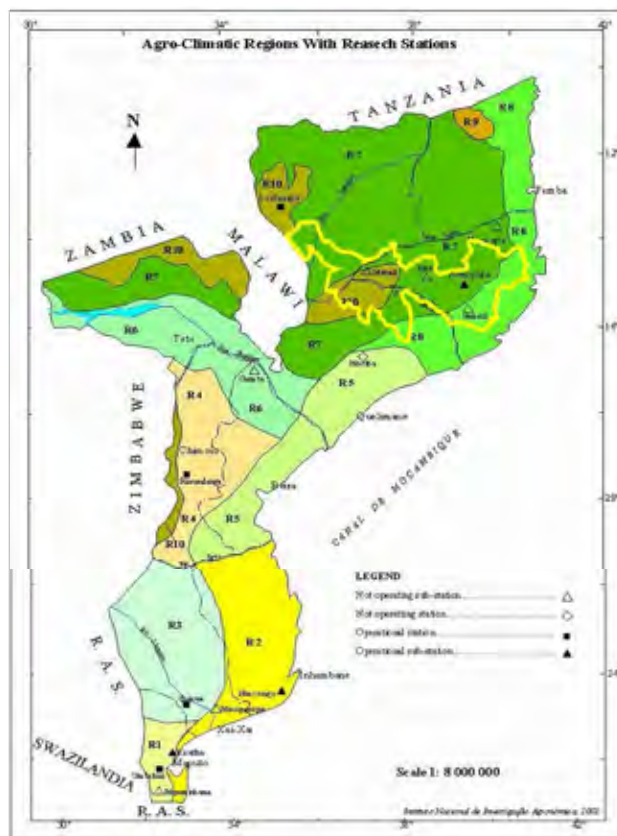
Nampula, Muecate and Alto Molocue), followed by zones with rainfall volume a little less than 800 ~ 1200 mm with equally sandy or clayish soils R8 (Monape, Meconta, Mogovolas). The only district presenting a soil similar to the cerrado, with strong ferralsols is the district of Gurué, located in a higher zone, with rain volume superior to 1200 mm.

So it can be concluded that the only zone with soil similar to the cerrado is the zone near Gurué district, soil with high acidity and low fertility (R10), and in the low zones facing the Indian Ocean, the soil is basic, similar to the caatinga soil (R8). Most part of the Study area is located between these two areas R7, proper for agricultural practices, for showing low acidity and many nutrients. On the other hand, according to the simple survey conducted by Dr. Okada Kensuke, PH 5.8~6.5 was identified at five points, but due to the limitation of the survey area, it is necessary to conduct a more detailed survey.

**Table 3.1.2 Classification of Soils in Mozambique from the Agro-Ecological Point of View**

Classification	Agroecologic zone		Annual rainfall volume (mm)	Type of soil	Jurisdiction Experiment Station
	Region				
R1	Interior south, semi desert zone		570	Sandy	South (Chókwé)
R2	South coast, semi desert zone		500-600	Very sandy	Idem
R3	South interior, desert zone		400-600	Proper for agriculture, clayish	Idem
R4	Central high zone		1,000-1,200	Clayish	Center (Sussundenga)
R5	Central coast zone		1,000-1,400	Vestisols and Fluvisols	Idem
R6	Zambezia Tete Desert		500-800	Sandy, clayish	Idem
<b>R7</b>	<b>Central and interior north region</b>		<b>1,000-1,400</b>	<b>Sandy, clayish</b>	<b>Northeast (Nampula)</b>
<b>R8</b>	<b>Region of North coast</b>		<b>800-1,200</b>	<b>Most have little areas of clayish and sandy soil</b>	Idem
R9	North interior, Cabo Delgado		1,000-1,200	Clayish and sandy	Idem
<b>R10</b>	<b>High areas</b>		<b>&gt;1,200</b>	<b>Strong Ferralsols</b>	<b>Northwest (Lichinga)</b>

Source: Ministry of Agriculture and Fishery, 1996



Source: Prepared from "National Institute of Agronomic Investigation Agro-climatic region with stations, 1996"

**Figure 3.1.8 Agro-Ecological Classification in Mozambique**

Soil at the surroundings of the watersheds at the 12 provinces at the Study area, like the cerrado, shows a low volume of saturated basic the but the former has sandy soil with low to medium acidity, differing from the cerrado soil that is silty and highly acid. Besides, the cerrado soil has a tendency to acidify while it is expected the soil in Nampula, an area with little rain, to have a tendency to be alkaline. However, from Nampula to Malema the soil is sandy with low density of vegetation but approaching from Malema to Gurue (mainly ferrasols), light vegetation increases and at the surroundings of Alto Molocue (mainly Acrisols), the soil is silty and the vegetation becomes more dense, as observed at the site survey. For the introduction of new cultivation products or definition of fertilization standards, further investigation considering the differences in type of soils is needed.

Sources of Studies conducted about the physical and chemical characteristics of soil at the Nacala Corridor where found in three technical messages of IIAM, of 1971. During the technical visit to the corridor region, the collected information was controversial, some qualified the soil as very fertile, and others qualified as too poor. It was noticed that concerning soil acidity analysis, it ranged from 4,5 to 5,0 PH up to 6,5 PH. This characteristic, if confirmed, should be well monitored, for there is a risk of causing soil salinisation. Data of the National Chart of Soils, scale 1:1.000.000 prepared by INIA - 1995,

presently National Institute of Agricultural Investigation of Mozambique (IIAM). Map of Soils and classification was prepared (Fig. 3.1.7).

## **(5) Biology**

### **1) Vegetation**

The term Savanna has been widely used to name different vegetation formation around the world. The French doctor-ecologist François Bourlière, together with authorities in the issue, provided a great contribution to clarify about savannas, by publishing in 1983 the book: “Ecosystems of the world 13: tropical savannas”. According to the authors, there are factors that in conjunction characterize the formation of savanna, among them the climate, edaphic, hydrologic and geomorphologic conditions and the type of vegetation. Other authors, like Professor Eiten, state that savannas in the world can be grouped in a macro scale according to the regional climatic conditions, where seasonality or concentration in rain pattern would be the predominant factor for the occurrence of savanna vegetation, in the African continent, for example. (Eiten, 1982).

According to the primary view of the term, savanna can be understood as a type of vegetation without trees with abundant herbal strata. On the other hand, the modern and wider view defines it as the vegetation characterized by continuous or discontinuous gramineous strata with presence of trees and bushes dispersed in the landscape (see Collinson, 1988). In this concept, savannas can be found in South America, Africa, Oceania and Asia. Savannas are considered the fourth largest biome in the world, corresponding in area to 33% of the continental surface of Earth, 40% of the tropical strip inhabited by 20% of the world population (Whittaker, 1975; Mistry, 2000).

Along the corridor, the diversity of vegetal cover fits in the wider characterization of Tropical Savannas. It has vegetation that is distinguished from open wood, followed by wooded herbaceous zones and open low altitude woods. See Map of use and coverage of earth (Figure 3.1.9).

### **2) Wild Fauna**

The conflict men wild fauna constitutes today a major preoccupation not only for the population, but all those intervening in Fauna management, for it has been growing and causing high levels of negative socioeconomic impacts, especially in the lives of rural area population. In the last four decades, the number of animal population decreased in general; however, in this same period the number of human population grew considerably. This situation contributed for the occupation of areas previously free of human presence. With the signing of the Peace Treaty, a process of coming back and resettlement of thousands of displaced or refugee citizens from the neighbor countries occurred. Unfortunately, the resettlement process in many zones of the country was centered in man, by the need of

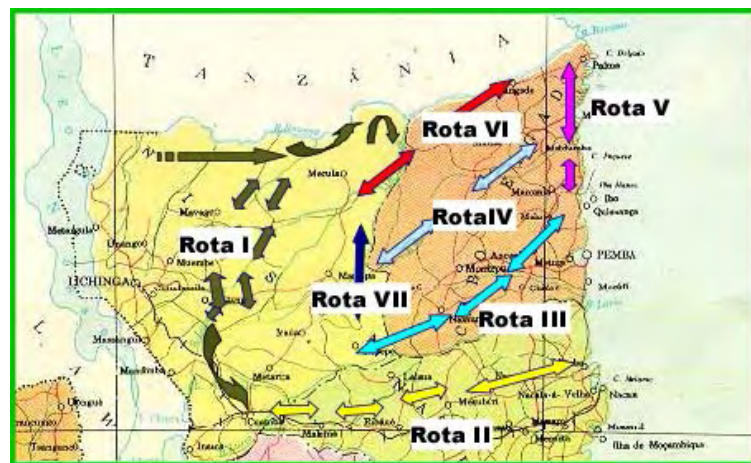
human development, and ecological aspects such as the load capacity of ecosystems and the secular routes of wild animals' migration were not taken into account.

The occupation of previously unoccupied areas and the routes of wild fauna (Figure 3.1.10), followed by the effective increase of population of elephants have somehow reduced their natural habitat, bringing together as consequence, the competition for the scarce resources of water and food and on the other hand the vegetation by herbivores and prey to carnivorous. In this situation, in order to survive, wild fauna has been obliged to venture in the farmers' plots where herbivores eat corn and manioc while carnivorous like lions eat cattle and attack men

**Table 3.1.3 Conflicts Ocurring in Districts Nearby the Nacala Corridor**

Province	Elephant	Crocodile	Hippopotamus	Lion
Niassa	Mecula Nipepe Marrupa Metarica	Meponda Lago Mecula Majune Mandimba	Mecanhelas Majune Lichinga	Majune Marrupa
Nampula	Malema Mecuburi Lalaua	Malema Memba Mecuburi Lalaua Mogincual	Angoche Moma	Moma Mossuril Mogovola

Source: Guidelines for the Mitigation of Man-Animal Conflicts (North Region– Niassa, Nampula and Cabo Delgado), SPFFB



Source: Linhas de Orientação para a Mitigação do Conflito Homem – Animal (Região Norte – Niassa, Nampula e Cabo Delgado)

**Figure 3.1.10 The Routes of Wild Fauna**

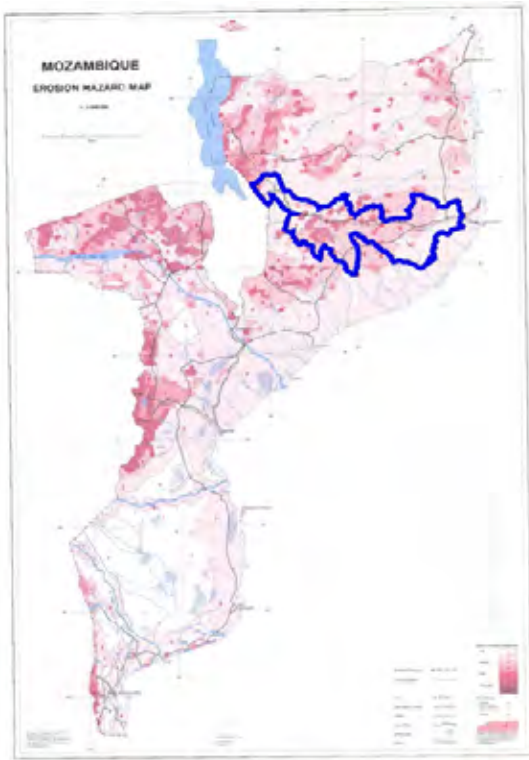
**(6) Natural Disasters**

The Study area in general has abundant rain, is located in zones with altitude superior to 200 m and there is abundant in sand soil, therefore it is very vulnerable to soil erosion. The districts of Gurué, Malema and Ribaué, considered as areas with abundant rain in the country,



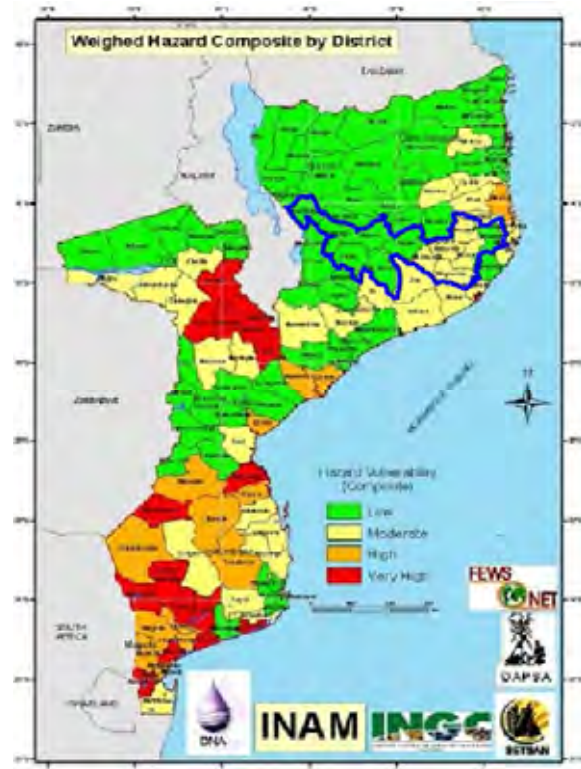
are among those with more zones with a tendency to suffer from soil erosion (Figures 3.1.11, and 3.1.12).

On the other hand, USAID made a classification for 4 stages of vulnerability (especially drought and flood) based in interviews about natural disasters, at national level by districts, with the Ministry of Agriculture. At the Study area there is no major important river and it is located at a relatively high zone, so the main problem would be drought. According to it, provinces of Murrupala, Nampula, Muecate, Meconta and Mogovolas, with relatively little rain have medium vulnerability in relation to natural disasters, but the other districts were classified among the most solid categories (Figure 3.1.12). Thus, in the Study area, for districts located at the higher zones and at the lower zones, drought and soil erosion are the impeding factors for agriculture practices



Source: Prepared from “Wambeke van J., Marques, M., Mozambique Erosion Hazard Map”, year unknown

**Figure 3.1.11 Grade of Vulnerability of Districts at the Study Area in relation to Erosion**



Source: Prepared from “Wambeke van J., Marques, M., Mozambique Erosion Hazard Map”, year unknown

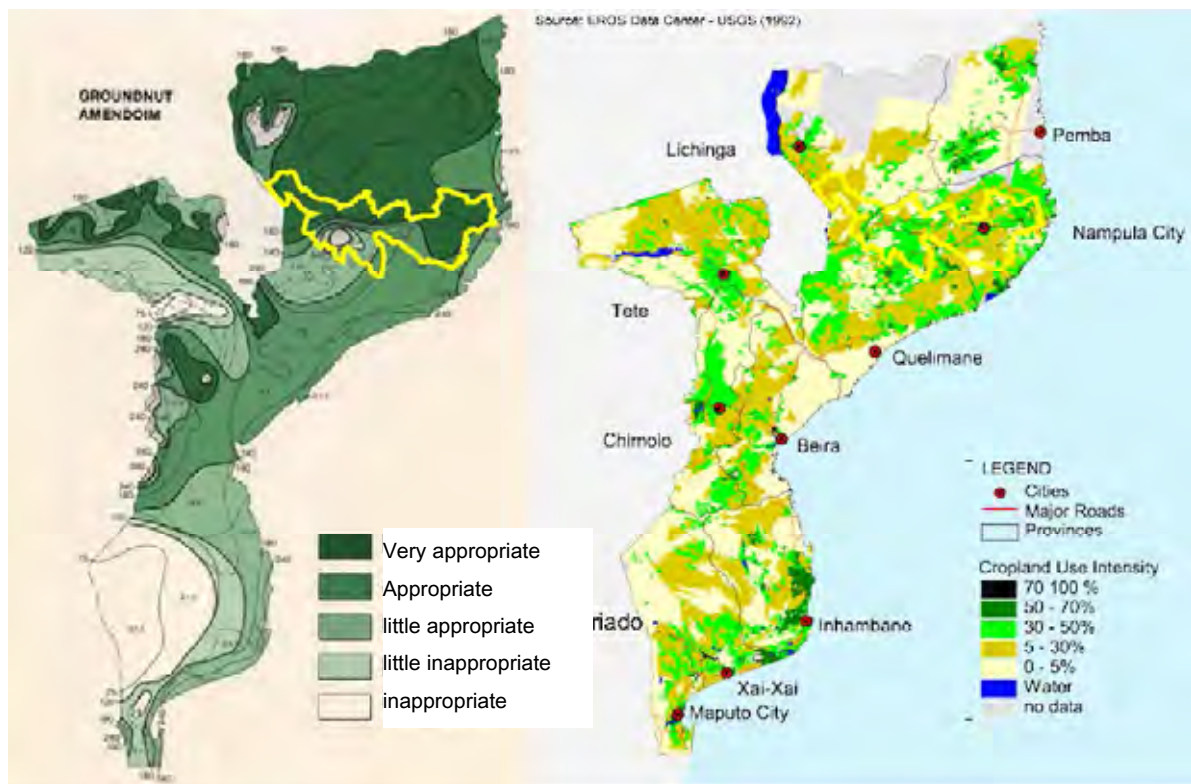
**Figure 3.1.12 Grade of Vulnerability of Districts at the Study Area in relation to Natural Disasters**

**(7) Situation of Agriculture Production**

Due to the high volume of rainfall and type of soil fertility, northern Mozambique is considered a zone proper for agriculture within the country. In the case of leguminous, peanuts is a product that favors alkaline soils and is produced in all zones of the Study area, except in the district of Gurué, with highly acid soil. An actual land use for agriculture of

peanuts is closely corresponded to proper cultivation zone, and targeted areas are most suitable zone for agriculture (Figure 3.1.13).

Two facts previously described summarize the agricultural situation in the Study area, as shown in Table 3.1.3. Gurué is in an altitude higher than 1000 m so the climate is warmer, but the soil is poor in nutrients and highly acid. Other zones are woody zones, relatively fertile with low acidity, but in Alto Molocué, Mulupala, Malema, Ribaue, Muecate and Nampula, rain can cause soils erosion. The presence of sandy soil was reported even in the rainy season, except Gurué, where data was not available; so when rainfall is delayed, these zones can easily suffer from drought problems.



Source: Left: “Generalised agro-climatic suitability for rain fed crop production sheet, 1982” and Right: “EROS Data Center-USGS, Mozambique Crop Use Intensity, 1992”

**Figure 3.1.13 Zones Considered Proper for Peanuts Cultivation (left) and Zones of Intense use for Cultivation (right)**

**Table 3.1.4 Summary of Agriculture Conditions at the Study Area**

Study Area		Agroecology	Annual volume of rainfall (mm)	Altitude (m)	Classification of soil	Type of soil	Soil acidity	Frequency of natural disasters	
Province	District							Erosion of soil	Drought/Flood
Zambezia	Gurue	R10	>1,200	>1000	Ferralsols	--	Strong	Strong	Low
	Alto Molocué	R7	1,000 - 1,400	600 - 1000	Acrisols	Sandy-Clayish	Weak	Medium	
Nampula	Mulupula	R7	1,000 - 1,400	200 - 600	Lixi/Luvisols	Sandy-Clayish	Weak	Medium	Medium
	Malema				Luvisols			Medium - Strong	Low
	Ribaue							Medium	Medium
	Muecate								
	Nampula	R8	800 - 1,200	0-200	Lixisols	Sandy-Clayish	Low	Low	
	Monapo				Medium			Medium	
	Meconta								
	Mogovolas								
Niata	Cuamba	R7	1,000 - 1,400	600 - 1000	Lixi/Luvisols	Sandy-Clayish	Weak	Low	Low
	Mandimba				Gleisols				

### 3.1.3. Socioeconomic Conditions

#### (1) Population

Provinces related to the Nacala corridor are the provinces of Nampula and Niassa. The province of Nampula has 18 districts besides the municipalities of Nampula, Nacala and Ilha de Mozambique, and the province of Niassa has 15 districts and the municipality of Lichinga. The province of Zambesia has 16 districts and municipalities of Quelimane, Mocuba and Gurue.

Total population of Nampula province in 2008 was 4 million inhabitants, being one of the most populated provinces in the country, together with the province of Zambezia. During the last five years from 2003 on, population growth reached 13% and according to population statistics projection of the province (1997-2015), by 2015 the population would be 4 million 750 thousand inhabitants (20% increase in relation to 2008). The population is concentrated in the municipalities of Nampula (11% of the province total population) and Nacala which together with the 6 districts at the coast, concentrate 42% of the total population of the province.

On the other hand, the province of Niassa has a population of 1 080 000 inhabitants, being the least populated province in the country, but during the last five years, from 2003 on, population increased in some 15 % and it is projected that in 2015 population would reach 1 million 310 thousand inhabitants (21% increase in relation to 2008). The population is concentrated in the municipality of Lichinga and in the province of Cuamba, totaling approximately 30% of the total population of the province.

The province of Zambezia has a population of approximately 4 000 000 inhabitants, with the biggest province next to the province of Nampula in 2008. The population is concentrated in municipality of Quelimane and surrounding area.

**Table 3.1.5 Area and Population at the Nacala Corridor Zone**

	Province of Nampula	Province of Niassa	Province of Zambezia
Area (km <sup>2</sup> )	81,606	129,061	103,127
Population (hab.)	3,958,899	1,084,682	3,967,127

Source: Statistic Yearbook 2008

The total population of 12 districts of the Study Area was 2,050,000 people (1/1/2005), and the Monapo district is the highest population density with 76.1 persons/km<sup>2</sup> and Muecate district is the least densely populated with 20.2 persons/km<sup>2</sup>, both of Nampula provinces.

**Table 3.1.6 Population of the Study Area (1/1/2005)**

District	Population	Population density (persons/km <sup>2</sup> )	District	Population	Population density (persons/km <sup>2</sup> )
Province of Nampula			Province of Niassa		
Malema District	149,782	23.5	Mandimba District	113,546	24.2
Ribaué District	153,794	31.4	Cuamba District	161,558	30.2
Murrupula District	122,028	39.4	Province of Zambézia		
Nampula District	153,449	41.0	Gurué District	241,303	42.4
Meconta District	147,145	38.9	Alto Molócue District	230,795	36.4
Mogovolas District	218,812	46.1			
Muecate District	83,669	20.2			
Monapo District	272,400	76.1			
Total/Average			2,048,281		36.3

Source: Perfil do Distrito, Ministerio da Administracao Estatal, 2005

## (2) GRDP

The Gross Domestic Product of Nampula province (regional GNP) is 725 million dollars, corresponding to 14% of the total GNP of the country and the province of Niassa is responsible for only 3% of the country GNP, totaling 171 million dollars.

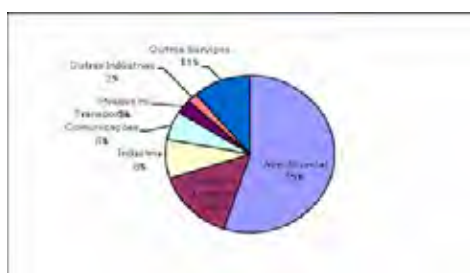
Agroforestry sector in the province of Nampula is responsible for 55% of the regional GNP, followed by exports (includes trade sector) with 15%. Basic goods consumption and products for the industry as well as oil depend on imports, and goods are transported from the Nacala port by 20 ton trucks. Manufacture sector represents 8% and the main industry is represented by some dozens of cashew nut processing plants. On the other hand, at Niassa province, agroforestry is responsible for 87 % of regional GNP, followed by mining (7%).

Along the Nacala corridor, subsistence farming depends on rain water and the percentage of irrigated land is very low. This is the cause for the presence of permanent crops like cashew nuts, cassava and cotton.

**Table 3.1.7 Regional GNP and GNP per Capita at the Nacala Corridor Zone**

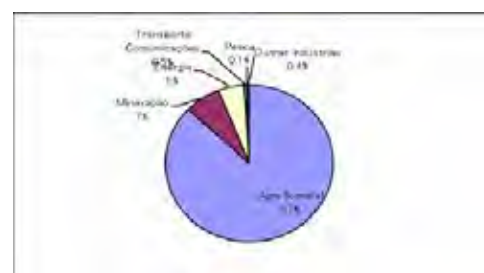
	Province of Nampula	Province of Niassa
Regional GNP (million of USD)	725	171
GNP per capita (USD)	202	171

Source: Statistics Yearbook of the Province of Nampula, Strategic Plan of Niassa Province 2017



Source: Statistics Yearbook of Nampula Province

**Figure 3.1.14 Structure of Economic Sectors at Nampula Province**



Source: Strategic Plan of Niassa Province 2017

**Figure 3.1.15 Structure of Economic Sectors at Niassa Province**

Looking at the per capita income, the average is around 200 dollars in both provinces, equivalent to 2/3 of the average per capita income of the country, 304 dollars. Most farmers live in mud brick houses with straw roof in conditions of subsistence. Ten to thirty families concentrate in a place, conforming villages that are dispersed in large areas. The farthest to the cities, there is a tendency to increase the distance from one village to another.

### (3) Education

As the table below shows, the adult literacy rates in Niassa and Nampula Provinces are lower than the national average of Mozambique. Many of them are over thirty's. It is said that the illiteracy rates in rural area are still lower and the rate of graduating primary education is around 6% of all population.

**Table 3.1.8 Adult Literacy Rates in the Target Area (2008)**

Skill	Reading and writing		Only reading		Impossible to read and write	
	female	male	female	male	female	male
Niassa	35.3		6.3		55.3	
	21.7	48.9	4.3	8.2	71.0	39.5
Nampula	35.9		4.1		57.4	
	20.5	51.2	3.6	4.7	73.2	41.7
National	46.9		3.3		48.1	
	32.6	63.2	2.9	3.8	62.7	31.4

Source: INES 2009

The Ministry of Education and Culture considers that the adult literacy is the foundations of the economic development of Mozambique; thus it has been making the effort to establish the adult education system, to increase the number of class rooms, to train the teachers, and to develop the learning materials since 2000. As the result of it, the adult illiteracy rate in Nampula decreased about 10% for last 5 years.

However, the department of Education and Culture in Nampula Province states that the number of completing the adult education course is almost the half of the enrolments, and also that the majority is female living in urban area. As the class is offered during the day and takes 10 months per year, it is difficult for some students to manage their time for the class.

In 2007, the total numbers of enrolling in EP1 and EP2 in Mozambique were 3,866,906, and 616,091 respectively. Since the team obtained the statistical data of schools and students in only Nampula Province, we will compare the data of Nampula Province and the national data in this chapter.

**Table 3.1.9 The Tendency of Primary and Secondary Schools and Students in Nampula Province (2005-2009)**

	Number of Schools			Number of Students		
	2005	2009	The growth rate	2005	2009	The growth rate
EP1	1,476	1,708	15.7%	570,682	781,130	36.9%
EP2	164	330	101.2%	61,573	108,814	76.7%
<b>EP sub total</b>	<b>1,640</b>	<b>2,038</b>	<b>24.3%</b>	<b>632,255</b>	<b>889,944</b>	<b>40.8%</b>
ESG1	18	40	122.2%	22,968	58,715	155.6%
ESG2	5	18	260.0%	2,502	11,311	352.0%
<b>ESG sub total</b>	<b>23</b>	<b>56</b>	<b>152.2%</b>	<b>25,470</b>	<b>70,026</b>	<b>175.0%</b>

Source: Department of Education in Nampula Province

The population share of Nampula Province in the whole country is about 19%. Considering the proportion, it can be said that the enrolment rate on EP1 and EP2 of Nampula Province is average. Table 3.1.9 shows the tendency of improving the primary and secondary education in Nampula Province. During the period from 2005 to 2009, the number of students dramatically increased 36.9%, 76.7% and 175.0% in EP1, EP2 and ESG respectively. The reason of the high growth rates can be attributed to the government's efforts on the increase in the class rooms, the training for teachers, and the distribution of teachers to all over the country. Especially, the government has given priority to the North region which has the high population growth rate.

**(4) Health**

The table 3.1.10 shows the number of health units in Niassa and Nampula Provinces.

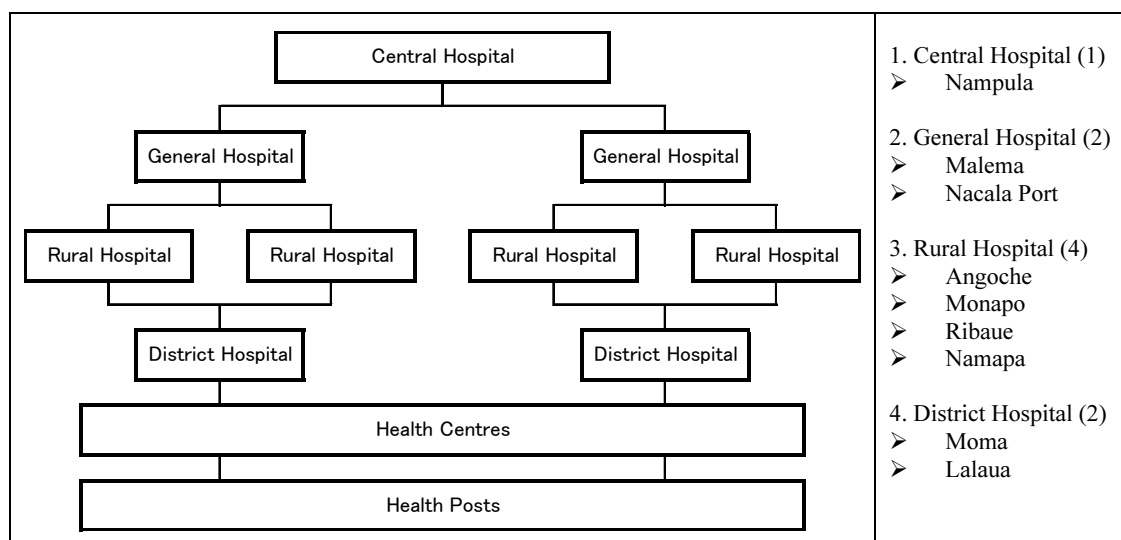
**Table 3.1.10 Health Units in Niassa and Nampula**

	Niassa	Nampula
<b>Total of Health Units</b>	<b>205</b>	<b>142</b>
Hospitals	8	2
Health Centres	135	112
Health Posts	49	28
<b>Total of Beds</b>	<b>2,988</b>	<b>731</b>
Obstetrical section	941	270
others	2,047	461

Note: the data of Niassa was of 2007, and the data of Nampula was of November 2009

Source: Niassa data from Mozambique in Figure 2008

Nampula data from Department of Health in Nampula Province



Source: Department of Health in Nampula Province

**Figure 3.1.16 Referral System in Nampula Province**

The health centre has an obstetrical section, but the health post does not. The Ministry of Health has been improving the facility of the health posts as they will work health centres near future. At the same time, the Ministry has been developing human resources like doctors, nurses, pharmacists and medical technologists. Nampula Province has a medical school for doctors in the University of Lurio and three training centres for others. These trained doctors, nurses and other medical staff registers with the provincial department of health, and the department of health allocates them to health units.

The target area has relatively high incidence of measles, meningitis, food poisoning, malaria, respiratory diseases, diarrhoea, tuberculosis, leprosy and HIV/AIDS. Among them, the incidence of malaria has been increasing in recent years. As the figure 3.1.20 shows, the

referral system was established in Nampula Province. However, many living in rural area do not have enough knowledge about medical services and/or proper transportation. It often leads to the delay of medical treatment and some disease epidemic.

The HIV/AIDS patients were 13.8% of all population; 18.9% in South region, 15.9% in central region and 7.2% in North region. Gaza Province in the central region marked 26.5% on the peak, but decreased 23% in 2007. One hand, the Ministry of Health claimed that the number of the patients would not increase dramatically in the future. On the other hand, some reported that condoms had not been distributed properly and that some patients are reluctant to take a HIV/AIDS checking because of being afraid of prejudice toward AIDS. It can be needed that the ministry distributes proper knowledge about the HIV/AIDS and the effectiveness of medical treatment like ART to remote communities more.

The Ministry of Health and the department of Health in each province are in charge of building wells for safe water. Contractors who were entrusted by the department of Health implement digging and setting wells. The contractors teach the operation and maintenance skills to the member of 'well management team', which each community establishes because the community take a responsibility for operation and maintenance.

## **(5) Finance**

The province of Nampula has 6 private banks<sup>6</sup> and the average number of clients in each agency is 18,000 clients (Strategic Plan of Nampula Province 2003~2007). The agencies are concentrated at the urban centers, mainly in the municipality of Nampula, and practically there are no agencies at other districts and the rural zone. So, an expansion of projects related to micro financing by national and external NGOs can be noticed.

Approximately 60% of the capital of foreign companies at the international trade sector and services depend on loans and most of this capital is used as operating capital, not for new investments. Due to the high interest rates, companies do not risk expansion of activities to correspond to the market and neither invest in new technologies, to reduce risks. This is a reason why still there are so many pending issues related to the recovery of economic activities.

### **3.1.4. Land Use**

#### **(1) Situation of land use**

The following map was prepared by the National Direction of Land and Forest of Mozambique and shows land use in the Province of Nampula and was updated in the first semester of 2008 (Figure 3.1.18).

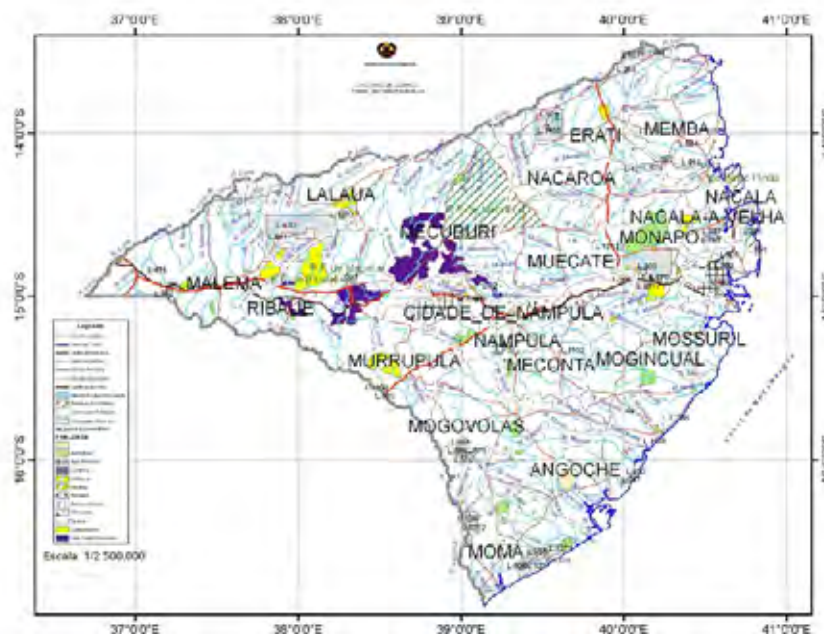
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<sup>6</sup> BIM, Banco Austral, Banco Standard Totta, Banco Comercial e de Investimentos, Banco do Fomento e Novo Banco



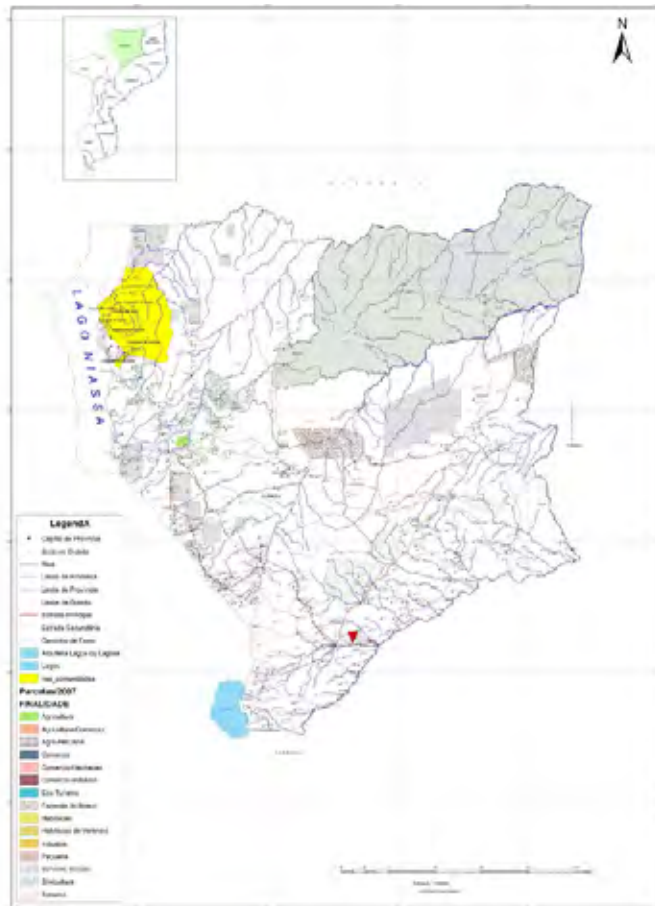
According to the land registry map in the province of Nampula, the protected reserves are concentrated in the central north, occupying large areas. In the northwest, east and south, the forest concession areas are scattered. Recently, the Lurio Green Resources obtained forest concession of a large area in the midwest. There are large areas of mineral concession in the west, and some scattered areas in the east. Small agricultural lands spread across the province, and in the north of Namialo, there is a large agricultural area. In eastern Monapo and southern Namina the land for agriculture and livestock are distributed widely. The industrial areas are concentrated in the vicinity of Namialo. From west Ribaué to east Malema, west Murrupula and a part of Monapo, there are lands for the community.

In the province of Niassa, there are only forest concessions that spread over large areas in northern Cuamba, and some areas of mineral concession. Moreover, in the province of Zambezia, the districts of Gurué and Alto Molócue, there are many small areas of land for agricultural and livestock, land for community, forest concession and land used for other purposes.



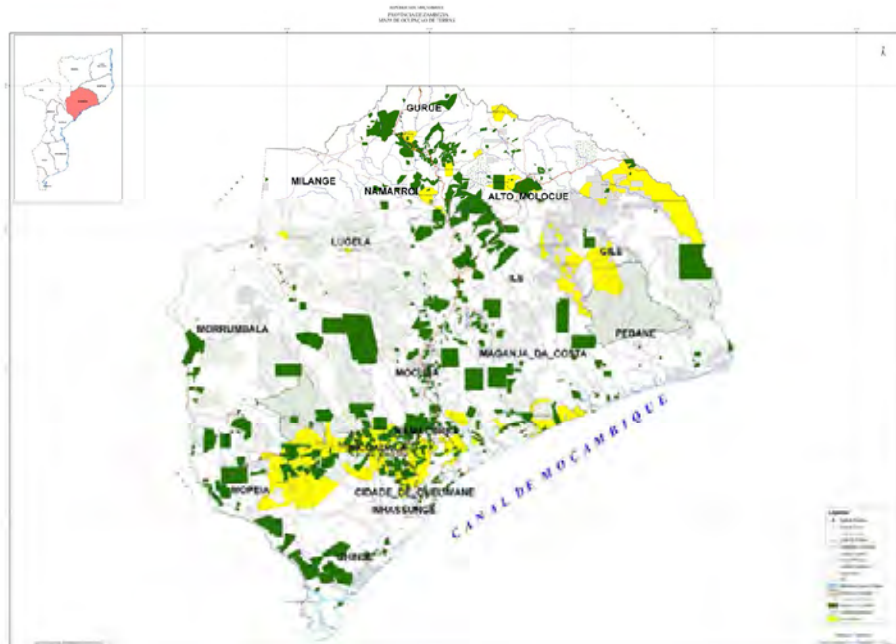
Source: National Direction of Land and Forest, 2008

**Figure 3.1.17 Map of Land Use– Province of Nampula**



Source: National Direction of Land and Forest, 2008

**Figure 3.1.18 Map of Land Use – Province of Niassa**



Source: National Direction of Land and Forest, 2008

**Figure 3.1.19 Map of Land Use – Province of Zambezia**

## **(2) Development Potential**

The studies carried out by Embrapa's technicians in Mozambique pointed out the strong limitations for the increase of agricultural production in Nacala Corridor area

- 1) inexistence of agricultural lands in dimensions which would make viable the implementation of large-scale agricultural production projects;
- 2) and, with the exception of a few small areas occupied with commercial crops southeast to EN 13, inexistence, in agronomical terms, of spaces on which the soil is similar to those found in Brazilian cerrado regions.

These findings show two important aspects for the development of a market-oriented agriculture in the region: evident limitation towards fast and appropriate introduction of genetic material and technology intended for market agriculture, already available in Brazil; and the findings also subject the expected agricultural increase to the good use of productivity increase on existing cultures, cultivated by small and medium-scale producers in small discontinuous areas.

On the other hand, studies made by Embrapa's experts, have detected the existence, west and north of the Nacala corridor, in the provinces of Niassa and Nampula, of approximately 6,4 million hectares of land which are, in agronomical terms, similar to those of the Brazilian cerrado region. However, only 12% of the land locates within the restricted area of the project.

### **3.1.5. Situation of Land Registration in the Province of Nampula**

The land registration in the province of Nampula is undertaken by the Provincial Geography and Cadastre Service (SPGC) of the Provincial Agriculture Directorate. In December 2009, the registration was done manually, directly on the topographic map on scale 1:50,000 (1971). Across the province had 2,931 entries, which correspond to the total area of 18,522 km<sup>2</sup>, about 23% of the 81,606 km<sup>2</sup> of the whole province. In the 8 districts of the Study Area, most of the eastern lands were registered, while in the west, about 80% of the land was not registered. However, according to the explanation of SPGC, lands not registered are not synonymous with unused land, with many land use whose registration is in process, or are not registered.

**Table 3.1.11 Land Registration (no registered) of the Province of Nampula (km<sup>2</sup>)**

District	District Area	No Registered Lands	Percentage (%)
Malema	6.386	5.147	81
Ribaué	6.280	5.429	86
Murupula	3.095	2.379	77
Nampula	3.739	2.849	76
Meconta	3.786	403	11
Mogovolas	4.748	1.733	36
Muecate	4.133	1.032	25
Monapo	3.581	2.994	84

Fonte: Material elaborado pelo Serviço Provincial de Geografia e Cadastro da Direcção Provincial da Agricultura.

There are registered lands with more than 10,000 ha, are mainly registered by companies or legal entity to be used for agriculture, livestock, forestry, or community.

**Table 3.1.12 Registered Lands of Large Scale in the Province of Nampula**

Distrito	Use Objectivo	Who registered	Area (ha)
Malema	Tourism	Natural person	59.032
	Agriculture	Juristic person	10.000
Ribaué	Community	Juristic person	21.509
	Community	Juristic person	34.488
	Forestry	Juristic person	15.867
	Forestry	Juristic person	17.895
	Forestry	Juristic person	12.582
Murupula	Forestry	Juristic person	11.557
	Forestry	Juristic person	17.519
	Community	Juristic person	63.204
	Community	Juristic person	37.500
	Community	Juristic person	16.950
Nampula	Community	Juristic person	13.743
	Agriculture and Livestock	Cooperative	10.000
	Others	Government	25.000
	Community	Juristic person	43.360
Meconta	Agriculture	Company	30.000
	Agricultura	Company	10.000
	Community	Juristic person	35.988
Monapo	Comunidade	Juristic person	24.000
	Agriculture	Company	9.985
	Agriculture and Livestock	Natural person	12.000
	Community	Juristic person	16.947
	Community	Juristic person	28.600

Source: Material elaborado pelo Serviço Provincial de Geografia e Cadastro da Direcção Provincial da Agricultura.

### 3.1.6. Infrastructure

#### (1) Ports

Nacala port is one of the important ports next to Maputo and Beira ports in Mozambique. North Development Corridor (CDN) has concession, valid with 15 years from 2005, and implements the operation and maintenance of Nacala port.

The total cargo in Nacala port is 0.74 million ton in 2005 and 0.8 million ton in 2006, increasing by 0.95 million ton in 2007 (Table 3.1.13). Among cargo with 0.95 million ton in 2007, 70% are international cargo for Mozambique, 23% of transit for Malawi, 6% of cabotage and 2% of transshipment.

**Table 3.1.13 Cargo in Nacala Port**

	2005	2006	2007
Total Cargo (1,000m/ton)	744.5	801.3	951.6
General Cargo (1,000m/ton)	330.0	416.3	465.1
Containers (TEU)	31,118	33,128	44,687

Source: CDN

Main imports to Mozambique are rice, wheat, fuel, and clinker, and exports are tobacco, industrial materials, timbers and fertilizer. On the other hand, imports for Malawi are sugar, fuel and fertilizer and exports are tobacco, sugar, tea, beans and industrial materials.

Followed by the increase of cargo in Nacala port, Bakhresa Grain Milling are currently building silos inside the port perimeter for storage of wheat grain. Bakhara will operate and manage a grain storage handling facility. Chiquita bananas converts an existing port warehouse into a refrigerated facility. There are two warehouses converted into a fertilizer terminal and two warehouse and the construction of a third warehouse into a sugar terminal.

Besides, port of Nacala expansion programme is planned with 30 million USD; rehabilitation of general cargo and container terminal quay structures (including upgrading of electrical sub stations and rehabilitation of drainage); expansion of container terminal<sup>7</sup> to accommodate the berthing of an additional vessel; construction of bonded warehouse in port; construction of additional grain silos; and the increase of security cameras.

#### (2) Railways

Cargo transport from Nacala port to Malawi and Zambia are usually used by railways. Same as Nacala port, CDN has concession and implements the operation and maintenance.

In the section between Nacala and Cuamba (553 km), passenger trains operate regularly operates twice per day, and the section between Cuanba and Lichinga operate twice once or twice per month. During harvest seasons from June to January, two cargo trains<sup>8</sup> are used

<sup>7</sup> In 30 million USD, this cost is excluded.

<sup>8</sup> There is no operation on Monday

from Nacala port. In the section between Cuamba to Entre Lagos has implemented the constant maintenance work.

Due to the flood damage, some parts of railway are not good condition. Also the poor vehicle causes the congestion of the cargo shipment. However, the government of Mozambique owns the railway itself, it is difficult for CDN to implement the rehabilitation construction with large scale.

Currently, railway development for export of coal from Tete province has been planned. Vale which is coal company in Brazil expects 12 million tons of coal production per year, and considers the export plan to Beira port via SENA railway, though both SENA railway and Beira port do not has enough capacity to accommodate the coal transport demands. Therefore, alternative coal transport via railway system in the north Mozambique of Nacala corridor is discussed, and in October 2009, the minister of transport and communications and Vale signed a minutes of understanding for the cooperation on railway transport between Moatiza and Nacala.

Vale will begin a feasibility study for a new railway line between Moatiza and Nacala in order to connect the railway system in Malawi and north Mozambique for coal transport to Nacala port. The feasibility study will complete by 2014 or 2015, including the investment for rehabilitation of railway system in Malawi and north Mozambique.

### **(3) Roads**

Only roads between Nacala and Namupula are paved with asphalt, though the roads between Namupula and Lichinga are still unpaved. During the dry seasons, it takes one day and it is hard to use the roads during the rainy seasons. Also most of roads in villages are not developed, it is difficult to cross even with the sedan during rainy season as well as dry season.

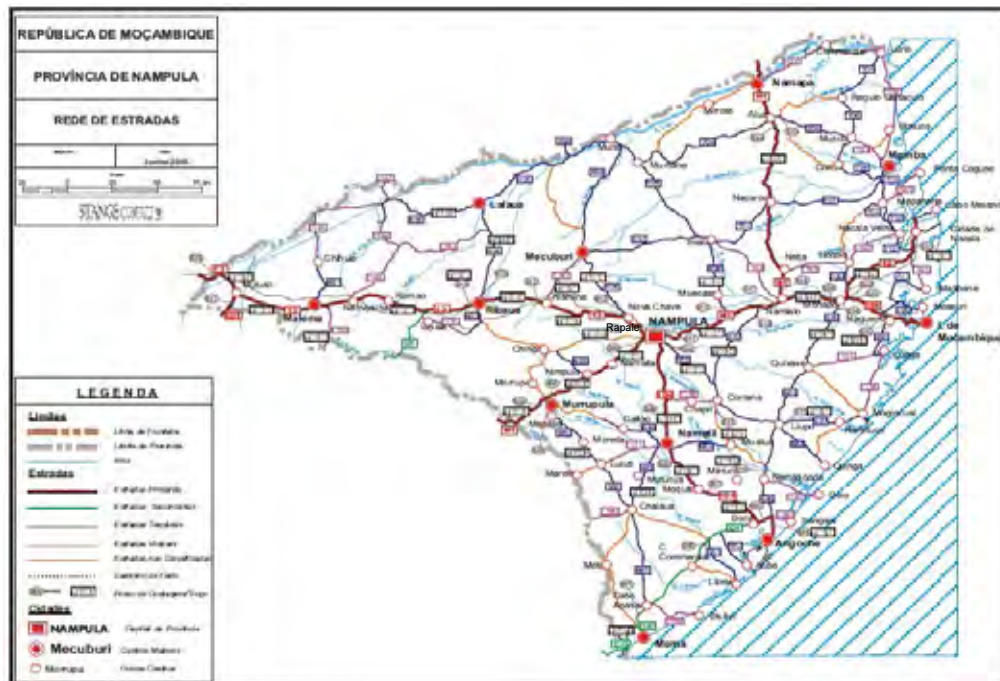
Currently, plans both arterial and feeder roads in Nampula province are developed<sup>9</sup>. Detailed design of the arterial road between Nampula and Cuamba by the government of Mozambique was completed and from August 2010, the construction works will start with cofinance with JICA and AfDB. The construction will complete by 2014 with 263 million USD. Roads between Cuamba and Lichinga are implemented the feasibility study and will complete by February 2010.

In terms of other arterial roads, Korea implemented the feasibility study on roads between Namupula, Nametil and Chalaua in July 2009. Millennium Challenge Corporation (MCC) also completed feasibility study for rehabilitation on roads between Namialo and Nampo, and plans the rehabilitation between Nampula, Murrupula, and Zambezia.

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<sup>9</sup> From the interview of National Road Administration: ANE

In terms of feeder roads, ANE proposed the request of roads rehabilitation on between Riabue and Lalaua and between Rapale and Mecuburi.



Source: ANE

Figure 3.1.20 Roads Network in Nanupula

## 3.2. Direction of Development Strategies by Provinces and Districts

### 3.2.1. Local Decentralization and Administration

#### (1) Decentralization Policies

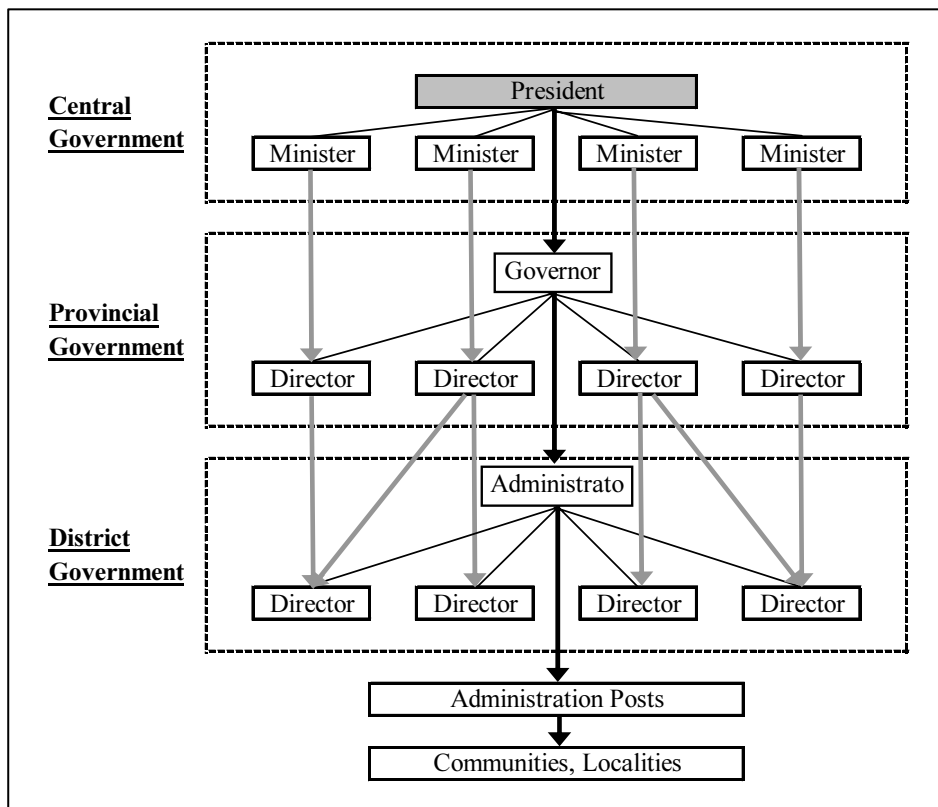
The administration of local governments in Mozambique is regulated by the Law on Local Organs of State (Lei dos Órgãos Locais do Estado: LOLE) in 2003 and establishes the system of provincial and district government. According to this law, in matters of development, the basic administrative unit in Mozambique is represented by the district and its development plans and budget would be the basis of the national development plans and budget. Development plans are prepared by district governments, and the municipal councils are conducted for purposes of implementing and monitoring projects, thus structuring a system that allows direct participation of local people.

Action Plan for the Reduction of Absolute Poverty II (PARAPA II) has been promoting decentralization, by focusing on district-based development. One of the three pillars of PARAPA II is governance pillar, in which public sector reform on decentralization and district-based development is to be promoted. Districts are key units as district development plans are formulated. It is aimed that districts become centers of planning and

implementation. However, the provincial directorates of sector ministries are currently in control of funds allocated from the central ministries. In order to break through this situation, in 2006 the government launched a scheme of directly providing districts with annual discretionary development funds. This scheme is so called “7 million” because the amount of the fund made available to each district is about 7 million MT.

**(2) Local Administration**

In Mozambique, government administrative bodies at the local level are organized into 10 provinces and Maputo city which equal with province. The provincial governor is the representative of the president of the republic at the provincial level. Provincial directors of provincial directorates are representatives of different sector ministers of the central government. A province is administratively divided into districts. Each province in the Study Area is composed 18 districts in Nampula Province, 15 districts in Nyasa Province and 16 districts in Zambezia Province. Administrators are heads of district administration and representatives of the provincial governor at the district level. In terms of sectors at each ministries, there are economic activity services at district level regarding agriculture, commerce and industry, fishery, environment, and tourism. A district is administratively divided into administrative posts. Furthermore, localities and villages are organized under each administrative post.



**Figure 3.2.1 Administration Structure of Local Government**



### (3) Overview of Provincial Directorate of Agriculture

The Provincial Directorate of Agriculture consists of: Office of the Provincial Director, Legal Office, Department of Administration and Finance (DAF), Department of Economics (DE), Department of Human Resources (DHR), Provincial Agriculture Services (SPA), Provincial Forestry and Wildlife Services (SPFFB), Provincial Geography and Cadastre Services (SPGC), Provincial Livestock Services (SPP), Provincial Agricultural Extension Services (SPER) and 3 subordinate institutions (Cashew Institute (INCAJU), Instituto Cotton of Mozambique (IAM), Institute of Agricultural Research of Mozambique (IIAM)). Moreover, in 20 districts there is the office of District Services for Economic Activities (SDAE). In total 933 employees working in the Directorate, and 602 employees in 3 subordinate institutions (June 2009). The proposed budget for 2010 of the Provincial Directorate of Agriculture was 151 million, respectively in total, an increase of 24.3% over the previous year (PES/PAAO-2010, 2009).

**Table 3.2.1 Proposed Budget of the Provincial Directorate of Agriculture (2010)**

Investment (Thousand meticais)			Operation (OGE)- Thousand meticais			Invest+Opera.
Internal	External	Sub-total	Wages	B/ services	Sub-total	Total
25.421,00	67.950,00	93.371,00	47.250,00	10.490,00	57.740,00	151.111,00

Source: PES/PAAO-2010, 2009

#### 3.2.2. Development Policy at Provincial Level

The Provincial Development Strategic Plan: (Plano Estratégico de Desenvolvimento Provincial: PEDP) such as a development policy at province level is a medium-term plan for a period of 3 to 5 years should be based on the contents of the Government Five-Year Plan and the PARPA, and verified by an officer sent from the central government to be finally approved by the Ministry of Planning and Development. The PEDP is considered the umbrella to the Strategic Plan of District Development (SDDS). The financial plan is designed as the Economic and Social Plan Budget (Plano Económico e Social Orçamento: PESOP).

##### (1) Development Policy of the Province of Nampula

In May 2002, the province of Nampula prepared the Provincial Development Strategic Plan (2003 ~ 2007). The main objective of this Plan is to reduce poverty through the expansion of sustainable production through fair distribution of income and opportunities. The Plan was developed considering mainly the investments being made along the corridor of Nacala. The basic guidelines for development strategy are: 1) promoting economic growth through the strengthening of public and private sectors, 2) development of human and social capital, 3) construction of infrastructure, 4) institutional strengthening and 5) promoting the sustainable use of resources. Of these, for the agricultural sector and rural development will be the

introduction of cassava varieties more resistant to pests, promoting the processing of agricultural products with low-cost, production and processing of mushrooms, production of honey, among others.

In the province of Nampula, the new Strategic Plan of Provincial Development 2010-2020 (PEP), for the years 2010 to 2020 was established in October 2009 by the Coordination Unit of the Integrated Development of Nampula (UCODIN).

The pillars of the new development strategy are following four, which basically continue to give the current strategy:

- Economic growth;
- Participatory Governance;
- Infrastructures and promotion of the environment; and.
- Development of human and social capital.

The 5 goals of the strategy for economic growth are follows:

- 1) To reach an economic development based on local resources;
- 2) To reform the family agricultuer in micro and small scales and medium entrepreneurs;
- 3) To encourage the business sector to adopt technologies that allow improve business competitiveness;
- 4) To create an environment that favors the formation of partnerships between business and the family sector and between the public and the private sector in order to facilitate the rapid transition; and
- 5) To engage in actions that encourage universities, institutions, research centers and professionalized to create strategic alliances with innovative elements that can absorb directly and rapidly in family and business sectors of micro and small scale.

The population growth at an average rate of 2.3% per year, will keep real GDP per capita to 5.4% per annum over the period 2010 to 2020.

**Table 3.2.2 Economic and Social Indicators in Nampula Province**

YEAR	2003/2004	2007	2020 (PROJ)
POPULATION	3.504.496	4.076.642	4.750.465A
GDP GROUGH	8%	8%	8%
GDP / CAPITA (MTS)	5.000,00	6.800,00	23.900,00
POVERTY INDEX	53.6%	53,6%	30%-35%
ILLITERACY RATE	64.5%	45%B	20%C
NET RATE OF SCHOOLING	59.5%	86.8	100%

Source: PEP Nampula 2010 - 2020, 2009

There are following programs that are designed to match the pillars of the development strategies of the PEP. As part of the Agricultural Production (PROA), contained in the strategy of economic growth is planned participation of ProSAVANA-JBM, alongside the World Bank and FAO.

**Table 3.2.3 Programs of PEP in Nampula Province**

Key strategies	Programas
Economic growth	<ul style="list-style-type: none"> <li>• Agricultural Production Program: PROA</li> <li>• Program of Enlargement of the Business Base: PROABE</li> <li>• Program of Tourist Statement: PROATUR</li> <li>• Program of rural market: PROMERU</li> </ul>
Government participation	<ul style="list-style-type: none"> <li>• Program for the Modernization of Public Services: PROMOSP</li> <li>• Program of financial Invigoration of the districts: PROFFID</li> <li>• Program of Invigoration of the Autarchical Government: PROGOA</li> <li>• Program of Invigoration of the Peacefulness and Public Safety: PROFOS</li> </ul>
Infrastructures and promotion of the environment	<ul style="list-style-type: none"> <li>• Program of Extension of the Net of Communications: PROMERCO</li> <li>• Program of Promotion of the units of production of construction materials and fomentation of improved house: PROMACOHA</li> <li>• Program of Enlargement of Infrastructures: PROAI</li> <li>• Program Cities 2020: PROC-2020</li> <li>• Program of Preservation of the Biodiversity: PREBIO</li> </ul>
Development of the human and social capital	<ul style="list-style-type: none"> <li>• Program of improvement of the teaching quality: PROMEQUE</li> <li>• Program of Improvement of the Cares of Health and Social Attendance: PROMESAS</li> <li>• Program of Massificação of the Culture and of the Sport: PROCULDE</li> </ul>

Source: PEP Niassa 2017, 2008

## (2) Development Policy of the Province of Niassa

In Niassa province, the Niassa Provincial Strategic Plan 2017 (PEP) for 10 years was established in January 2008. General Objective: Accelerate and consolidate the economic, social and cultural development of the province and reduce poverty by 15% by 2017.

Development Pillars in Niassa: Three pillars support the strategy and the global objective of consolidating and augmenting the current levels of social, economic and cultural growth and development within the province.

**Table 3.2.4 Indicators of the Development Strategy of the Province of Niassa**

Scenario	Conservative	Moderate	Optimistic
GDP Growth	8 % per annum	10 % per annum	12 % per annum
Population	3 % per annum	2.7 % per annum	2.5 % per annum
GDP per capita	4.8% per annum	7.1% per annum	9.3.8% per annum
Agricultural Production	2.1% per annum	4.5% per annum	5 % per annum

Source: PEP Niassa 2017, 2008

### **3.2.3. Development Policy at District Level**

Development policies at the district level, each district develops its own District Development Strategic Plan (Plano Estratégico de Desenvolvimento Distrital: PEDD). Currently, almost all PEDD cover the period 2006 ~ 2010, but according to the district, the Plan period varies slightly and this is reflected in the position of developing new projects. However, they are basically prepared in accordance with the Provincial Development Strategic Plan and the contents are similarly targeting the eradication of poverty and economic development.

The annual budget plan is prepared as the District Economic and Social Plan (Plano Económico e Social do Distrito: PES or Plano Económico e Social e Orçamento Distrital: PESOD), this is annual implementation plan. Moreover, the central government has the budget for local investment initiatives in 2006 to allocate funds of approximately 7 million MT annually for all districts of 128. Based on these resources are running projects such as buying tractors and financing services to small farmers in districts.

### **3.2.4. Information on the Remaining Mines**

According to the relating staff of the provincial government the dangers of remaining mines are small over the region of the Nacala corridor, except in some parts of the west area. It is said that the National Demining Institute has a map of the location of mines and it is requested a copy of it, but so far not been possible to obtain a response on the issue.

Moreover, according to the socioeconomic information from the Japanese Embassy in Mozambique, the following information regarding to the mines.

- During the ceremony of the international support and awareness of actions against mines, the Vice Minister of the Ministry of Foreign Affairs stated that the mines had been eradicated in the four provinces of Cabo Delgado, Niassa, Nampula and Zambezia (April 2009).
- There were accidents with mines in the districts of Malema, Meconta and Rapale-Nampula in Nampula province, killing 1 person and wounding 5. The majority of victims are women and children (June 2009).

## **3.3. Agricultural Sector in Nampula Provincial Economy**

Total Provincial GDP in 2007 and 2008 is 23 billion MT (790 million dollars), and 25 billion MT (880 million dollars) respectively. This accounts for each 8% and 10% of gross domestic product (GDP) in 2007 and 2008. Details of the share in total provincial GDP according to the sector are Tables 3.3.1.

Agricultural sector is the biggest industry which accounts for about 44 % of the provincial GDP. Half of provincial GDP is dependent on beef-cattle production by a large-scale stock

raising farmer. A corporate wood deforestation industry continuously occupies the large percentage.

The wood after it deforests it is exported from the Nacara port to Asia in which it centers on China in the state of the log. As for economy structure from the Table 3.3.1 to Nampula province, the realities that depend on extensive livestock raising and forestry with a low additional value with the harvesting timber in large-scale land are understood. This can be pointed that provincial economical contribution level low, small-scale farmer's crops production and processing agricultural products industry field will be gripping the key to economic development with both fields of livestock raising and forestry now in the future.

**Table 3.3.1 Provincial GDP and its Breakdown by Sector (2008)**

Sector	Production value (1,000MT)	(%)
1. Agricultural	11,246,971.7	43.7
1.1 Agro-processing	664,431.6	2.6
1.2 Agricultural production(small-farmers)	838,224.0	3.3
1.3 Large –scale livestock farmers <sup>1)</sup>	5,718,913.8	22.2
1.4 Small-scale livestock farmers <sup>2)</sup>	1,281,325.4	5.0
1.5 Forestry (enterprise)	2,403,099.0	9.3
1.6 Forestry(small-scale farmers)	340,977.9	1.3
2. Fishing	603,106.5	2.3
3. Mining	185,998.3	0.7
4. Energy	485,641.6	1.9
5. Manufacture	5,408,055.7	21.0
6. Materials	282,791.5	1.1
7. Construction	860,243.3	3.3
8. Transportation	6,690,554.0	26.0
Total	2,576,3362.6	100.0

Note: 1)More than 100head of cows, 2) Less than10head of cow

Source: Direcção Provincial de Agricultura de Nampula, 2009

### 3.4. Major Crops and Price Change in Study Area

#### 3.4.1. Number of Farm Households and Land Holdings Scale

Nampula province is the one that has the largest number of farm households in Mozambique with 720,000, equivalent to 24% of the entire nation. Average land holding area possessed by one household is 1.0 ha, below the national average of 1.3 ha per household (Agricultural Census 2000). By size of the land owned, farmers who have 0.5 ha to 0.9 ha top other tiers with accounting for 37% to the total, and this tier together with those who have less than 2 ha totals 91% of the aggregate number of farm households (Table 3.4.1). The national land including agricultural land is in its entirety nationally-owned land. Therefore, the area of land possessed is, to be precise, the area of land used.

The Provincial government has recently taken a course of expanding the area of the land possessed by farmers, and so the current land per farmer is considered to have slightly

enlarged from the time when the Agricultural Census was conducted. Also, it is characterized in that many farmers have several plots of land which are scattering about in three or more places. In the province, a ratio of women who are heading the households accounts for 20%, slightly lower than the national average of 25%.

**Table 3.4.1 Number of Farm Households and Land Holdings Size**

Land holding(ha)	No. of farm households	(%)	Average holding area (ha)	Average farm land
0.1 ~ 0.4	172,408	24	0.2	1.3
0.5 ~ 0.9	265,088	37	0.7	2.4
1.0 ~ 1.9	216,284	30	1.4	3.1
2.0 ~ 2.9	41,658	6	2.4	3.6
3.0 ~ 3.9	11,612	2	3.4	3.8
4.0 ~ 9.9	6,575	1	5.4	3.8
10.0~49.9	285	-	20.0	3.6
> 50.0	11	-	904.0	1.5
Total (non-land)	720,485 (6,564)	100	1.0	3.0

Source: Elaborated by Agricultural Census, 2000, INE

### 3.4.2. Right to Use Agricultural Land

Because the agricultural land is possessed by the country, it cannot be used as collateral or mortgage to borrow farming funds from a financial institution. When a farmer wishes to enlarge the existing farm plot or acquire it newly, the usage right will be given subject to processing an application to a county office or the Nampula government. However, the Nampula government does not require an application procedure for expanding the farm plot unless it surpasses 2 ha in a bid to promote an increase in agricultural production through expansion of agricultural land. Such measures are serving as incentives for expanding agricultural land by small-scale farmers who back away from scaling up their agricultural plot because of the complicated procedures. Meantime, those who wish to expand their agricultural land to over 2 ha are required to submit the production plan (including crops to be cultivated and cropping average) to a county office or the Nampula government and obtain the approval thereof.

### 3.4.3. Trends of Main Agricultural Production

Total agricultural land area in Nampula province is estimated to be about 4.59 million ha, and 1.45 million ha that corresponds to about 31% is used as a arable land (BALANÇO QUINQUENAL DA AGRICULTURA, 2003 – 2007). The main agricultural products are maize, cassava, sorghums, rice, fejon beans, and production for the self-sufficiency. Moreover, cotton, cashew nuts, and tobacco are produced as crops for traditional processing agricultural products enterprise in the province. The production trends of these main products for five years is shown in Table 3.4.2

Production of maize and cassava is a growth rate of about 6-8% in the annual rate. The cash crops such as groundnuts sweet potatoes are high expansions of 15% or more.

On the other hand, cotton and tobacco of crops for processing agricultural products show the tendency to decrease output. However, increases in production in crops for untraditional processing agricultural products like the sunflower and sesame seeds, etc. are remarkable. The change of the international market price generally influences the purchase price from the farmer by the agro processing enterprise directly crops for processing agricultural products. Cotton and the tobacco are larger than other crops the decrease of the international value, and are factors that the decrease of the purchase price in recent years obstructs farmer's willingness to produce with a production decrease by the generation of the pest. As for the production increase of the cashew nut, the amount of purchase from the farmer increases because the advancement of the processing enterprise (Refer to paragraph 3.6) increased by the improvement of a recent international market price, and the side that leads to an increase in production is strong.

**Table 3.4.2 Production Trend of Main Crops**

unit: 1,000 ton

Crops	2003	2004	2005	2006	2007	Decrease/ increased (%)
<b>1. Food crops</b>						
Maize	139.6	116.8	134.0	148.9	170.7	6.0
Sorghum	66.8	60.9	62.8	99.0	108.5	15.4
Millet	5.9	3.8	3.7	4.7	8.1	15.3
Rice	23.3	17.9	23.3	29.8	32.9	11.3
Fejon beans	40.1	27.8	35.8	43.4	59.2	13.9
Groundnuts	45.3	36.5	62.6	74.3	79.1	19.3
Cassava	2,051.6	2,174.2	2,285.3	2,801.8	2,809.0	8.5
Sweet potato	5.5	5.2	4.9	7.4	11.3	22.7
Sub-total	2,378.1	2,443.1	2,612.4	3,209.3	3,278.8	8.7
<b>2. Agr-processing</b>						
Cashew nuts	21.7	59.4	29.3	43.6	46.1	44.3
Cotton	40.1	27.6	31.9	26.6	19.2	-15.0
Tobacco	4.9	3.2	3.8	6.4	1.8	-5.3
Sunflower	1.5	0.6	0.4	1.9	2.0	84.1
Sesame	7.4	4.4	8.7	13.5	17.6	35.3
Sub-total	75.6	95.2	74.1	92.0	86.7	19.6
Total	2,453.7	2,538.3	2,686.5	3,301.3	3,365.5	8.8

Source: BALANÇO QUINQUENAL DA AGRICULTURA, 2003 A 2007

The average yield of the above-mentioned main agricultural product (ton/ha) is the following:

Maize: 0.9~1.5, Rice: 0.6~0.8, Fejon beans : 0.7~0.8

Cassava: 4.5~5.0, Sweet potato: 1.5~2.0, Cotton: 0.4~0.5

Tobacco: 0.4~0.5, Sunflower: 0.4~0.5, Sesame: 0.4~0.6

Nampula provincial government is pointed out the importance of the expansion for the agricultural production in the region as following; 1) increased of inputs for agricultural production materials such as improved seeds, fertilizer and chemicals, 2) introduction of organic fertilizer, 3) soil conservation, 4) promotion of use for agricultural machinery and animal traction, 5) strengthening of agricultural extension system.

### 3.4.4. Production Performance by Region and Farm Management

#### (1) Major crops production

The Nampula province gains an understanding of the production status of major crops by dividing it to four areas; Interior, Intermedia, Costeria Norte and Costeria Sur. The major crops are maize and cassava of food crops for self-sufficiency and cotton and tobacco of cash crops. The production area of cassava is the largest of all with 520 thousand ha, followed by maize with 160 thousand ha, sorghum with 120 thousand ha and peanut with 110 thousand ha (Table 3.4.3).

The production area of cassava in Nampula province accounts for almost half of the entire country, the largest production site of cassava in Mozambique. The respective production areas for maize and sorghum in the province account for one tenth and one third of the national production area respectively, and the province is regarded as major production area of the crops in the country.

**Table 3.4.3 Major Crops Production by Region (2006/2007)**

Area:1,000 ha, Production:1,000 ton

Region		Crops							
		Maize	Sorghum	Millet	Rice	Frijol	Groundnuts	Cassava	Potatoes
Interior	Area	46.1	36.7	1.5	3.1	24.8	17.6	86.6	1.0
	%	29.0	31.1	17.0	6.3	25.4	15.4	16.7	22.2
	Production	43.9	31.0	1.9	2.2	12.3	11.5	486.2	2.6
	%	28.3	25.9	20.9	6.6	24.6	15.4	16.8	18.6
Intermediate	Area	29.3	52.1	2.1	21.0	39.3	52.6	223.0	1.8
	%	37.2	44.2	23.9	42.9	40.2	46.1	43.0	40.0
	Production	62.2	54.7	3.0	12.8	19.8	38.1	1,453.8	4.1
	%	39.9	45.7	33.0	38.3	39.5	51.1	50.2	29.3
Northern Coast	Area	29.2	17.8	3.5	7.1	16.9	16.2	104.4	1.2
	%	18.3	15.1	39.8	14.5	17.3	14.2	20.2	26.7
	Production	21.2	19.1	1.9	4.2	8.4	7.1	416.9	2.2
Southern coast	%	13.6	16.0	20.9	12.6	16.7	9.5	14.4	15.7
	Area	24.6	11.4	1.7	17.7	16.7	27.8	104.1	0.5
	%	15.5	9.7	19.3	36.2	17.1	24.3	20.1	11.1
	Production	28.4	14.9	2.3	14.2	9.6	17.0	536.5	5.1
Total	%	18.2	12.4	25.3	42.5	19.2	24.0	18.5	36.4
	Area	129.2	118.0	8.8	48.9	97.7	114.2	517.4	4.5
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Production	155.7	119.7	9.1	33.4	50.1	74.6	2,893.4	14.0
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: Elaborated by Direcção Provincial de Agricultura de Nampula - Serviços Provinciais de Agricultura - Sector de Aviso Prévio, 2009



In the Intermediate region where the province capital Nampula city is located, six districts (Murrupula, Nampula: Npl-District, Muecate, Meconta, Monapo, Mangovolvas) of the study area are found, and the production of cassava, maize and sorghum their accounts for 42%, 32% and 44%, respectively, of the provincial production. Further, the counties produce approximately 45% of rice, feijao and peanut each, serving as a major supplying center of food crops. Two districts (Malema, Ribaue) of the study area are located in the Interior near to Niassa province. Unlike the other regions, this region shows a higher production ratio of grain than cassava. Although the Costeria near to the port of Nacala is not included in the study area, the production area of cassava is large, and rice cultivation is practiced by many farmers in the Costeria Sur.

On the other hand, cotton which is a crop for agricultural processing is produced in every region except for the Costeria Sur (Table 3.4.4). Production sites of tobacco have been developed in the Interior region while sun flowers tend to be collectively produced in the Intermedia and the Costeria Sur.

**Table 3.4.4 Agro-Industrial Crops Production by Region**

Area:1,000 ha,Production:1,000 ton

Region		Cotton	%	Tobacco	%	Sunflowe	%	Sesame	%
Interior	Area	23.2	29.4	6.0	84.5	0.5	15.2	5.9	18.0
	Production	15.7	34.9	6.3	91.3	0.3	13.0	3.1	11.7
Intermediate	Area	28.1	35.6	1.1	15.5	1.1	33.3	17.7	54.0
	Production	24.1	53.6	0.6	8.7	1.0	43.5	17.7	67.0
Northern Coast	Area	20.4	25.8	0	0	1.6	48.5	4.2	12.8
	Production	0.2	0.4	0	0	0.1	4.4	2.7	10.2
Southern Coast	Area	7.3	9.2	0	0	0.1	3.0	5.0	15.2
	Production	5.0	11.1	0	0	0.9	39.1	2.9	11.0
Total	Area	79.0	100.0	7.1	100.0	3.3	100.0	32.8	100.0
	Production	45.0	100.0	6.9	100.0	2.3	100.0	26.4	100.0

Source: Elaborated by Direcção Provincial de Agricultura de Nampula - Serviços Provinciais de Agricultura - Sector de Aviso Prévio, 2009

## (2) Farm Household Conditions

The results of the on-the-site survey (interviewed from farmers and NGO:CLUSA) indicates that farm households are roughly divided into small-scale farmers who have more or less 1.5 ha of land and medium-size farmers who have around 10 ha, and in between there are farmers who own land of 3 to 5 ha. An overwhelming majority is held by small-scale farmers in terms of the number.

The basic form of agricultural management in the study area is based on the combination of crops for self-sufficiency such as maize and cassava and cash crops such as cotton, tobacco, soybean and cashew nut. In addition to such major crops, a variety of crops including sorghum, beans and peanut are produced. Moreover, they raise small livestock, and their

agricultural management is characterized by multiple farming of plural field crops albeit small-scale and small livestock.

It can be estimated farm household actual condition and gross agricultural income as follows.

### Type A. Cereals + Cotton + Cashew nuts + Livestock

Land holdings scale	1.5 ha					
Laabor	No. of family labor: 5~7. Employment 2 or 3person at the time of raw cotton harvest (Minimum wage 45 MT/person/day)					
Agricultural facilities	Hoe, break, shovel, agri-chemical sprayer for cotton cultivation. No use of tractor					
Crops	Maize	Cassava	Cotton	Cashew nuts	Livestock	
Clutivation area (ha)	0.4	0.3	0.7	30 – 40	Chicken10	
Average yield (ton/ha)	0.5 - 0.8	4.0 - 5.0	0.6 - 0.8	3 - 4kg/tree	Goat10	
Cropping pattern	Maize - Cassava (cultivated ground nuts and cowpea by intercropping) Sowing:Oct.-Dec., Harvest:Apr.-Jun.		Sowing:Nov-Dec. Harvest:Apr.-May	Year-round	Backyard rearing	
Profit (MT)	Unit price	3.5/kg	Self-sufficiency	8 - 9 /kg	9 - 14/kg	Chicken800-1,000
	Gross income	500	—	4,500	1,700	—
	Production cost	—	—	500 (seed,chemical, labor)	—	—
	Net income (Estimate)	6,200/year (Income varies with minimum guaranteed price for raw cotton and cashews companies purchase price)				

### Type B. Cereals + Sesame + Soy beans + Livestock (Farmer in case of by CLUSA (NGO) guidance)

Land holdings scale	5 ha					
Laabor	No. of family labor: 5~7. Employment 6-8person at the harvest time of sesame and soybeans (Minimum wage 45 MT/person/day)					
Agricultural facilities	Hoe, break, shovel, agro-chemical sprayer for cotton cultivation. Use tractor for land preparation (lease					
Crops	Maize	Cassava	Sesame	Soybeans	Livestock	
Clutivation area (ha)	0.5	0.6	1.0	1.0	Chicken10	
Average yield (ton/ha)	0.5 - 0.8	4.0 - 5.0	0.3 - 0.5	1.0 - 2.2	Goat10	
Cropping pattern	Maize - Cassava - Friol - Groundnuts - Maize - Cowpea - Cassava Harvest: Oct.-Dec , Harvest: Apr.-Jun		Sowing: May Harvest: Nov. Fallow area 1ha	Dec. Apr.- May	Backyard rearing	
Profit (MT)	Unit price	3.5/kg	Self-sufficiency	20 - 25/kg	9 - 12/kg	Chicken800-1,000
	Gross income	500	—	9,200	17,600	—
	Production cost	—	—	2,000(tractor, seed, labor)	3,000(tractor, seed, labor)	—
	Net income (Estimate)	22,300/year (Income varies by purchase price of soybean and sesame seeds processing factories)				

**Type C. Cereals + Soybeans + Tobacco + Sesame + Livestock (Farmer in case of by CLUSA (NGO) guidance)**

Land holdings scale	10 ha					
Laabor	No. of family labor: 5~7. Employment 7-10 person at the harvest time of sesame, soybeans and tobacco (Minimum wage 45 MT/person/day)					
Agricultural facilities	Hoe, break, shovel, agro-chemical sprayer for cotton cultivation. Use tractor for land preparation (lease)					
Crops	Maize	Cassava	Soy beans	Tobacco	Sesame	
Cultivation area (ha)	0.7	0.7	2.0	2.0	2.0	
Average yield (ton/ha)	0.5 - 0.8	4.0 - 5.0	1.0 - 2.2	0.3 - 0.5	0.3 - 0.5	
Cropping pattern	Maize – Cassava – Frijol - Ground nuts - Maize Harvest: Oct.-Dec., Harvest: Apr.-Jun.		Sowing: Dec. Harvest: Apr.-May Soy beans - Tobacco - Sesame Fallowland 1 ~2ha	Sep.-Oct. Jan.-Feb.	May-Jun. Nov.-Dec.	
Profit (MT)	Unit price	3.5/kg	Self-sufficinc	9 - 12/kg	28 - 30/kg	20 - 25/kg
	Gross income	500	—	35,200	23,200	18,400
	Production cost	—	—	8,000(tractor, seed, labor)	5,000(tractor, seed, labor)	4,000(tractor, seed, labor)
	Net income (Estimate)	60,300/year (Income changes a purchase price of soybean, sesame, tobacco processing factories)				

Source: JICA Study Team

The following points are pointed out as features for farm household management and production:

a) Form of agricultural practice	<ul style="list-style-type: none"> <li>Production materials of a small-scale farm are very simple with farm tools only. Plowing with farm animals is not widely used and their operations are mainly manual.</li> <li>Among middle-size farmers which have introduced plural cash crops, a rented tractor is commonly used. The rental fee is about MT1,500 per ha inclusive of an operator (MT900 in case a fuel fee is paid by a farmer).</li> </ul>
b) Production and production materials	<ul style="list-style-type: none"> <li>Shifting cultivation of burn agriculture has been traditionally practiced, and the fallow period is short (1 to 2 years).</li> <li>Fertilizer, agricultural chemicals and certified seeds are not used excluding cases where they are used for cash crops.</li> <li>In case of cotton, seeds and fertilizer are provided by a processing company, and such materials are returned after harvesting.</li> <li>In producing soybeans, fertilizers are not input. Seeds are lent from a feedstuff company or CLUSA (Cooperative League of USA), and the farm returns the volume which includes an additional 20% of the original volume after harvesting.</li> <li>Fertilizer is lent from a company in case of tobacco, and seeds are free of charge.</li> <li>Farmers do not use all of the fertilizers which they borrow from agricultural processing companies and use about 40% of them to produce other food crops. The companies point out that this is responsible for low yield of material crops for processing.</li> <li>The price of fertilizer is MT2,750/50 kg if purchased in Nampula city, but it is priced at about half, MT1,000 to MT1,500 per 50 kg in Malawi.</li> </ul>
c) Distribution	<ul style="list-style-type: none"> <li>Crops shipped to markets of those for human consumption are vegetables, and maize and beans of surplus production. Such crops are sold to distributors in many cases.</li> <li>Distribution route is a simple form of transportation by a trader from a field of a farmer to Nampula markets and resale to retailers.</li> <li>All cash crops are picked up by trucks of companies and directly delivered to processing facilities near-by. Soybeans are mainly shipped for foodstuff enterprises in Tete and Maputo provinces.</li> </ul>

	<ul style="list-style-type: none"> <li>• Tobacco prices purchased by companies have been on the decrease in recent years. However, tobacco is popular among farmers because cultivation period is short and they can turn their crops into cash at the earliest.</li> <li>• Cotton is produced in accordance with a contract of the concession method. Because of this, companies can purchase materials only from the farmers within fixed regions. As a result, some companies find it difficult to ensure quantity and quality of materials, becoming one of the factors of declining operation rate at factories (average annual operation rate is 40%).</li> <li>• Farm households now have a wider range of choice for crop production for companies though they did not have a choice but cotton before. More farmers sow a crop in consideration of the trend of the price which the company quotes.</li> </ul>
Others	<ul style="list-style-type: none"> <li>• The study area includes farm households that are exceptionally as large as 50 ha or 100 ha. Such farmers have expanded their management scale independently, but we should not ignore that there are policy measures such as to provide a tractor with a low interest rate granted by the provincial government.</li> <li>• In areas where irrigating with water source of rain is possible, even some small-scale farmers try to produce vegetables, but this trial is conducted through the support by NGOs rather than their independent efforts.</li> </ul>

### 3.4.5. Inland Water Fisheries

Inland water fisheries (freshwater fish cultivation) are done aiming at securing and sales of farmer's main protein source. Inland water fisheries pond are distributed 425 in Nampula province, and is cultivating it actually sooner or later reaches 400 households now (Table 3.4.5). It's cultivated extensively at a district in an inland area near provincial capital Nampula and a heavy rainfall district such as Rapale, Murrupula, Malema and Mecuburi.

**Table 3.4.5 Number of Inland Water Fisheries Households and Ponds**

Districts	Number of fisheries ponds					Number of fishereis households				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Angoche	8	-	8	-	1	-	-	8	8	7
Eráti	10	17	14	5	4	9	7	6	7	10
Lalaua	56	10	54	13	18	15	11	39	11	39
Mecuburi	78	10	106	9	20	26	10	76	10	42
Meconta	51	20	75	50	23	21	20	20	20	40
Malema	70	55	59	62	67	12	45	44	45	59
Muecate	27	-	23	-	28	8	-	9	-	12
Murrupula	59	199	103	105	135	84	86	23	86	61
Memba	0	3	0	1	1	-	-	0	-	3
Monapo	21	-	24	10	12	21	-	14	-	15
Mossuril	0	-	0	1	2	-	-	0	-	3
Mogincual	2	5	-	5	5	2	5	0	5	7
Mogovolas	2	10	47	23	17	2	10	27	10	19
Moma	10	9	12	12	10	4	-	7	-	13
Nacala-a-Velha	10	-	-	2	5	-	-	-	-	17
Nacala Porto	0	-	-	1	1	-	-	-	-	2
Ilha de Moç	0	-	-	1	1	-	-	-	-	2
Rapale	36	53	40	38	57	36	88	29	88	23
Ribaué	50	9	-	2	4	14	7	9	7	14
Nampula city	-	-	3	10	14	-	-	3	-	12
Total	499	400	603	350	425	254	289	311	289	400

Source: BALANÇO QUINQUENAL DA AGRICULTURA, 2003 A 2007

### 3.4.6. Livestock

Beef and chicken are main products for meat production in Nampula province. Chicken is raised for self-sufficiency though it's small number in addition to the beef, the pork and Hircine at a small-scale farmhouse. As mentioned in Table 3.3.1 beef production is mainly depends on large scale livestock farmers which is shared about 22% regional GDP in Nampula province. However, as shown in Table 3.4.6, in beef, it's done, and, processing sale is only 22 tons. Number of cattle heads is unclear because of there is no data.

A small-scale farmer produces chicken for self-support, and most of the production is chosen as an enterprise. The production of the chicken is showing annual average 87% and remarkable increase in 5 years recently (Table 3.4.6).

**Table 3.4.6 Animal Production Trend**

	Production (ton)					Decreased /increased (%)
	2004	2005	2006	2007	2008	
1. Small-scale farmers						
Beef	81.8	56.9	161.3	190.4	150.8	37.6
pork	43.8	28.0	18.4	69.9	30.0	38.1
Hircine/sheep	52.9	43.0	59.6	111.3	130	30.9
Sub-total	178.5	127.9	239.3	371.6	310.8	24.4
2. Large scale farmers/enterprise						
Beef	82.8	38.3	25.4	11.9	22.1	-13.7
Chicken	98.4	240.4	505.2	741.7	1,057.3	86.0
Sub-total	181.2	278.7	530.6	753.6	1,079.4	57.4
Total	359.7	406.6	769.9	1,125.2	1,390.2	43.0

Source: BALANÇO QUINQUENAL DA AGRICULTURA, 2003 A 2007

### 3.4.7. Forestry Production

Change in forestry production during for 5 years of these days is indicated in Table 3.4.7. There is most production of the log by forestry, and most is in the province of the original material after felling, and shipment (mainly, export for China) is done. The production of the log (including part processing) becomes increased close to 5 times with 42,000m<sup>3</sup> in 2008 from about 9000 m<sup>3</sup> in 2004.

Each district of Mecuburi, Muecate and Monapo which are a main forested land is an area with a lot of forest felling by an enterprise, and necessity of large-scale forestation after felling is pointed out. 32% of all homes in Nampula province is felled by a resident disorderly by for formation and an sales goal because it's still dependent on a wood for fuel, and it's said to be a primary cause of environmental degradation.

**Table 3.4.7 Forestry Production Trend**

	2004	2005	2006	2007	2008
Log (M <sup>3</sup> )	7,626	7,851	11,325	11,165	10,882
Log(part processing) (M <sup>3</sup> )	1,316	1055	1,971	2,432	31,413
Wood(ton)	3,901	1,028	3,727	3,286	2,106
Bamboo(ton)	2,402	469	3,128	3,947	2,662
Stake(ton)	317	2,075	3,439	3,438	921

Source: BALANÇO QUINQUENAL DA AGRICULTURA, 2003 A 200

### 3.4.8. Irrigation

#### (1) Irrigation Development Policy

In Mozambique, only 3% of the cultivation area is irrigated at present. In order to transfer the traditional cultivation which is facing the fair of drought and flooding, to productive and competitive agriculture, it is urgently required to extend the irrigation development.

According to the National Irrigation Policy and Implementation Strategy which were adopted in 2002, the irrigation development shall be implemented based on the following 4 concepts: 1) water resources, although renewable, are not inexhaustible and therefore it is necessary to manage, control and preserve them strictly, 2) water is an economic resource, which deserves an appropriate economic and social value, 3) water and irrigated land are public assets whose use has to depend on licenses, 4) the hydrographic basin is a geographical water management unit for hydro-agricultural purposes which have to abide by ordinations established in the basin water use plans. Based on these basic concepts, the following activities shall be implemented; ensuring integrated water management for multiple purposes in agriculture and rural development; i) promoting irrigated agriculture and the respective research, adaptation and adequacy of appropriate technologies, particularly empowering the development of irrigation systems for the family sector so as to transform agricultural production (preponderantly subsistence) to one that is gradually integrated in the market; ii) promoting and fostering the entrepreneurial sector in irrigated agriculture, including small, medium and large enterprises; iii) activating the development of the irrigation potential in Mozambique through the promotion of new irrigation systems, of medium and large scale; iv) establishing technical and financial mechanisms to prevent and mitigate the occurrences and the impact of cyclic droughts; v) promoting decentralization and fostering a greater participation of the beneficiaries, communities and the local authorities in the integrated water resources management as well as in the management and operation of infrastructures; and vi) acknowledging the role of women in agriculture, creating a stimulus for their economic and social affirmation through their participation as beneficiaries of irrigated agriculture.

Corresponding to national water policy, the water in the each water basin, as a economic capital, shall be appropriately distributed to relevant sectors and managed by the integrated and participated by all stakeholders. Increase irrigation efficiency and sustainable operation and maintenance of irrigation system shall be achieved or implemented by the water users association after transfer the authorities by the Government.

## **(2) Irrigation in the Study Area**

The Study Area locates on the foot of mountains of watershed. Even though the annual precipitation is more than 1,000 mm/year, the small catchment areas cannot supply the sufficient irrigation water in the Study Area. Small drainages/rivers in the study Area flush the flood water in the raining season and moat of the dry-up in the dry season. Under these hydrological conditions, several small scale irrigation systems were installed and irrigated by progressive farmers/groupers in the Study Area.

According to the Irrigation Inventory survey (Levantamento dos Regadios Existentes no País) conducted by the Fund for Irrigated Agriculture Development (Fundo para o Desenvolvimento da Hidráulica Agrícola) in 2001, irrigable areas of 6389 ha, 19647 ha and 92084 ha under the small scale (less 50 ha), medium scale (50ha – 500ha) and large scale (more than 500ha) were irrigated. And totally 755ha in 9 districts among 12 districts in the Study Area were irrigated, but actually irrigated area was estimated at 300 ha. There is no inventory survey on the irrigation after 2001.

According to the Agricultural Department of Nampula province, there are 54 small scale irrigation schemes planned, among them, 14 schemes were completed the construction or rehabilitation. These construction or rehabilitation work are conducted by the provincial government budget as a part of the improvement of productivity of PAPA. Some schemes is implemented under the district development funds (FDD). After the appraisal of request of farmers, all costs are covered by the government budgets fro survey/design to construction, applicant farmers provide their labor during the construction without payment, and responsible to operation and maintenance after construction. In parallel with government support on irrigation schemes, many NGO and Funds support the farmers to install irrigation as a part of agricultural or rural development programs.

In the Study Area Small/medium irrigation schemes are located at the foot of inselbergs with small catchment areas with fragile intake structures against the flow of debris by strong storms. Not only the valuable vegetables but also grains such as maize are irrigated as supplemental. Operation and maintenance conducted by farm workers or water users associations. Water users associations are not registered, sometimes members of association do not know the number of association, and it is possible say there are not functioning as a association. Irrigation system of medium scale farms seems more properly maintained because of they recognized the importance of irrigation.

According to the regulations on the water fee for irrigation, it is required to register the water use and pay the water based on the price and payment method set by Regional Water Administration. In the Study Area no beneficiaries of irrigation pays any water fee, because of their financial capacities and lack of awareness.

### 3.5. Price of Agricultural Products and Value Chain

#### 3.5.1. Price Trend of Major Crops

Peanut has the highest ratio with 30% among the crops that are produced for markets of edible crops in the study area, followed by maize at 21% (Table 3.5.1). Compared to other provinces, the rates of the two crops are lower by nearly 20%. This is attributable to the clear segregation of the production between self-sufficient crops (edible crops) and cash crops in the study area compared to other provinces.

**Table 3.5.1 Shipment Percentage for Markets by Crops (%)**

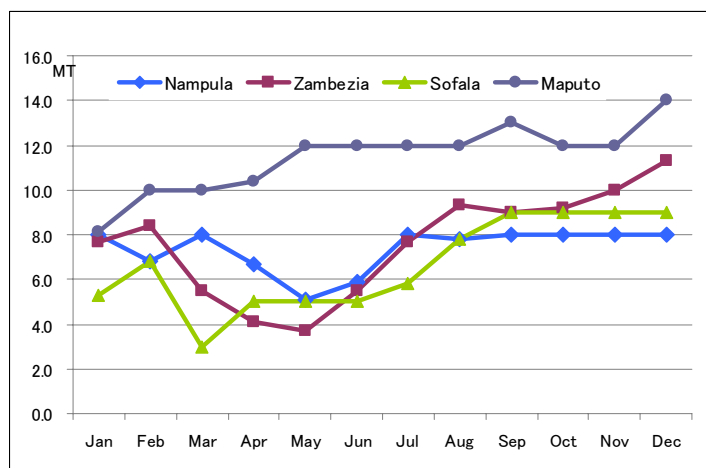
	2002	2003	2005	2006	2007
Maize	26	23	22	22	21
Rice	10	16	11	17	13
Cassava	5	5	5	5	5
Sorghum	3	6	5	5	4
Ground nuts	25	24	25	27	30
Cowpea	8	11	9	9	10

Source: Elaborated by TIA survey information, Ministry of Agriculture, 2007

Retail price of maize with relatively high rate to be shipped to markets begins to increase in around June when the off-crop season (the cultivation period of rainy season) starts and to decline in March when the harvest ends and shipping starts (Fig. 3.5.1). The similar price movement as described above is seen in the domestic main product areas of Zambesia and Sofala.

Meanwhile, in Maputo, the largest consumption market in Mozambique, the retail price of maize maintains above MT12/kg even in May when shipments to markets increase (harvesting and shipment periods of the dry season), which suggests that it is a stable market throughout the year. The similar price trend is seen in other edible crops except for wheat which is dependent on import.





Source: Elaborated by Preco Medio Mensual de Cereais, 2008, MIC

**Figure 3.5.1 Retail Price Trend of Maize**

### 3.5.2. Value Chain (increased value-added by marketing stage)

In the study area, a value chain has been formed centering on crops for agricultural processing such as cashew nut, cotton and tobacco. The material price of cotton increases threefold to \$1.2/kg by processing it for export (lint) from \$0.4/kg, creating value added worth \$0.8/kg. Sesame is among the crops with the lowest value added rate because it is exported in the raw. Soybeans generate soybean oil and soybean waste by oil expression, but the survey this time have not provided data related to this (Table 3.5.2).

The price in a case food crop, maize, is milled reaches \$0.9/kg, far exceeding the retail price of \$0.3/kg in a case it is sold in the raw. It suggests that a higher profitability is possible by working together with the agricultural processing industry even in edible crops.

**Table 3.5.2 Estimated Value-added by Marketing Stage**

	Maize	Cotton	Cashew nuts	Sesame	Tobacco	Soy beans
Farmgate 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

Note: FOB price at Nacala port

## **3.6. Agro-Processing**

### **3.6.1. Existing Agro-Processing Enterprises**

The registered companies in the study area amount to about 1,800. Eighty (80) percent of the registered companies are accounted for by service companies such as small-scale shops and hotels, of which companies related to the agricultural processing sector counting around 200. As the study area is a leading agricultural area in the country, it is highly expected as a supply center for processing raw materials.

The situation of enterprises in the agricultural processing field which have entered into Nampula Province in these six years (Table 3.6.1), already mentioned (section 3.5) the number of cashew nut processing firms which have created the highest value added in the value chain is particularly striking.

The enterprises that began operations there recently are characterized by the points described below:

- (1) Most of the foreign companies entered in Mozambique manufacture their products for export because the domestic and provincial markets are narrow.
- (2) Recently, some processing companies have started operations in a new processing sector such as cold chicken, soybean and sesame in addition to the traditional processing such as cotton and cashew nuts.
- (3) Milling and processing of cassava and corn as well as the new nation's processing sector described above are mostly for domestic market limited to the northern area and have a strong feature of alternate production of imported goods.
- (4) The investment size of the enterprises varies from \$10 thousand to \$24 million, and such enterprises are mostly comprised of small and mid-sized firms.

**Table 3.6.1 Existing Agro-Processing Enterprises in Nampula Province**

Investment: 1,000 US\$

Year	Enterprises	Products	District	Investment Size	Employment
2002	Liupotur Mocambique	Agriculture	Mogimcual	60	30
	Atsncom, TS	Agriculture	Malema	980	197
	Mocambique	Agriculture	Nampula	50	36
	GEIT	Poultry	Nampula	1,132	20
	AFRICAJU	Cashew nuts	Mogimcual	144	120
2003	Unagi Mocambique	Agriculture	Nacala	20,000	470
	Maderiras de Memba	Agriculture	Memba	491	10
	Moma Caju	Cashew nut	Moma	187	60
	Sanam Oil Industries	Edible oil	Monapo	1,500	107
2004	TRANSALT	Salt	Nacala	1	45
	Condor Caju-Agr. Industrias	Cashew nut	Nacala	1,057	250
	Mauricaju	Cashew nut	Mogovolas	75	103
2005	New Horizons Mocambique	Poultry	Nampula	1,374	50
	Remodelacao da Fabrica CIM	Milling	Manapo	1,200	138
	Atja Nuts	Cashew nut	Meconta	376	104
2006	CCA-Sisal	Sisal hemp	Angoche	5,800	700
	Unidade Proc. Castanha Caju	Cashew nut	Nacala	404	155
2007	Caju Itha	Cashew nut	Iiha	920	700
	Cister Mocambique	Agriculture	Nampula	50	24
	Nova Texmoqued	Lint	Nampula	24,000	450

Source: Elaborated by CPI information, 2008 and JICA Economic corridor development project formulation study report, 2008

### 3.6.2. Condition of Agro-Processing Enterprise Operation

Table summarizes the major agro-processing enterprises conducted interviews shown in 3.6.2. Common feature on most of these processing enterprises operating in the following points to be raised.

- (1) The operating ratio of the facilities at most of the processing enterprise is as low as 40% to 60% against the manufacturing capacity.
- (2) Lack of raw materials for processing is a common reason for declining operating ratio. In case of cotton mill manufacturers (ginning) in particular, procuring materials is a constant obstacle in operations because they cannot collect materials for processing only within a limited scope due to the concession method.
- (3) Sellers appear to be dominant in cotton and tobacco markets. This is because processing companies have been diversified in recent years and farmers tend to change to other crops next year if the procurement price paid by a firm is low.
- (4) As for cashew nuts, commercial farms tend to have a weaker consciousness for price compared to annual crops such as cotton and tobacco because there are many commercial farms for the product, with 250,000 in Nampula Province only

(approximately one third of all the commercial farms) and because of a perennial crop, and companies or buyers appear to be dominant.

- (5) International price changes affect the profitability of many companies. They expect an increase in yield by lending seeds and fertilizers. However, farms use the fertilizer for other crops, which makes difficult for the companies to secure the expected yield. In case of tobacco and cotton production, a company lends 200 kg of fertilizer to a farm, while the actual volume of fertilizer applied is estimated to be 15% (20 kg to 30 kg) by the enterprises. They regard this as one reason for deterioration of corporate profit caused by declining productivity.
- (6) Most of agricultural processing enterprises are in the primary processing level or the middle level between the primary and secondary processing (yarn-making, cotton seed oil, assorted feed, dried leave tobacco). There are no company which has enhanced the processing degree to the second or the third processing.
- (7) It is pointed out that this is caused by the situation where all of the related materials such as packages for packing or casing products, or bottles are dependent on importation, and so the higher the processing degree becomes the more the related materials are imported, resulting in an increase in cost of the final product and hurting earnings.
- (8) Fundamental infrastructure such as electricity, water and roads is not completely equipped. In particular, frequent blackouts lower the operating ratio. Each agricultural processing company is equipped with an in-house power generation. But the energy cost is pointed out to be a major factor which raises operational cost except for processing materials.

In addition to the processing by companies mentioned above, upgrading value added by making cassava which is boasting the largest production volume in the country into flour (gali) and using it as complementary goods of bread, or by flouring and processing corn, are attracting the attention in the surveyed area. Improving the nutrition of farmers and increasing their incomes through promoting villages due to simple processing explained above are considered by the provincial government.

Table 3.6.2 Operation Conditions of Processing (1)

Enterprise	Yogurt Company (Foundation 1995)	New Horizon Industry (Foundation 2005)								
1.Location	Suburbs of Nampula city	Nampula city								
2.Capital	Mozambique	Zimbabwe								
3.Investment	Property (vertical)	Joint (horizontal)								
4.Capital Amount	—	US\$1,374,890								
5.Products/ Production	-Yogurt: 160,000 L/year	-Chick 45,000/week, - Broiler 15,000/week -Compound feeds 120 ton/week								
6.Raw materials	- Milk powder for the processing depends on the import from South Africa -100 cows are bred in 144ha at own farm - 16,000kg (2008)	- Chick and compound feed are in-house production								
1)Processing		-Hach chickens in own - Breeding of the chicken is consigned to the farmer within 20 km in the radius (890 farmers, 1,250 chicken per farmers)								
2)Shipment	-Direct shipment to Nampula city -Trust with transporter to other city	-Trust with transporter								
3)Quality	—	—								
4)Stability	- Power failure frequently at the dry season -Washing work and the frozen storing damage occur by this influence	-Decrease in productivity by low degree of lack of fodder raw material for breeding and farmer's chicken breeding technologies								
7.Processing/labor	-Employment: Factory 16, Farm 9	-Factory employment: 186								
1)Wage	-Minimum wage + Extra allowance	—								
2)Cost	-The package for wrapping imports it from whole quantity South Africa. A high cost is generated because the capital machine parts for other processing also depends on the import for 90%. -Estimated that it is possible to decrease by 60% more than production cost of current state when yogurt raw material is supplied by operating directly.	- Compound feed of 1.9 kg necessary for the chicken production of 1 kg. -The chicken for the processing is low and the utilization rates of facilities or more is low dissatisfied with 30%.								
3)Management(KI)	-Labour intensive	-Capital intensive								
4)Energy	-Clean water facilities (underground water) for the own generation of electricity and the processing will be prepared	—								
8.Market	-Nampula, Carbo Delgado, Niassa -Transportation cost 5,000 MT/truck - The cost increases by 60% at the airlift -Polyethylene container	-Northern region: Nampula, Niassa, Carbo Del. -Alternate production of imported chicken -Vinyl packing (10 kg) in a case								
1)Shipment		—								
2)Market share	-65% of Niassa, Carbo Del., Zambejia									
3)Price	<table border="1"> <thead> <tr> <th>Shipment (MT)</th> <th>Retail (MT)</th> </tr> </thead> <tbody> <tr> <td>175mmL :</td> <td>14.0      20.0</td> </tr> <tr> <td>330mmL :</td> <td>17.5      25.0</td> </tr> <tr> <td>500mmL :</td> <td>17.5      25.0</td> </tr> </tbody> </table>	Shipment (MT)	Retail (MT)	175mmL :	14.0      20.0	330mmL :	17.5      25.0	500mmL :	17.5      25.0	-Chicken: 80 MT/kg -Compound: 870 MT/50kg
Shipment (MT)	Retail (MT)									
175mmL :	14.0      20.0									
330mmL :	17.5      25.0									
500mmL :	17.5      25.0									
4)Export	-Intension to export	-Intension to export								
9. Issues of export competitive	- Stable system of power supply -Self-support of raw material for processing -Financial support for revolving fund and the capital machine parts purchase -Extension of global standard knowledge such as ISO and HACCP.	-Lack of raw material (poultry farming) for processing -Lack of maize used for animal feed and soybean dregs -Low-cost processing technology								

Table 3.6.2 Operation Conditions of Processing (2)

Enterprise	SONIL-FABRICA DE TABACCO MALEMA (Foundation middle of 1980)	CONDORNUTS (Operation 2009)
1.Location	Nampula: Malema district	Nampula: Malema district
2.Capital	Portugal +Mozambique	Portugal
3.Investment	Property (vertical)	Property (vertical)
4.Capital Amount	—	—
5.Products/ Production	-Dry tobacco leaf -2,000ton/year (2008) -Capacity: 5,000ton/year	-Cashew nuts -4,000ton/year
6.Raw materials		
1)Processing	-2,000 ton - Consignment contract cultivation method (a part of field of operating directly) with farmer.	-Purchase:4,000~6,000 ton/year -Average purchase price:9~12 MT/kg (depends on shape and size of cashew, and market price)
2)Shipment	-Fertilizer, the seed, and agricultural chemicals are loaned the contract farmer -Consignment contract cultivation farmer: 2,500 (2008) and 1,500 (2009)	-Purchase directly around the farmer in mainly in Nampul, and Cabo Delgado, Zambezia,Sofara)
3)Quality	-Technical transfer provided to consignment contract cultivation farmer by 150 engineers who belong exclusively to factory	-For good quality control separately to 26 kinds at the selection stage -White, big Cashew nuts become high-quality.
4)Stability	-The consignment farmer uses only the loaned 15% of fertilizer 200kg (about 20-30kg), and turns it on to other crops production. Therefore, expected yield is low, and it influences the quality. -Farmer field 1ha is made division into four (0.25ha), and it grows it. Cropping density: 6,666/ha	-Factory will buy the raw material that can be operated for one year in Oc. – Jan (warehouse that has the storing ability of 6,000 tons). -Lot of absence without permission. - Raw material cost accounts for 30-35% and the labour cost 20-30%.
7.Processing and labor force		
1)Wage	-Factory: 100 -Farm: 150	-Employment: 750
2)Cost	-Minimum wage (60MT/day)+allowance -Transportation: 0.15\$/kg (Malema →Malawi by truck)	-Minimum wage(60MT/day)+allowance -Transportation: Nampula → Nacala port→Rotterdam
3)Management(KL)	-Labor intensive	-Labour intensive
4)Energy	-Power failure happens frequently. Cost increase of superannuation of generator and other infrastructure.	-Power failure happens frequently. Cost increase of superannuation of generator and other infrastructure.
8.Mrket		
1)Shipment	-Export for Malawi -1,800ton (2008)、1,200ton (2009)	-Vacuum packaging and all products export to Netherlands (Rotterdam)
2)Market share	—	-Detour shipment to South Asia and Europe, -Production capacity:10,000ton (largest scale in domestic )
3)Price	—	-Un processed :500~700\$/ton -Processed: 5,000\$/ton
4)Export	-Export	-Export
9. Issues of export competitive	-Low operation rates of facilities -Increased total cost by an loan fertilizer -Difficulty of correspondence of international market price changes	-Improved packaging materials cost -Improvement technology for yield and quality of cashew nuts. -Competition with Brazil

Table3.6.2 Operation Conditions of Processing (3)

Enterprise	San Oil (Sanam Oil industries, Ltd.:GEIN Grouped), Foundation 2000	Mozabanana Lda. (Banana production, 2007)
1.Location	Nampula:Muecate district, Namialodistrict	Nampula province, Namialodistrict
2.Capital	India	Zimbabwe capital (Matanusuca co.Ltd)
3.Investment	Property (vertical)	Vertical (Technical and marketing cooperative with Chiquita company)
4.Capital Amount	10,000,000 US\$	80 million US\$
5.Products/ Production	-Cotton edible oil and oil cake (residuary substance) - 20,000ton/year (edible oil 4,000ton, residuary 16,000ton)	-Banana production and export —
6.Raw materials 1)Processing  2)Shipment  3)Quality  4)Stability	Farm:5,000ha (yield 600kg/ha, no used fertilize and chemical, low yield) Consignment cultivation with 30,000farmers(Loan of seed and fertilizer) Purchase of part from each province farmer of Cabo Delgado, Zambezia, and Sofara Purchase price: 8MT/kg Not only raw cotton but also squeezing oil from the soybean and the pinder is possible facilities.  The content of the operation of facilities can be changed, and be adjusted according to the harvest time of raw cotton, the soybean, and the pinder. The improvement of the facilities utilization rates is attempted by such correspondence.	<ul style="list-style-type: none"> <li>• Total area 4,000ha、Planting area 3,000ha</li> <li>• Full scale production beginning in 2011</li> <li>• Cultivation area is expanded on 20-30ha scale every week.</li> <li>• Direct shipment to exporting country (Ship from the Nacara port with 20 owned containers).</li> <li>• Irrigation system is prepared for planting, respects of cultivation management through observance at production such as management of homemade seedling, and execution of proper fertilizer balance, etc.</li> <li>• Cultivation management guidance by Chiquita company: Brazil and establishment of system of guidance that banana plantation in Colombia, Costa Rica, and Panama, etc. depends by six management management specialists</li> </ul>
7.Processing and 1) labor force 2)Wage 3)Cost 4)Management(KL) 5)Energy	-1,000 -Minimum wage allowance — — -Power failure happens frequently. Cost increase of superannuation of generator and other infrastructure.	- - - - -
8.Mrket 1)Shipment  2)Market share 3)Price  4)Export	Edible oil: Domestic market Residuary substance: Nampula → Nacala port→South Africa — Edible oil: 20MT/L Export for South Africa(Residuary substance) : 80~100\$/ton Residuary substance	<ul style="list-style-type: none"> <li>• Europe(Italy, Greek, east Europe, Middle east)</li> <li>-</li> <li>-</li> <li>• Export to Europe needs 25 days from Latin America, but it becomes possible by 5 days from Nacala port and enables to reduce the cost substantially.</li> </ul>
9. Issues of export competitive	- Operation rates is lower than the plant sizes - There is no supply destination of the squeezing dregs that are end-products because of a domestic meat demand (Purchase is difficult because of a low income) little, and the factor of the operation decrease.	<ul style="list-style-type: none"> <li>• An immediate measure is necessary because the Nacala port which is an export port is narrow.</li> <li>• Maintenance in a road and an export port is indispensable for the advance by which an immediate measure is a large-scale enterprise</li> <li>• Recognition of CSR and introduction are needed.</li> </ul>

Note: [-] in the table shows that the answer from the enterprise was not obtained.